



3 June 2016

MOUNT POLLEY MINE TAILINGS STORAGE FACILITY, PERIMETER EMBANKMENT BREACH

Update Report: Post-Event Environmental Impact Assessment Report

Submitted to:

Mount Polley Mining Corporation
P.O. Box 12
Likely, BC
V0L 1N0

REPORT



Report Number: 1411734-124-R-Rev0-10000

Distribution:

1 e-copy - Mount Polley Mining Corporation
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1.0 INTRODUCTION

On August 4, 2014, the failure of a glacial lacustrine layer beneath the Perimeter Embankment of the Tailings Storage Facility (TSF) at the Mount Polley Mine, British Columbia caused a breach of the embankment and resulted in the release of construction materials, water and tailings from the TSF to Polley Lake, Hazeltine Creek and Quesnel Lake. The BC Ministry of Environment (MoE) issued a Pollution Abatement Order (PAO) with the requirement to initiate monitoring with the end goal of producing a Post-Event Environmental Impact Assessment. The objective of the impact assessment was to provide an assessment of the physical, chemical, and biological impacts of the tailings spill on terrestrial and aquatic environments.

Mount Polley Mining Corporation (MPMC) immediately developed a Rehabilitation and Remediation Strategy (the "Strategy") framework to guide rehabilitation of terrestrial and aquatic environments (Figure 1). Following this framework, MPMC began work to stabilize and contain the tailings, initiated scientific studies to identify the impacts of the tailings spill on the terrestrial and aquatic environments, and began developing strategies to rehabilitate the terrestrial and aquatic environments impacted. The first edition of the Post-Event Environmental Impact Assessment Report (PEEIAR, MPMC 2015) focused on the findings from studies conducted during the first six to eight months following the tailings spill. Post-event monitoring continued and this edition of the PEEIAR provides an update to the initial findings, with a focus on the findings from the next ten months (from March to December 2015). This edition of the PEEIAR marks completion of Phase 2 of the Strategy; the information collected from both impact assessment reports will feed into the Detailed Site Investigation and Risk Assessment and development of Remediation Options. These reports will focus on identifying the significance of contaminants from the tailings spill to human health and ecological receptors. Uncertainties identified following these investigations will be taken into consideration in MPMC's Comprehensive Environmental Monitoring Plan (CEMP). The CEMP is required under *Environmental Management Act* Permit 11678 and an assessment of impacts will be provided in the Human Health and Ecological Risk Assessment (HHERA).

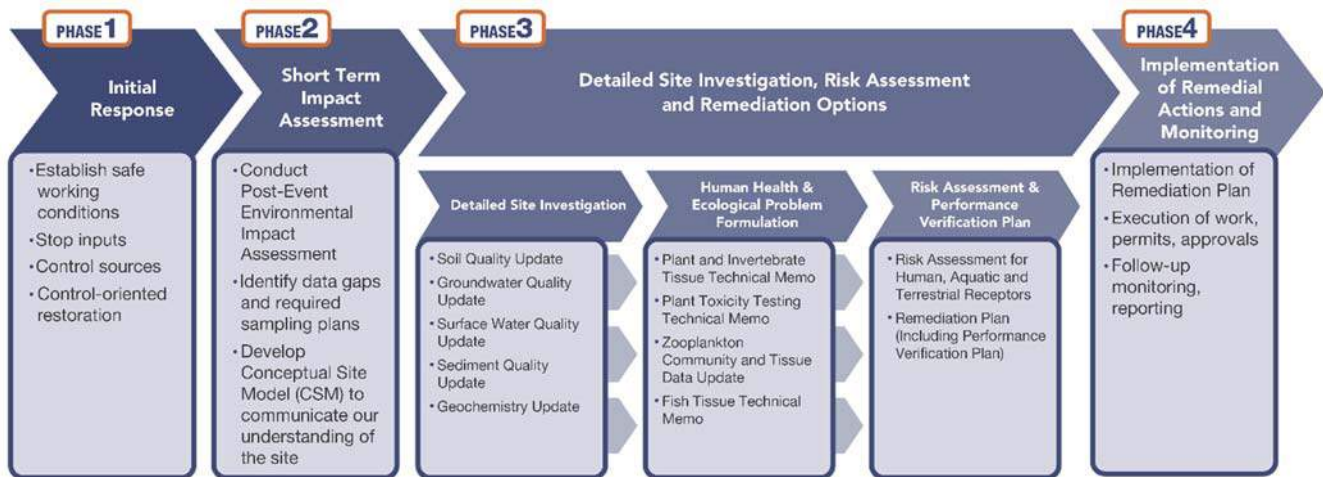


Figure 1: Rehabilitation and Remediation Strategy.



1.1 Organization of this Report

This PEEIAR is a compilation of the scientific studies that have been conducted follow the tailings spill, with particular focus on the findings from the time period between March and December 2015. A comprehensive reporting of the data collected between August 2014 and March 2015 is included in the first version of the PEEIAR (submitted to MoE in June, 2015). Readers are encouraged to review the contents of the June, 2015 report for more detail on the data collected in the first eight months following the spill.

The studies of this PEEIAR update are organized into Technical Appendices based on subject matter. Ahead of the Technical Appendices a summary of findings, by rehabilitation area, is provided (Section 3.0). The rehabilitation areas are shown on Figure 2, below. The information provided in the summary of findings is considered a high level synopsis of the significant findings from the many scientific studies conducted in response to the tailings spill. Readers are encouraged to review the Technical Appendices for detailed methods, results, figures, tables, discussion, conclusions, and references.

In this report, the term parameter of interest (POI) is used to be consistent with terminology commonly used in Environmental Assessments. The terminology, contaminant of potential concern (COPC) is used in work conducted under the CSR. For the purposes of this report, these terms are used interchangeably.

The Technical Appendices include the following scientific studies:

■ Appendix A – Geochemical Characterization

- SRK Consulting. *Mount Polley Mine Tailings Dam Failure: Update on Geochemical Characterization of Spilled Tailings.*

■ Appendix B – Soil Quality

- Golder Associates Ltd. *Factual Report for Soil Investigation, Hazeltine Creek Floodplain.*

■ Appendix C – Groundwater Quality

- Golder Associates Ltd. *Factual Data Report on Groundwater Quality, Hazeltine Creek Floodplain, August 2015.*

■ Appendix D – Surface Water Quality

- Golder Associates Ltd. *Mount Polley Surface Water Quality Impact Assessment Update, March to August 2015.*
- Golder Associates Ltd. *Addendum to Mount Polley Surface Water Quality Impact Assessment Update.*
- Minnow Environmental Inc. *Results of Diffusive Gradients in Thin Films Device Deployment – August to October 2015.*

■ Appendix E – Sediment Quality

- Minnow Environmental Inc. *Sediment Quality Data Report – August 2015 Collections.*



- Minnow Environmental Inc. *Application of the SEM-AVS Method and Selective Extraction Analysis in Evaluating Sediments Collected in the Vicinity of Mount Polley Mine – August 2015.*

■ **Appendix F – Aquatic Toxicology**

- Minnow Environmental Inc. *Investigation of the Influence of Sediment Physical Characteristics on Sediment Toxicity Test Results.*
- Minnow Environmental Inc. *Summary and Interpretation of Water Toxicity Tests (August to September 2014).*
- Minnow Environmental Inc. *Summary and Interpretation of Water Toxicity Tests (Nov 2014 to Apr 2015).*
- Golder Associates Ltd. *Update on Post-event Aquatic Toxicity Testing – March to November 2015.*

■ **Appendix G – Lake Productivity and Lower Trophic Tissue Metal Analysis**

- Minnow Environmental Inc. *Chemical Analysis of Benthic Invertebrates Collected in the Vicinity of the Mount Polley Mine – August 2015.*
- Golder Associates Ltd. *Quesnel and Polley Lakes 2015 Plankton Update Report.*
- Golder Associates Ltd. *Mount Polley Mine – Update of Quesnel and Polley Lakes Productivity Assessment.*

■ **Appendix H – Fish Tissue Metal Analysis**

- Golder Associates Ltd. *Summary of Available Fish Tissue Chemistry Data (2014-2015) for Assessment of Potential Changes in Concentrations related to the Mount Polley Tailings Storage Facility Dam Failure.*
- ALS Environmental. *Summary of Selenium in Tissue Data Verification for Mount Polley Mining Corporation Frypan Gonad Tissue Samples – ALS Work Order L1621080 – ALS Corrective Action Report (CAR) #143968.*

■ **Appendix I – Terrestrial Ecosystem Assessment**

- Golder Associates Ltd. and University of British Columbia. *Terrestrial Ecosystem Assessment of Hazeltine Creek Halo*

■ **Appendix J – Terrestrial Plant and Invertebrate Tissue Metal Analysis**

- Golder Associates Ltd. *Terrestrial Vegetation Data Report.*
- Golder Associates Ltd. *Terrestrial Invertebrate Tissue Data Report.*

■ **Appendix K – Evaluation of the Mercury Biomagnification Potential in Quesnel and Polley Lakes**

- Golder Associates Ltd. *Review of Mercury Data in Quesnel Lake and Polley Lake.*



2.0 BACKGROUND

As described in the PEEIAR (MPMC 2015), the tailings spill resulted in a complex debris flow extending down Hazeltine Creek to Quesnel Lake, a distance of 9.4 km. The estimated amount of material (water, tailings, and construction materials) released was approximately 25 Mm³. The majority of the material released was water. The release occurred as a sequence of surges, initially as debris flow scouring out native soil and vegetation, followed by debris floods depositing tailings fines in the floodplain and the surrounding forest.

The tailings spill resulted in a thick (~2-3 m) deposit of tailings in the area referred to as the Polley Plug. The debris flow eroded Upper Hazeltine Creek resulting in a wider and deeper channel, which in turn created over steepened, unstable slopes adjacent to the Hazeltine Creek channel. Within the Hazeltine Creek Canyon, the channel was eroded down to bedrock with subsequent deposits of only thin, isolated layers of tailings. Within Lower Hazeltine Creek, the floodplain was eroded, and tailings and native material (mixed tailings) were deposited. The lower reach of Edney Creek was affected by scour and deposition from the debris flow. At the confluence of these two creeks, the Edney Creek channel was scoured resulting in a drop of approximately 2 metres in elevation providing a barrier to the free movement of fish from Quesnel Lake to Edney Creek.

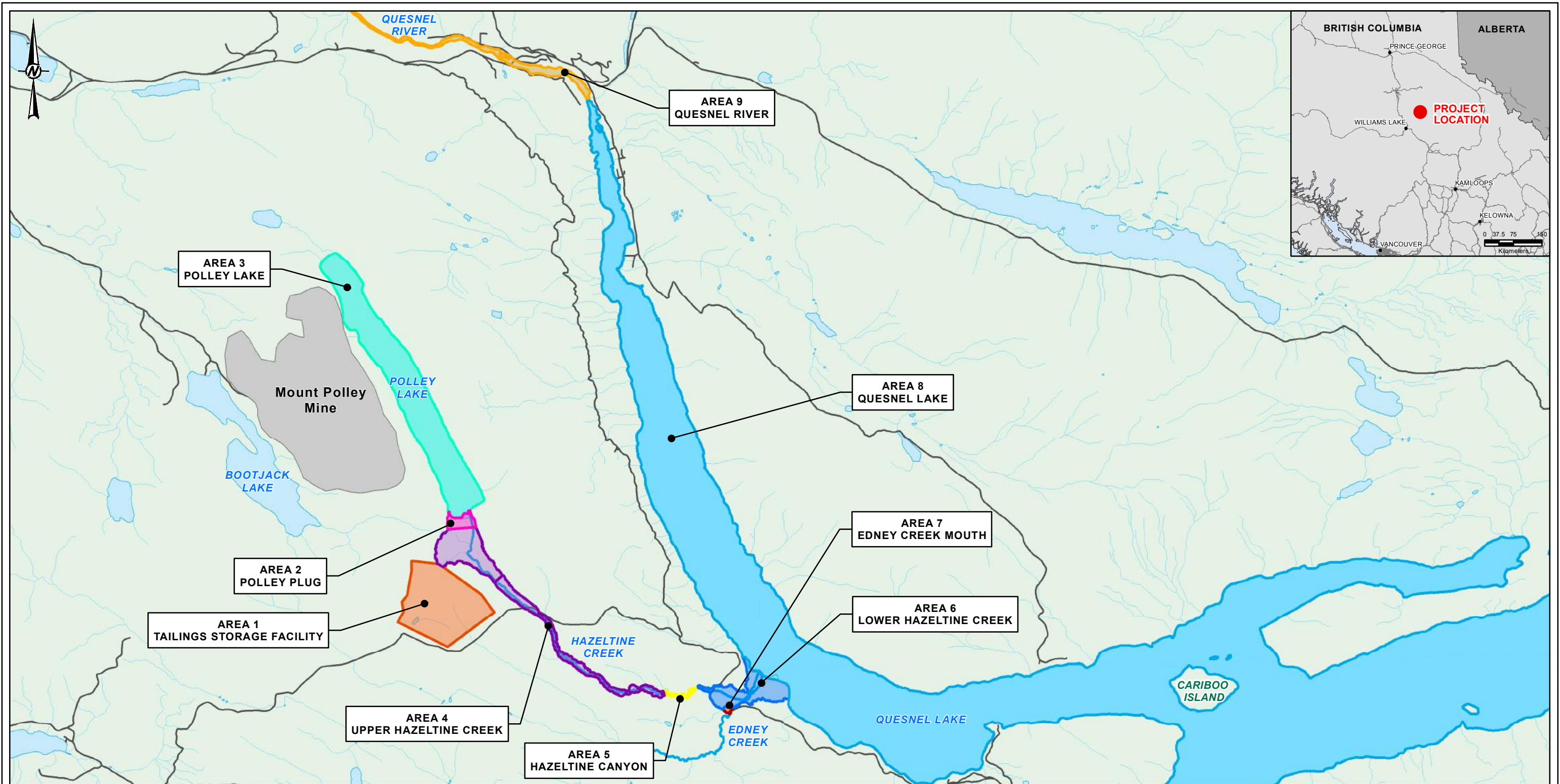
The results of chemistry studies found that the tailings and tailings-eroded native material mixture were low in organic carbon and nutrients and had concentrations of copper and, to a lesser extent, vanadium that exceeded the provincial contaminated site regulation (CSR) standards protective of soil invertebrates and plants. The geochemistry results found that the tailings were not acid-generating and had low leaching potential.

The results of monitoring the biological impacts found that the terrestrial and aquatic communities along Hazeltine Creek were lost immediately following the tailings spill. The sediment-dwelling communities in Polley Lake and in a portion of the West Basin of Quesnel Lake were covered. These effects on the local biological communities were physical and immediate. Toxicology studies using representative aquatic biota and water from Quesnel and Polley Lakes found that the more turbid samples caused an effect on one of the zooplankton test species, but that evidence did not indicate a clear metal-related toxic effect. The 2015 studies of potential toxicity to aquatic organisms from chemical exposure from spill-related related sediments deposited in Quesnel Lake were inconclusive due to the low total organic carbon (TOC) content and/or particle size differences of the tailings soil mixture compared to reference sediment. The PEEIAR assessment of biological effects to terrestrial biota, including the terrestrial riparian forest community, was limited to analysis of soil contaminants and nutrient concentrations, and mapping of areas affected by the tailings. Later studies conducted as part of the risk assessment problem formulation found that there were physical impacts to the terrestrial ecosystem where the tailings deposited on the existing forest floor (referred to as the 'halo') blocked air exchange and led to the loss of standing trees in the 'halo' area along Hazeltine Creek. However, there was no evidence for a metal-related toxic effect on the impacted trees.



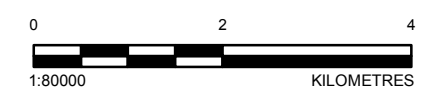
3.0 SUMMARY OF FINDINGS BY AREA

To assist in design and implementation of the Rehabilitation and Remediation Strategy, nine areas potentially affected by the tailings spill were identified (Figure 2). This was done because the different areas of impact have different characteristics, different potential for impact and different study needs. The first edition of the PEEIAR found that conditions along the length of Hazeltine Creek were similar, thus Areas 4 through 7 are treated as a single area. Area 1, the TSF, was excluded as this area is part of the operating mine.



LEGEND

1 - TAILINGS STORAGE FACILITY	MOUNT POLLEY MINE SITE
2 - POLLEY PLUG	ROAD
3 - POLLEY LAKE	WATERCOURSE
4 - UPPER HAZELTINE CREEK	WATERBODY
5 - HAZELTINE CANYON	
6 - LOWER HAZELTINE CREEK	
7 - EDNEY CREEK MOUTH	
8 - QUESNEL LAKE	
9 - QUESNEL RIVER	



REFERENCES
 1. WATERCOURSE, LAKE, ROAD, CITY AND PROVINCE DATA OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
 2. PROJECTION: NAD 1983 UTM ZONE 10

CLIENT	IMPERIAL METALS MOUNT POLLEY MINING CORPORATION
CONSULTANT	Golder Associates
DATE	2016-01-25
DESIGNED	AA
PREPARED	RH
REVIEWED	AB
APPROVED	TAM

PROJECT	DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT
TITLE	MOUNT POLLEY TAILINGS DAM FAILURE - REMEDIATION AREAS
PROJECT NO.	1411734
CONTROL	11000 / 2000
REV.	0
FIGURE	2

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3.1 Polley Lake (and Plug)

3.1.1 Physical

Polley Lake is a long (6.17 km), narrow (0.65 km) lake situated adjacent to the Mount Polley Mine within a watershed area of 17.1 km². The estimated hydraulic residence time of the lake is approximately 16.2 years (MPMC 2015 Appendix F). Polley Lake had a mean depth of 18 m and maximum depths of 35 m in the south basin and 33 m in the north basin. The main inflow to the lake is from the Frypan Lake sub-watershed situated to the northwest. Polley Lake is a dimictic lake that mixes from the surface to the lake bottom twice each year. Thermal stratification occurs in summer; a thermocline typically forms at a depth between 5 and 15 m (Minnow 2014). Hypoxic conditions (low oxygen) generally occur at depths greater than 20 m, with dissolved oxygen (DO) concentrations less than 5 mg/L (Minnow 2014). Trophic status of the lake changed from oligotrophic/mesotrophic prior to mine development (1995/1996) to mesotrophic/eutrophic in 2012 (Minnow 2014).

Water and tailings released during the spill were deposited directly into Polley Lake. The sediment investigation indicated that tailings were heterogeneously deposited throughout Polley Lake (MPMC 2015 Appendix E). A thick deposit of tailings and other debris (known as the Plug), blocked water from flowing out of Polley Lake and into Hazeltine Creek. In addition, the wetland area that existed before the tailings spill at the outlet of Polley Lake, was inundated with tailings that have remained saturated due to the high water table associated with the lake. Reconstruction of the Hazeltine Creek channel has restored the connection to Polley Lake, and a weir installed just downstream of the lake outlet controls the volume of water flowing out of Polley Lake.

Immediately following the event, the water level in Polley Lake increased by approximately 1.7 m and turbidity was increased in the deeper waters of the lake (below the thermocline). In mid-October 2014, lake turnover occurred causing mixing of shallow and deep water in the lake; during that period turbidity and DO were uniform throughout the water column. In mid-November 2014, turbidity and DO concentrations in the lake returned to pre-event conditions and have remained consistent since (Appendix D).

3.1.2 Chemical

3.1.2.1 Surface Water Quality Update

Water quality data collected from Polley Lake by MPMC has been evaluated to assess temporal trends of POIs since the tailings spill through December 2015 (Appendix D). The water quality assessment was based on comparison of water chemistry to BC water quality guidelines (WQG), reference data, and baseline data. Immediately following the tailings spill, concentrations of copper and molybdenum were measured at concentrations greater than the BC WQGs for protection of aquatic life (MPMC 2015 Appendix F). Concentrations of those POIs in Polley Lake have been below BC WQGs throughout 2015. With respect to nutrients, total phosphorus concentrations were somewhat elevated in deep water immediately following the event, but have been within the range observed in Polley Lake prior to the event since fall turnover in November 2014. Based on the evaluation of 2015 water quality data, no POIs in surface water remain above WQGs in Polley Lake.

Metals concentrations in Polley Lake surface water will continue to be monitored as part of MPMC's routine monitoring program.



3.1.2.1.1 Free Metals in Surface Water

Between August and October 2015, Minnow deployed diffusive gradients in thin films (DGT) passive sampling devices in the south basin of Polley Lake (near-field location) to measure the amount of free and weakly complexed metals in water near the sediment-water interface (Appendix D). Labile metals are the fraction of metals that are considered to be potentially bioavailable (i.e., that can be readily transported across biological membranes of aquatic organisms). The DGT device simulates the biological membrane of an aquatic organism. Calculated concentrations of free metals in water (based on accumulation by the DGT device) were compared to concentrations of total and dissolved metals in concurrent water samples, reference concentrations from Bootjack Lake, and BC WQGs.

In Polley Lake, copper and molybdenum were measured by the DGT devices at concentrations greater than in Bootjack Lake, but lower than the BC WQGs (Figure 3). It is acknowledged that the WQGs were not derived with DGT data, so the comparison was made for information purposes only. In comparison to total and dissolved (filtered) concentrations, the DGT-labile concentrations of copper in water near the bottom of Polley Lake were lower. The 'dissolved' concentrations are measured by filtering water through a 0.45 um filter. The DGT results suggest that the free and weakly complexed fraction of these metals is lower than indicated by the filtered water samples referred to as dissolved metals in routine analysis.

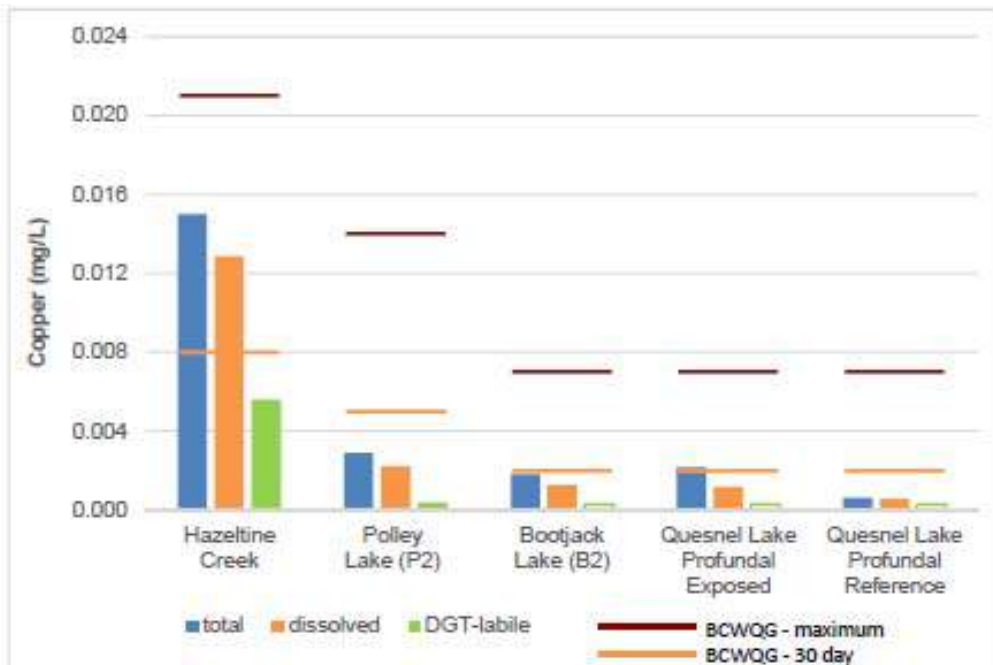


Figure 3: Total (T), Dissolved (D) and DGT-labile Concentrations of Copper in Water

Note: The open bars denote results that were less than detection limits.



3.1.2.2 *Sediment Quality Update*

Sediment quality data collected from Polley Lake by Minnow Environmental Inc. (Minnow) has been evaluated to assess changes in sediment chemistry since the tailings spill occurred (Appendix E, MPMC 2015 Appendix E). Unlike water quality, concentrations of metals in the tailings-influenced sediment are not expected to have changed substantially between sampling events in 2014 and 2015. A total of 21 sediment samples have been collected by Minnow in Polley Lake following the tailings spill. The sediment quality assessment was based on comparison of sediment chemistry to BC sediment quality guidelines (SQG), reference data and baseline data (i.e., data collected prior to the tailings spill). Baseline sediment data from Polley Lake indicated that concentrations of metals were naturally-elevated in the lake prior to the tailings spill (MPMC 2015 Appendix E).

In 2014, sediment was collected from deep and mid-depth locations throughout the lake. The 2014 chemistry data indicated that arsenic (at deep stations), copper (at mid-depth and deep stations) and iron (at mid-depth stations) were elevated in comparison to guidelines and reference/baseline concentrations. The deep station in the south basin of Polley Lake was considered to be representative of the worst case and sampled in 2015. The 2015 chemistry data indicated that arsenic and copper remained elevated in comparison to standards and reference/baseline concentrations (Appendix E). Iron was not elevated in comparison to reference/baseline at the deep station; however, the concentrations of iron at the deep station were similar between 2014 and 2015, thus the same could be assumed for the mid-depth stations where iron was elevated in 2014. Based on the evaluation of 2014 and 2015 sediment quality data, arsenic, copper and iron were identified as POIs in Polley Lake.

3.1.2.3 *Evaluation of Mercury Biomagnification Potential*

COPCs related to the tailings spill were identified for surface water (Appendix D, MPMC 2015 Appendix F), soil (Appendix B, MPMC 2015 Appendix D), and sediment (Appendix E, MPMC 2015 Appendix E). Although mercury was not identified as a COPC based on measured concentrations in these media, mercury has been identified as a stakeholder concern due to questions regarding possible methylation and subsequent biomagnification into the aquatic food web via a “reservoir effect” in Polley Lake that could potentially occur as a result of the TSF breach and the introduction of organic debris into the lakes.

The reservoir effect refers to a phenomenon of enhanced mercury mobilization sometimes observed in newly-formed reservoirs. Reservoir formation often involves flooding soils and vegetation, thus providing a new source of nutrients and organic material for bacteria that can methylate and de-methylate mercury in the flooded environment (Ullrich et al. 2001). Bacterial decomposition of this new organic material can increase the natural rate of formation of methylmercury. Methylmercury is a positively charged ion that readily binds to sulfur-based amino acids such as cysteine (Newman 2009).

Once attached to amino acids, methylmercury can be incorporated into proteins and transferred to higher trophic levels. Bacteria that methylate inorganic mercury are consumed by invertebrates, which are consumed by fish, leading to increased concentrations of methylmercury in fish tissues (CCME 2000). Stakeholder concern related to mercury is connected to the hypothesis that the deposited mixture of tailings and native organic material created conditions that promote the methylation of mercury, as occurs in a reservoir.



Golder reviewed the conditions that favour the methylation of mercury to assess whether these conditions could occur in Polley Lake and reviewed the existing monitoring data to examine if there is evidence of increased mercury concentrations as a result of the tailings spill.

3.1.2.3.1 Factors Influencing Methylation of Mercury

Azimuth (2010, 2012, and 2015) summarized environmental factors that influence mercury methylation. As outlined in Sections 4.3 to 4.5 of Azimuth (2012), key parameters that influence methylation potential are residence time, trophic status, temperature, DO, pH, dissolved organic carbon, total suspended solids, sulphate, sediment grain size, and total organic carbon in sediment. The correlation of these parameters with mercury methylation (i.e., positive or negative) is summarized in Table 3-1.

Table 3-1: Summary of Parameters and their Correlation with Mercury Methylation (Azimuth 2012) and Current (Post-event) Conditions of these Parameters in Polley Lake

Parameter	Correlation	Conditions that Favour Methylation	Polley Lake	Source for Polley Lake data
Residence time	Positive	Longer residence time	16.2 years, more likely	1
Trophic status	Positive	Highly productive systems	Moderate to high productivity; classified as mesotrophic/eutrophic, more likely	1
Water – Temperature	Positive	Warmer temperatures (weakly related)	Temperature < 10 °C at depths greater than 15 m, less likely	2
Water - Dissolved Oxygen	Negative	Low oxygen conditions	Concentrations < 5 mg/L at depths greater than 10 m, more likely	2
Water – pH	Negative	Slightly acidic waters (pH <6.5)	Median pH = 8.1, less likely	3
Water - dissolved organic carbon	Positive	Concentrations > 5 mg/L	Mean concentration = 6.2 mg/L, more likely	3
Water - total suspended solids	Positive	Higher concentrations (as transport media for mercury)	Below detection limit of 3 mg/L in most samples (n= 54); 4 samples had detected concentrations that ranged from 3.1 to 5.4 mg/L, less likely	3
Water - sulphate	Positive	Higher concentrations over environmentally relevant range (5-30 mg/L)	Mean concentration = 44.3 mg/L, more likely	3
Sediment - grain size	Negative	Fine grain sediment ⁵	Predominantly silt in the <63 µm fraction, more likely	4
Sediment - total organic carbon	Positive	Higher	Mean total organic carbon ≤ 7.7% in the <63 µm fraction, more likely	4

Abbreviations: < = less than; ≤ = less than or equal to; > = greater than; ~ = approximately; °C = degrees Celsius; m = metres; mg/L = milligrams per litre; µm = micrometres; % = percent.

Sources:

¹ Minnow (2014).

² Depth profiles presented in MPMC (2015 Appendix H).

³ Appendix D. Values calculated using all Quesnel Lake samples or all Polley Lake samples collected in 2015.

⁴ Appendix E. Based on mean particle size or mean total organic carbon at exposed locations sampled in 2014 and 2015.

⁵ Condition that favours mercury methylation is described in Azimuth (2012).



In Polley Lake, some parameters indicate that mercury methylation would not be favoured (i.e., temperature, pH, and total suspended solids), whereas other parameters indicate that mercury methylation could be favoured (i.e., trophic status, DO, sulphate, and sediment characteristics). For the latter set of parameters, these conditions appear to be unrelated to the tailings spill because, with the exception of sulphate¹, pre-event and post-event conditions are comparable. Prior to the tailings spill, Polley Lake was classified as a mesotrophic/eutrophic lake with hypoxic conditions (i.e., dissolved oxygen concentrations less than 5 mg/L) generally occurring at depths greater than 20 metres (MPMC 2015 Appendix F). Pre-event sediment grain size (predominantly silt; MPMC 2015 Appendix E) and total organic carbon in sediment (mean in deep areas = 18.2%, mean in mid-depth areas = 8.4%; MPMC 2015 Appendix E) were also similar to conditions shown in Table 3-1. Overall, based on the key parameters identified in Sections 4.3 to 4.5 of Azimuth (2012) and the data presented in Table 3-1, the potential for the tailings spill to increase mercury methylation in Polley Lake is considered low.

3.1.2.3.2 Review of Existing Monitoring Data for Mercury

Water Chemistry

Water chemistry data collected between August 2014 and July 2015 are reported in Appendix D. During this time total aqueous mercury concentrations in Polley Lake samples have been below the reported detection limits of 50 ng/L (August 2014 samples), 10 ng/L (September 2014 samples), or 5 ng/L (2015 samples). Because mercury data are sparse and total aqueous mercury concentrations were below the reported detection limit in all samples, interpretation of aqueous mercury trends is limited.

In Appendix D, detection limits for samples with no detected mercury were compared to the BC water quality guideline (BC MoE 2001) of 10 ng/L, based on the assumption that the percent methylmercury in Polley Lake is 1%. Because the percent methylmercury in Polley Lake has not been measured, the aqueous mercury data cannot be directly compared to the BC water quality guideline. However, comparison to the CCME (2003) water quality guideline for inorganic mercury (26 ng/L) suggests that the potential for mercury effects is low. In water samples collected from September 2014 (i.e., detection limit of 10 ng/L) to July 2015 (i.e., a detection limit of 5 ng/L), aqueous mercury concentrations were lower than the CCME (2003) water quality guideline for inorganic mercury.

Although the above comparisons to the CCME (2003) water quality guidelines suggest that the potential for mercury effects is low, the CCME (2003) derivation document states that the water quality guidelines may not fully protect higher trophic level fish. Therefore, sediment, zooplankton tissue chemistry, and fish tissue chemistry data collected from Polley Lake were also reviewed to assess spatial and temporal trends in mercury concentrations.

Sediment Mercury Chemistry

Sediment chemistry data are reported in MPMC (2015 Appendix E) and Appendix E. Sampling in Polley Lake was conducted in 2014 at two depths: mid-depth (approximately 20 metres deep) and deep basins (approximately 29 meters deep). Sampling of both the mid-depth and deep basins were done in two areas, one located on the south side and the other on the north side of Polley Lake. Mercury concentrations were measured in the <2 mm

¹ Mean pre-event sulphate concentration was 20 mg/L (MPMC 2015 Appendix F).



fraction (deep basin samples) and the <63 µm fraction (mid-depth and deep basin samples). In 2015, sampling of the deep basin on the south side of Polley Lake was conducted and concentrations were measured for the <63 µm fraction. The deep basins had been historically sampled as a part of baseline studies for Mount Polley Mine and are summarized in MPMC (2015 Appendix E). Bootjack Lake served as a reference for Polley Lake.

In 2014 and 2015, sediment mercury concentrations in Polley Lake were lower than concentrations in Bootjack Lake (i.e., the reference lake), lower than the BC sediment quality guideline, and lower than the mean historic baseline concentration (pre-mine operation) in Polley Lake. With respect to temporal comparisons, mercury concentrations in sediment were similar in 2014 and 2015 (Appendix E).

Mercury in Zooplankton Tissue

Zooplankton tissue chemistry collected in 2015 from Polley Lake is reported in Appendix G. Tissue samples were collected in four months (May, July, August, and September) from two stations in Polley Lake; P1 (northern end of Polley Lake) and P2 (southern end of Polley Lake, closer to the outlet of Hazeltine Creek). No baseline or reference data were available for comparison.

Zooplankton mercury concentrations were similar between sampling stations (P1 and P2) in Polley Lake in 2015, with the exception of the September 2015 sampling event when P1 was higher than P2. August and September mercury tissue concentrations were higher at both stations compared to mercury concentrations in May and July. Tissue mercury concentrations in all Polley Lake samples were lower than or similar to those measured in the Quesnel Lake reference stations. Zooplankton was not sampled in 2015 in the Polley Lake reference site, Bootjack Lake.

The zooplankton data are considered preliminary at this time. Further assessment of zooplankton conditions is included in the CEMP.

Fish Tissue - Mercury

Fish tissue chemistry collected in 2014 and 2015 from Polley Lake is reported in Appendix G. Tissue chemistry comparisons were conducted spatially (i.e., exposure versus reference areas) and temporally (i.e., 2014 versus 2015 data) for site, species, and tissue type, where data were available.

In 2014 and 2015, mercury concentrations in all fish species collected from Polley Lake were either lower than or similar to concentrations in fish collected from reference locations. With respect to temporal comparisons, mercury concentrations in fish were similar in 2014 and 2015. These results are consistent with the lack of spatial and/or temporal trends observed in water chemistry, sediment chemistry, and zooplankton tissue chemistry.

This review of the available data suggests that increased mobilization of mercury in the aquatic food chain in Polley Lake as a result of the tailings spill is unlikely. There are uncertainties related to this evaluation, including that there may be additional key parameters currently unknown that influence mercury methylation. Also, the percent aqueous methylmercury in Polley Lake has not been measured but was assumed to be 1%. In order to reduce uncertainty regarding future conditions, monitoring mercury concentrations in fish tissue has been included in the CEMP. However, indications to date are that methylation and increased mobilization of mercury in Polley Lake is unlikely.



3.1.3 Biological

3.1.3.1 Sediment Toxicity

MPMC conducted a post-event toxicity testing program between August and October 2014 (MPMC 2015 Appendix E), in which surface sediment samples collected from Polley Lake were tested using a series of standard laboratory tests using sensitive invertebrate test species. The program provided an important evaluation of the bioavailability and toxicity of POIs as they are observed in site-specific samples, as well as changes to physical conditions of the sediment that may affect the capacity of sediment to support sediment dwelling organisms. The laboratory testing provided a direct measure of biological effect to individual organisms under site-relevant conditions.

The results of the 2014 post-event toxicity testing indicated no instances of significantly reduced survival or growth of either *Hyalella* or *Chironomus* test species in Polley Lake sediments relative to concurrent laboratory controls and reference samples from Bootjack Lake. One exception was a modest reduction in survival of *Chironomus dilutus* at the mid-depth area close to the south end of the lake. Further toxicity testing of Polley Lake sediment was not conducted in 2015.

3.1.3.2 Benthic Invertebrate Tissue Metal Analysis

Benthic invertebrate biomass and tissue metal analysis is provided in Appendix G. The approximate biomass of benthic invertebrates retrieved from the south basin of Polley Lake was much lower than the biomass collected from the corresponding reference area in Bootjack Lake (exposed area mean <0.17 g/m² wet weight; reference area mean >0.85 g/m² wet weight). Samples collected from Polley Lake and Bootjack Lake were composed mainly of chironomids (midge larvae) and oligochaetes.

Mean concentrations of copper, manganese, molybdenum, selenium, tin, and titanium in benthic invertebrates from Polley Lake were more variable and were significantly higher than those in the corresponding reference area (Table 3-2). Principal Components Analysis (PCA) supported these observations.

For all these metals, except selenium, concentrations were lower in benthic invertebrates compared to sediment concentrations in Polley Lake and Bootjack Lake, indicating accumulation factors of less than 1. For selenium, the concentrations in benthic invertebrates appeared to be about twice the concentration in sediment, indicating that the benthic invertebrates in Polley Lake may be accumulating selenium. The benthic invertebrates analyzed in this study were not depurated prior to analysis, so some of the metal content may be related to sediment in gut. MPMC are conducting further investigation into concentrations of selenium in biota in Polley Lake, as well as initiating further investigations into the fate and transport of selenium in Polley Lake and the significance of these measurements to benthic invertebrates and lake productivity.



Table 3-2: Summary whole benthic invertebrate and sediment chemistry results from lake sampling areas in Polley Lake, 2015

Parameter		Units	Polley Lake									
			Reference					Exposed				
			Bootjack Lake (BOL-B2)					Polley Lake (POL-P2)				
			Benthic Invertebrate Tissue		Sediment		BSAF ²	Benthic Invertebrate Tissue		Sediment		BSAF ²
Mean	t*SE	Mean	t*SE	Mean	t*SE	Mean		t*SE				
Parameters of Interest (POIs)	Arsenic	mg/kg	0.76	0.44	7.72	1.65	0.10	2.36	2.90	14.0	0.95	0.17
	Copper	mg/kg	16.7	4.4	382	59.3	0.04	97.4	84.0	823	57.2	0.12
	Iron	mg/kg	1,114	701	30,067	7,512	0.04	3,793	4,115	29,760	2,270	0.13
	Manganese	mg/kg	25.4	8.2	3,327	1,207	0.01	585	635	2,574	787	0.23
	Nickel	mg/kg	0.42	0.05	33.3	3.25	0.01	3.09	2.77	22.0	3.64	0.14
	Zinc	mg/kg	68.2	14.0	82.8	9.4	0.82	61.0	29.2	86.4	6.5	0.71
Indicator Parameters (IPs)	Barium	mg/kg	16.8	15.3	289	46.8	0.06	50.1	50.8	329	22.2	0.15
	Calcium	mg/kg	1,055	350	8,417	1,571	0.13	3,706	3,050	24,500	4,099	0.15
	Cobalt	mg/kg	0.23	0.09	13.3	1.65	0.02	2.47	2.61	23.1	2.66	0.11
	Molybdenum	mg/kg	0.49	0.21	4.32	1.22	0.11	2.74	3.04	10.1	1.56	0.27
	Phosphorus	mg/kg	7,902	129	2,537	2,182	3.12	7,250	4,167	1,200	86	6.04
	Selenium	mg/kg	2.31	0.56	2.75	0.40	0.84	7.31	2.82	4.43	1.07	1.65
	Silver	mg/kg	0.029	0.005	0.377	0.031	0.08	0.051	0.041	0.348	0.013	0.15
	Sodium	mg/kg	5,642	487	900	418	6.27	4,424	3,681	1,828	127	2.42
	Strontium	mg/kg	5.38	1.89	99.4	14.5	0.05	38.0	36.7	289	18.7	0.13
	Tin	mg/kg	0.038	0.016	0.697	0.183	0.06	0.225	0.236	2.10	0.199	0.11
	Titanium	mg/kg	6.86	1.93	461	157	0.01	224	264	1,832	238	0.12
	Vanadium	mg/kg	1.34	0.43	80.3	10.5	0.02	20.9	25.1	115	7.5	0.18

Notes:
 1. Summary statistics were calculated using method detection limit (MDL) values if data were below the MDL. Means are shown with a < symbol if all data used in their calculation were < MDL. If MDLs were variable, means were reported as < the maximum MDL.
 2. BSAF = Biota Sediment Accumulation Factor; [Mean concentration of analyte in benthic tissue (mg/kg dw)] / [Mean concentration of analyte in sediment (mg/kg dw)]
Bold font indicates mean analyte concentration in benthic invertebrates was significantly higher than in the associated reference area, p < 0.05 (using a non-parametric Mann-Whitney U test).



3.1.3.3 Benthic Invertebrate Community

Analysis of the benthic invertebrate community in Polley Lake has been conducted by Minnow to assess the initial impacts of the tailings spill and track recovery. The benthic invertebrate community assessment was based on comparison of community metrics (e.g., diversity, richness, evenness) to reference (Bootjack Lake) and baseline data. Sampling in 2014 at mid-depth locations in Polley Lake and at the deep location in the north basin indicated density (individuals per m²) and richness of invertebrates were lower in comparison to reference (Bootjack Lake), but were consistent with baseline sampling at those locations in Polley Lake. Sampling at the deep location in the south basin of Polley Lake in 2014 yielded no benthic invertebrates, indicating the benthic community was entirely covered by tailings. A follow up analysis of the benthic invertebrate community was conducted during the fall of 2015. The data report was not available for this Update Report, but will be included in the Risk Assessment and CEMP reports.

3.1.3.4 Surface Water Toxicity Testing

MPMC has conducted a post-event toxicity testing program since the tailings spill occurred, in which surface water samples collected from Polley Lake were tested using a series of standard laboratory tests using sensitive plant, invertebrate, and fish test species. The program provides an important evaluation of the potential bioavailability and toxicity of POIs as they are observed in site-specific samples. The laboratory testing provides a direct measure of biological effect to individual organisms under site-relevant conditions, and includes sensitive test species representing primary producers, primary consumers, and secondary consumers.

The results of post-event toxicity testing conducted between August 2014 and February 2015 (MPMC 2015 Appendix F) and follow-up post-event toxicity testing conducted between March and November 2015 (Appendix F) indicate that the water quality in Polley Lake did not adversely affect aquatic health. The results of toxicity testing conducted between January and November 2015 are presented in Table 3-3.



Table 3-3: Summary of Surface Water Toxicity Testing in Polley Lake (January to December 2015)

Test	Sample ID	Date	T. Cu (mg/L)	D. Cu (mg/L)	LC50 (% v/v)	IC25 (% v/v)	IC50 (% v/v)
7-d fathead minnow survival and growth	P2-Surface	06 Jan 2015	0.0024	0.0021	>100	>100	>100
	P2-Surface	14 Apr 2015	0.0025	0.0019	>100	>100	>100
7-d Rainbow Trout swim-up survival and growth	P2-Surface	06 Jan 2015	0.0024	0.0021	>100	>100	>100
	P2-Surface	14 Apr 2015	0.0025	0.0019	>100	>100	>100
	P2-Surface	25 Aug 2015	0.0033	0.0029	>100	>100	>100
	P2-Surface	12 Nov 2015	0.0036	0.0024	>100	>100	>100
7- to 8-d <i>C. dubia</i> survival and reproduction	P2-Surface	06 Jan 2015	0.0024	0.0021	>100	>100	>100
	P2-Surface	14 Apr 2015	0.0025	0.0019	>100	>100	>100
	P2-Surface	25 Aug 2015	0.0033	0.0029	>100	>100	>100
	P2-Surface	11 Nov 2015	0.0036	0.0024	>100	>100	>100

Notes: Effect concentration expressed on a volume/volume basis. LC50 = Lethal concentration causing 50% mortality. IC25/IC50 = Non-lethal concentration causing 25% or 50% reduction in growth or reproduction. Total and dissolved copper (T. Cu and D. Cu) concentrations for January to August samples are provided in Appendix B; concentrations for September to November samples are MPMC unpublished data.

3.1.3.5 Plankton Community and Tissue Metal Analysis

Sampling of plankton was conducted at two stations in Polley Lake monthly between May and September 2015 (during the open water period; Appendix G). Plankton was not sampled in Polley Lake in 2014. Plankton was also not collected from a reference lake for Polley Lake. Therefore, these data were considered to provide a preliminary indication of plankton biomass and tissue metal concentrations that can be built on in future sampling events.

- Spatial and temporal trends in phytoplankton biomass (as chlorophyll a) and zooplankton abundance throughout the open water period of 2015 were qualitatively examined by plotting the data.
- Trophic status of Polley Lake was classified as ranging from oligotrophic to mesotrophic based on nutrients, Secchi depth, and chlorophyll a concentrations measured during the 2015 period.
- Total zooplankton abundance in Polley Lake increased from May to June followed by a decline in abundance from June to August. In September, P1 had an increase in zooplankton abundance where P2 had a slight decline from August. No biomass calculations were made so it is unknown whether zooplankton biomass follows a similar seasonal pattern compared to abundance.
- Similar community composition was observed at the two stations in Polley Lake. Copepod nauplii made up the greatest proportion of total zooplankton abundance in Polley Lake between May and July whereas cyclopoid copepods were generally dominant in August and September. Cladocerans, rotifers, and calanoid copepods were generally present in smaller numbers at both stations through the open water period.
- Zooplankton tissue concentrations of arsenic, copper, mercury, and selenium were generally similar between sampling stations (P1 and P2) in Polley Lake in 2015 with the exception of the September sampling event when P1 was consistently higher than P2 for arsenic, copper, mercury, and selenium.



- Tissue concentrations of arsenic, copper, mercury, and selenium displayed an increasing trend from May to September at P1. This trend was not observed in aqueous concentrations of these parameters with the exception of copper, which also exhibited a slight increase in aqueous concentrations at both sampling locations. See Figures 4a to 4d, below.
- Zooplankton tissue selenium concentrations were at or above the BC interim dietary guideline for tissue consumption by fish (BC MoE 2014) at both stations during the sampling events in Polley Lake in 2015, as shown in Figure 4d. MPMC are continuing to monitor the zooplankton tissue selenium concentration in Polley Lake and compare results to Bootjack Lake, the reference location to determine if there are trends in concentrations over time.

The available data did not allow for evaluation of changes between 2014 and 2015 or assessment of natural variability.

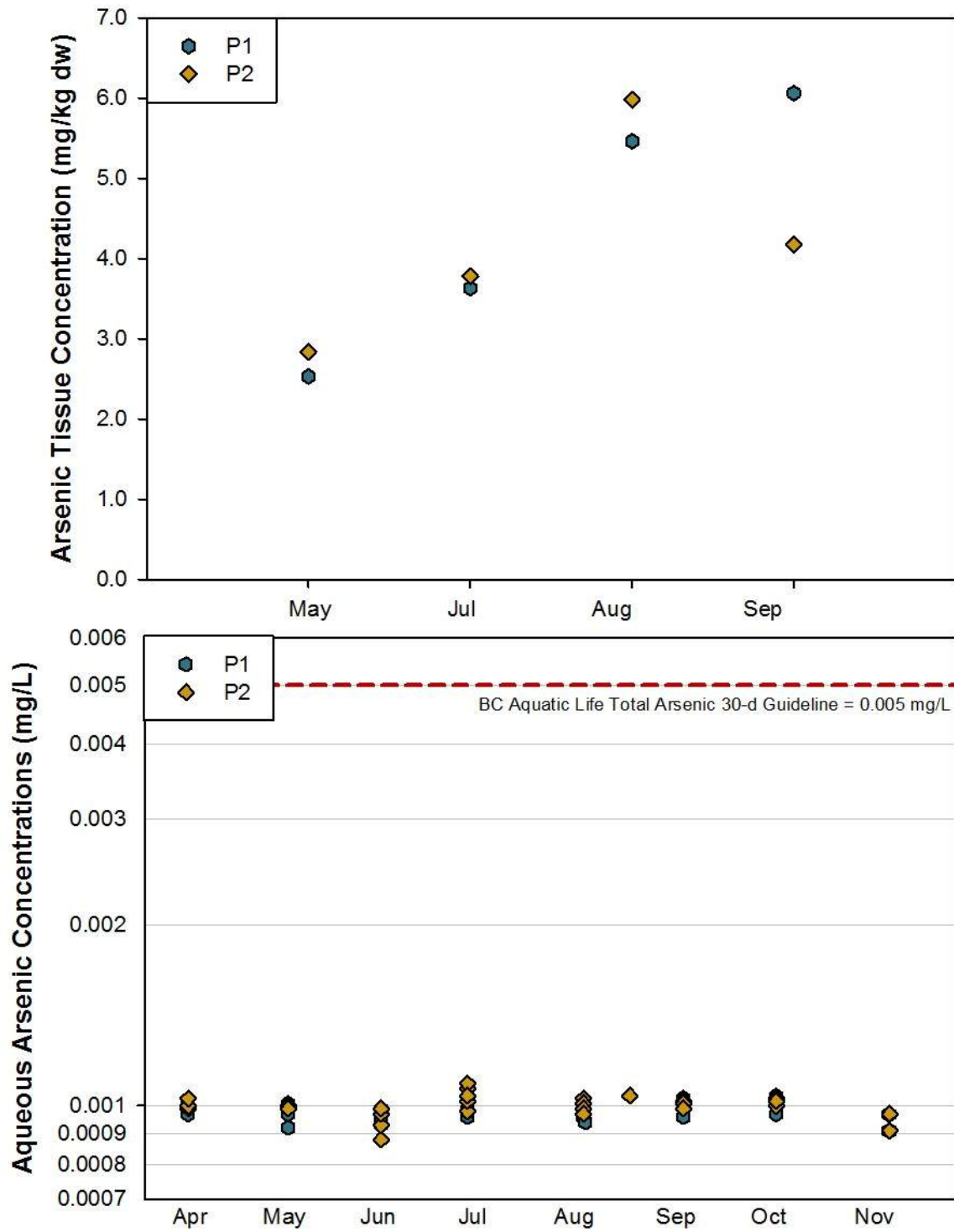


Figure 4a: Concentrations of Arsenic Measured in Zooplankton Tissue (top) and Surface Water (bottom) Collected from Polley Lake, 2015.

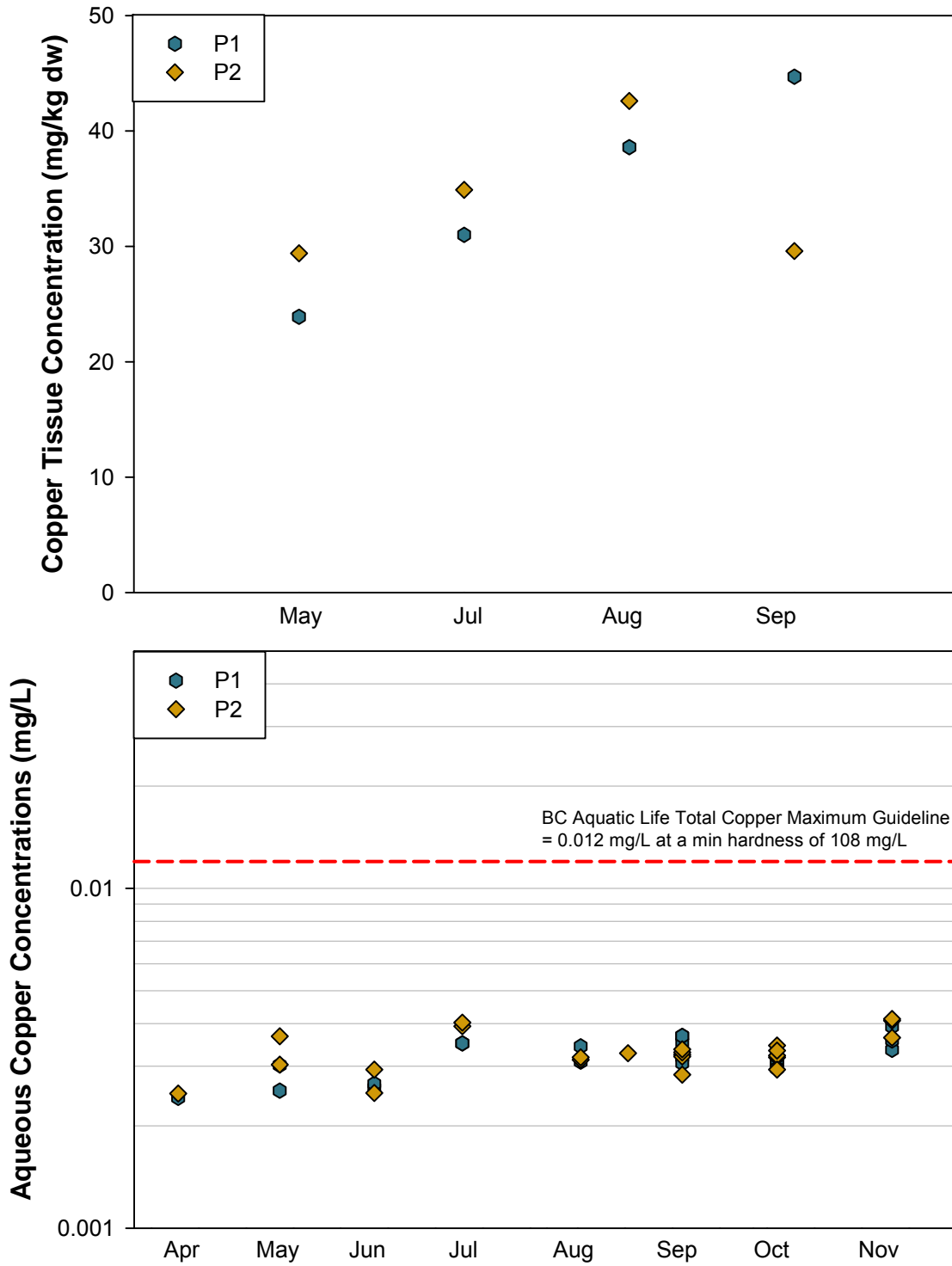


Figure 4b: Concentrations of Copper Measured in Zooplankton Tissue (top) and Surface Water (bottom) Collected from Polley Lake, 2015.

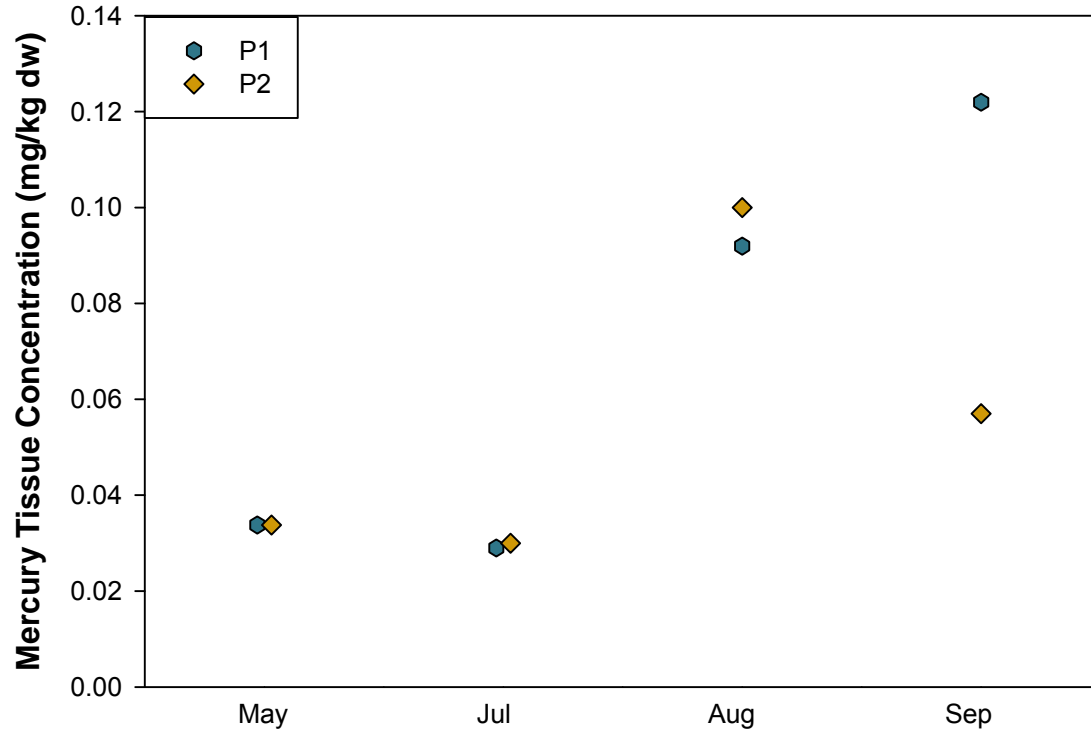


Figure 4c-Concentrations of Mercury Measured in Zooplankton Tissue Collected from Polley Lake, 2015.

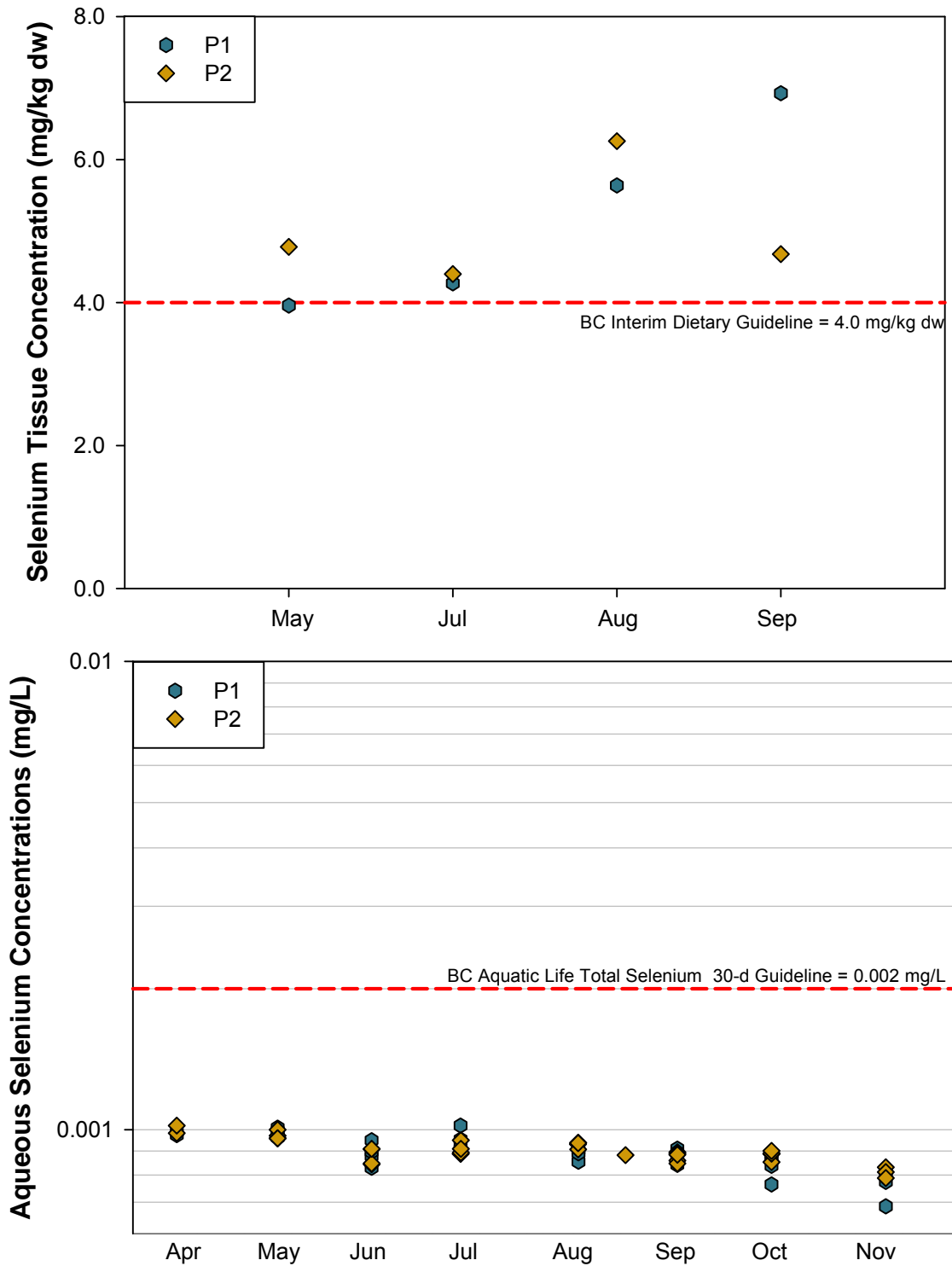


Figure 4d: Concentrations of Selenium Measured in Zooplankton Tissue (top) and Surface Water (bottom) Collected from Polley Lake, 2015.



3.1.3.6 *Fish Productivity*

The primary effect of the event on the Rainbow Trout of Polley Lake was the disruption to rearing habitat in Hazeltine Creek and the potential loss of a year-class of Rainbow Trout and the blockage of access to Hazeltine Creek for spawning in 2015 and 2016 (Appendix G). Post-event toxicity testing indicated that Polley Lake water did not affect survival or growth of fish, survival or growth of daphnid zooplankton, or growth of plant test species. Rainbow Trout and Longnose Sucker length and weight data suggest that feeding efficiency was not affected. A summary of Rainbow Trout tissue metal concentrations and potential impacts on fish productivity is discussed below.

3.1.3.7 *Fish Tissue Metal Analysis*

Multiple stakeholders collected fish tissue samples following the release of tailings. Golder consolidated the data from these multiple sources into a single dataset to facilitate data review. The details of the methods for review are provided in Appendix H, Fish Tissue. As discussed in detail in Appendix H, there are several limitations to this data set and this evaluation is considered to be preliminary at this time. See discussion of selenium data below. Additional monitoring to investigate these selenium concentrations will be conducted, as required.

3.1.3.7.1 *Comparison to Tissue Guidelines*

Tissue guidelines are available for arsenic, mercury and selenium (See Appendix H). The proportion of samples above tissue guidelines is reported by species (including all species for which data are available) and tissue type. The primary comparison for arsenic and mercury is for muscle tissue because this sample type is the most frequently consumed portion of the fish. However, liver and kidney may be consumed by some populations, and therefore, Golder has conservatively retained those comparisons in this data summary. General observations regarding the number of exceedances of these guideline values are as follows.

- There were no arsenic guideline exceedances observed for Polley Lake fish.
- There were no mercury guideline exceedances observed for Polley Lake fish.
- Some selenium guideline exceedances were observed for Polley Lake fish. These guideline exceedances are considered to be suspect at this time. In particular, the selenium tissue results for Frypan Creek-Polley Lake Rainbow Trout are unusually high for the ovary tissue in comparison to the muscle tissue. The data are also considered somewhat suspect as the selenium concentrations in surface water have been below the water quality guideline for the protection of fish and egg productivity.
- Given the unexpected and unusual tissue data, further investigation regarding data quality is currently underway. In the meantime, the selenium concentrations in fish tissue from Frypan Creek-Polley Lake are considered to be suspect.

These exceedances are outlined in Table 3-4 for human health protection and Table 3-5 for environmental protection.



Table 3-4: Summary of Selenium Tissue Exceedances for the Protection of Human Health in Polley Lake. These data should be interpreted with caution as data quality concerns are investigated further

Guideline	Year	Species	Location	Number and Type
Low Fish Intake (75 mg/kg dw) Recreational Fishers	2014	Rainbow Trout	Polley Lake (exposure)	3 of 15 liver
	2015	Rainbow Trout	Polley Lake (exposure)	3 of 8 liver
Moderate Fish Intake (14.5 mg/kg dw) General Population	2014	Rainbow Trout	Polley Lake (exposure)	14 of 15 liver
	2015	Rainbow Trout	Polley Lake (exposure)	8 of 8 ovary, 8 of 8 kidney, 8 of 8 liver
High Fish Intake (7.3 mg/kg dw) First Nation Subsistence	2014	Longnose Sucker	Polley Lake (exposure)	3 of 16 whole body
		Rainbow Trout	Polley Lake (exposure)	1 of 2 ovary, 14 of 15 liver
	2015	Rainbow Trout	Polley Lake (exposure)	8 of 8 ovary, 8 of 8 kidney, 8 of 8 liver
	2016	Rainbow trout	Polley Lake (exposure)	3 of 8 ovary

Table 3-5: Summary of Selenium Tissue Exceedances for Environmental Protection in Polley Lake

Year	Species	Location	Number and Type
2014	Longnose Sucker	Polley Lake (exposure)	1 of 1 muscle
	Rainbow Trout	Polley Lake (exposure)	1 of 15 muscle and 1 of 2 ovary
	Longnose Sucker	Polley Lake (exposure)	16 of 16 whole-body
	Rainbow Trout	Polley Lake (exposure)	1 of 3 whole-body
	Rainbow Trout	Polley Lake (exposure)	5 of 8 muscle and 8 of 8 ovary
2016	Rainbow Trout	Polley Lake (exposure)	3 of 8 ovary

3.1.3.7.2 Risk Assessment and Toxicological Context

Fish tissue chemistry data were reviewed in further detail for selected combinations of metals and fish species and/or sample types to provide early context for how the data will be integrated into the HHERA. Fish tissue



chemistry data would typically be used to develop a realistic, worst-case exposure estimate for each receptor being evaluated. This receptor-specific evaluation means that different parts of the fish tissue chemistry data set would be used for each receptor, depending on a variety of factors such as fish ecology, variability in the data, and the strength of association between the chemistry data and the underlying assessment endpoint. Ultimately, fish tissue can be used as part of the following three measurement endpoints:

- Consumption of fish by humans --- Increased metals concentrations in muscle samples from large bodied fish caught for recreation or sustenance can contribute to risks to human receptors. Further input is needed from the Williams Lake Indian Band and Soda Creek First Nation regarding appropriate fish tissue to consider for local consumption.
- Bioaccumulation by fish – Increased accumulation of metals in fish tissue can cause adverse effects to the fish themselves.
- Consumption of fish by ecological receptors – Increased metals concentrations in whole-body samples from smaller fish can contribute to risks to piscivorous fish and wildlife. Increased metals concentrations in muscle or organ samples can also contribute to increased risk to higher trophic level wildlife such as bears or raptors which might preferentially feed on these parts of this fish instead of consuming the whole body.

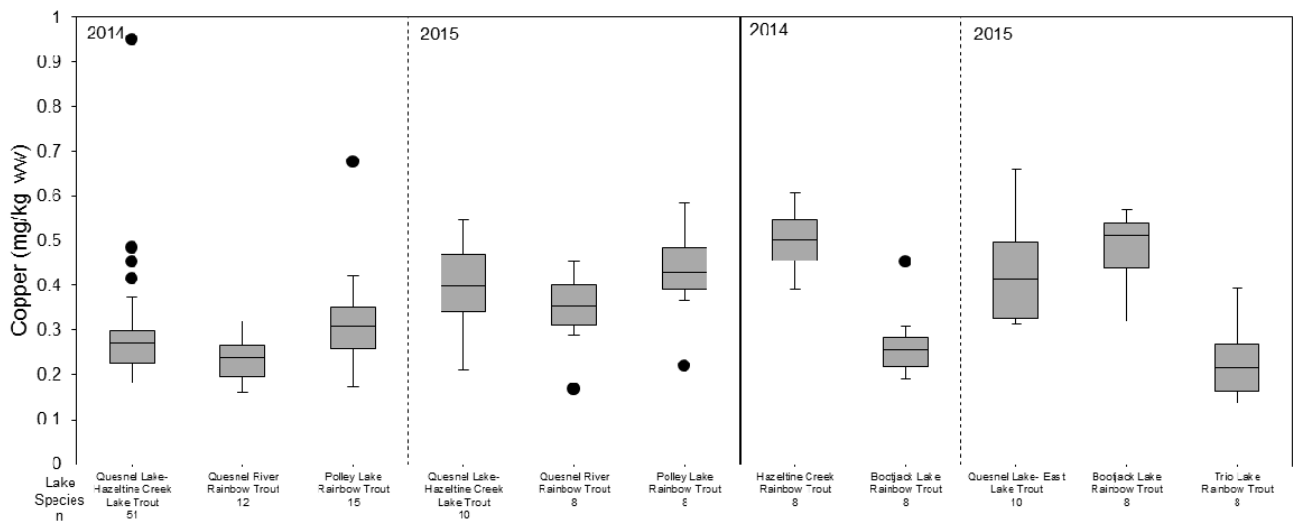
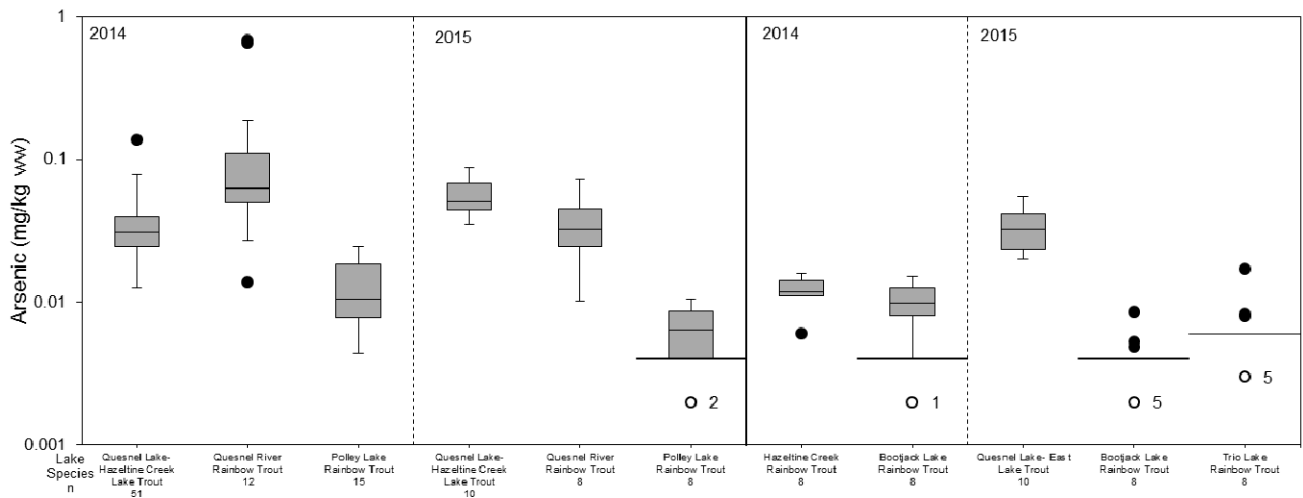
For Polley Lake, Rainbow Trout are an isolated population. A fence prevents them from moving into Hazeltine Creek while restoration work, including the addition of habitat improvements, continues for Hazeltine Creek. Therefore, Rainbow Trout are representative of conditions of Polley Lake. Rainbow Trout are also consumed by humans and wildlife, so they fulfill all three objectives. Rainbow Trout data from Polley Lake were compared to Bootjack Lake and Trio Lake for reference purposes.

Consumption of Fish by Humans

Figure 5 (below) provides a summary of the box plots for specific metals in the muscle samples from large-bodied fish species. As described above, Lake Trout, Rainbow Trout, and juvenile Sockeye Salmon were identified as a reasonable surrogate for the preliminary consideration of this pathway. Individual box plots with pair-wise comparisons for different sites, species, and years are provided in Appendix I, Attachment 2.

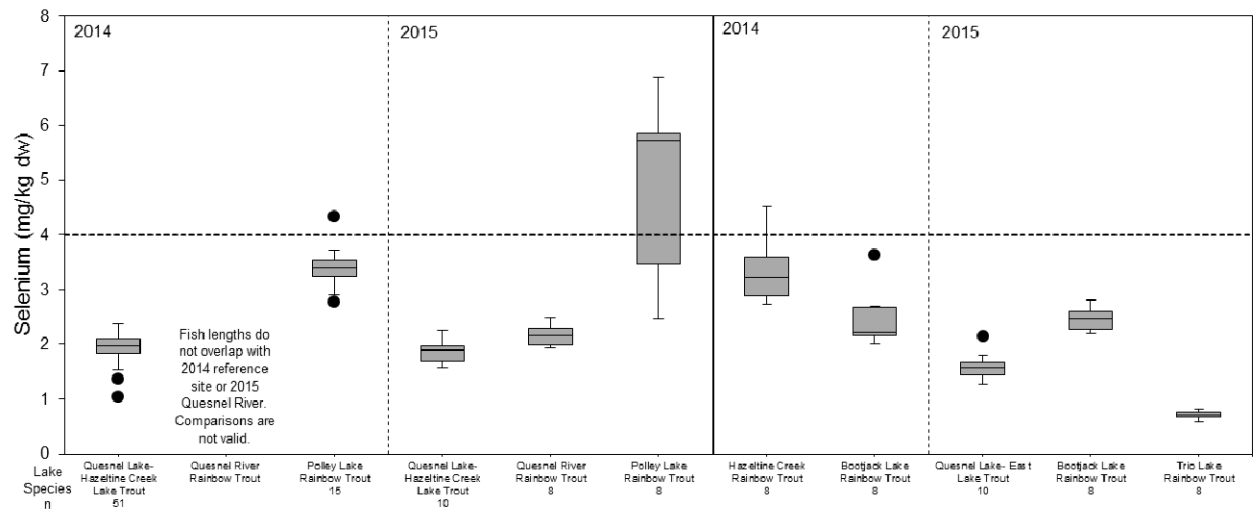
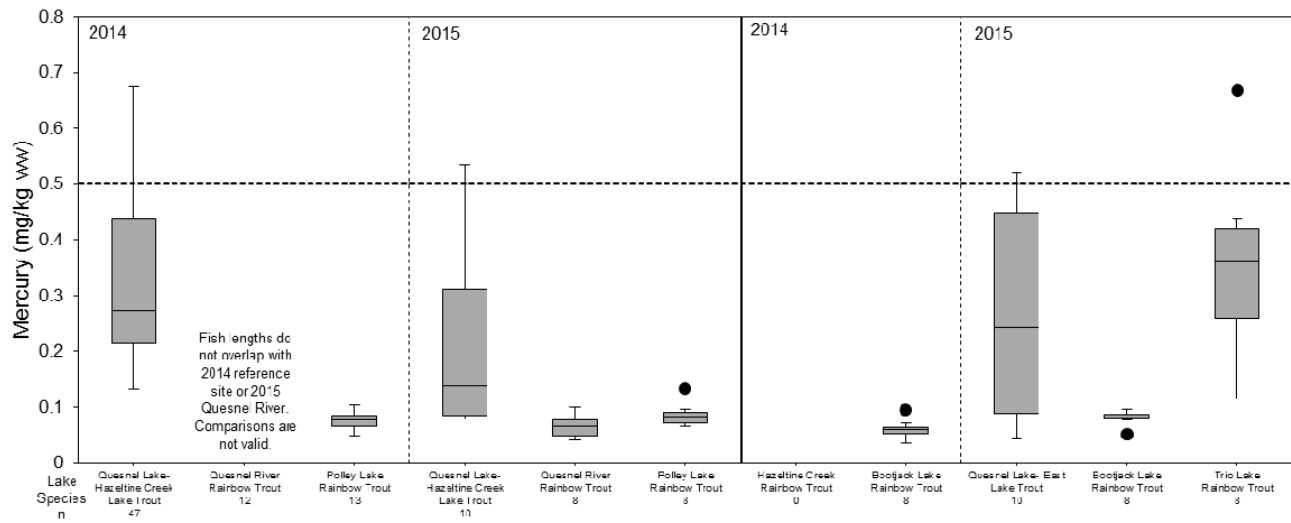


PEEIAR UPDATE REPORT - MOUNT POLLEY MINE





PEEIAR UPDATE REPORT - MOUNT POLLEY MINE



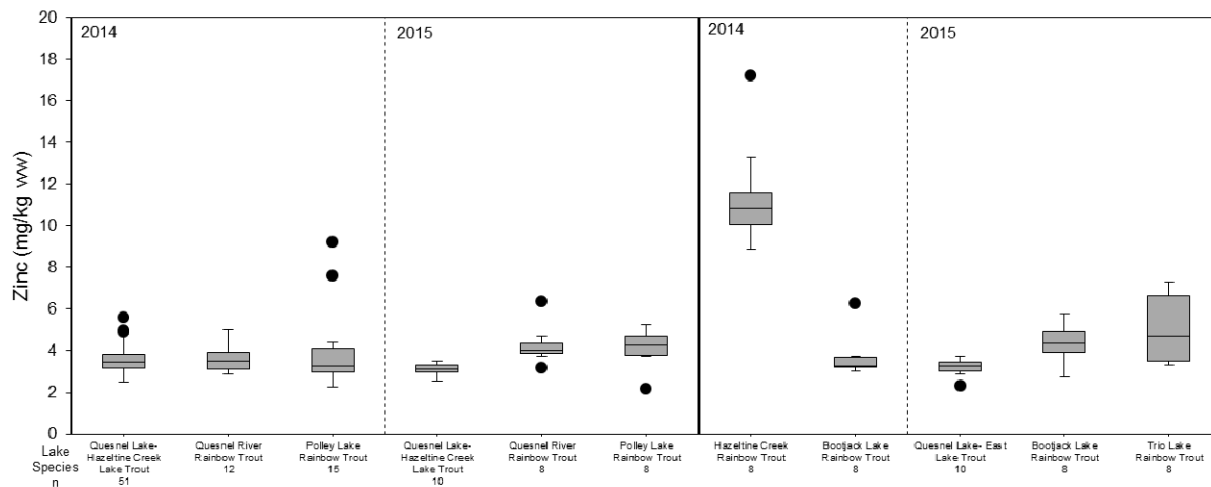


Figure 5: Summary of Available Muscle Chemistry Data for Select Fish Species and Sampling Sites (2014, 2015).

Note: Cadmium and vanadium are not presented because most values were below detection limit with the exception of four samples for cadmium, and one sample for vanadium. Box plots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed vertical lines (- - -) indicate the separation of years; solid vertical lines (-) indicate the separation of exposure and reference; dashed horizontal lines (- - -) indicate guidelines from CFIA (mercury) or BC MoE (selenium).

The purpose of Figure 5 is to highlight whether there are obvious changes in metal accumulation between reference and exposed sites, or between years that would indicate that there has been a change in tissue concentrations. In brief, results are summarized as follows:

- Arsenic concentrations in muscle samples were variable among reference and the exposed sites. Samples from Polley Lake Rainbow Trout appeared to be similar to Bootjack and Trio Lake Rainbow Trout, as well as Rainbow Trout collected from Hazeltine Creek prior to the release of tailings. All measured concentrations were less than the Canadian Food Inspection Agency (CFIA) preliminary tissue guideline.
- Copper concentrations in muscle samples were similar between Polley Lake and Bootjack Lake.
- Mercury concentrations in muscle samples appeared to be similar between exposed sites and reference sites.
- Selenium concentrations in Rainbow Trout muscle collected in 2015 from Frypan Creek (tributary to Polley Lake) were frequently higher than the tissue guideline for environmental protection, and appear to be elevated relative to the applicable references sites (i.e., Bootjack Lake, Trio Lake). The selenium concentrations measured in Frypan Creek Rainbow Trout muscle did not exceed the screening value for First Nation subsistence fish consumers. Readers are reminded that these selenium data are considered to be anomalous and are undergoing further quality checks (see below). Selenium concentrations in Polley Lake Rainbow Trout muscle appear similar to those observed in Hazeltine Creek Rainbow Trout, which were collected prior to the release of tailings.



- Zinc concentrations in muscle tissue appeared to be generally consistent between exposed and reference sites, and were also lower than the median concentrations measured in Hazeltine Creek Rainbow Trout, which were collected prior to the release of tailings.
- The selenium concentrations in Frypan Creek-Polley Lake Rainbow Trout ovary tissue exceeded thresholds for productivity and are higher than what would be expected based on the muscle tissue data. Selenium concentrations in Rainbow Trout ovary tissue collected from Polley Lake (Frypan Creek) in 2015 showed a substantial increase relative to ovary concentrations in Rainbow Trout collected from Hazeltine Creek or Bootjack Lake in 2014 (Figure 6). A similar increase was noted in Rainbow Trout kidney and muscle samples (Figure 5) for the same individual fish. These concentrations were considered potentially anomalous based on the magnitude of the increase and the lack of a similar magnitude of increase in water or fish dietary concentrations. The anomalous data was contained in a single certificate of analysis, and therefore, the analytical laboratory was requested to provide further validation. A summary of the validation conducted to date is included in Appendix H. The concentrations measured in Rainbow Trout ovary tissue were lower in 2016, though concentrations ranged above and below the guidelines for protection of productivity in fish and birds, and the guideline for subsistence consumers of fish. MPMC are conducting additional studies of selenium concentrations in Polley Lake biota and are seeking feedback from the Williams Lake and Soda Creek First Nations regarding current or traditional consumption of Rainbow Trout and other fish tissues.

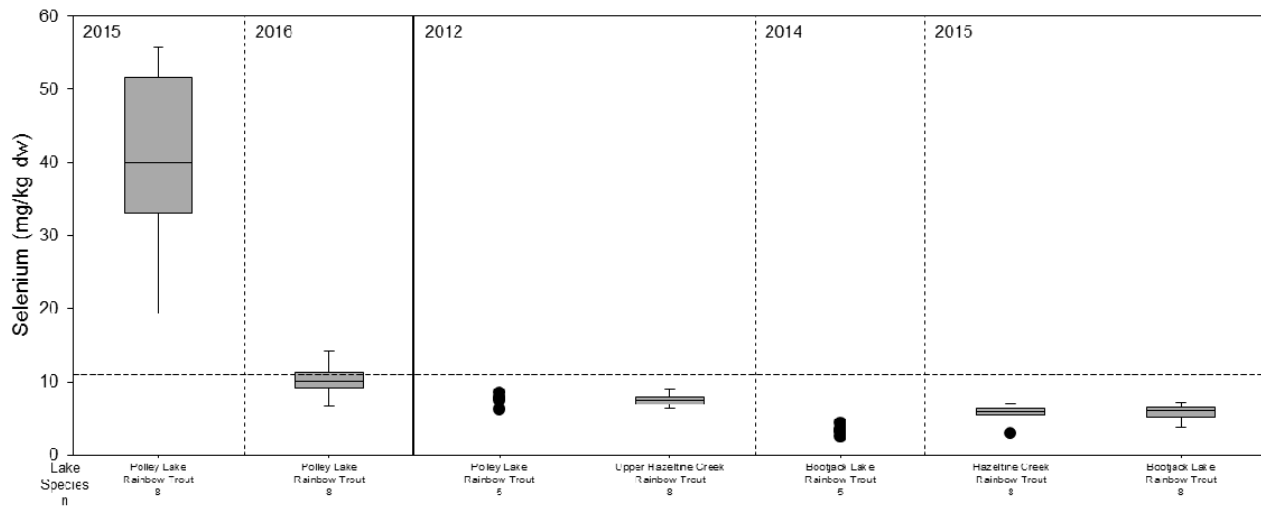


Figure 6: Summary of Available Ovary Chemistry Data for Rainbow Trout from Relevant Sampling Sites.

Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed vertical lines (- - -) indicate the separation of years; solid vertical lines (-) indicate the separation of exposure and reference; dashed horizontal lines (- - -) indicate guidelines from CFIA or BCMoE.



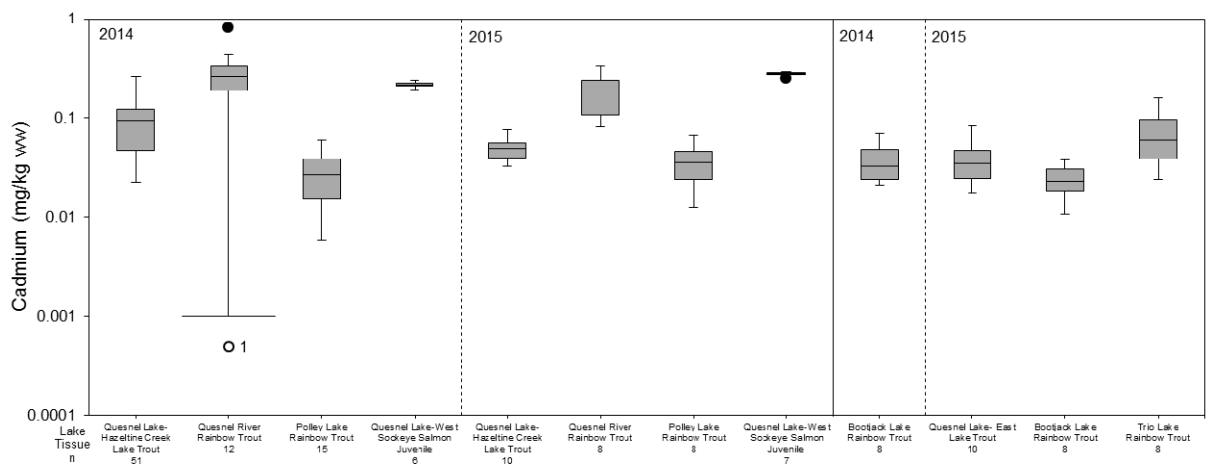
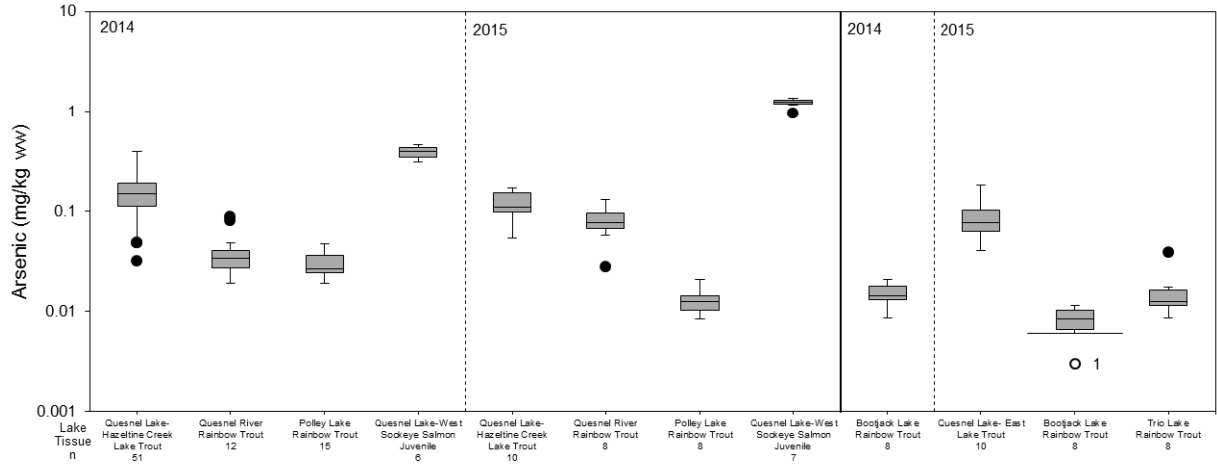
Bioaccumulation by Fish

Figure 7 (liver), below, provides summaries of the available fish tissue chemistry data for liver samples presented as censored box plots for the specific metals identified. Individual censored box plots showing comparisons of exposure and reference sites, species, and years are provided in Appendix H, Attachment 2. The purpose of the five summary figures presented herein is to highlight changes in metal concentrations between reference and exposed sites, or between years in tissues that have been associated with metal accumulation. In brief, results are summarized as follows:

- For arsenic, copper, and zinc, liver (Figure 7) and kidney concentrations were generally consistent between the Polley Lake compared to Bootjack and Trio Lakes.
- Mercury concentrations in fish liver were consistently low for both Polley Lake and Bootjack Lake.
- Concentrations of vanadium may have been higher in Polley Lake Rainbow Trout liver in 2015 compared to reference, which were generally below the detection limit.
- Selenium concentrations in the liver samples collected from Rainbow Trout in Polley Lake, Frypan Creek and Bootjack Lake in 2014 appeared to be greater than Bootjack samples collected in 2015. The concentrations of selenium in liver samples appeared to decrease in Bootjack Lake between 2014 and 2015 (Figure 7). As noted above, additional data quality confirmation is on-going to confirm the 2015 Polley Lake Rainbow Trout data.

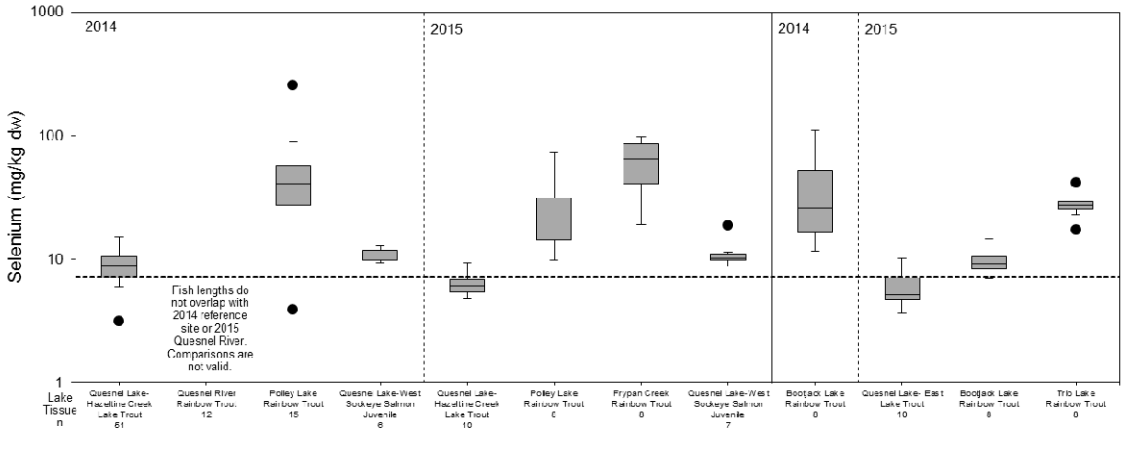
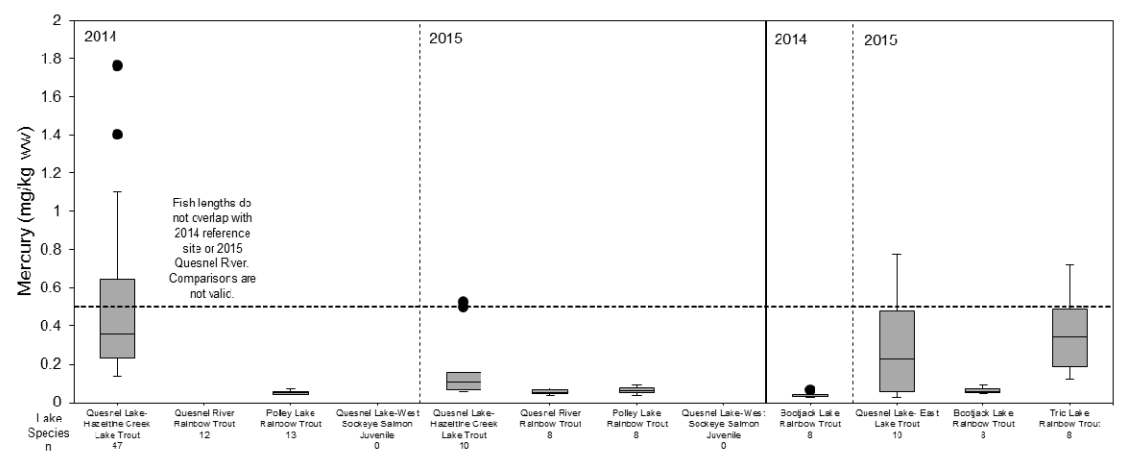
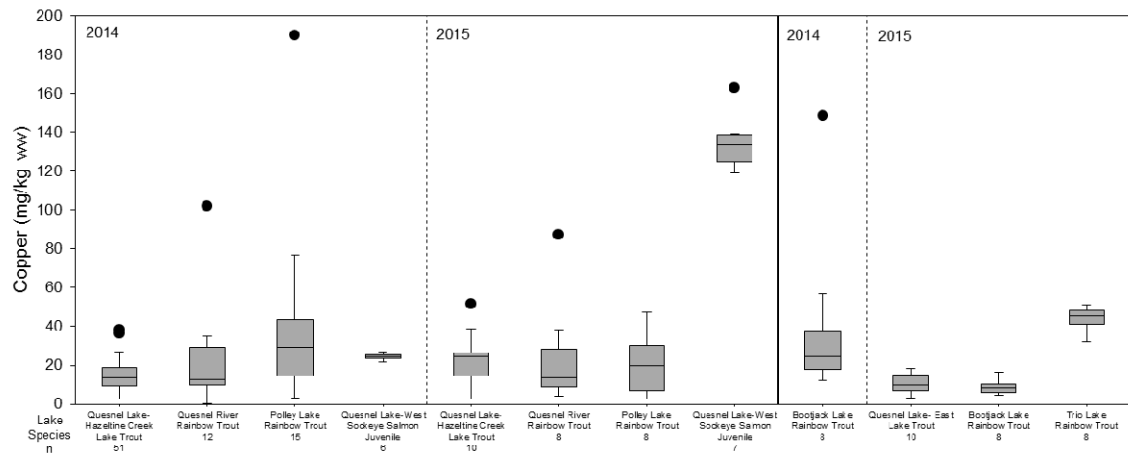


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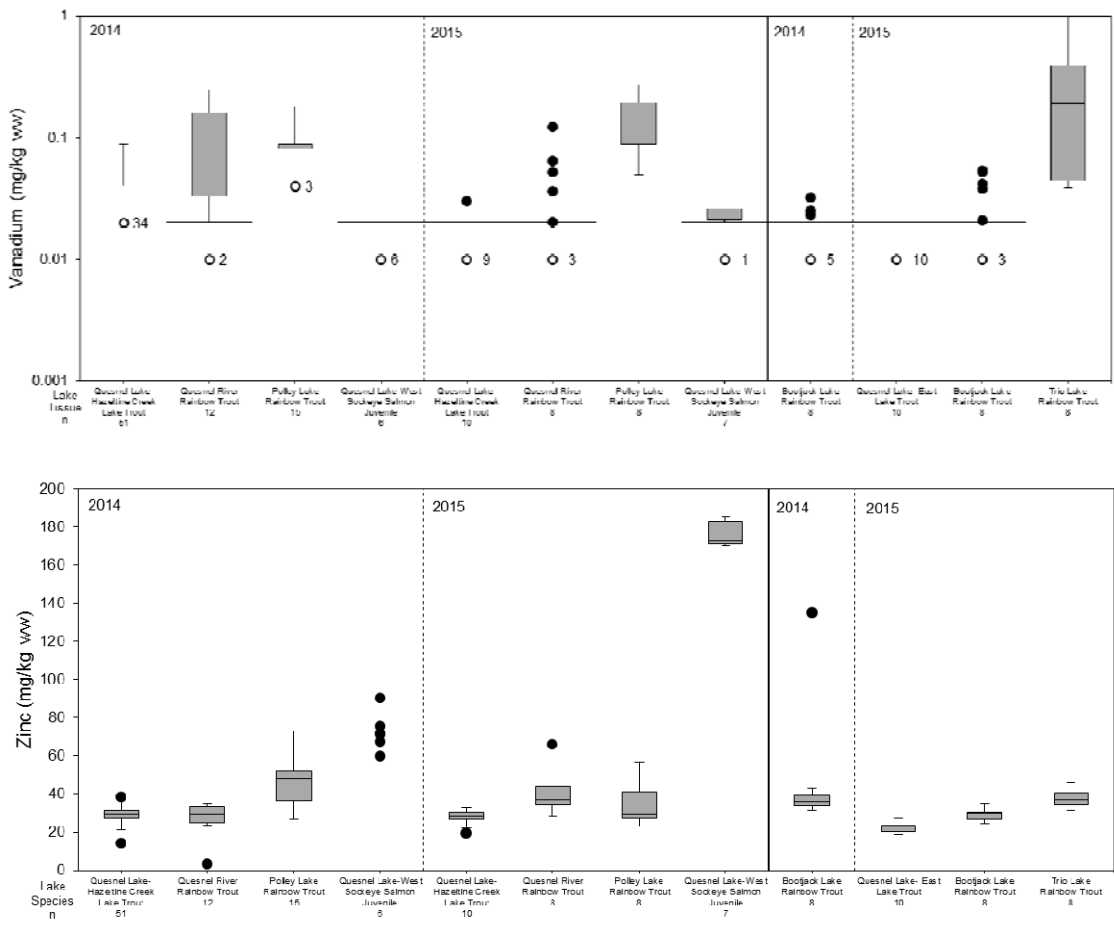


Figure 7: Summary of Available Liver Chemistry Data for Select Fish Species and Sampling Sites (2014, 2015).

Box plots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed vertical lines (- - -) indicate the separation of years; solid vertical lines (-) indicate the separation of exposure and reference; dashed horizontal lines (- - -) indicate guidelines from CFIA (mercury) or BC MoE (selenium).

Consumption by Piscivores

The fish assemblage in Polley Lake is limited. Whole body fish samples were not collected.

3.2 Hazeltine and Edney Creeks

3.2.1 Physical

Hazeltine Creek flows from Polley Lake to the West Basin of Quesnel Lake, a distance of approximately 9.2 km. Prior to the tailings spill, Hazeltine Creek flowed into Edney Creek just upstream of the discharge to Quesnel Lake. Edney Creek drains the watershed south of the Mount Polley Mine, and is understood to be a larger drainage than Hazeltine Creek and to provide more significant fish habitat as pertains to fish communities migrating to and from Quesnel Lake.



Water and tailings released during the spill created a debris flow that eroded material along the Hazeltine Creek channel and surrounding area (referred to as the floodplain). The debris flow formed a wider and deeper channel along the entire length of Hazeltine Creek by removing sediments from the channel, and native soil and forest from the floodplain. The floodplain accounts for 57% (136 ha) of the total terrestrial area affected by the debris flow. An additional 100 hectares of forest surrounding the floodplain (referred to as the halo) was inundated by tailings and remobilized sediment and the forest floor was buried to varying depths. Figure 8 shows the extent of erosion and tailings inundation in Lower Hazeltine Creek.

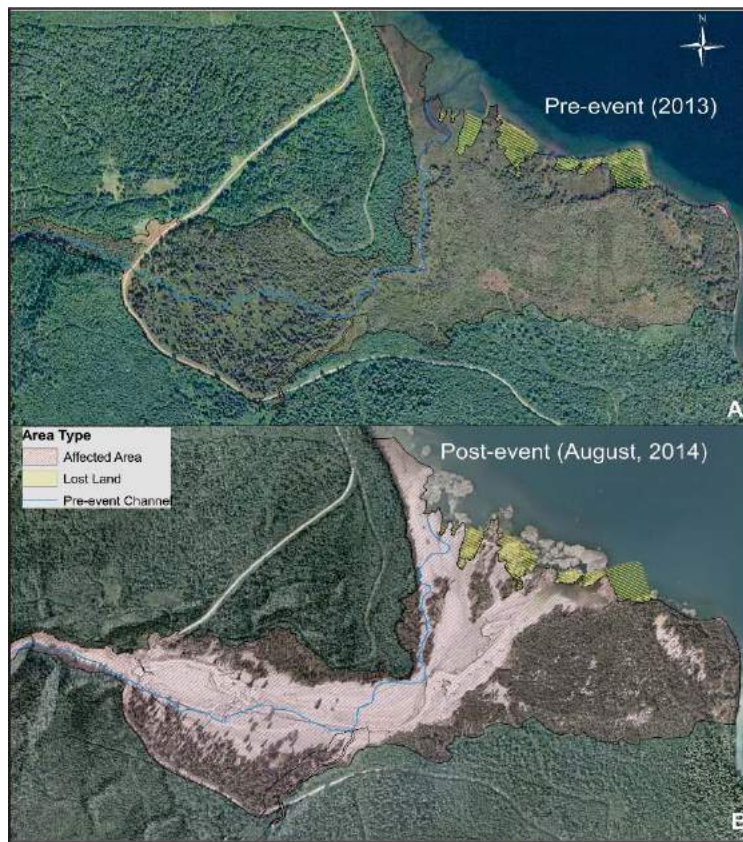


Figure 8: Pre-event and post-event view of Hazeltine Creek delta.

The lower portion of Edney Creek was also eroded away by the debris flow and fish passage into upper Edney Creek was cut off. Early rehabilitation efforts were able to restore the connection between Edney Creek and Quesnel Lake, and isolate Edney Creek from continuous impact by tailings deposited along Hazeltine Creek. While the lower portion of Edney Creek was impacted by the physical effects of the debris flow, Edney Creek water quality is determined by a watershed that was not influenced by the event and thus impacts on Edney Creek water quality were not assessed. As such, analyses of impacts to people, and terrestrial and aquatic wildlife are focused on conditions along Hazeltine Creek.



The Hazeltine Creek corridor (inclusive of the channel, floodplain, and halo) includes both terrestrial and aquatic habitats that have been impacted by the tailings spill. The impacts to these habitats and the communities within each are discussed separately below.

Terrestrial Habitat

Within the floodplain, the physical impact of the tailings spill included uprooting and transport of trees and other forest biota down the Hazeltine Creek corridor, leaving the floodplain largely absent of original vegetation. The force of the debris flow diminished at the edges of the floodplain, such that the trees in the “halo” zone were not uprooted, but the forest floor was covered by a layer of tailings and left absent of understory vegetation. The nature of the physical impact within the halo zone was less obvious than within the floodplain. The deposition of tailings and water within the halo filled the pores in the forest floor and mineral soil, blocking exchange of oxygen (O₂) and carbon dioxide (CO₂) involved in root and microbial metabolism and respiration. Many trees in the halo area appeared moribund in the spring and early summer of 2015, likely because the depth, fine texture, and saturation of the tailings created anaerobic conditions in the rooting zone. Under anoxic conditions, anaerobic and facultative soil microbes can use alternative electron acceptors such as sulfate, nitrate, ferric iron, manganese oxide, and carbon dioxide to produce energy. Field observations of an anaerobic (‘rotten egg’) odour, supported by quantitative measures (refer to Appendix I), in holes excavated in the tailings indicated at least some microbes were using sulfate as an alternative electron acceptor to oxygen. By contrast, the obligate aerobic tree roots, mycorrhizal fungal symbionts, and associated soil food web invertebrate organisms had died in the anoxic soils. These organisms require approximately 5% oxygen and use oxygen as their electron acceptor.

The pattern of tree mortality observed within the halo zone indicated tree death was caused by the anaerobic environment of the tree roots and not metal toxicity. Primarily, the foliage of trees was observed to have died uniformly through the crown, suggestive of sudden death caused by oxygen starvation to tree roots. The dying trees observed in July 2015, were reportedly still green until May 2015, after which the foliage rapidly turned brown. It is likely the tree roots had started to die immediately when the tailings inundated the floodplain, but foliage did not turn brown until the following spring after the winter dormancy had broken. As soils warmed in the spring of 2015, the foliage would have transpired while dead roots were incapable of acquiring and transporting water to the crown via the xylem. The browning of the foliage hence occurred rapidly in spring, over a period of approximately 1 to 2 months. Further summary of the impacts to the forest community within the halo area is provided in Appendix I.

Aquatic Habitat

Like within the floodplain, the sediments and aquatic community associated with Hazeltine Creek were scoured during the debris flow and transported downstream. As the debris flow receded, the remaining creek channel was composed of exposed and eroding underlying native materials and tailings, with turbid waters flowing into Quesnel Lake. After providing for safe worker access and controlling the residual source inputs from the TSF, construction began on an armoured creek channel capable of resisting erosion and providing for future fish habitat. Pockets of tailings and tailings dam materials were removed from the footprint of the constructed channel and from the footprint of any fill materials placed in the floodplain. A significant interim feature of sediment control during these works was treatment of the entirety of Hazeltine Creek flow in two sequential sediment ponds located in the lower



Hazeltine Creek floodplain. The sediment ponds provided beneficial suspended solids removal. Construction of the armoured Hazeltine Creek channel was completed in May 2015. Further work is planned to add habitat features for aquatic life along the length of the channel.

Prior to and during construction, turbidity concentrations in Hazeltine Creek were elevated above the short and long-term BC WQGs. Clear-flow conditions ensued upon completion of the channel construction. A progressive decline in turbidity levels continued throughout 2015 with levels measured closer to BC WQGs by the end of the year. Turbidity and total suspended solids remain POIs as they can be elevated above BC WQGs during occasionally turbid flow events when the creek is subject to erosion (See Appendix D). Fish access to Hazeltine Creek is currently blocked until construction is complete and appropriate habitat has been established.

3.2.2 Chemical

3.2.2.1 Soil Quality Update

Soil quality data collected from along Hazeltine Creek by SNC and Golder has been evaluated to characterize the chemical and physical composition of the deposited tailings. The soil quality assessment was based on comparison of soil chemistry to Contaminated Sites Regulation (CSR) standards and reference data. Copper and vanadium were found to exceed the most conservative applicable CSR standards and were greater than reference concentrations. The soil quality assessment found that metals concentrations between the two types of tailings observed (grey fine grained and red-black sand) were not significantly different. With regards to nutrients, average nutrient concentrations were up to 12 times less and concentrations of TOC were up to 34 times less in tailings compared to reference and native soil (Appendix B).

Based on the evaluation of 2014 and 2015 soil quality data, copper and vanadium were identified as POIs in tailings deposited along Hazeltine Creek. The bioavailability of these metals to terrestrial life has been assessed further, as discussed below.

3.2.2.2 Groundwater Quality Update

Limited groundwater quality data collected in the summer of 2015 from along Hazeltine Creek by Golder has been evaluated to provide field confirmation of the geochemistry findings that the tailings have a low potential for leaching of metals. Further investigation is planned for the summer of 2016 to confirm the potential for dissolved metal transport from the tailings to shallow groundwater that would largely discharge to Hazeltine Creek.

The groundwater quality assessment was based on comparison of groundwater chemistry to CSR standards and reference data. No exceedances of standards were observed in groundwater samples collected in 2015 and the average concentrations of metals in groundwater samples from along the creek were similar to reference concentrations (Appendix C). Based on the evaluation of 2015 groundwater quality data, no POIs were retained.

The additional groundwater investigation to be conducted in 2016 has been broadened in response to stakeholder concerns, and includes characterization of the hydrogeological regime near Hazeltine Creek.



3.2.2.3 Surface Water Quality Update

Water quality data collected from Hazeltine Creek by MPMC has been evaluated to assess temporal trends of POIs since the tailings spill through December 2015 (Appendix D). The water quality assessment was based on comparison of water chemistry to BC WQGs, reference data, and baseline data. Baseline water quality data indicates that concentrations of copper were naturally-elevated in Hazeltine Creek prior to the tailings spill. The water quality assessment identified exceedances of total metal WQGs in Hazeltine Creek in the first half of 2015, mainly during turbid flow periods typically associated with elevated concentrations of particulate matter. Clear-flow conditions ensued upon completion of channel construction, and typically resulted in lower concentrations of particulate matter and subsequently lower concentrations of total forms of metals.

The majority of metals identified as POIs in the first half of 2015 decreased to concentrations below guideline levels by mid-summer and remained stable through December 2015, with a few noted exceptions (e.g., beryllium, chromium, and cobalt in Hazeltine Creek at the Horsefly-Likely Forest Service Road (the “Ditch Road”) bridge). By December 2015, only total and dissolved copper consistently exceeded BC WQGs for the protection of aquatic life. Copper therefore remains the primary POI in Hazeltine Creek based on the 2015 data. When the creek is subject to erosion (primarily runoff and high flow events) resulting in turbid flow events, some other metals may also exceed guidelines. The water quality data from June through December 2015 is considered representative of post creek construction conditions within Hazeltine Creek. The immediate impacts of the tailings spill to Polley Lake and the creek, as well as impacts during construction of the creek channel, had subsided during this period.

Discharge of treated effluent to Hazeltine Creek, as authorized by BC MoE in the amendment to Permit 11678 (November 29, 2015), was initiated on December 1, 2015. Concomitant with the initiation of the authorized discharge, selenium concentrations increased at two stations in Hazeltine Creek located close to and downstream from the discharge location. The most sensitive receptors to selenium are egg laying vertebrates. Although these receptors have been either excluded (fish) or are limited in number (aquatic feeding birds), selenium was also monitored as a POI in Hazeltine Creek. Concentrations of selenium in water appear to have decreased in the first quarter of 2016 by 1 to 2 times compared to the concentrations reported in December 2015 following the initial discharge of treated effluent to the creek.

Metals concentrations in Hazeltine Creek surface water will continue to be monitored as part of MPMC’s routine monitoring program.

Free Metals in Surface Water

Between August and October 2015, Minnow deployed diffusive gradients in thin films (DGT) passive sampling devices in pools within the Hazeltine Creek canyon to measure the amount of free and weakly complexed metals from water near the sediment-water interface (Appendix D). Calculated concentrations of free metals in water (based on accumulation by the DGT device) were compared to concentrations of total and dissolved metals in concurrent water samples, and BC WQGs. Further background discussion of the DGT data is provided in the Polley Lake section above.

In Hazeltine Creek, copper was measured by the DGT devices at concentrations greater than other waterbodies, but lower than the applicable BC WQGs (Figure 3 above; Appendix D). It is acknowledged that the WQG were not developed based on DGT data so the comparison was made for information purposes only. In comparison to total and dissolved (filtered) concentrations, the DGT-labile concentrations of copper in water in Hazeltine Creek were lower.



3.2.2.4 Sediment Quality Update

Sediment quality data collected by Minnow from Hazeltine Creek has been evaluated to assess changes in sediment chemistry since the tailings spill occurred and following reconstruction of the creek channel (Appendix E). The sediment quality assessment was based on comparison of sediment chemistry to BC sediment quality guidelines (SQG), reference data, and baseline data. Baseline sediment data indicates that concentrations of metals were naturally-elevated in Hazeltine Creek prior to the tailings spill.

In 2014 prior to reconstruction of the creek channel, sediment was collected from locations in the upper, mid, and lower sections of the creek. The 2014 chemistry data indicated that copper and iron were elevated in comparison to guidelines and reference/baseline concentrations. Reconstruction of Hazeltine Creek included removal of tailings and laying of clean rock. Two sedimentation ponds were installed at the end of the creek, just upstream of Quesnel Lake, to contain particulate material that entered the creek during construction activities or through erosion from upland areas. In 2015 following reconstruction of the creek, sediment within the sedimentation pond was collected to represent sediment that might be present within the creek. The 2015 chemistry data indicated that copper and iron were elevated in comparison to standards and reference/baseline concentrations. Arsenic concentrations were higher in 2015 than in 2014. Based on the evaluation of 2015 sediment quality data, arsenic, copper, and iron remain POIs in Hazeltine Creek. Mercury and selenium have been added as POIs due to stakeholder concerns.

3.2.2.5 Geochemistry

Geochemistry investigations conducted by SRK Consulting (SRK) have continued since the release of the PEEIAR to geochemically characterize tailings material released during the tailings spill (Appendix A, MPMC 2015 Appendix C). The investigations have included tests to determine the potential for acid generation (acid-base accounting), as well as assessment of tailings composition, mineralogy, and leaching under subaerial (humidity cell and column tests) and subaqueous (sequential extractions) conditions.

Preliminary investigations (MPMC 2015 Appendix C) found that when compared to average concentrations in similar rock types, the only enriched elements in the tailings were copper and selenium. Only a portion (approximately 33%) of the copper is associated with sulphide, with the remainder (approximately 67%) associated with silicate minerals. This non-sulphide fraction is relatively insoluble and would have a low potential for leaching under both subaerial and subaqueous conditions. The sulphide fraction would also have low potential for leaching under subaerial conditions because the tailings were determined to be neutral or slightly alkaline with negligible potential to cause acid rock drainage (ARD). The ARD potential is negligible owing to low sulphur content and high buffering potential from calcite in the tailings. The portion of non-sulphide selenium is lower than copper (approximately 13%), and potential for leaching is also expected to be low for selenium.



Updated results provided by SRK (Appendix A) corroborate the initial findings. Results of kinetic leaching reported for 32 weeks of the 40 week long tests (humidity cells and column tests) indicate leaching rates have reduced over time and at 32 weeks showed a progressive decrease, which is likely to continue to the end of the tests. Based on the information from the geochemical tests to date the following conclusions can be drawn with respect to the potential for leaching from the tailings deposited along Hazeltine Creek under subaerial conditions:

- The results indicate that a significant amount of copper (up to 66%) is associated with the non-sulphide portion (likely chlorite) of the tailings and is considered to be non-reactive. This is based on previous studies and the results provided in this report that required acidic conditions to leach copper associated with the non-sulphide fraction.
- Kinetic testing confirmed that leaching considerations are under neutral to alkaline conditions and continue to support the previous assessment that ARD is not expected in these materials. Based on 32 weeks of testing, leaching rates are beginning to stabilize and general downward trends are expected to continue as the testing progresses. Variability in leaching rates is also being established and water contact chemistry predictions (i.e. geochemical source terms) should be possible after 40 weeks of testing.
- For any tailings materials with water flow paths longer than half a metre, mineral solubility controls for copper are expected. Longer flow paths in the fine grained materials may also be conducive to lower rates of oxygen diffusion and therefore conditions that support selenium reduction to its more insoluble forms such as selenite and elemental selenium.
- Testing is on-going and the current assessment of tailings reactivity and leaching rates will be updated once testing passes 40 weeks.

3.2.3 Biological

3.2.3.1 Terrestrial Ecosystem Assessment

As discussed above, in the summer of 2015, a study was conducted to describe and quantify the differences in terrestrial habitat quality between the halo and reference/background areas (Appendix I). Secondly, the study was conducted to determine the cause of mortality for trees in the halo area. The study considered forest floor and mineral soil properties, forest stand attributes (e.g., tree species composition, site index, height, age, basal area, stems per hectare, and stand structure), vegetation attributes (e.g., species cover, richness, and diversity), evidence of wildlife use, and wildlife attributes (e.g., snag density and size, and coarse woody debris cover and diameter).

The results of the study indicated that roots of trees within the halo were in a state of decay and were visibly disappearing from the soil horizons. Abundance and richness of the plant community were significantly lower in the halo than reference. Over forty plant species were either eliminated or reduced by over 80% in the halo compared to reference. Species gained in the halo plots tended to be “weedy” species, characteristic of disturbed areas (e.g., fireweed, dandelion, great mullein, hawksweed, white clover). Species lost tended to be characteristic of mature forests (e.g., wild ginger, rattlesnake plantain, one-side wintergreen). Cover of all plant layers were also significantly reduced due to the decline of the trees and burial of the plant community.



As discussed in the summary of physical impacts, the results available from the field program indicate that the pattern of tree mortality in the halo was caused by the anaerobic conditions in the tree rooting zone created by the deposit of fine, saturated tailings material over the forest floor. This deposit immediately blocked soil pores and reduced oxygen reaching the roots of the trees. Water trapped within the fine particles created a perched water table that continued to restrict oxygen reaching the roots. Health of the soil and microbial community also declined in response to the restricting layer of water or deposited material.

Further work is being conducted to determine if metals concentrations in soil and tailings will inhibit re-establishment of the forest community.

3.2.3.2 Terrestrial Plant and Soil Invertebrate Tissue Metals Analysis

Sampling of edible plants (berries, spruce, willow, and rye grass) and soil invertebrates (ants, beetles, worms, and slugs) was conducted in 2015 within the terrestrial area impacted by the tailings spill (i.e., Hazeltine Creek floodplain and halo) (Appendix J). The purpose of the program was to evaluate whether concentrations of soil POIs had increased in plants or soil invertebrates as a result of the tailings deposition. Plant and invertebrate sample results were compared to reference sample results and baseline data (plants only) to determine if tissue concentrations of POIs were increased and to evaluate the potential exposure to higher trophic level receptors. Each tissue sample was collected with a co-located soil sample to calculate tissue:soil ratios (i.e., bioaccumulation factors [BAFs]).

Concentrations of several metals were occasionally found to be greater in plant or invertebrate samples from the floodplain or halo in comparison to reference or baseline. BAFs calculated for copper and vanadium (POIs in soil) were below one indicating there is no relationship between copper or vanadium concentrations in soil and plants or soil and invertebrates.

A limitation of these datasets were the small number of samples, particularly for soil invertebrates. Additional sampling of plants and soil invertebrates along Hazeltine Creek will be conducted in 2016.

3.2.3.3 Surface Water Toxicity Testing

Toxicity testing was conducted on water samples collected in Hazeltine Creek prior to and following the December 1, 2015 discharge of treated mine effluent to Hazeltine Creek (authorized by BC MoE in the amendment to Permit 11678 dated November 29, 2015). Surface water samples from Hazeltine Creek were tested using a series of standard laboratory tests using sensitive invertebrate and fish test species. Neither short-term nor long-term exposure to Hazeltine Creek water, collected before or after the start of discharging treated water, resulted in adverse effects to aquatic life. The results of toxicity testing conducted between November and December 2015 are presented in Table 3-6. No toxicity was observed for any of the tests conducted, indicating that the creek water was not toxic to sensitive fish and invertebrate species tested during sensitive life stages.



Table 3-6: Summary of Surface Water Toxicity Testing in Hazeltine Creek (November to December 2015)

Test	Sample ID	Date	T. Cu (mg/L)	D. Cu (mg/L)	LC50 (% v/v)	IC25 (% v/v)	IC50 (% v/v)
96-h Rainbow Trout LC50	HAC-12	02 Nov 2015	-	-	>100	-	-
48-h <i>D. magna</i> LC50	HAC-12	02 Nov 2015	-	-	>100	-	-
7-d Rainbow Trout swim-up survival and growth	HAC-12	30 Dec 2015	0.013	0.01	>100	>100	>100
	HAC-12	12 Nov 2015	0.0099	0.0077	>100	>100	>100
7- to 8-d <i>C. dubia</i> survival and reproduction	HAC-12	30 Dec 2015	0.0099	0.0077	>100	>100	>100

Notes: Effect concentration expressed on a volume/volume basis. LC50 = Lethal concentration causing 50% mortality. IC25/IC50 = Non-lethal concentration causing 25% or 50% reduction in growth or reproduction. Total and dissolved copper (T. Cu and D. Cu) concentrations for November and December samples are MPMC unpublished data.

3.2.3.4 Sediment Toxicity

Additional testing, including sediment bioassays, community, and benthic invertebrate tissue samples were not conducted in 2015 as the creek was under construction and was not considered to be fish habitat.

3.2.3.5 Benthic Invertebrate Tissue Metals Analysis

Benthic invertebrate samples collected from upper Hazeltine Creek were dominated by a high abundance of black fly larvae, while a more diverse benthic invertebrate assemblage, composed mainly of caddisflies and mayflies, was evident at the lower Hazeltine Creek sampling area. Benthic invertebrate samples collected from Edney Creek were composed of a diverse mix of organisms, including mayflies, stoneflies and caddisflies.

The mean concentrations of several metals were significantly higher in benthic invertebrates from both upper and lower sampling areas of Hazeltine Creek than those in the corresponding reference area (Edney Creek; Table 3-7; Appendix G). PCA results confirmed the distinction between the two exposed areas and reference (Appendix G).



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Table 3-7: Summary whole benthic invertebrate and water chemistry (dissolved metals) results from creek and river sampling areas in the vicinity of the Mount Polley Mine, 2015¹

Parameter		Units	Hazelatine Creek																								
			Reference					Pre-event (2010)										Exposed (2015)									
			Edney Creek (EDC-1)					Upper Hazelatine (W7)					Lower Hazelatine (W11)					Upper Hazelatine (HAC-U)					Lower Hazelatine (HAC-D)				
			Benthic Invertebrate Tissue		Water		BCF ²	Benthic Invertebrate Tissue		Water		BCF ²	Benthic Invertebrate Tissue		Water ³		BCF ²	Benthic Invertebrate Tissue		Water		BCF ²	Benthic Invertebrate Tissue		Water		BCF ²
			Mean	t*SE	Mean	t*SE		Mean	t*SE	Mean	t*SE		Mean	t*SE	Mean	t*SE		Mean	t*SE	Mean	t*SE		Mean	t*SE	Mean	t*SE	
Parameters of Interest (POIs)	Arsenic	mg/kg	1.47	0.43	0.00054	0.00016	2,710	2.62	1.07	0.00042	0.00032	6,323	3.94	2.64	0.00051	-	7,729	2.56	0.20	0.00090	0.00008	2,842	2.29	0.46	0.00117	0.00009	1,957
	Copper	mg/kg	15.9	3.0	0.0050	0.0015	3,198	49.8	5.2	0.0021	0.0003	24,000	26.2	7.8	0.0028	-	9,432	176	13.2	0.014	0.005	12,215	204	56.0	0.034	0.008	6,054
	Iron	mg/kg	384	453	0.15	0.04	2,573	-	-	<0.03	0	-	-	-	0.094	-	-	6,502	2,902	0.079	0.046	82,144	7,720	4,103	0.243	0.227	31,749
	Manganese	mg/kg	73.8	43.2	0.0060	0.0022	12,385	2,018	275	0.0043	0.0105	468,757	1,146	477	0.0036	-	321,120	590	66.2	0.46	0.34	1,271	204	27.5	0.17	0.07	1,169
	Nickel	mg/kg	0.42	0.23	0.0011	0.0001	382	13.54	8.18	<0.0005	0	27,088	26.8	31.1	0.00070	-	38,334	8.44	2.46	0.00094	0.00038	9,016	3.14	1.01	0.0016	0.0005	1,941
	Zinc	mg/kg	74.9	5.8	<0.003	0	24,953	220	27.5	<0.001	0	219,800	101	13.5	0.0010	-	100,740	91.9	10.8	0.0034	0.0008	27,091	110	8.4	0.0033	0.0004	33,887
Indicator Parameters (IPs)	Barium	mg/kg	6.7	2.8	0.014	0.006	478	65.0	14.4	0.0079	0.0067	8,262	69.5	33.0	0.0102	-	6,818	97.9	26.0	0.031	0.009	3,118	69.8	13.7	0.032	0.004	2,200
	Calcium	mg/kg	1,477	555	22.1	7.6	67	4,276	5,999	36.1	12.7	118	2,568	1,186	21.8	-	118	7,416	2,017	62.5	14.2	119	4,202	1,300	42.5	3.4	99.0
	Cobalt	mg/kg	0.19	0.12	0.00011	0.00001	1,825	2.51	0.70	<0.0001	0	25,120	3.47	2.24	<0.0001	-	34,660	4.22	1.10	0.00064	0.00045	6,602	3.95	2.21	0.00038	0.00016	10,272
	Molybdenum	mg/kg	5.01	2.11	0.0013	0.0012	3,790	4.08	0.80	0.0020	0.0013	2,018	5.14	2.88	0.00094	-	5,481	1.47	0.25	0.012	0.001	123	1.26	0.27	0.0084	0.0014	150
	Phosphorus	mg/kg	7,408	804	0.0084	0.0014	878,419	-	-	-	-	-	-	-	-	-	-	3,940	1,341	0.0080	0.0048	492,500	2,914	993	0.0082	0.0018	354,910
	Selenium	mg/kg	1.51	0.84	0.00033	0.00011	4,519	10.9	0.82	0.001	0	10,900	3.51	0.24	<0.001	-	3,508	4.91	0.79	0.00083	0.00016	5,921	2.72	0.26	0.00090	0.00011	3,019
	Silver	mg/kg	0.023	0.022	<0.00001	0	2,259	-	-	<0.00001	0	-	-	-	<0.00001	-	-	0.080	0.024	0.000015	0.000008	5,308	0.126	0.068	0.000013	0.000002	9,787
	Sodium	mg/kg	1,972	179	3.83	1.99	514	-	-	4.50	3.81	-	-	-	3.28	-	-	3,432	671	13.9	2.9	247	1,199	311	9.55	0.95	126
	Strontium	mg/kg	10.8	3.73	0.135	0.053	80	22.5	9.87	0.23	0.17	100	20.7	8.83	0.136	-	152	60.4	7.16	0.485	0.102	125	28.4	6.85	0.350	0.033	81
	Tin	mg/kg	0.148	0.080	<0.0001	0	1,479	<0.20	0	<0.0001	0	2,000	0.24	0.10	<0.0001	-	2,420	0.031	0.015	0.00013	0.00007	235	0.026	0.019	0.00013	0.00002	208
	Titanium	mg/kg	3.90	1.78	<0.01	0	390	-	-	<0.01	0	-	-	-	<0.01	-	-	51.3	27.3	0.0102	0.0003	5,056	48.2	26.0	0.018	0.013	2,624
	Vanadium	mg/kg	0.85	1.20	0.00086	0.00010	992	6.60	2.87	<0.001	0	6,602	11.0	6.16	<0.001	-	11,024	28.9	9.39	0.0013	0.0007	21,405	44.2	18.4	0.0017	0.0005	25,464

Notes:

- Summary statistics were calculated using maximum method detection limit (MDL) values if data were below the MDL. Means are shown as < the maximum reported MDL if all data used in their calculation were < MDL. If MDLs were variable, means were reported as < the maximum MDL.
- BCF = Bioconcentration Factor; [Mean concentration of analyte in benthic tissue (mg/kg dw)] / [Mean dissolved concentration of analyte in water (mg/L)]. Mean water concentrations calculated using all available data.
- Results are based on a single sampling event, therefore data from this single sample are displayed.

Mean analyte concentration in benthic invertebrates was significantly higher than in the associated reference area (EDC, 2015), p < 0.05 (using a non-parametric Mann-Whitney U test).

Mean analyte concentration in benthic invertebrates was significantly lower than in the associated reference area (EDC, 2015) and pre-event data (2010, if available), p < 0.05 (using a non-parametric Mann-Whitney U test).

Mean analyte concentration in benthic invertebrates was significantly higher than in the associated reference area (EDC, 2015) and pre-event data (2010, if available), p < 0.05 (using a non-parametric Mann-Whitney U test).



Mean benthic invertebrate metal concentrations in Edney Creek show low concentrations, including concentrations of selenium below the dietary guideline of 4 ug/g for environmental protection. Prior to the tailings spill, mean concentrations of several metals, including selenium, were higher in upper and lower areas of Hazeltine Creek compared to samples taken in 2015. Concentrations of selenium in invertebrates collected in 2010 in upper and lower Hazeltine Creek were 10.9 ug/g dw and 3.5 ug/g dw, respectively, compared to 4.9 ug/g dw and 2.7 ug/g dw, respectively, in 2015. These data may indicate high natural variability for selenium in this area. Analyses of 10 samples of glacial sands, silts and varved clays (glaciolacustrine-glaciofluvial sediments) from along Hazeltine Creek yielded selenium values ranging from 0.3 to 4.8 ppm, while tailings (2013) averaged 1.14 ppm selenium. The 10 Hazeltine Creek glacial sediment samples had higher average cadmium and antimony than the average values in the 2013 tailings for these elements. (C.D.Anglin, pers comm, 2016) Post-event benthic invertebrate concentrations of copper and vanadium in the upper and lower Hazeltine Creek were higher than pre-event conditions. It is unknown at this time if the observed increase in concentrations of metals in benthic invertebrates is related to sediment particulates in the gut content of the benthic invertebrates or if these concentrations have been absorbed into tissues. Evaluation of fish tissue concentrations may help in this matter, as sediment bound metals would be more efficiently excreted. Further assessment of the metal concentrations in benthic invertebrates and the significance to predator species is underway.

3.2.3.6 Benthic Invertebrate Community

No benthic invertebrate community sampling was conducted in Hazeltine Creek in 2014 due to the absence of appropriate erosional habitat following the tailings spill (i.e., substrates were entirely fine materials derived from the tailings and scoured creek bed). Benthic invertebrate sampling was undertaken in 2015 following reconstruction of the creek channel to track recovery. The data were not available at the time of writing this report. These data will be included in the Risk Assessment report due later this year (2016).

3.3 Quesnel Lake

3.3.1 Physical

Quesnel Lake is a large, deep fjord lake reaching from the Cariboo Mountains into the Interior Plateau of BC. The lake has a surface area of 266 km² and is comprised of West, East, and North Arms. The average and maximum depths of the lake are 157 and 511 m, making Quesnel Lake one of the deepest fjord-type lakes in the world (Laval et al. 2008). The West Basin is a relatively shallow (113 m maximum depth) portion of the West Arm that is separated from the rest of the lake by a shallow sill approximately 35 m deep, near Cariboo Island, and is considered the area between Cariboo Island and the Quesnel River (Laval et al. 2008). The West Basin has vertical mixing that is typical of temperate lakes, with thermal stratification for most of the year interrupted by brief turnover periods in the spring and the fall when vertical density gradients are lowest. A thermocline typically forms at a mean depth of 12.4 m (Nidle et al. 1994). In the deeper portions of the lake, seasonal turnover events only occur in the upper 100 to 200 m of the water column due to changes in temperature-density relationships with increased pressure at greater depths. Nutrient data collected since the mid-1990 indicate that the trophic status of the lake is oligotrophic (Nidle et al. 1994).



Hazeltine Creek enters the West Basin of Quesnel Lake. It is estimated the tailings spill resulted in the discharge of about 18.6 million m³ of mixed tailings, soil and water into Quesnel Lake (MPMC 2015 Appendix B). The majority of the discharged material settled in the West Basin at depths >100 m below surface (MPMC 2015 Appendix B). The area of this major deposit was estimated to be approximately 1.81 km² with thickness of the deposit ranging up to about 10 m. On the underwater lake side-slope from the mouth of Hazeltine Creek, native material was eroded by underwater debris flow; deposition of tailings material on the side-slope was considered negligible. Along the side-slope from the mouth of Hazeltine Creek and in the deep portion of the West Basin, the immediate physical impact to the lake bottom included the loss of habitat and displacement of the benthic community. No significant deposition of material was measure in the main body of the lake (MPMC 2015 Appendix B), but up to 40% of material that remained in suspension was predicted to disperse into the main body of the lake at low concentration.

Turbidity monitoring in Quesnel Lake following the tailings spill revealed within the West Basin a turbidity plume in the water column at depths >20 m below surface and below the thermocline. The turbidity plume persisted until late November 2014 when lake turnover occurred and the water column mixed. By January 2015, the turbidity in Quesnel Lake had decreased to below that prescribed by the BC WQGs (MPMC 2015 Appendix F). Throughout 2015, levels of turbidity and total suspended solids were low in the far-field areas of Quesnel Lake as well as in the West Basin, and generally remained below guidelines (Appendix D). Exceptions to this were instances between March and May 2015, where higher levels of turbidity were recorded in the near-field area at the mouth of Hazeltine Creek during turbid flow periods in Hazeltine Creek.

3.3.2 Chemical

3.3.2.1 Surface Water Quality Update

Water quality data collected from Quesnel Lake by MPMC has been evaluated to assess temporal trends of POIs since the tailings spill through December 2015 (Appendix D). The water quality assessment was based on comparison of water chemistry to BC WQGs and reference data. During the period immediately following the tailings spill, copper was identified as the primary POI within the West Basin of Quesnel Lake. Total copper was below applicable BC WQGs in the near-field, mid-field and far-field stations in Quesnel Lake throughout most of 2015. Exceptions to this were instances where total concentrations were above the BC WQG between March and May in the near-field area close to the mouth of Hazeltine Creek and to a lesser extent at the western mid-field station further away from the mouth. These higher total concentrations coincided with turbid flow periods in Hazeltine Creek and dissolved concentrations did not exceed BC WQGs. Other metals monitored at the Quesnel Lake stations in 2015 were below applicable BC WQGs. With respect to nutrients, phosphorus data collected throughout 2015 suggested that event-related changes with respect to the potential for a change in lake trophic status were not evident in Quesnel Lake. Based on the evaluation of 2015 water quality data, no POIs in surface water remain above WQGs in Quesnel Lake.

Metals concentrations in Quesnel Lake surface water will continue to be monitored as part of MPMC's routine monitoring program.



3.3.2.2 *Free Metals in Surface Water*

Between August and October 2015, Minnow deployed diffusive gradients in thin films (DGT) passive sampling devices in a profundal area of Quesnel Lake near the mouth of Hazeltine Creek to measure labile (free and weakly complexed) metals from water near the sediment-water interface (Appendix D). Calculated concentrations of free metals in water (based on accumulation by the DGT device) were compared to concentrations of total and dissolved metals (determined by filtering through a 0.45 µm filter) in concurrent water samples, reference concentrations from a reference profundal area of Quesnel Lake, and BC WQGs. We note that WQG were not derived using DGT data, so the comparison is for information purposes only.

In Quesnel Lake, DGT-detectable parameters were measured by the DGT devices at concentrations similar to reference concentrations and lower than the applicable BC WQGs (Figure 3 above). In comparison to total and filtered concentrations, the DGT-labile concentrations in water near the bottom of Quesnel Lake were lower. These data show that the proportion of free and weakly complexed metals is low.

3.3.2.3 *Sediment Quality Update*

Sediment quality data collected from Quesnel Lake by Minnow has been evaluated to assess changes in sediment chemistry since the tailings spill occurred. Unlike water quality, concentrations of metals in the tailings-influenced sediment are not expected to have changed substantially between sampling events in 2014 and 2015. The sediment quality assessment was based on comparison of sediment chemistry to BC SQGs and reference data. Reference sediment data from areas of Quesnel Lake unlikely to be impacted by the tailings spill indicated that concentrations of metals were naturally elevated in the lake prior to the tailings spill (MPMC 2015 Appendix E).

Sediment has been collected from littoral and profundal areas in the lake, and at various distances from the mouth of Hazeltine Creek. The 2014 chemistry data indicated that several metals including arsenic and copper were elevated in comparison to guidelines and reference concentrations. Concentrations of metals were observed to decrease with distance from the mouth of Hazeltine Creek, while total organic carbon (TOC) was observed to increase. Sediment chemistry in 2015 was similar to 2014 and exhibited the same spatial pattern of decreasing copper concentrations and increasing TOC with distance from Hazeltine Creek mouth.

3.3.2.3.1 *Evaluation of Mercury Biomagnification Potential*

Golder reviewed the conditions that favour the methylation of mercury to assess whether these conditions occur in Quesnel Lake and reviewed the existing monitoring data to examine the evidence (if any) of increased mercury concentrations as a result of the tailings spill.

Factors Influencing Methylation of Mercury

Azimuth (2010, 2012, 2015) summarized environmental factors that influence mercury methylation. As outlined in Sections 4.3 to 4.5 of Azimuth (2012), key parameters that influence methylation potential are residence time, trophic status, temperature, DO, pH, dissolved organic carbon, total suspended solids, sulphate, sediment grain size, and total organic carbon in sediment. The correlation of these parameters with mercury methylation (i.e., positive or negative) is summarized in Table 3-8 below.



As summarized in Table 3-8 below, conditions in Quesnel Lake generally do not favour mercury methylation. Quesnel Lake is oligotrophic, cold, well oxygenated, slightly basic, and relatively low in concentrations of dissolved organic carbon, total suspended solids, and sulphate. Sediment grain size and TOC are also not favourable for mercury methylation.

Table 3-8: Summary of Parameters and their Correlation with Mercury Methylation (Azimuth 2012) and Current (Post-event) Conditions of these Parameters in Quesnel Lake

Parameter	Correlation	Conditions that Favour Methylation	Quesnel Lake	Source for Quesnel Lake data
Residence time	Positive	Longer residence time	10 years (entire lake); 3 months (West Basin); less likely	1,6
Trophic status	Positive	Highly productive systems	Low productivity; classified as oligotrophic; less likely	1
Water - Temperature	Positive	Warmer temperatures (weakly related)	Temperature < 10 °C at depths greater than 40 m; less likely	2
Water - Dissolved Oxygen	Negative	Low oxygen conditions	Concentrations > 5 mg/L at all depths; less likely	2
Water - pH	Negative	Slightly acidic waters (pH <6.5)	Median pH = 7.95; less likely	3
Water - dissolved organic carbon	Positive	Concentrations > 5 mg/L	Mean concentration = 2.2 mg/L; less likely	3
Water - total suspended solids	Positive	Higher concentrations (as transport media for mercury)	Below detection limit of 3 mg/L in most samples (n= 198); 13 samples had detected concentrations that ranged from 3 to 54.1 mg/L.; less likely	3
Water - sulphate	Positive	Higher concentrations over environmentally relevant range (5-30 mg/L)	Mean concentration = 6.6 mg/L; less likely	3
Sediment - grain size	Negative	Fine grain sediment ⁵	In the <63 µm fraction, predominantly silt in profundal samples and predominantly sand in littoral samples.; less likely in littoral, more likely in profundal	4
Sediment - total organic carbon	Positive	Higher	Mean total organic carbon ≤ 2.3% in the <63 µm fraction; less likely	4

Abbreviations: < = less than; ≤ = less than or equal to; > = greater than; ~ = approximately; °C = degrees Celsius; m = metres; mg/L = milligrams per litre; µm = micrometres; % = percent.

Sources:

¹ MPMC (2015 Appendix F).

² Depth profiles presented in MPMC (2015 Appendix H).

³ Appendix D. Values calculated using all Quesnel Lake samples or all Polley Lake samples collected in 2015.

⁴ Appendix E. Based on mean particle size or mean total organic carbon at exposed locations sampled in 2014 and 2015.

⁵ Condition that favours mercury methylation is described in Azimuth (2012).

⁶ MPMC (2015 Appendix B).



Review of Existing Monitoring Data for Mercury

Water Chemistry

Water chemistry data collected between August 2014 and July 2015 are reported in Appendix D. Between August 2014 and July 2015, with the exception of one water sample, total aqueous mercury concentrations in Quesnel Lake samples have been below the reported detection limits of 50 ng/L (August 2014 samples), 10 ng/L (late August and September 2014 samples), or 5 ng/L (2015 samples). The single sample with a detected concentration (11 ng/L) was collected from station QUL-96 in September 2014. Water samples collected on the same day from nearby station QUL-2 were below the detection limit of 10 ng/L. Because mercury data are sparse and total aqueous mercury concentrations were below the reported detection limit in all but one sample, interpretation of aqueous mercury trends is limited.

The single measured aqueous mercury concentration and the detection limits for samples with no detected mercury were compared to the BC Water Quality Guideline (BC MoE 2001) of 10 ng/L, based on the assumption that the percent methylmercury in Quesnel Lake is 1%. Because the percent methylmercury in Quesnel Lake has not been measured the aqueous mercury data cannot be directly compared to the BC water quality guideline. However, comparison to the CCME (2003) water quality guidelines for inorganic mercury suggest that the potential for mercury effects is low. In water samples collected from late August 2014 (i.e., detection limit of 10 ng/L) to July 2015 (i.e., detection limit of 5 ng/L), aqueous mercury concentrations were lower than the CCME (2003) water quality guideline for inorganic mercury (26 ng/L).

Although the above comparison to the CCME (2003) water quality guideline suggests that the potential for mercury effects is low, CCME (2003) states that the water quality guideline may not fully protect higher trophic levels. Therefore, sediment, zooplankton tissue chemistry, and fish tissue chemistry data collected from Quesnel Lake were also reviewed to assess spatial and temporal trends in mercury concentrations.

Sediment Mercury

Sediment chemistry data are reported in MPMC (2015 Appendix E) and Appendix E. Sampling in Quesnel Lake was conducted in 2014 and 2015 at two depths: littoral (1 to 2 metres deep) and profundal (approximately 80 to 100 metres deep). In 2014, both the littoral and profundal sampling in Quesnel Lake included two reference areas and four exposed areas. For each sampling location, concentrations were measured in the <2 mm fraction and the <63 µm fraction. In 2015, both the littoral and profundal sampling included one reference area and one exposed area. Concentrations were measured in the <63 µm fraction only. Baseline sediment chemistry data were not available for Quesnel Lake (MPMC 2015 Appendix E).

In littoral and profundal sediment samples collected in 2014 and 2015, concentrations of mercury in exposed areas were generally higher than concentrations in reference areas. However, mercury concentrations in exposed areas were lower than the BC working sediment quality guideline. In 2014 and 2015, mean sediment mercury concentrations in exposed areas were either lower than or similar to the mean baseline concentration in Hazeltine Creek.

With respect to temporal comparisons, sediment mercury concentrations in 2015 were generally higher than concentrations measured in 2014 post-event. Mean sediment mercury concentrations appeared to be higher in 2015 relative to 2014 both in exposed areas (31 to 42%) and reference areas (16 to 19%).



Zooplankton Tissue Mercury

Zooplankton tissue chemistry collected in 2014 and 2015 from Quesnel Lake is reported in Appendix G. Tissue samples were collected from three stations in Quesnel Lake: one exposed station called Hazeltine (in the West Arm west of Cariboo Island) and two reference stations, Horsefly (near the Horsefly River) and Junction (in the Main Basin where the east and north arms meet).

Zooplankton tissue metals concentrations were variable at all three stations, with no consistent spatial or temporal trends.

Fish Tissue Mercury

Fish tissue chemistry collected in 2014 and 2015 from Quesnel Lake is reported in Appendix H. Tissue chemistry comparisons were conducted spatially (i.e., exposure versus reference areas) and temporally (i.e., 2014 versus 2015 data) for site, species, and tissue type, where data were available.

The following observations were made with respect to spatial comparisons in Quesnel Lake:

- For five of the sampled fish species with sufficient tissue mercury data to compare between exposed and reference areas (i.e., Lake Trout, Largescale Sucker, Northern Pikeminnow, Redside Shiner, and juvenile Sockeye Salmon), mercury concentrations in fish collected from exposed locations appeared to be similar to concentrations in fish collected from reference locations.
- Two species exhibited potential differences between exposed and reference areas:
 - Kokanee collected in 2014 from Quesnel Lake near Quesnel River (exposure) had higher mercury concentrations in ovary relative to Kokanee collected from Quesnel Lake North Arm (reference), although concentrations in liver and muscle samples were similar.
 - Peamouth Chub collected in 2015 from Quesnel Lake Hazeltine Creek Confluence (exposure) had higher mercury concentrations in whole body relative to fish collected from Quesnel Lake North Arm (reference). There is uncertainty in this comparison because it was not possible to confirm that similar length distributions were sampled in the two waterbodies due to a lack of fish length data.

With respect to temporal comparisons in Quesnel Lake, mercury concentrations in tissue appeared to be similar.

Overall, the spatial and temporal comparisons indicate that fish tissue mercury concentrations in Quesnel Lake are comparable to concentrations measured in reference locations and that concentrations have not increased since the tailings spill. These results are consistent with the lack of spatial and temporal trends observed in water chemistry, sediment chemistry, and zooplankton tissue chemistry. These data are considered to be preliminary at this time. Further monitoring of fish tissues will be conducted as part of the CEMP.



3.3.3 Biological

3.3.3.1 Sediment Toxicity Testing

MPMC conducted a post-event toxicity testing program between August and October 2014 (MPMC 2015 Appendix E), in which surface sediment samples collected from Quesnel Lake were tested using a series of standard laboratory tests using sensitive invertebrate test species. The program provided an important evaluation of the bioavailability and toxicity of POIs as they are observed in site-specific samples, as well as changes to physical conditions of the sediment that may affect the capacity of sediment to support sediment dwelling organisms. The laboratory testing provided a direct measure of biological effect to individual organisms under site-relevant conditions.

The results of post-event toxicity testing conducted in 2014 indicated effects to the survival and growth of test organisms in tailings-affected sediments collected in Quesnel Lake. Sediments collected from Quesnel Lake exhibited physical differences from sediments generally present in aquatic environments, and from sediment collected from reference areas and from the same locations pre-event. Physical differences included uniform particle size, relatively high density, and relatively low TOC content. Chemical differences included elevated metal concentrations. Effects were not clearly correlated with either physical or chemical characteristics of sediment following the series of tests conducted in 2014.

Additional testing was conducted in 2015 to elucidate the respective roles of the physical and chemical factors, as well as to confirm the general patterns of toxicity observed in Quesnel Lake sediments in the 2014 testing program. This additional investigation of toxicity of Quesnel Lake impacted sediments indicated no effect to the survival of either invertebrate test organism, which differed from 2014. In contrast, effects on growth of both invertebrate test organisms (*C. tentans* and *H. azteca*) were confirmed in 2015, with growth apparently being the more sensitive test endpoint in the impacted sediment tested. Effects on growth were not seen with the addition of TOC to concentrations similar to reference conditions, and comparisons of exposed sediments to a clay control indicated either no difference from the clay control (*C. dilutus*) or slightly greater growth than the clay control (*H. azteca*). This is consistent with previous findings that *C. dilutus* is intolerant of sediment with TOC lower than approximately 1% despite feeding of the test organisms (Suedel and Rodgers 1994). The consistent positive response to TOC amendment in both exposed sediment and reference clay (uncontaminated but with high fines content) suggests that the response to TOC was through provision of food resources rather than through additional metal binding capacity. Strong positive relationships were observed between growth of both organisms and TOC whereas there were no strong relationships with copper. These observations are consistent with geochemical investigations, which indicated that leaching of tailings-associated metals is low (Appendix A, MPMC 2015 Appendix C) and physical characteristics of the sediment may lead to slower rates of sediment recolonization in the profundal zone.

3.3.3.2 Benthic Invertebrate Biomass and Tissue Metal Analysis

3.3.3.2.1 Quesnel Lake Littoral

Benthic invertebrate biomass and tissue metal analysis is provided in Appendix G. The approximate biomass of benthic invertebrate subsamples retrieved from exposed and reference littoral areas of Quesnel Lake were similar (Table 3-9). Quesnel Lake littoral benthic invertebrate samples were composed mainly of chironomids, mayflies, leeches, amphipods, and pea clams.



Table 3-9: Summary whole benthic invertebrate and sediment chemistry results from lake sampling areas in Quesnel Lake, 2015¹

Parameter		Units	Quesnel Lake																			
			Littoral										Profundal									
			Reference					Exposed					Reference					Exposed				
			LREF1					Far-field (LFF)					PREF1					Near-field (PNF)				
			Benthic Invertebrate Tissue		Sediment		BSAF ²	Benthic Invertebrate Tissue		Sediment		BSAF ²	Benthic Invertebrate Tissue		Sediment		BSAF ²	Benthic Invertebrate Tissue		Sediment		BSAF ²
			Mean	t*SE	Mean	t*SE		Mean	t*SE	Mean	t*SE		Mean	t*SE	Mean	t*SE		Mean	t*SE	Mean	t*SE	
Parameters of Interest (POIs)	Arsenic	mg/kg	1.84	1.23	4.5	1.94	0.40	2.20	0.86	4.04	2.21	0.55	12.5	4.76	8.88	0.52	1.41	4.55	6.08	15.4	1.90	0.30
	Copper	mg/kg	13.6	6.6	32	8.0	0.43	26.8	11.6	65.7	51.7	0.41	54.9	17.7	55.1	11.8	1.00	178	118	859	378	0.21
	Iron	mg/kg	1,964	1,852	23,200	4,245	0.08	2,880	1,606	27,280	8,966	0.11	7,636	5,945	31,300	5,187	0.24	8,742	8,031	40,620	6,727	0.22
	Manganese	mg/kg	96.6	84.4	322	103	0.30	130	22.4	308	88.3	0.42	140	73.3	491	54.6	0.29	187	145	1,033	329	0.18
	Nickel	mg/kg	3.77	3.66	30.7	6.81	0.12	4.99	2.76	26.2	5.70	0.19	8.53	4.64	39.1	6.67	0.22	17.1	32.4	20.2	6.84	0.85
	Zinc	mg/kg	129	143	62.3	11.0	2.08	123	32.5	49.1	9.8	2.51	96.8	8.3	79.8	17.8	1.21	233	169	96.0	41.2	2.43
Indicator Parameters (IPs)	Barium	mg/kg	22.5	14.8	115	19.0	0.20	25.8	17.9	68.6	25.1	0.38	86.8	39.0	147	9.9	0.59	50.5	52.3	255	72.1	0.20
	Calcium	mg/kg	82,818	198,333	7,483	1,498	11.07	9,818	16,263	10,622	2,157	0.92	2,996	1,253	8,747	283	0.34	4,032	3,375	31,160	3,467	0.13
	Cobalt	mg/kg	2.03	1.96	10.8	2.30	0.19	2.89	0.20	10.9	3.43	0.27	3.57	1.80	14.5	2.45	0.25	4.81	5.68	25.5	10.6	0.19
	Molybdenum	mg/kg	0.38	0.27	0.83	0.37	0.46	0.46	0.47	0.67	0.35	0.69	0.83	0.25	1.08	0.27	0.77	1.31	0.97	4.05	0.89	0.32
	Phosphorus	mg/kg	6,031	5,387	1,143	103	5.27	5,504	1,848	971	343	5.67	7,388	1,238	1,180	65.7	6.26	11,274	5,234	1,352	297	8.34
	Selenium	mg/kg	3.24	2.75	0.64	0.23	5.09	3.46	0.43	0.52	0.37	6.65	8.12	1.10	0.97	0.29	8.37	4.59	3.16	1.23	0.46	3.74
	Silver	mg/kg	0.047	0.012	0.148	0.030	0.32	0.033	0.018	0.099	0.025	0.34	0.191	0.079	0.214	0.061	0.89	0.191	0.270	0.369	0.106	0.52
	Sodium	mg/kg	1,854	648	460	50	4.03	1,850	1,228	386	219	4.79	3,634	810	497	62.5	7.32	5,922	2,623	1,396	411	4.24
	Strontium	mg/kg	149	255	69	15.7	2.16	61.3	88.5	79.3	34.6	0.77	30.1	12.3	85.1	8.7	0.35	43.2	39.5	212	45.2	0.20
	Tin	mg/kg	0.016	0.011	0.38	0.025	0.04	0.022	0.017	0.440	0.178	0.05	0.056	0.051	0.453	0.100	0.12	0.225	0.344	1.99	0.528	0.11
Titanium	mg/kg	28.2	24.8	936	86.8	0.03	53.3	68.0	1,085	387	0.05	143	178	1,130	197	0.13	218	230	1,996	509	0.11	
Vanadium	mg/kg	5.94	8.06	57	9.3	0.10	12.1	5.95	85.3	46.6	0.14	17.0	9.67	70.1	11.2	0.24	24.4	18.9	142	32.6	0.17	

Notes:
 1. Summary statistics were calculated using method detection limit (MDL) values if data were below the MDL. Means are shown with a < symbol if all data used in their calculation were < MDL. If MDLs were variable, means were reported as < the maximum MDL.
 2. BSAF = Biota Sediment Accumulation Factor; [Mean concentration of analyte in benthic tissue (mg/kg dw)] / [Mean concentration of analyte in sediment (mg/kg dw)]
Bold font indicates mean analyte concentration in benthic invertebrates was significantly lower than in the associated reference area, p < 0.05 (using a non-parametric Mann-Whitney U test).



Mean concentrations of metals in benthic invertebrates from the littoral far-field area of Quesnel Lake did not differ from the reference area (Table 3-9), including copper. PCA results supported this finding, with very little distinction between the exposed and reference area results.

Biota-to-sediment accumulation factors (BSAFs) for the Quesnel Lake littoral exposed area (Quesnel Lake LFF) were similar to those at the reference area. Copper concentrations in sediment were below the sensitive sediment standard in the littoral exposed area. Although the BSAF for selenium in invertebrates collected from the littoral zone was greater than 1.0, it was similar to reference and concentrations of selenium in invertebrates were less than the wildlife dietary guideline of 4 ug/g dw.

3.3.3.2 Quesnel Lake Profundal

The approximate biomass of benthic invertebrates retrieved from the profundal exposed area of Quesnel Lake was lower than the approximate biomass of benthic invertebrate subsamples retrieved from the corresponding profundal reference area (exposed mean <0.09 g/m² wet weight; reference mean >0.34 g/m² wet weight; Appendix G). Samples collected from both profundal areas of Quesnel Lake were composed mainly of chironomids.

Copper was the only metal with a mean benthic invertebrate concentration in the profundal near-field area of Quesnel Lake that was significantly greater than the reference area mean (Table 3-9 above). A higher concentration of copper in benthic invertebrates was expected, as the sediment concentrations were significantly higher in copper in near field profundal compared to reference. However, the biota-to-sediment accumulation (BSAF) for the relationship of copper in invertebrates to copper in sediment was less than 1.0 and had a negative slope (Appendix G, Figure 3). The concentration of copper in benthic invertebrates collected from the near-field exposed area appeared to be greater than reference by approximately three times compared to a 16x difference in sediment concentrations of copper. These data show that copper is not a biomagnifying metal.

For selenium, the mean benthic invertebrate concentrations for near field profundal was slightly greater than the dietary guideline (4.6 ug/g vs 4 ug/g), but significantly less than reference. The mean benthic invertebrate concentration of selenium was 8.1 ug/g in the reference samples. These preliminary data may indicate that Quesnel Lake selenium concentrations in invertebrates varies above and below the guideline naturally or from other sources. Further investigation into the concentrations of metals in benthic invertebrates in Quesnel Lake exposed and reference sites is planned as part of the CEMP.

3.3.3.3 Benthic Invertebrate Community

Analysis of the benthic invertebrate community in Quesnel Lake has been conducted by Minnow to assess the initial impacts of the tailings spill and track recovery (MPMC 2015 Appendix E). The benthic invertebrate community assessment was based on comparison of community metrics (e.g., diversity, richness, evenness) to reference areas in Quesnel Lake. Sampling in 2014 at littoral areas in Quesnel Lake, at various distances from the Hazeltine Creek mouth (near-field, far-field and far-far-field) indicated that richness and density were lower at near-field locations compared to reference. Metrics for far-field and far-far-field littoral locations indicated those communities were similar to reference. Samples from profundal areas exhibited greater difference from reference, with lower richness and density at both near and far field locations; several samples yielded no benthic



invertebrates, indicating the benthic community was entirely covered and/or displaced by tailings. Additional samples of benthic community diversity and abundance were collected from Quesnel Lake in the fall of 2015. Although the data were not ready at the time of preparing this report, based on the biomass data provided above, there appear to no longer be a difference in biomass in the Quesnel Lake littoral zone. A difference in biomass continues to exist in the profundal zone. The data were not ready at the time of preparing this report. These data will be included in the Risk Assessment report that will be submitted later this year (2016).

3.3.3.4 Surface Water Toxicity Testing

MPMC has conducted a post-event toxicity testing program since the tailings spill occurred, in which surface water samples collected from Quesnel Lake were tested using a series of standard laboratory tests using sensitive plant, invertebrate, and fish test species. The program provides an important evaluation of the bioavailability and toxicity of POIs as they are observed in site-specific samples. The laboratory testing provides a direct measure of biological effect to individual organisms under site-relevant conditions, and includes sensitive test species representing primary producers, primary consumers, and secondary consumers.

The results of post-event toxicity testing conducted between August 2014 and February 2015 (MPMC 2015 Appendix F) indicated that receiving environment waters in Quesnel Lake were not acutely toxic (i.e., lethal) to sensitive plant, invertebrate, and fish species, nor chronically toxic (i.e., sub-lethal, longer term effects) to sensitive plant and fish species. Reproductive test responses in *Ceriodaphnia* were observed in three samples. The responses were inferred to be related to suspended matter in the samples, as filtered samples from the same locations did not elicit toxicity.

In subsequent sub-lethal toxicity tests with water samples collected from Quesnel Lake between March and December 2015, no impacts on survival and growth of fish were observed, and no impacts on survival of invertebrates were observed (Appendix F). The only observed effects were on reproduction of invertebrates in a subset of the unfiltered samples collected in Quesnel Lake close to the Hazeltine Creek mouth in January and March 2015. Again, no effects were reported in the corresponding filtered samples. Dissolved copper concentrations were not different between filtered and unfiltered samples. All measured parameters were below corresponding BC WQGs, supporting our interpretation that exposure to suspended particulate matter in the unfiltered samples may have resulted in the reproduction responses. The results of toxicity testing conducted between March and December 2015 are presented in Table 3-10.



Table 3-10: Summary of Surface Water Toxicity Testing in Quesnel Lake (March to December 2015)

Test	Sample ID	Date	T. Cu (mg/L)	D. Cu (mg/L)	LC50 (% v/v)	IC25 (% v/v)	IC50 (% v/v)
7-d fathead minnow survival and growth	QUL-66-0m	15 Jan 2015	0.0043	0.0019	>100	83.2 (46.7-100)	>100
	QUL-66-85m		0.0049	0.002	>100	95.6 (25.4-100)	>100
	QUL-66-0M	02 Mar 2015	-	-	>100	>100	>100
7-d Rainbow Trout swim-up survival and growth	QUL-66-0m	15 Jan 2015	0.0043	0.0019	>100	>100	>100
	QUL-66-85m		0.0049	0.002	>100	>100	>100
	QUL-55-0M	16 Jun 2015	0.0014	0.0011	>100	>100	>100
	QUL-55a-0M	25 Aug 2015	0.00095	0.00055	>100	>100	>100
7- to 8-d <i>C. dubia</i> survival and reproduction	QUL-66-0m	15 Jan 2015	0.0043	0.0019	>100	11.1 (7.2-29.1)	>100
	QUL-66-0m (Filtered)		-	0.0019	>100	>100	>100
	QUL-66-85m		0.0049	0.002	>100	8.3 (2.3-23.0)	>100
	QUL-66-85m (Filtered)		-	0.002	>100	>100	>100
	QUL-66-0M	02 Mar 2015	-	-	>100	74.2 (5.7-NC)	>100
	QUL-66-0M (Filtered)		-	-	>100	>100	>100
	QUL-55a-0M		25 Aug 2015	0.00095	0.00055	>100	>100

Notes: Samples were not filtered, unless indicated otherwise. Effect concentration expressed on a volume/volume basis; in instances where an effect was observed, 95% confidence limits were not always calculable (NC). LC50 = Lethal concentration causing 50% mortality. IC25/IC50 = Non-lethal concentration causing 25% or 50% reduction in growth or reproduction. Total and dissolved copper (T. Cu and D. Cu) concentrations for January to August samples are provided in Appendix B.

3.3.3.5 Plankton Community and Tissue Metal Analysis

Sampling of plankton was conducted weekly in 2014 in the months immediately following the tailings spill (September to November; MPMC 2015 Appendix H) and then monthly between May and September 2015 (Appendix G). Plankton communities exhibit inherent variability related to temperature, daylight, depth sampled etc. Because the same months were not sampled in both 2014 and 2015 the data between years are not directly comparable. Due to differences in resolution of taxonomic identification as well as units, the zooplankton abundance and biomass data were not compared to pre-event data presented in Hume et al. (2005) and MacLellan et al. (1993). Thus, the update report focuses on characterizing the plankton community observed between May and September 2015.

In 2015, plankton communities were sampled at three stations in Quesnel Lake (one near field exposure station and two far field reference stations) during the open water period from May to September. Spatial and temporal trends in phytoplankton biomass (as chlorophyll a), and zooplankton abundance and biomass were qualitatively examined by plotting the data. Trophic status of Quesnel Lake was determined through comparison of chlorophyll a, nutrient concentrations, and water transparency (Secchi depths). The evaluation of trophic status indicated that Quesnel Lake is oligotrophic (nutrient-poor, unproductive system). Chlorophyll a in Quesnel Lake was low and seasonally variable, and chlorophyll a concentrations generally increased through the open water period from May to September.



The zooplankton tissue results are presented in Figures 9a to 9d, below. A brief summary of the findings for Quesnel Lake sampling is as follows:

- Phytoplankton biomass (as chlorophyll *a*) in Quesnel Lake was below 1.0 µg/L in all sampling events, but varied seasonally. Chlorophyll *a* concentrations generally increased through the open water period from May to September. Overall, Quesnel Lake is classified as oligotrophic based on several classification systems, which use nutrients (total phosphorus and total nitrogen), Secchi depths, and chlorophyll *a* concentrations to evaluate trophic status.
- Total zooplankton biomass and abundance in Quesnel Lake during the open water period of 2015 was generally higher than values observed during post-event sampling in fall of 2014. Seasonal variability was observed through the open water period of 2015 with a generally increasing trend in biomass and a generally decreasing trend in abundance observed from May to September 2015.
- Zooplankton biomass and abundance in Quesnel Lake were generally dominated by either cyclopoid copepods or cladocerans. Seasonal differences were observed throughout the open water period of 2015 with cyclopoid copepods generally dominant in spring and early-summer and cladocerans dominant in late-summer and fall. Limited spatial variability was observed among stations with similar trends observed at the Hazeltine, Horsefly, and Junction stations through the open water period in 2015.
- Zooplankton tissue concentrations of copper, selenium, mercury, and arsenic were plotted by sampling period for each station in Quesnel Lake to qualitative evaluate trends in these parameters in comparison to aqueous concentrations of these parameters at comparable water quality sampling locations.
 - An increasing trend in arsenic concentrations was observed in zooplankton tissue from all three stations; however, this trend was not observed in aqueous arsenic concentrations at comparable water sampling stations. In 2015, aqueous arsenic concentrations were generally similar at all three stations and all concentrations were below the BC WQG. The trends in tissue concentrations do not reflect what is observed in arsenic concentrations in surface water collected from nearby locations.
 - No consistent trends were observed in zooplankton copper concentrations measured in sampling events from 2014 and 2015. Tissue concentrations of copper were generally higher at Hazeltine compared to the other two stations. In 2014, tissue concentrations of copper appeared to increase from October to November; however, this same increasing trend was not observed to continue in 2015. One elevated copper concentration was observed at Hazeltine in May 2015. Given that copper does not biomagnify in freshwater systems (Cardwell et al. 2013) and aqueous copper concentrations in May 2015 were similar to or lower than aqueous concentrations during other sampling events that did not result in comparable copper concentrations in tissue, this elevated value appears to be anomalous.
 - Zooplankton tissue mercury concentrations were variable at all three stations, with no consistent spatial or temporal trends. In 2015, tissue concentrations of mercury at Hazeltine and Junction increased between May and September to values within the range observed at Junction in September 2014. Aqueous mercury data are sparse and aqueous concentrations were below the reported detection limit in all samples and interpretation of aqueous mercury trends is therefore limited.
 - Zooplankton tissue selenium concentrations appeared to exhibit a generally increasing trend at all stations throughout the 2015 sampling period with the exception of the August 2015 sampling event when lower concentrations were observed. Over the open-water period of 2015, aqueous selenium concentrations exhibited a slight decreasing trend.

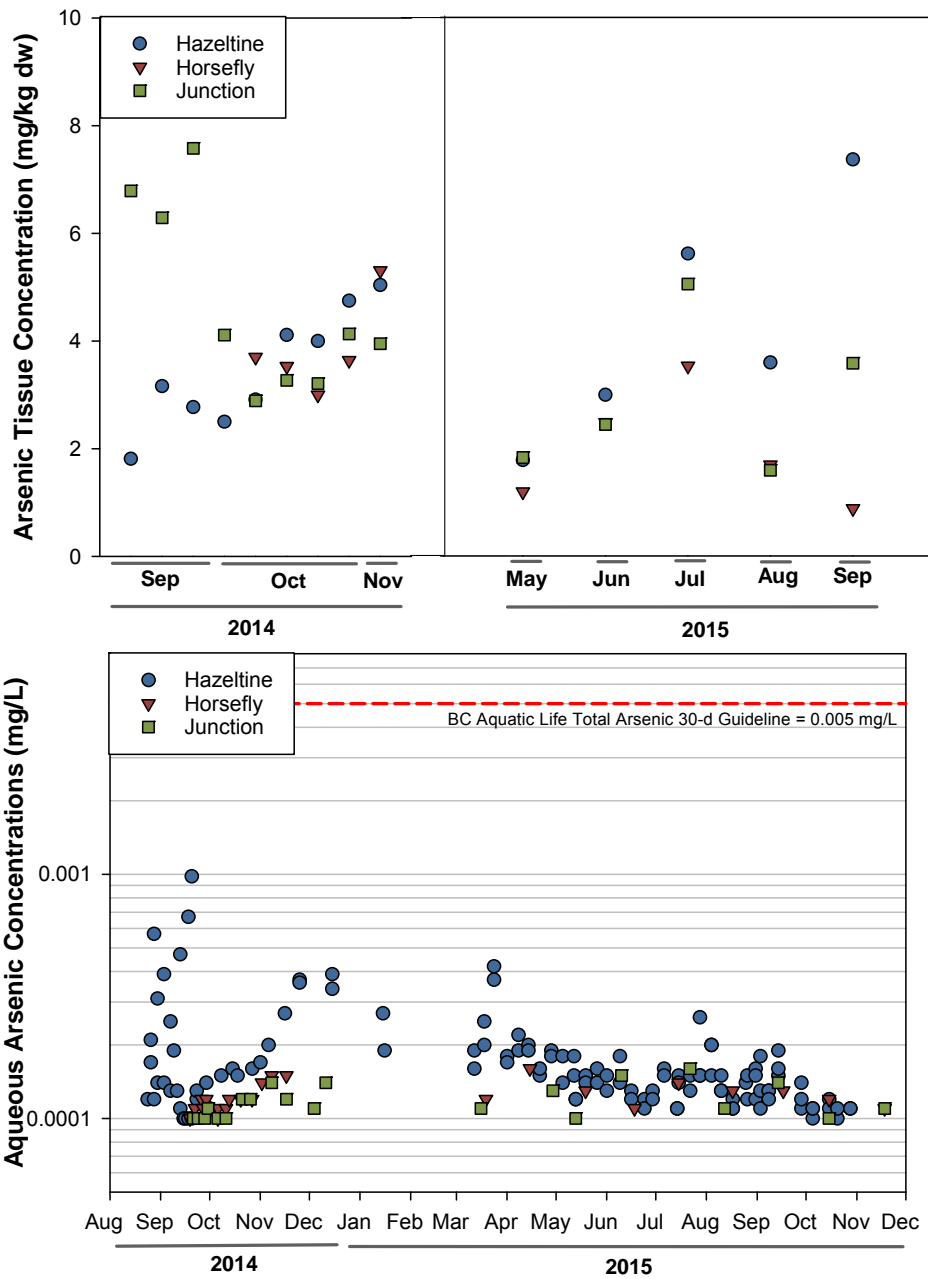
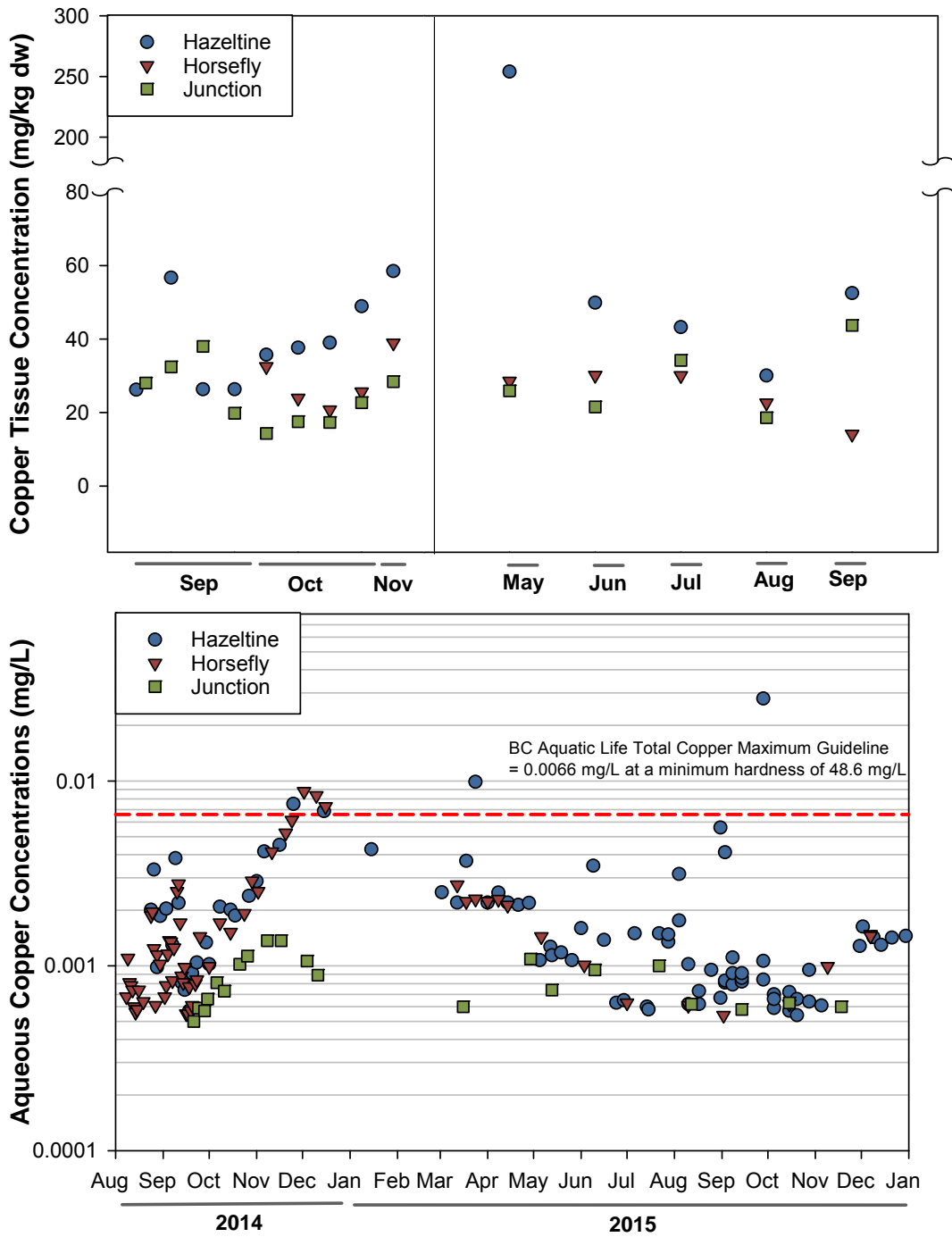
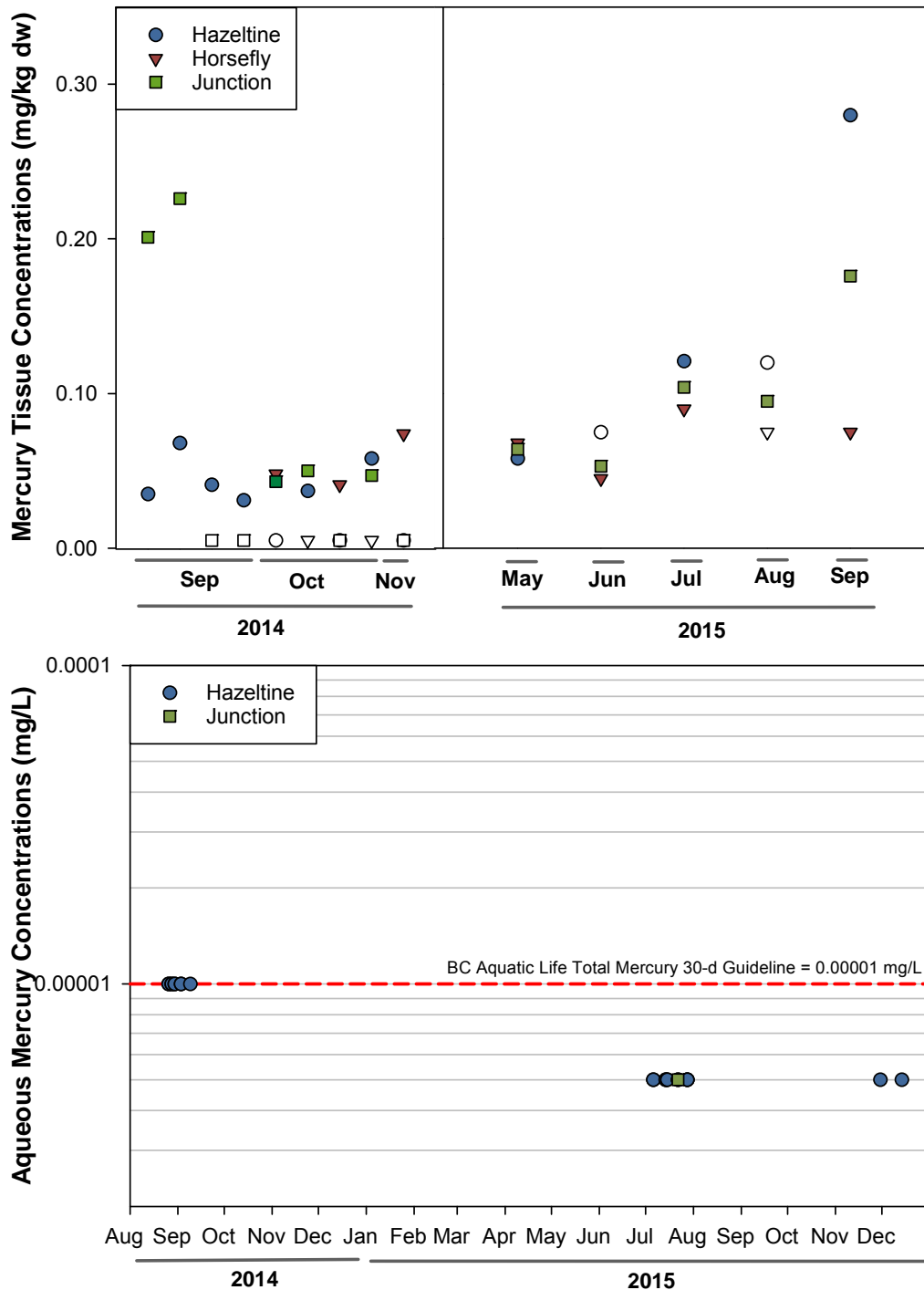


Figure 9a: Concentrations of Arsenic in Zooplankton Tissue and Surface Water Collected from Quesnel Lake in Fall 2014 and 2015.



Note: Potentially anomalous value observed in Hazeltine in May 2015.

Figure 9b: Concentrations of Copper in Zooplankton Tissue and Surface Water Collected from Quesnel Lake in Fall 2014 and 2015.



Note: Open symbols represent non-detect values.

Figure 9c: Concentrations of Mercury in Zooplankton Tissue and Surface Water Collected from Quesnel Lake in Fall 2014 and 2015.

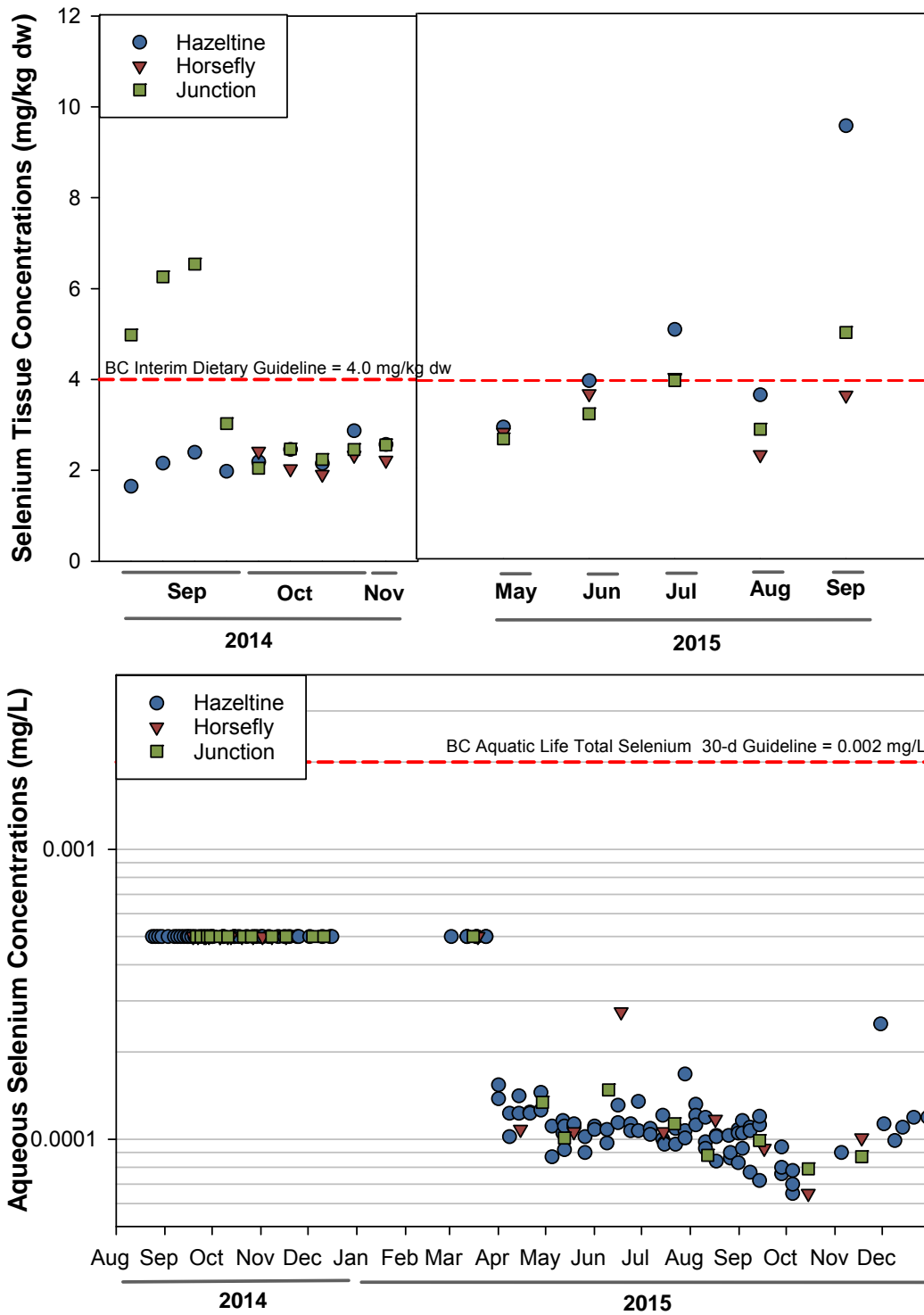


Figure 9d: Concentrations of Selenium in Zooplankton Tissue and Surface Water Collected from Quesnel Lake in Fall 2014 and 2015.



3.3.3.6 Fish Productivity

Post-event toxicity testing indicated that Quesnel Lake water did not affect survival or growth of fish, survival or growth of daphnid zooplankton, or growth of plant test species. The literature indicates that the direction of change in primary productivity as a result of introduction of suspended sediments to a lake depends on whether the phytoplankton are light limited or nutrient limited. The information available suggest that there was an influx of phosphorus into Quesnel Lake. Although changes in phytoplankton and zooplankton biomass were not observed, juvenile Sockeye Salmon collected west of Cariboo Island in 2014 were larger than those from the lake east of Cariboo Island. Juvenile Sockeye Salmon collected west of Cariboo Island in 2015 were similar in size to fish collected in other parts of the lake pre-event and in 2015. The absence of an observed increase in either phytoplankton or zooplankton abundance may reflect grazing/predation, which may in turn be reflected in the larger and possibly more numerous juvenile Sockeye observed in DFO's data compared to previous years.

3.3.3.7 Fish Tissue Metal Concentrations

Multiple stakeholders collected fish tissue samples following the release of tailings. Golder consolidated the data from these multiple sources into a single dataset to facilitate data review. The methods used to present the data are discussed in detail in Appendix H. The following section summarizes the observations made for Quesnel Lake.

3.3.3.7.1 Comparison to Tissue Guideline

- There were no arsenic guideline exceedances observed for Quesnel Lake fish.
There were mercury guideline exceedances observed for Quesnel Lake fish, as outlined in Table 3-11, below:

Table 3-11: Summary of mercury guideline exceedances in fish sampled from Quesnel Lake (2014-2015)

Table with 4 columns: Year, Species, Location, and Number and Type. It details mercury guideline exceedances for Burbot and Lake Trout in 2014 and 2015 across various locations in Quesnel Lake.



Selenium concentrations that exceed the BC MoE screening values for the protection of First Nation subsistence consumers and the general population are outlined in Table 3-12, below. The screening value for the protection of First Nation subsistence consumers of 7.3 ug/g dw was based on a fish ingestion rate of 220 g/day (Health Canada, 2004). The screening value for the protection of the general population of 17.5 ug/g dw was based on a fish ingestion rate of 111 g/day (Health Canada, 2004). Exceedances were noted for both exposed and reference sites. Selenium concentrations in Quesnel Lake fish that exceed the BC MoE guideline for Environmental Protection are outlined in Table 3-13, below.

Table 3-12: Exceedances of MoE selenium screening values in fish tissues collected from exposed and reference sites in Quesnel Lake

Guideline	Year	Species	Location	Number and Type
Low Fish Intake (75 mg/kg dw) Recreational Fishers	2014	Rainbow Trout	Quesnel Lake near Quesnel River (exposure)	1 of 2 liver
		Rainbow Trout	Quesnel River (exposure)	1 of 12 liver
	2015	Kokanee	Quesnel Lake near Quesnel River (exposure)	1 of 8 liver
Moderate Fish Intake (14.5 mg/kg dw) General Population	2014	Burbot	Quesnel Lake Hazeltine Creek (exposure)	2 of 12 liver
		Kokanee	Quesnel Lake near Quesnel River (exposure)	10 of 10 liver
		Kokanee	Quesnel Lake North Arm (reference)	10 of 10 liver
		Lake Trout	Quesnel Lake Hazeltine Creek (exposure)	1 of 51 liver
		Rainbow Trout	Quesnel Lake near Quesnel River (exposure)	2 of 2 liver
		Rainbow Trout	Quesnel River (exposure)	2 of 3 ovary, 8 of 12 liver, 1 of 12 muscle



Guideline	Year	Species	Location	Number and Type
High Fish Intake (7.3 mg/kg dw) First Nation Subsistence	2015	Kokanee	Quesnel Lake near Quesnel River (exposure)	8 of 8 liver
		Rainbow Trout	Quesnel River (exposure)	6 of 8 liver
		Sockeye Salmon (juvenile)	Quesnel Lake East (reference)	1 of 3 liver
		Sockeye Salmon (juvenile)	Quesnel Lake North Arm (reference)	1 of 3 liver
		Sockeye Salmon (juvenile)	Quesnel Lake Middle (exposure)	1 of 4 liver
		Sockeye Salmon (juvenile)	Quesnel Lake West (exposure)	1 of 7 liver
	2014	Burbot	Quesnel Lake Hazeltine Creek (exposure)	1 of 8 ovary, 2 of 12 liver
		Kokanee	Quesnel Lake Quesnel River (exposure)	10 of 10 liver
		Kokanee	Quesnel Lake North Arm (reference)	10 of 10 liver
		Lake Trout	Quesnel Lake Hazeltine Creek (exposure)	36 of 51 liver
Mountain Whitefish		Quesnel Lake Hazeltine Creek (exposure)	3 of 3 ovary, 3 of 4 liver	
Rainbow Trout		Quesnel Lake near Quesnel River (exposure)	2 of 2 liver	
Rainbow Trout		Quesnel River (exposure)	3 of 3 ovary, 10 of 12 liver, and 1 of 12 muscle	
Sockeye Salmon (juvenile)		Quesnel Lake North Arm (reference)	3 of 3 liver	
Sockeye Salmon (juvenile)		Quesnel Lake Middle (exposure)	1 of 3 liver	
Sockeye Salmon (juvenile)		Quesnel Lake West (exposure)	6 of 6 liver	



Guideline	Year	Species	Location	Number and Type
	2015	Burbot	Quesnel Lake Hazeltine Creek (exposure)	1 of 1 ovary
		Kokanee	Quesnel Lake Quesnel River (exposure)	8 of 8 liver
		Lake Trout	Quesnel Lake Hazeltine Creek (exposure)	2 of 9 kidney, 1 of 10 liver
		Lake Trout	Quesnel Lake East (reference)	3 of 10 kidney, 2 of 10 liver
		Rainbow Trout	Quesnel River (exposure)	1 of 1 ovary, 7 of 8 kidney, 8 of 8 liver
		Sockeye Salmon (juvenile)	Quesnel Lake North Arm (reference)	3 of 3 liver
		Sockeye Salmon (juvenile)	Quesnel Lake Middle (exposure)	4 of 4 liver
		Sockeye Salmon (juvenile)	Quesnel Lake West (exposure)	7 of 7 liver
		Sockeye Salmon (juvenile)	Quesnel Lake East (reference)	3 of 3 liver

Table 3-13: Summary of Selenium Tissue Exceedances for Environmental Protection

Year	Species	Location	Type and Number
2014	Rainbow Trout	Quesnel Lake near Quesnel River (exposure)	1 of 2 muscle
	Northern Pikeminnow	Quesnel Lake Hazeltine Creek Confluence (exposure)	2 of 36 whole-body
	Northern Pikeminnow	Quesnel Lake Horsefly River Confluence (exposure)	1 of 10 whole-body
	Northern Pikeminnow	Quesnel Lake North Arm (reference)	1 of 31 whole-body
2015	Largescale Sucker	Quesnel Lake Hazeltine Creek Confluence (exposure)	1 of 8 muscle
	Peamouth Chub	Quesnel Lake Hazeltine Creek Confluence (exposure)	1 of 8 whole-body

Notes: Quesnel Lake Horsefly River confluence was previously classified as “exposure” by DFO and this classification was retained.



3.3.3.7.2 Risk Assessment and Toxicological Context

For Quesnel Lake, Golder selected a subset of fish species for which there are adequate data (e.g., at least 8 samples in both exposure and reference sites; sampled in both years) and focused on species that represent small-bodied fish that are more likely to reflect local conditions and large bodied fish that likely reflect exposure in a larger area and are valued for human consumption. The following species were selected:

- Peamouth Chub and juvenile Sockeye Salmon were selected as a representative small-bodied fish that are expected to occupy a smaller home range (relative to large-bodied fish such as Lake Trout or Rainbow Trout) and would be consumed by piscivorous fish. Definitive data regarding Peamouth Chub home range size are not currently available, but literature supports this assumption (e.g., Environment Canada 1995). There is also an adequate number of Peamouth Chub samples from both exposed and reference sites in both years. Juvenile Sockeye Salmon were also considered to occupy a smaller home range, although they move from their spawning habitats out into the open lakes as they mature.
- Lake Trout and Rainbow Trout were selected as representative larger-bodied fish that are likely to be consumed by humans (and potentially, by large piscivorous wildlife). There are also adequate numbers of Lake Trout and Rainbow Trout samples from both exposed and reference sites in both years.
- Adult Sockeye Salmon were excluded because the duration and frequency of their time in impacted areas is limited to migration back to their natal streams. Feeding during this time is expected to be minimal. Juvenile Sockeye Salmon are included because they would be residents within the study area and are of concern to many stakeholders.

The primary focus of the comparison was between locations that shared a similar ecology. Fish samples from exposed sites in Quesnel Lake were compared to reference sites in Quesnel Lake.

Human Consumption of Fish

Figure 5 in the Polley Lake section above, provides a summary of the available box plots for specific metals in the muscle samples from large-bodied fish species. As described above, Lake Trout, Rainbow Trout and juvenile Sockeye Salmon were identified as a reasonable surrogate for the preliminary consideration of this pathway. Individual box plots with pair-wise comparisons for different sites, species and years are provided in Appendix H. The purpose of this figure is to highlight whether there are obvious changes in metal accumulation between reference and exposed sites, or between years that would indicate that there has been a change in metal concentrations in muscle tissue that is frequently consumed by people. In brief, results are summarized as follows:

- Arsenic concentrations in muscle samples were similar among reference and the exposed sites. The box plots for Rainbow Trout and Lake Trout caught in exposed sites in Quesnel Lake overlapped with the box plots for Lake Trout collected from the reference sites in Quesnel Lake, indicating that there was not a significant increase in fish tissue concentrations observed. All measured concentrations were less than the preliminary tissue guideline.
- Copper, selenium and zinc concentrations in muscle samples were similar among reference and exposed sites. There was one muscle sample from a Rainbow Trout collected at Quesnel River in 2014 that exceeded the BC screening value for selenium for the protection of subsistence fish consumers. Concentrations were below the screening value in 2015.



- Mercury concentrations in muscle samples appeared to be similarly variable between exposed sites and reference sites. About 10% Lake Trout muscle samples from both exposed and reference areas of Quesnel Lake had tissue concentrations that exceeded the muscle preliminary tissue guideline for the protection of human health in both years.

Bioaccumulation by Fish

Figures 6 and 7 (liver and ovary) in the Polley Lake section above, provide summaries of the available fish tissue chemistry data for organ-specific samples presented as censored box plots for the specific metals identified. Individual censored box plots showing comparisons of exposure and reference sites, species and years are provided in Appendix H, Attachment 2. The purpose of the summary figures presented herein is to highlight changes in metal concentrations between reference and exposed sites, or between years in tissues that have been associated with metal accumulation. In brief, results are summarized as follows:

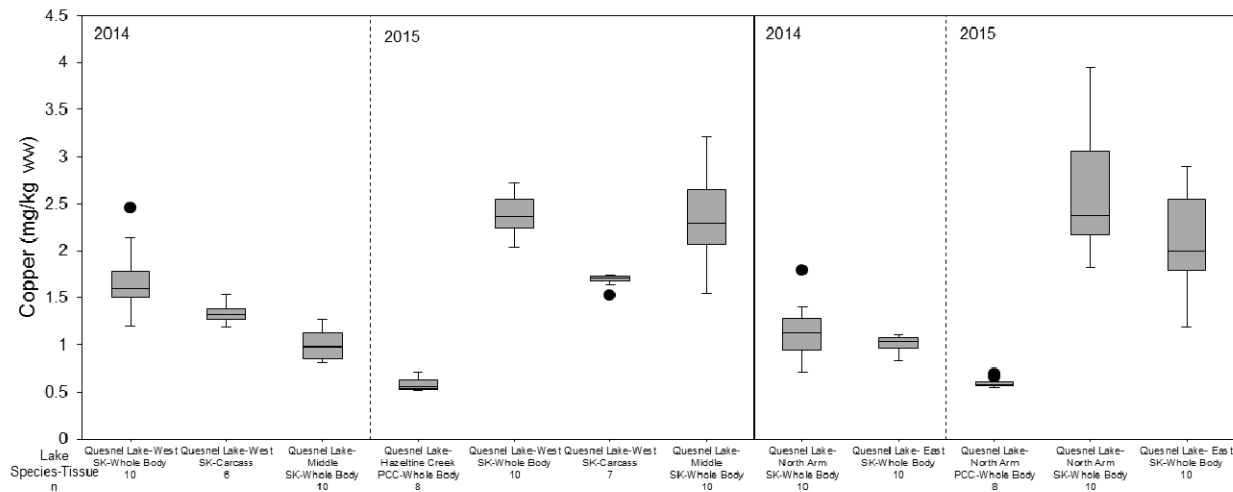
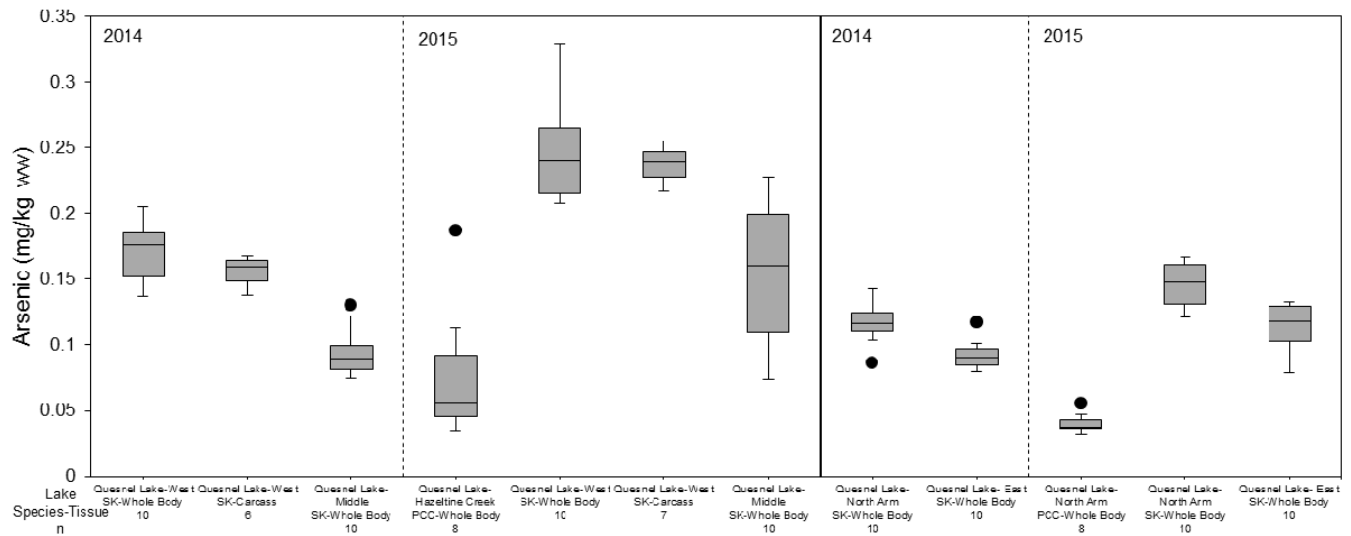
- For arsenic and copper, liver concentrations were generally consistent between the exposed and reference sites. One potential exception is juvenile Sockeye Salmon from Quesnel Lake (West) which tended to have higher liver arsenic and copper concentrations than those observed in other species. There are no juvenile Sockeye Salmon liver samples from reference sites, and therefore, it is not clear whether this is a species-specific difference (i.e., Sockeye accumulate more arsenic in their liver than Rainbow Trout) or a potential site-specific influence. For arsenic in kidney samples, there may be an increased concentration at the Quesnel River exposed site compared to Quesnel Lake – East. However the Lake Trout collected from Quesnel Lake at Hazeltine were similarly low compared to Quesnel Lake – East.
- Mercury concentrations in fish liver were variable for both the reference sites and exposed sites. Some of these concentrations exceeded the fish tissue guidelines as outlined above. Liver tissue is not commonly consumed, but Golder would welcome input on this from the Williams Lake Indian Band and Soda Creek First Nation.
- Selenium concentrations in liver were similar between exposed and reference samples in Quesnel Lake and concentrations exceeded the guideline for environmental protection in some samples.
- Vanadium concentrations were generally not detected in fish from either exposed or reference in Quesnel Lake.
- Zinc concentrations in Lake Trout liver and kidney were low in both reference and exposed areas of Quesnel Lake.

Consumption by Piscivores

A summary of the box plots for specific metals in the available whole body Peamouth Chub and juvenile Sockeye Salmon samples is provided in Appendix H and Figure 10 below. Peamouth Chub and juvenile Sockeye Salmon were considered reasonable surrogates for the preliminary consideration of potential risks to piscivorous wildlife. The purpose of this summary figure is to highlight whether there are obvious changes in metal accumulation between reference and exposed sites, or between years that would indicate that this pathway is operable.

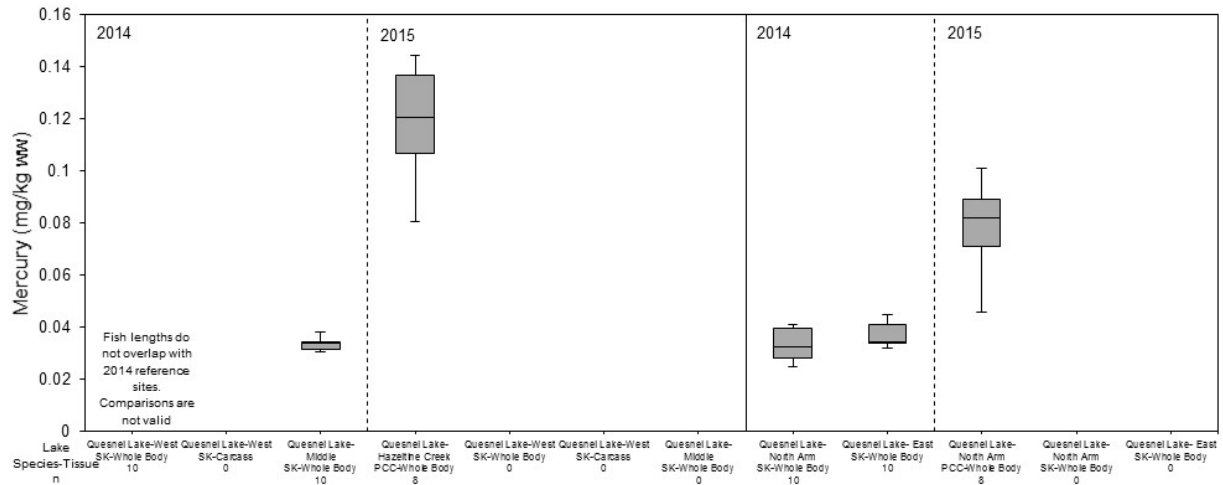
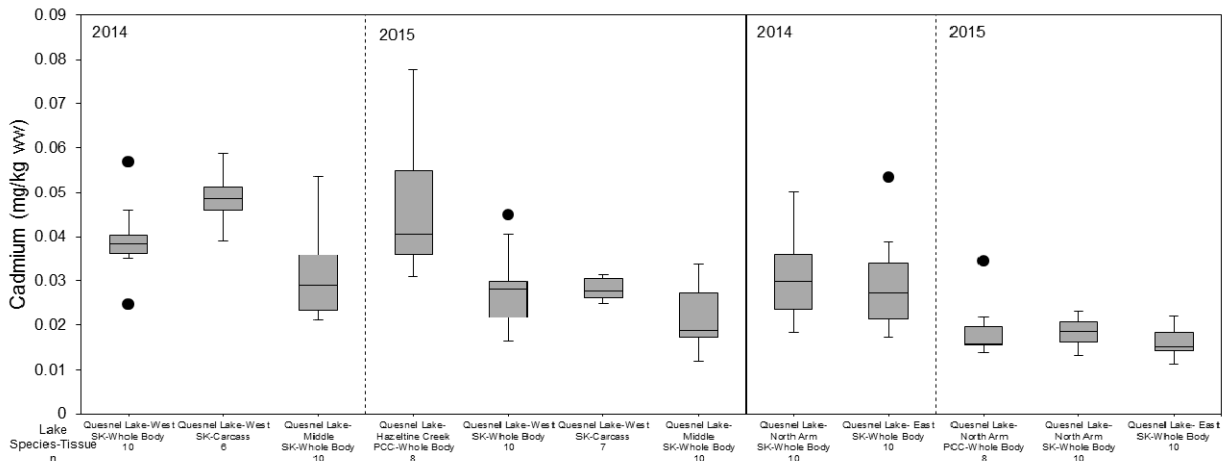
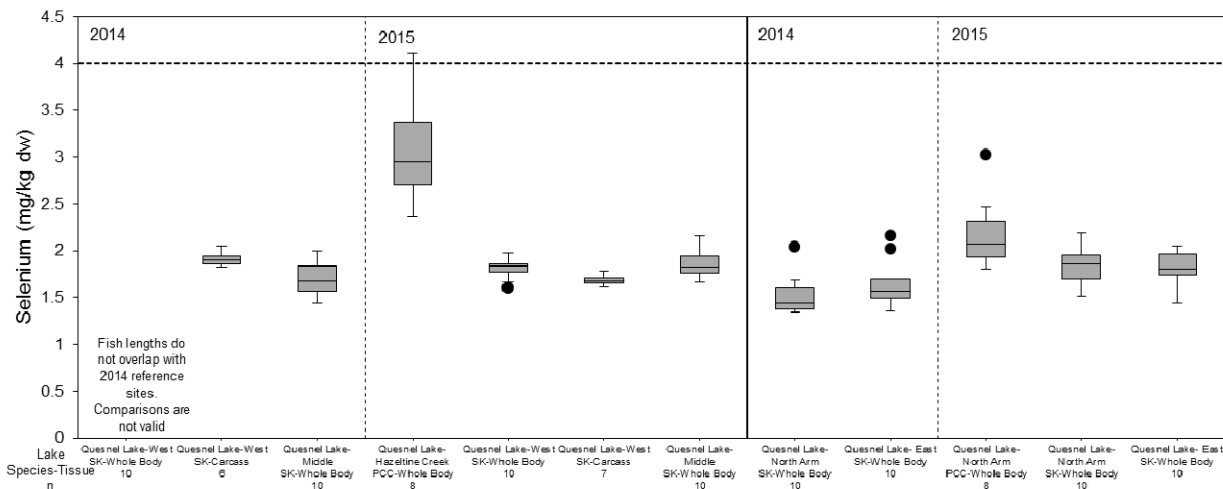


PEEIAR UPDATE REPORT - MOUNT POLLEY MINE





PEEIAR UPDATE REPORT - MOUNT POLLEY MINE



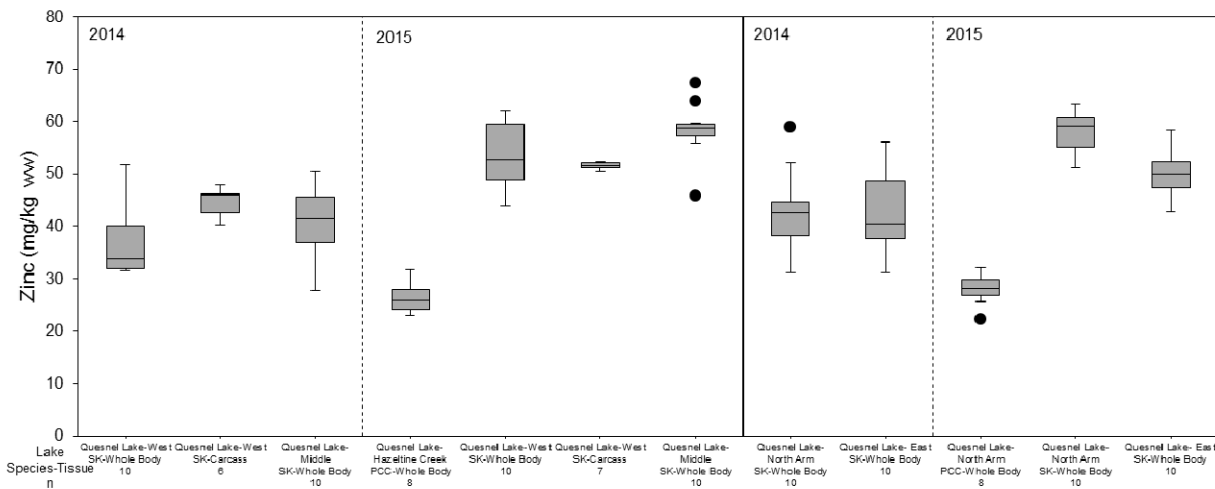


Figure 10: Summary of Available Whole Body and Carcass Chemistry Data for Sockeye Salmon and Peamouth Chub from Relevant Sampling Sites (2014, 2015).

Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; mg/kg dw = milligrams per kilogram dry weight; n = sample size. Dashed vertical lines (---) indicate the separation of years. Solid vertical lines (-) indicate the separation of exposure and reference; dashed horizontal lines (---) indicate guidelines from CFIA (mercury) or BC MoE (selenium).

Cadmium, mercury and selenium concentrations may be elevated in whole body Peamouth Chub samples collected from Quesnel Lake at Hazeltine Creek relative to Quesnel Lake in the North Arm, based on the lack of overlap in their box plots. Conversely, the box plots overlapped for zinc and copper, indicating that the concentrations were similar between exposed and reference fish. This comparison is limited to one exposed site (Quesnel Lake – Hazeltine Creek) compared to one reference site (Quesnel Lake – North Arm).

For juvenile Sockeye Salmon, arsenic concentrations may be higher in whole body samples from exposed compared to reference and also higher in 2015 compared to 2014. For mercury, a difference in fish length did not allow a comparison between exposed and reference fish. There were no apparent spatial or temporal trends in the whole body concentrations of copper, cadmium, selenium and zinc in juvenile Sockeye Salmon. MPMC will continue to monitor fish tissue metal concentrations under the CEMP.

3.4 Quesnel River

3.4.1 Physical

Quesnel River is the major drainage from Quesnel Lake and is located at the north end of the lake's West Basin. The river is located approximately 13 km north of where Hazeltine Creek discharges into Quesnel Lake. Modelling predicted that by summer 2015, between 15% and 20% of the original amount of suspended material in Quesnel Lake from the tailings spill would have been discharged into Quesnel River (MPMC 2015 Appendix B). That amount of material represents 12% or less of the river's annual sediment load.



Following the tailings spill, turbidity concentrations in Quesnel River were generally below the long-term BC WQG, with the exception of measurements from late November 2014 to late January 2015 following the fall turnover of Quesnel Lake and mixing of the deep turbid water. Daily average and in situ turbidity concentrations in Quesnel River have shown an overall progressive decrease over time throughout 2015.

3.4.2 Chemical

Surface Water Quality Update

Water quality data collected from Quesnel River by MPMC has been evaluated to assess temporal trends of POI since the tailings spill through December 2015 (Appendix D). The water quality assessment was based on comparison of water chemistry to BC WQGs. For a period of time following the fall turnover of Quesnel Lake, concentrations of total copper in Quesnel River exceeded the short-term BC WQG. However, water quality in Quesnel River since January 2015 has not exhibited any concentrations of metals greater than guidelines or standards. Based on the evaluation of 2015 water quality data, no POIs remain in Quesnel River.

Sediment Quality Update

The Quesnel River is erosional and no areas of sediment deposition were identified during sampling and therefore impact characterization did not include sediment.

3.4.3 Biological

3.4.3.1 *Benthic Invertebrate Biomass and Tissue Metal Concentrations*

Benthic invertebrate samples collected from the Quesnel River and the corresponding reference area (Cariboo River) were more diverse than those collected from Hazeltine Creek, and were composed mainly of stoneflies, mayflies, caddisflies, and snails.

Benthic invertebrates from the Quesnel River did not have significantly different mean concentrations of any of the contaminants relative to those from the reference river (upper Cariboo River; Appendix E). PCA results supported this finding, with very little to no distinction present between the exposed and reference.

3.4.3.2 *Surface Water Toxicity Testing*

MPMC has conducted a post-event toxicity testing program since the tailings spill occurred, in which surface water samples collected from Quesnel River were tested using a battery of standard laboratory tests using sensitive plant, invertebrate, and fish test species. The program provides an important evaluation of the bioavailability and toxicity of POIs as they are observed in site-specific samples. The laboratory testing provides a direct measure of biological effect to individual organisms under site-relevant conditions, and includes sensitive test species representing primary producers, primary consumers, and secondary consumers.



The results of post-event toxicity testing conducted between August 2014 and February 2015 (MPMC 2015 Appendix F) indicated that receiving environment waters in Quesnel River were not acutely toxic (i.e., lethal) to sensitive plant, invertebrate, and fish species, nor chronically toxic (i.e., sub-lethal, longer term effects) to sensitive plant and fish species.

In subsequent sub-lethal toxicity tests with water samples collected from Quesnel River between March and December 2015, no impacts on survival and growth of fish were observed, and no impacts on survival of invertebrates were observed (Appendix F). One unfiltered sample collected from Quesnel River in March 2015 showed a slight (IC25% = 95.9) reproductive test response. This response was not associated with elevated water chemistry (i.e., concentrations of all parameters in this sample were below applicable BC WQGs), nor did the response align with fish toxicity testing results reported for the same sample. The results of toxicity testing conducted between January and December 2015 are presented in Table 3-14 .

Table 3-14: Summary of Surface Water Toxicity Testing in Quesnel River (January to December 2015)

Test	Sample ID	Date	T. Cu (mg/L)	D. Cu (mg/L)	LC50 (% v/v)	IC25 (% v/v)	IC50 (% v/v)
7-d fathead minnow survival and growth	QUR-1	07 Jan 2015	0.004	0.0016	>100	>100	>100
	QUR-1	10 Feb 2015	0.0024	0.0013	>100	>100	>100
	QUR-1	03 Mar 2015	0.0021	0.0013	>100	>100	>100
7-d Rainbow Trout swim-up survival and growth	QUR-1	07 Jan 2015	0.004	0.0016	>100	>100	>100
	QUR-1	16 Jun 2015	0.0015	0.00085	>100	>100	>100
	QUR-1	24 Aug 2015	0.00067	<0.00050	>100	>100	>100
	QUR-1	12 Nov 2015	0.00082	<0.00050	>100	>100	>100
7- to 8-d <i>C. dubia</i> survival and reproduction	QUR-1	07 Jan 2015	0.004	0.0016	>100	>100	>100
	QUR-1 (Filtered)		-	0.0016	>100	>100	>100
	QUR-1	10 Feb 2015	0.0024	0.0013	>100	>100	>100
	QUR-1	03 Mar 2015	0.0021	0.0013	>100	95.9 (50-NC)	>100
	QUR-1	24 Aug 2015	0.00067	<0.00050	>100	>100	>100
	QUR-1	12 Nov 2015	0.00082	<0.00050	>100	>100	>100

Notes: Samples were not filtered, unless indicated otherwise. Effect concentration expressed on a volume/volume basis; in instances where an effect was observed, 95% confidence limits were not always calculable (NC). LC50 = Lethal concentration causing 50% mortality. IC25/IC50 = Non-lethal concentration causing 25% or 50% reduction in growth or reproduction. Total and dissolved copper (T. Cu and D. Cu) concentrations for January to August samples are provided in Appendix B; concentrations for September to November samples are MPMC unpublished data.



4.0 OVERALL SUMMARY OF IMPACTS FROM TAILINGS SPILL

To date, the post-event studies continue to indicate that the tailings spill has resulted in physical impact to Polley Lake, Hazeltine Creek and valley, the mouth of Edney Creek, the benthic environment in the West Basin of Quesnel Lake, and the communities in these environments. Observations of potential chemical and biological impacts have been made:

- Soil and sediment data show that there are some metals that exceed guidelines and/or standards.
- Geochemistry investigations continue to indicate that the tailings are not acid-generating and have low leaching potential. A preliminary groundwater investigation involving limited sampling of shallow groundwater from within the tailings deposited in Hazeltine Creek valley had concentrations of metals that were below groundwater standards. Further investigation is planned for the summer of 2016.
- Surface water data has shown a decreasing trend in the concentrations of total metals and turbidity that were associated with the tailings spill. Concentrations of all contaminants that were initially elevated are now below water quality guidelines, with the exception of copper in Hazeltine Creek.
- Surface water has been tested using a series of toxicity tests and found to be not toxic to various aquatic test species. Some turbid samples appeared to impact on performance of one of the aquatic insects. However, zooplankton samples have not shown a decreasing trend in biomass in Quesnel Lake.
- Sediment toxicity testing was conducted and found to be associated with low toxicity. The sediment substrate, low in TOC and particle size, was found to hinder performance of benthic invertebrates in standard tests. The changed environment may also slow the progress of natural re-colonization in the profundal zone.
- Benthic invertebrate biomass measurements indicate lower populations in Polley Lake and the deeper (profundal) areas of the West Arm of Quesnel Lake.
- Benthic invertebrate biomass was similar to reference in the littoral areas of Quesnel Lake, Quesnel River and Edney Creek.
- Benthic invertebrate tissue concentrations indicate higher concentrations of metals, including selenium in Polley Lake compared to Bootjack Lake. Copper concentrations were higher in the deeper (profundal) areas of the West Arm of Quesnel Lake compared to reference. Concentrations of copper and vanadium in benthic invertebrates were higher in Hazeltine Creek following the tailings spill, but the concentrations of selenium were higher prior to the breach than after, and higher than 2015 measurements for Polley Lake. Concentrations of metals in Edney Creek benthic invertebrates were not different from reference.
- Available data for evaluating fish productivity for Polley Lake indicates that it is currently similar to reference conditions. Further investigation into potential impacts of selenium tissue concentrations in Rainbow Trout to productivity are in-progress. Fish productivity in the West Arm of Quesnel Lake was found to be similar to reference conditions.
- Concentrations of metals in fish were generally found to be variable and, with a few exceptions, the concentrations observed at exposed sites were similar to reference sites. Selenium in Polley Lake Rainbow Trout ovary tissue in 2015 was one of the few metal/tissue combinations that suggest a significant increase in metal accumulation may be present; however, this data set is considered anomalous relative to the preponderance of available selenium tissue data and was not duplicated by data collected in the spring of 2016. Notwithstanding the potential for anomalous data in a subset of the available ovary data, Golder recommends further evaluation of long-term trends in selenium concentrations and their potential for adverse effects to aquatic populations in a site-specific risk assessment and monitoring of selenium concentrations in Polley Lake biota as part of the CEMP.



5.0 NEXT STEPS

The next steps in the Rehabilitation and Remediation Strategy is conducting the Human Health and Ecological Risk Assessment (HHERA) and this work is currently underway. Supplementary investigations conducted during the summer of 2016 will provide additional data for the risk assessment and reduce uncertainty regarding environmental conditions. MPMC is moving ahead with further remediation of the affected areas on the mine site and in Hazeltine Creek and have also developed their CEMP, required under Permit 11678. The CEMP contains a detailed plan to monitor potential impacts associated with on-going operations and to provide confirmation that conditions associated with the tailings spill measured during these earlier investigations are either representative of conditions in the future, or that conditions will continue to improve over time.



6.0 CLOSURE

We trust that this report meets your needs at this time. If you have any questions regarding this work, please do not hesitate to call Trish Miller.

GOLDER ASSOCIATES LTD.

Trish Miller, M.Sc., R.P.Bio
Principal, Senior Environmental Scientist

Reidar Zapf-Gilje, Ph.D., P.Eng.
Contaminated Sites Remediation Expert

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APPENDIX A

Geochemical Characterization

Mount Polley Mine Tailings Dam Failure: Update on Geochemical Characterization of Spilled Tailings

Prepared by:

Chris Kennedy, P.Geo. and Stephen Day, P.Geo.

SRK Consulting

Mount Polley Mine Tailings Dam Failure: Update on Geochemical Characterization of Spilled Tailings

Prepared for

Mount Polley Mining Corp.



Prepared by



SRK Consulting (Canada) Inc.
1CI008.003
November 2015

Mount Polley Mine Tailings Dam Failure: Update on Geochemical Characterization of Spilled Tailings

November 2015

Prepared for

Mount Polley Mining Corp.
580 Hornby Street
Vancouver, BC V6C 3B6
Canada

Tel: +1 604 669 8959
Web: www.imperialmetals.com

Prepared by

SRK Consulting (Canada) Inc.
2200–1066 West Hastings Street
Vancouver, BC V6E 3X2
Canada

Tel: +1 604 681 4196
Web: www.srk.com

Project No: 1CI008.003

File Name: MtPolleySpilledTailings_GeochemUpdate_1CI008.003_20151125_CBK

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Executive Summary

A geochemical characterization program was developed and carried out by SRK Consulting (Canada) Inc. on spilled tailings from the Mount Polley Mine (MPM) dam failure that occurred on August 4, 2014, approximately 55 km north-east of Williams Lake, BC. Initial results were provided in SRK (2015), with results pending for analysis of the non-sulphide fraction of the spilled tailings and laboratory kinetic testing (humidity cells and columns). This report provides the pending results, although kinetic testing is on-going.

Copper and selenium were the main focus of continued investigations as they were identified to be enriched in the initial study and possibly have potential for leaching. However, all parameters with guidelines for the protection of freshwater aquatic life in British Columbia are being monitored.

The non-sulphide copper analysis (i.e. a 2.5% sulphuric acid leach) indicated that up to 66% of the solid phase copper in the tailings materials is associated with the non-sulphide portion of the tailings. As extremely acidic conditions are required to leach this form of copper, it is considered to be non-reactive in the Hazeltine Creek environment because pH conditions are neutral and there is a low risk of acid rock drainage potential from the tailings.

Kinetic testing results have been reported for 32 weeks as of the date of this report. Results support the assessment that ARD is not expected from the tailings and leaching will be under neutral to alkaline conditions. Leaching rates are beginning to stabilize and general downward trends are expected to continue as the testing progresses. Variability in leaching rates is also being established and the necessary components for providing contact water chemistry predictions (i.e. geochemical source terms) will be available after testing passes 40 weeks.

One of the considerations for water chemistry prediction will be flow paths as copper and selenium leaching rate differences were noted between the humidity cells and columns. Mineral solubility limits for calcite (calcium carbonate) and tenorite (copper oxide) were reached in the columns but not in the humidity cells, with the formation of secondary copper minerals expected to limit concentrations of copper. Selenium is not expected to have a mineral solubility control under fully oxygenated conditions, but the longer water flow paths in fine grained materials may also be conducive to lower rates of oxygen diffusion and, therefore, conditions that support selenium reduction to more insoluble forms such as selenite and elemental selenium.

Kinetic testing is on-going and the current assessment of tailings reactivity and leaching rates will be updated once testing passes 40 weeks.

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Appendices

Appendix A – Non-Sulphide Copper Analysis Results

Appendix B – Geochemical Properties of Tailings

Appendix C – Humidity Cell Concentrations Charts

Appendix D – Leaching Rates for Humidity Cells and Columns

Appendix E – Column Concentrations Charts

List of Abbreviations

ABA	acid-based accounting
ARD	acid rock drainage
DOC	dissolved organic carbon
HC	humidity cells
ICP-MS	inductively coupled plasma mass spectrometry
IGCM	initial geochemical conceptual model
LOD	limit of detection
ML/ARD	metal leaching and acid rock drainage
MPM	Mount Polley Mine
MPMC	Mount Polley Mining Corporation
ORP	oxidation-reduction potentials
QA/QC	quality control and quality assurance
RPD	relative percentage difference
SI	saturation indices
TIC	total inorganic carbon

1 Introduction

SRK was retained by the Mount Polley Mining Corporation (MPMC) to develop and execute a plan to geochemically characterize tailings materials that were released as a result of the tailings dam failure on August 4, 2014 from the Mount Polley Mine (MPM), located approximately 55 km north-east of Williams Lake, BC. The plan included a review of existing operational data, development of a geochemical conceptual model to guide sampling design, and a sampling and analysis plan.

The majority of geochemical characterization work has been completed with interpretation of results previously reported by SRK (2015). The work presented in this report that was not previously reported includes characterization of the non-sulphide component of the tailings and laboratory kinetic testing results (i.e. humidity cells and water unsaturated columns). This report is a supporting document to the initial work and provides updates to the conclusions provided in the SRK (2015) report on the metal leaching and acid rock drainage (MLARD) potential of exposed tailings along Hazeltine Creek.

2 Background

Geochemical characterization, including acid-base accounting (ABA) tests, trace element analyses, mineralogical analyses, and sequential extractions were undertaken on representative samples of tailings that spilled into Hazeltine Creek, and Quesnel and Polley Lakes from the MPM. The characterization approach was based on SRK's sampling plan (SRK 2014) and the geochemical conceptual models presented along with complete details on the sampling and analytical methods used, field observations and analytical results are provided in SRK (2015). For ease of reference, relevant sections have been reproduced in this report.

Two types of tailings-bearing materials were observed along Hazeltine Creek. They were classified in the field as 'grey tailings' and 'magnetite sands'. Grey tailings were dominantly grey in colour and had a finer texture (silty sand) than the magnetite sands. Magnetite sands were speckled pinkish-orange and black. They were strongly magnetic and sandier than the grey tailings. The grey tailings tended to be most abundant along the embankments and upper benches of the creek, whereas the magnetite sands were commonly present in low-lying areas near the creek. With the exception of the area near the tailings dam failure and Polley Lake, the tailings were deposited in relatively thin 'skiffs' (e.g. 10 to 20 cm deep). The thickest observed tailings deposits (e.g. around 1 metre deep) were in the immediate vicinity of the tailings dam failure and Polley Lake (SRK 2015).

The main geochemical finding was that the MPM tailings are not potentially ARD generating, which is consistent with historical understanding of the tailings and the low sulphur nature of the ore deposit. Any leaching would be expected to occur under neutral to basic pH conditions only, which tends to support low mineral and element specific solubility. The only elements that were noted to be enriched when compared to typical crustal rocks (basalt) were copper and selenium. Both of these elements were expected to be associated with sulphide minerals and require oxidation to be leached. The potential for reductive dissolution processes to leach elements from

natural oxidation components of the spilled tailings that settled in Quesnel and Polley Lakes was assessed and found to be low.

The main questions/tasks remaining after the initial characterization report were:

- Confirm if copper is partially deported to non-sulphide minerals (also referred to by MPM as copper 'oxide').
- Characterize leaching rates of the spilled tailings.

Establishing the proportion of copper and other elements associated with the non-sulphide fraction is important as they are not likely to readily leach from the tailings at neutral pH. Leaching rates of the tailings have been assumed to be low, but need to be demonstrated and are an important consideration for assessing potential water chemistry changes arising from the tailings in the receiving environment.

3 Methods

3.1 Non-Sulphide Copper Analysis

Approximately 25% (17 out of 69) of the Hazeltine Creek tailings materials collected in the field between September 8, 2014 and September 19, 2014 were submitted for determination of copper and other elements associated with the non-sulphide fraction. Samples were selected to capture the range of sulphur, total inorganic carbon (TIC), copper, and selenium content in the Hazeltine Creek samples based on previous results (SRK 2015).

Determination of non-sulphide copper was performed by ALS Environmental based on a similar method routinely used by MPM on-site as follows:

- Leach dried samples with 2.5% sulphuric acid (H_2SO_4).
- Mix the acidic slurry using a vortex shaker and then on a shaker table for 90 minutes.
- Collect supernatant after settling, filter and submit for ICP-MS multi-element scans (35 elements including sulphur and low level selenium).

The main difference from the MPM method is that ICP-MS was used instead of atomic absorption spectroscopy. Two samples were randomly selected to serve as duplicates for QA/QC purposes.

3.2 Kinetic Testing

3.2.1 General

The kinetic testing program consists of six standard laboratory humidity cells (HCs), three column leach tests, two blanks (a HC and a column), and one HC duplicate (Table 3-1). Samples were selected to represent the median and upper range of geochemical variability identified during the initial characterization work.

The intent of the program is to establish weathering rates under atmospheric conditions using humidity cell testing and then use column tests to evaluate the effect of longer water flow paths. Longer flows paths are more likely to represent field conditions and to assess potential attenuation processes such as formation of secondary minerals and surface sorption.

Geochemical composition and mineralogy characteristics were obtained during the initial characterization work and results are summarized in Section 4.3 for ease of reference.

Table 3-1: Composite preparation requirements and sample labelling.

Kinetic Test ID	Tailings Type	Original Sample IDs (SRK 2015)
HC-1/COL-1; HC-1D	Magnetite Sand	Composite of ST11-02-02, ST12-02 and ST11-02-1
HC-2/COL2	Magnetite Sand	Composite of ST16-02 and ST01-03
HC-3/COL-3	Grey Tailings	Composite of ST08-02-01 and ST13-03
HC-4	Grey Tailings	ST01-05-02
HC-5	Magnetite Sand	ST02-05-02
HC-6	Grey Tailings	ST17-08-01
HC-7	Blank	
COL-4		

Source: \\01_SITES\Mt_Polley\1CI008.003_Privileged_and_Confidential\500_Reporting\Interpretations\Geochemistry\Hzltn_Crk_2014\PHII_sample_selections_1C1008.003_REV00_CBK.xlsx

3.2.2 Humidity Cells

The HCs were set up according to the methods described in the 1991 Mine Environment Neutral Drainage Program’s Acid Rock Drainage Prediction Manual (MEND 1991). A photograph of the set-up is provided in Figure 3-1.

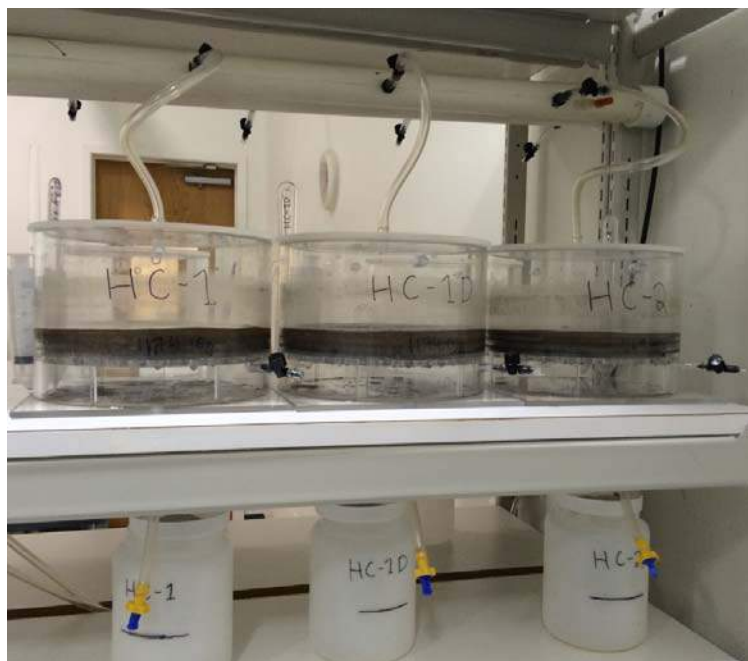


Figure 3-1: Set-up of tailings humidity cells at ALS Environmental. For scale, the diameter of the clear plastic cells is 20 cm.

The two major sample mixture/tailings types identified in the field, (1) magnetite sands tailings and (2) grey tailings, were both tested. The duplicate cell (HC-1D) is a split from HC-1. The blank cell (HC-7) was constructed using the exact same material and adhesives as the other cells and is operating according to the same procedures.

Weekly analyses of leachate included volume recovered, pH, and conductivity.

The following parameters were measured weekly for the first four weeks and then every two weeks thereafter:

- Acidity, alkalinity
- Oxidation-reduction potential (ORP)
- Sulphate
- Nitrate, nitrite, ammonia
- Bromide, chloride, fluoride
- Orthophosphate, total phosphorus
- 35 element scan by ICP-MS
- Low level mercury

The tests were initiated on March 6, 2015, and have yielded 32 weeks of data at the time the data were interpreted for this report. While these tests typically run for a minimum of 40 weeks, release rates are now stable and initial interpretations are provided herein. All tests are continuing.

3.2.3 Columns

The column tests, including the blank, were constructed from plexiglass (acrylic) with an 8.2 cm inner diameter and a perforated base supporting two layers of nylon screen (400 mesh). The columns were filled as follows:

- Column 1 (magnetite sand): 4.3 kg to a height of 45 cm
- Column 2 (magnetite sand): 4.5 kg to a height of 36 cm
- Column 3 (grey tailings): 1.5 kg to a height of 16 cm

ALS Environmental confirmed that heavier Column 2 had a lower height than Column 1, which is attributed to greater compaction compared to the other columns.

Each of the samples is being trickle leached. Columns 1 and 2 have about 90 mL added daily until 500 mL has been added in a work week (5 days). For Column 3, only 30 mL of water can be added in a day to avoid pooling on the surface and, as a result, only 150 mL is added in a week. Collection of leachate from the magnetite sands is performed weekly, whereas collection of leachate from the grey tailings column requires up to three weeks due to the fine grained nature of these materials resulting in slow infiltration rates. Laboratory analysis of leachate includes the

same parameters as the humidity cells (Section 3.2.2). A photograph of the set-up is provided in Figure 3-2.

The tests were initiated on April 21, 2015. The magnetite sands samples have yielded 25 weeks of data, and the grey tailings 8 weeks of data at the time the data were interpreted for this report.



Figure 3-2: Column set-up at ALS Environmental. For scale, the diameter of the columns is 8 cm and the height of materials in column 1 (far left) is 45 cm.

4 Results

4.1 Quality Assurance and Quality Control

Various quality control and quality assurance (QA/QC) measures were included in the program. Duplicate comparisons were done for the non-sulphide copper analysis and kinetic tests. For the kinetic tests only, ion balance calculations and blank sample analysis were also done. Results were as follows:

- Duplicates – samples were assessed with a relative percent difference (RPD) target of 25% (set by SRK) when results were greater than ten times the limit of detection. RPD was calculated using the equation below, where 'x' is the concentration of the original sample and 'y' is the concentration from the duplicate sample:

$$\text{RPD}(\%) = \frac{x - y}{(x + y)/2} \times 100$$

- The RPD criterion does not apply at concentrations near the LOD because RPD is expected to frequently be greater than 25% due to reduced analytical accuracy at very low concentrations. This applied to silver and boron. All other parameters with guidelines for the protection of freshwater aquatic life in British Columbia (BC FAL guidelines) were within the criterion. Results for non-sulphide copper analysis for provided in Appendix A and duplicate humidity cell results are included in Appendix C.
- Ion balance – samples were assessed with an RPD target of $\pm 15\%$ (set by SRK) when major anions and cations were greater than ten times analytical detection limits. For all sampling dates the ion balance was within $\pm 15\%$.
- Blanks – samples were assessed with a target of ten times the detection limit (set by SRK). None of the samples exceeded this criterion.

SRK's overall conclusion is that data quality is acceptable.

4.2 Non-Sulphide Copper Analysis

Results of sulphuric acid leaching to determine the amount of non-sulphide copper and selenium are provided in Table 4-1. Analytical results are provided in Appendix A.

The main finding was that a significant portion of the copper in the tailings is associated with the non-sulphide fraction, ranging from 29% to 66% with an average of 46%. This finding is consistent with previous understanding of the non-sulphide copper fraction representing between 20% and 70% (Taplin 2002; Henry 2009) and mineral processing of the MPM ore, as sulphide flotation would preferentially remove sulphides and leave behind a higher portion of non-sulphide minerals.

Selenium was much lower in the non-sulphide fraction, ranging from 4% to 23%, with an average of 13% of the total fraction.

Table 4-1: Non-sulphide analysis results for copper and selenium.

Sample ID	Sample Type	Non-Sulphide		% of Total	
		Cu mg/kg	Se mg/kg	Cu %	Se %
HC-1/COL-1	Magnetite Sand Composite	400	0.18	29%	11%
HC-2/COL-2	Magnetite Sand Composite	440	0.21	49%	13%
HC-3/COL3	Grey Tailings Composite	590	0.30	64%	19%
ST03-04	Grey Tailings	520	0.26	56%	23%
ST02-02-01	Grey Tailings	170	0.037	30%	4%
ST02-05-02/HC-5	Magnetite Sand	290	0.092	41%	8%
ST01-05-02/HC-4	Grey Tailings	100	0.035	32%	4%
ST18-03-02	Grey Tailings/Magnetite Mix	740	0.23	50%	19%
ST17-08-01/HC-6	Grey Tailings	390	0.21	30%	12%
ST05-02-01	Magnetite/Grey Tailings Mix	320	0.12	49%	10%
ST08-03	Magnetite Sand	450	0.22	43%	14%
ST12-04	Grey Tailings	480	0.24	55%	14%
ST14-04	Grey Tailings	510	0.28	66%	23%
ST18-02-01	Grey Tailings/Magnetite Mix	370	0.23	39%	14%
ST18-05-01	Grey Tailings	430	0.23	48%	14%
Statistics	Minimum	100	0.035	29%	4%
	Mean	430	0.22	48%	14%
	Maximum	740	0.30	66%	23%

Source: Z:\01_SITES\Mt_Polley\1CI008.003_Privileged_and_Confidential\500_Reporting\1.Interpretations\Geochemistry\Cu_oxides\Copper Oxide Leach_Interp_1CI008.003_REV00_CBK.xlsx]

Note: Results have been rounded to two significant figures.

4.3 Kinetic Testing

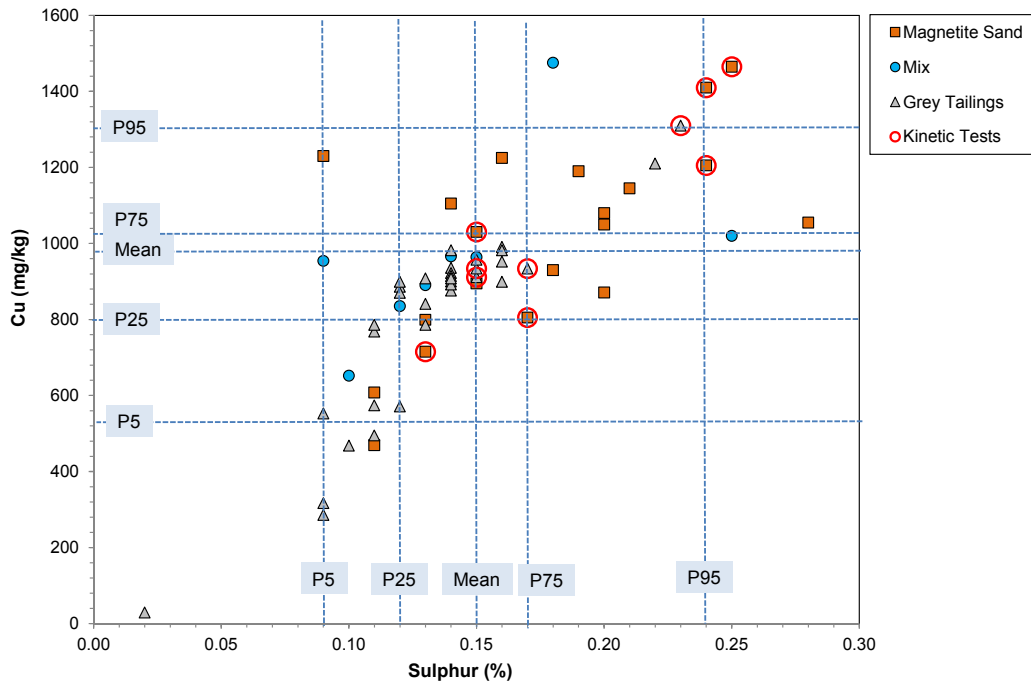
4.3.1 General

Geochemical properties of the humidity cells were provided in SRK (2015), but for ease of reference key properties are provided in Table 4-2 and complete results are provided in Appendix B. Copper, selenium and sulphur concentrations for kinetic test samples and the entire dataset are compared in Figure 4-1 and Figure 4-2.

Table 4-2: Geochemical properties of kinetic tests.

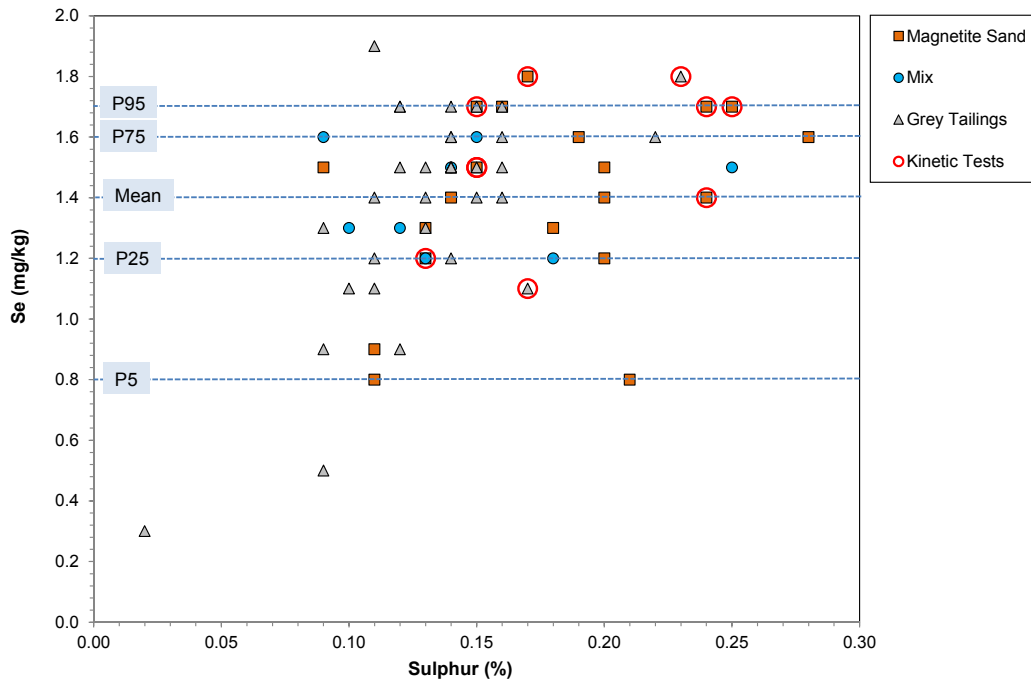
Kinetic Test	Tailings Type	TIC kg CaCO ₃ /t	Total S %	S ²⁻ %	AP kg CaCO ₃ /t	TIC/AP ratio	Cu mg/kg	Se mg/kg
HC-1/COL-1	Magnetite Sand	25	0.26	0.27	8.4	3.0	1200	1.5
HC-1D	Magnetite Sand	-	0.27	0.27	8.4	-	1200	1.7
HC-2/COL-2	Magnetite Sand	18	0.16	0.15	4.7	3.8	950	1.3
HC-3/COL-3	Grey Tailings	33	0.16	0.15	4.7	7.0	940	1.6
HC-4	Grey Tailings	26	0.17	0.09	2.8	9.3	320	0.9
HC-5	Magnetite Sand	15	0.18	0.13	4.1	3.6	720	1.2
HC-6	Grey Tailings	32	0.21	0.23	7.2	4.5	1300	1.8

Source: Z:\01_SITES\Mt_Polley\1CI008.003_Privileged_and_Confidential\500_Reporting\5.Kinetic+CuOxide_UpdateReport\Tables\Kt+Cu_Memo_tables_1CI008.003_REV00_CBK.xlsx]



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Figure 4-1: Solid phase copper and sulphur concentrations in kinetic test selections compared to existing dataset.



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Figure 4-2: Solid phase selenium and sulphur concentrations in kinetic test selections compared to existing dataset.

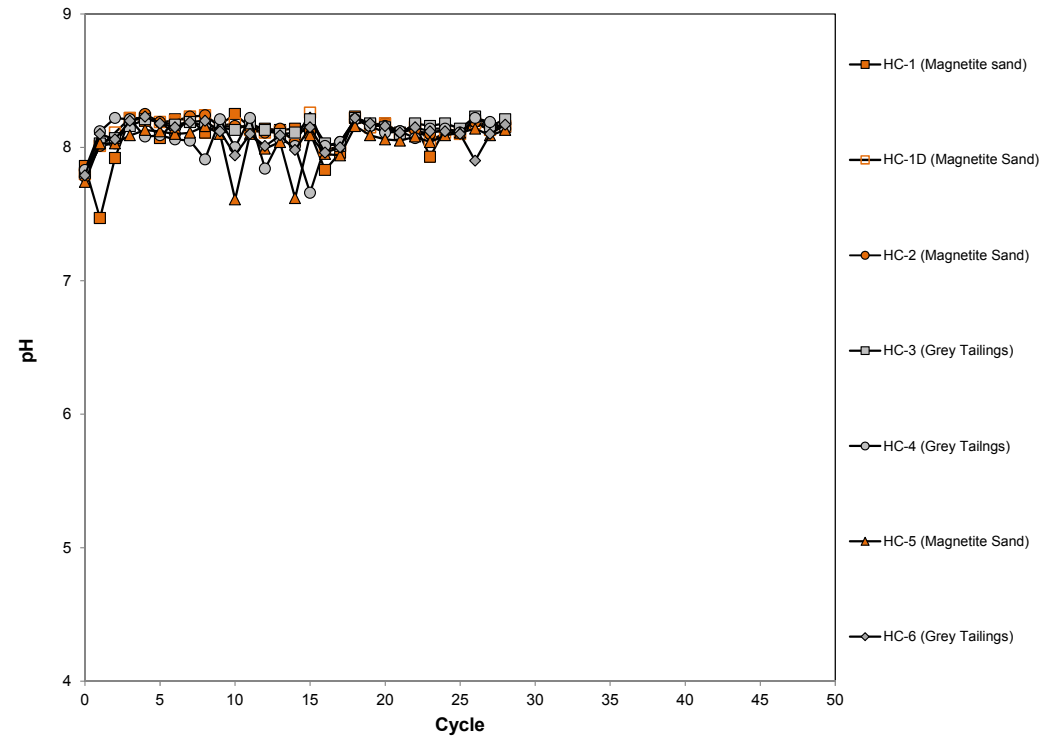
4.3.2 Humidity Cells

At the time of this report, data for 32 weeks had been received. Charts of humidity cells results for all parameters that have BC FAL guidelines are provided in Appendix C and a summary of leaching rates (loadings) are provided in Appendix D. Charts for pH and sulphate are provided in Figure 4-3 for ease of reference as these parameters are used to understand oxidation and leaching rates. Copper and selenium charts are also provided in Figure 4-3 as these are the two main elements noted to be of leaching concern by SRK (2015).

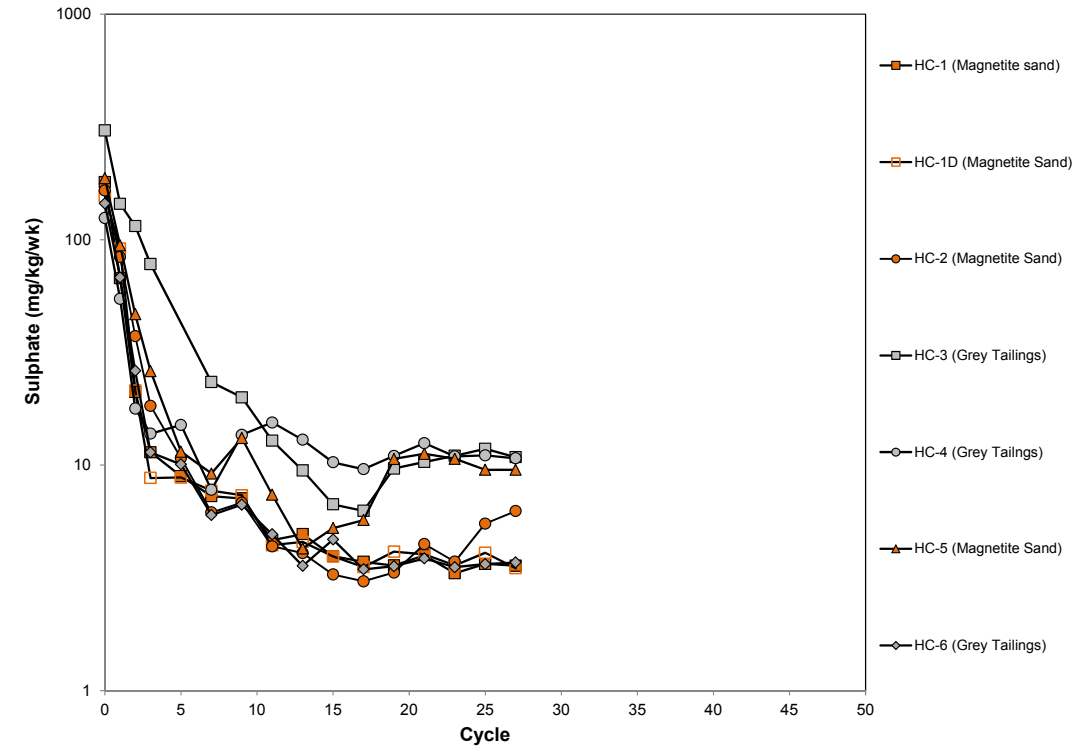
Humidity cell results for all parameters except pH are presented as loading rates in units of mg/kg/week. The laboratory data provides results as concentrations (i.e. mg/L), but given the known weight of each sample and a measured volume of water leached through the cells on a weekly basis, concentrations are converted to loadings.

Leachates from all humidity cell tests have shown alkaline pHs, just slightly above 8.0, and are dominated by sulphate, alkalinity (predicted to be bicarbonate), calcium and lesser amounts of magnesium, potassium and sodium. Release rates for major cations and trace elements have just begun to stabilize and are trending slightly down. Initially elevated sulphate was observed for most tests in the first few weeks of testing, which is typical of these tests reflecting flushing of oxidation products accumulated prior to testing.

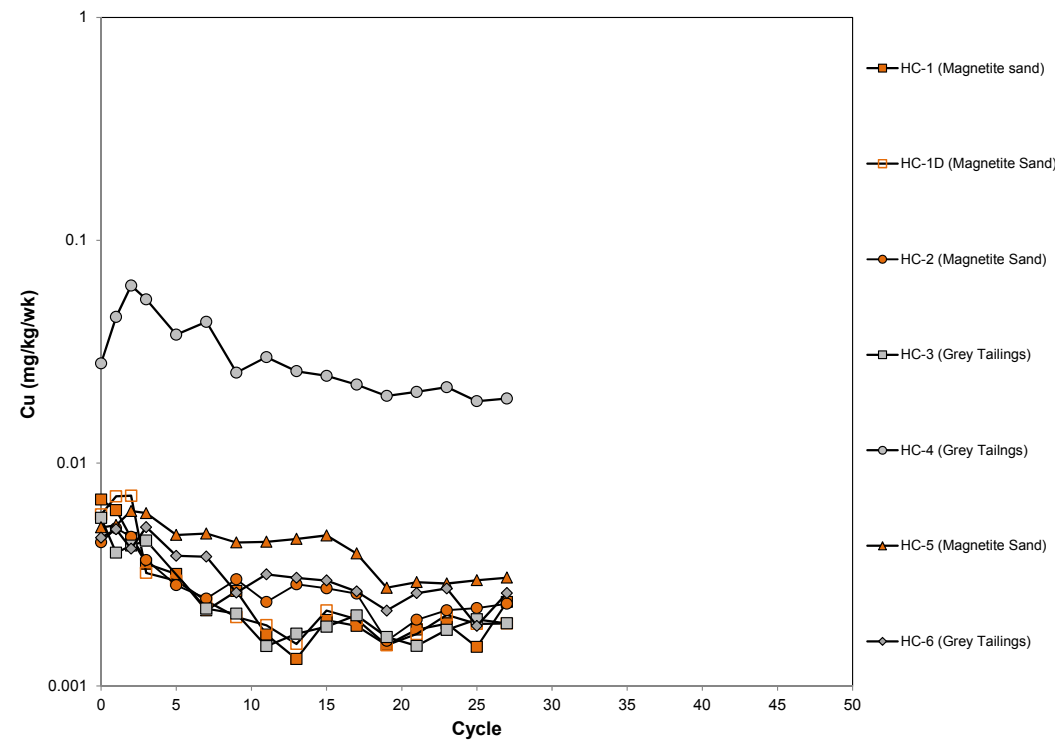
The majority of tests are leaching at generally similar rates, with the exception of HC-4 (grey tailings). Copper is leaching at the highest rate in this test (HC-4) whereas selenium is leaching at the lowest rate for this sample. This is not consistent with the solid phase content of copper (Figure 4-4) nor with the significant correlation previously established by SRK (2015) between copper and selenium in the tailings. The solid phase correlation would indicate that selenium should also be leaching at the highest rate in HC-4, but instead it is leaching at the lowest rate (Figure 4-5). The tests are all yielding alkaline leachates (around pH 8), which typically supports low solubility of copper and with no pH difference between the tests. Other parameters that appear to be inconsistent in HC-4 are the relatively elevated nitrate, nitrite and iron (Appendix C). Investigations are on-going to understand the leaching behaviour in HC-4.



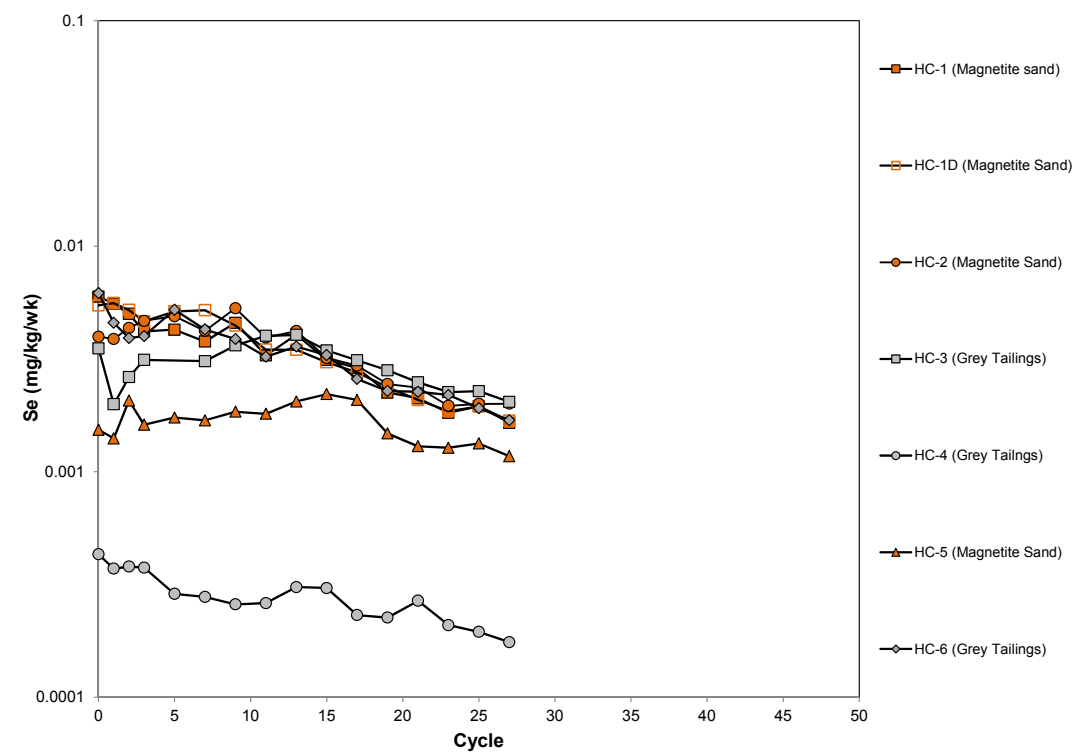
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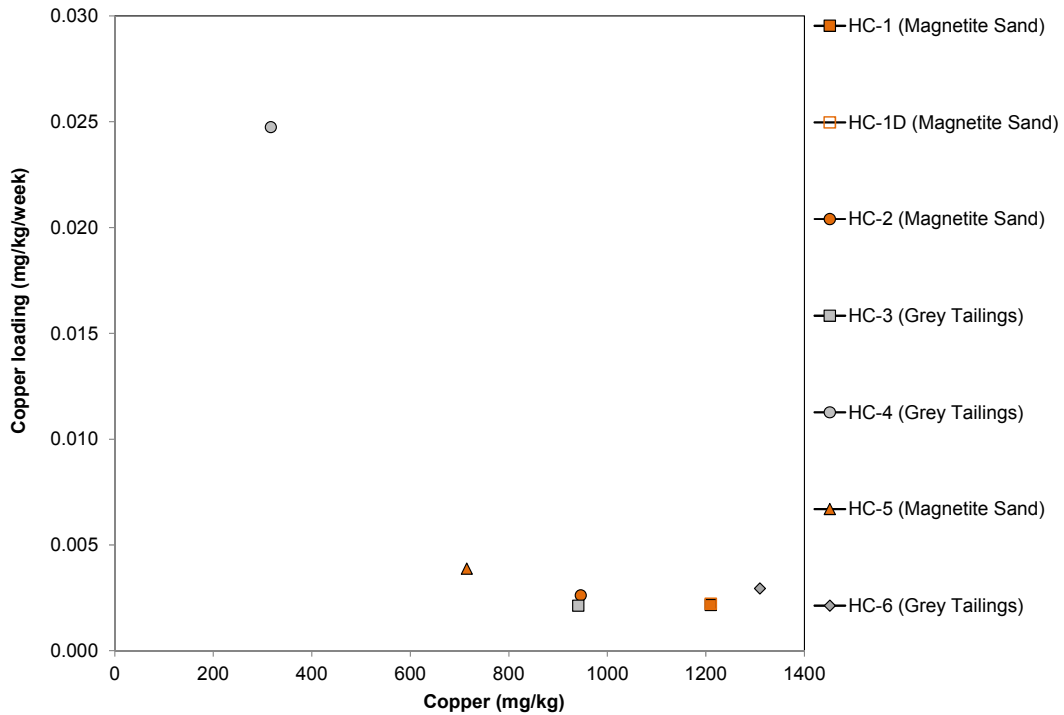


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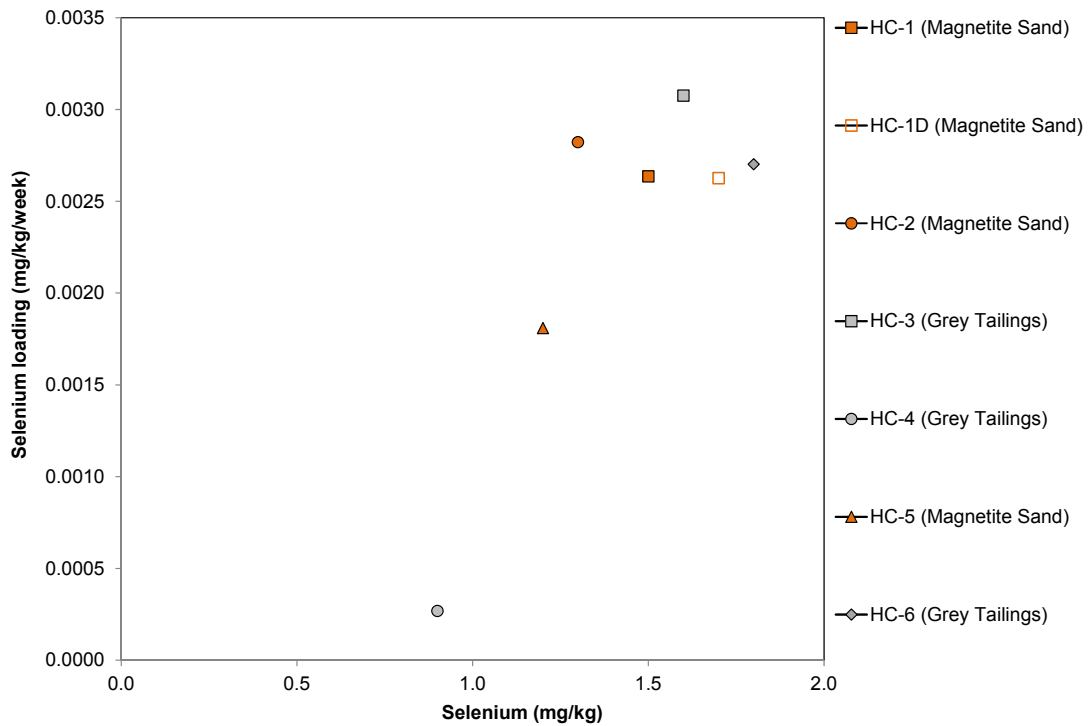
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Figure 4-3: Humidity cell loadings charts for pH, sulphate, copper, and selenium.



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Figure 4-4: Comparison of average copper leaching rate versus solid phase copper content.



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Figure 4-5: Comparison of average selenium leaching rate versus solid phase selenium content.

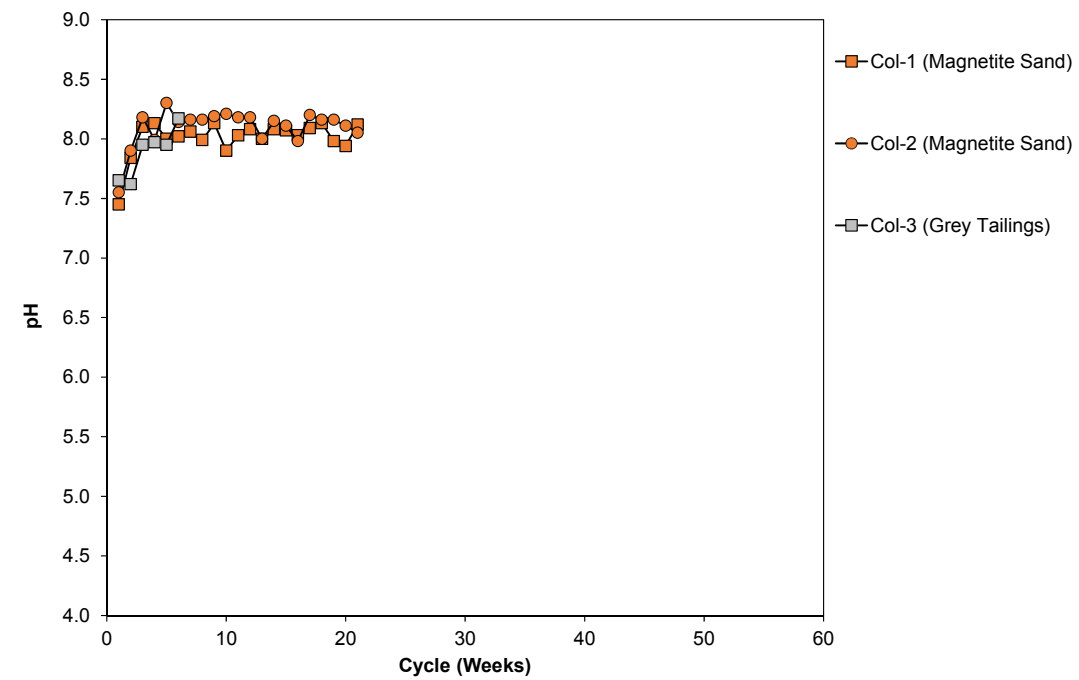
4.3.3 Columns

At the time of reporting, 25 weeks of data had been received for the magnetite sand samples and only 8 weeks for the grey tailings sample. Concentration charts for columns for all parameters with BC FAL guidelines are provided in Appendix E and stable loading rates are provided in Appendix D. Results for pH, sulphate, copper and selenium are provided in Figure 4-6, for the same reason as described in Section 4.3.2.

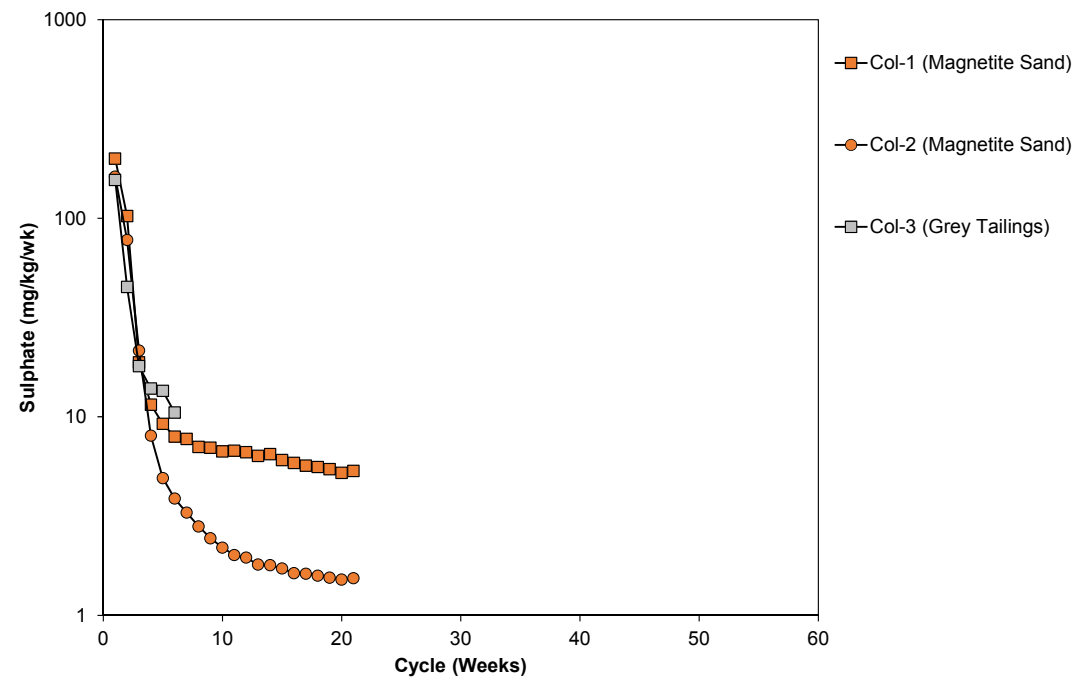
Loading rates (i.e. mg/kg/week) are also being used to show leaching results as described in Section 4.3.2. The one difference between the columns and the humidity cells is that in the columns water initially took several weeks to travel through the materials and be collected. Column 3 (COL-3; grey tailings) still takes several weeks to collect enough leachate for analysis. As a result, the rates for columns are calculated based on how long water took to travel through the column and be collected. For the magnetite sand columns (COL-1 and COL-2), this is now the same as humidity cells (i.e. one week) but the grey tailings column divides the rate by three weeks.

Column leachates are alkaline, with pHs just slightly above 8.0 and are dominated by sulphate, alkalinity (predicted to be bicarbonate), calcium and lesser amounts of magnesium, potassium and sodium, which is similar to the humidity cells. A comparison of humidity cell and column leachates is provided in Section 4.3.4. Release rates for major cations and trace elements have generally just begun to stabilize for the magnetite sands columns (COL-1 and COL-2), but have still not stabilized in the grey tailings column (COL-3). Generally all parameters are either stable or trending down slightly. Initially, elevated sulphate release was observed for most tests in the first few weeks probably reflecting flushing of oxidation products accumulated prior to testing.

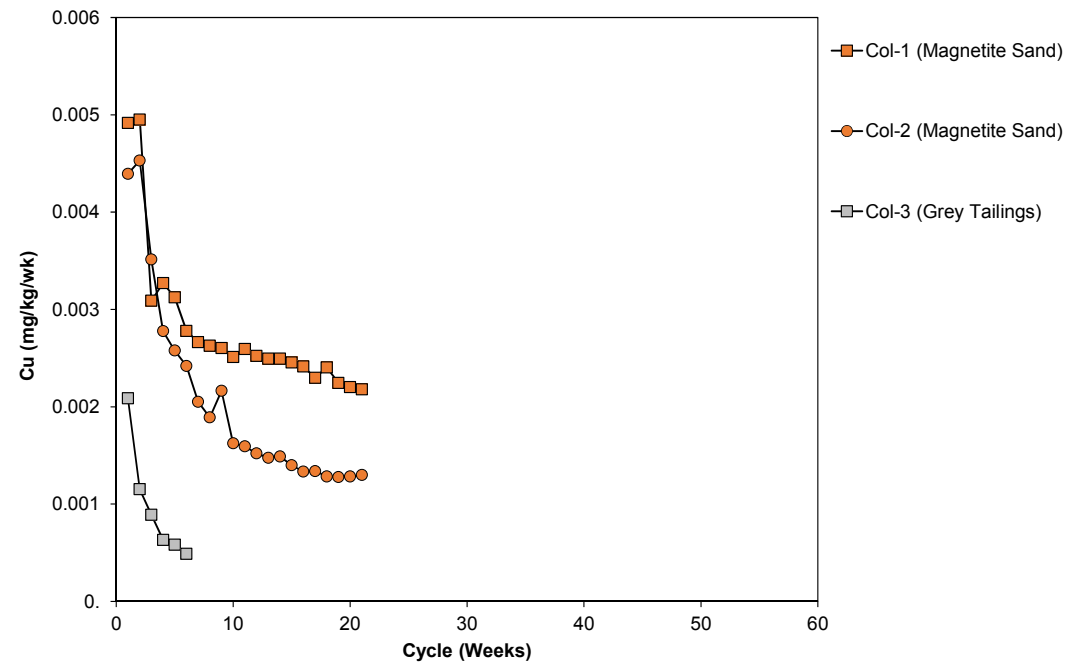
With only three samples, correlations are not particularly meaningful, but the differences in rates are consistent with solid phase content where highest sulphate, copper and selenium rates also contain highest solid phase content of these parameters.



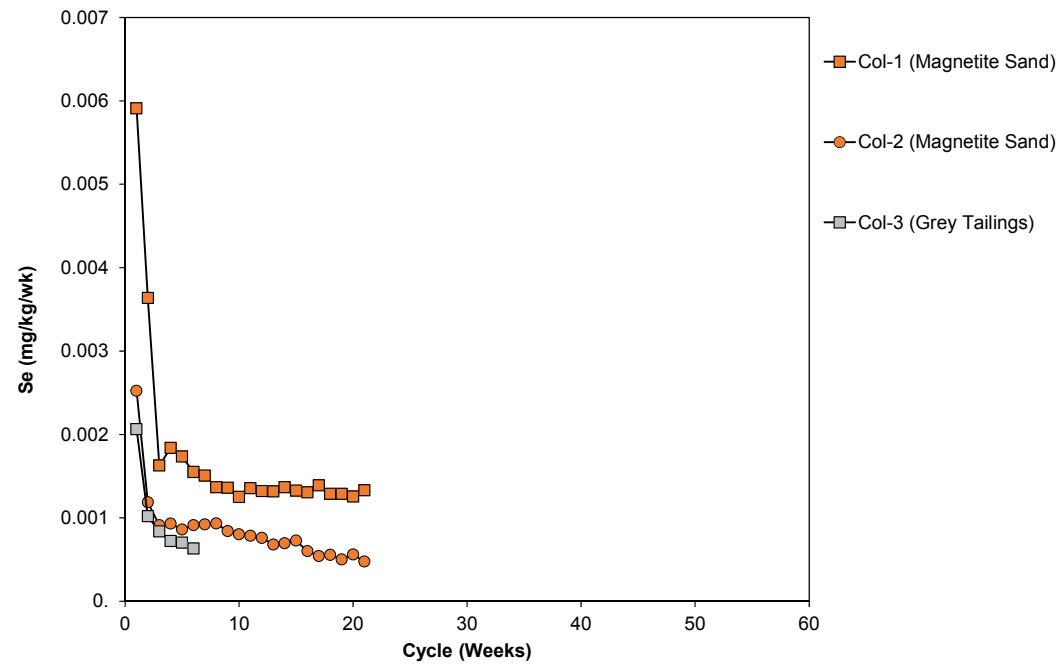
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Figure 4-6: Column cell loadings charts for pH, sulphate, copper, and selenium.

4.3.4 Kinetic Test Comparison

A comparison between humidity cells and columns for pH, sulphate, copper and selenium provides the basis to understand how the different test configurations impact leaching rates in order to better predict how tailings materials in the field might react and impact water chemistry. The comparison also included mineral saturation indices (SI) for calcite (CaCO_3), malachite ($\text{Cu}_2\text{CO}_3(\text{OH})_2$) and tenorite (CuO) using the equilibrium modelling software package PHREEQC (version 2.17.4137) (Parkhurst and Appelo, 1999). A number of secondary minerals were reviewed in the calculations but the above three were chosen as they illustrate the influence of longer flow paths (calcite) and also potential controls on copper solubility (malachite and tenorite). Ferrihydrite (an iron oxyhydroxide) is also likely at saturation in the tests and is an important secondary mineral for attenuating metals, but concentrations were always below detection and therefore SI calculations were not possible. In the SI calculation, the most recent chemistry from each of the tests was used and equilibrated with the atmosphere. The comparison is provided in Table 4-3.

The pH conditions were essentially the same for both tests at around pH 8.0. Sulphate was lower in HC-1, as compared to its column pair, higher for HC-2 and essentially the same (i.e. less than 15% RPD) for HC-3. Copper release rates were essentially the same in paired sample 1, but lower in the other two paired column tests. Selenium release rates were always lower in the column tests, by approximately an order of magnitude in paired samples two and three. The columns have been running for a shorter period of time and rates are expected to continue decreasing for the columns and therefore differences will potentially become more pronounced.

Saturation indices showed that flow path was impacting mineral solubility in the magnetite sand tests. When interpreting SIs, positive values indicate that the mineral is predicted to precipitate, whereas negative numbers indicate that the mineral would not precipitate. For both of the magnetite sand tailings samples, calcite and tenorite were below saturation in the humidity cells, but above saturation in the column tests indicating that the longer flow path would likely lead to calcite and tenorite precipitation. Malachite was at or just below saturation. The grey tailings sample had nearly identical saturation indices in both the humidity cell and column test. While the flow path is about half of the distance as the magnetite sands samples, calcite was already saturated in the humidity cell test and did not need a longer flow path to reach mineral equilibrium. The grey tailings are taking nearly three times as long to allow water to pass through the column, which appears to be support mineral equilibrium to be reached over a shorter flow path. Implications of these results are discussed in Section 5.3.

Table 4-3: Comparison of humidity cell and column leaching rates and mineral equilibria.

Tailings Type	Test	Date Started	pH avg	SO ₄ mg/kg/wk	Cu mg/kg/wk	Se mg/kg/wk	Saturation Indices		
							Calcite	Malachite	Tenorite
Magnetite Sand	HC-1	March 6, 2015	8.1	4.3	0.0022	0.0026	-0.2	-1.2	-0.1
	COL-1	April 28, 2015	8.0	6.0	0.0024	0.0013	0.7	0.3	0.7
Magnetite Sand	HC-2	March 6, 2015	8.1	4.9	0.0026	0.0028	-0.3	-1.3	-0.2
	COL-2	April 30, 2015	8.1	1.7	0.0014	0.0006	0.3	-0.3	0.4
Grey Tailings	HC-3	March 6, 2015	8.1	11	0.0021	0.0031	0.3	-1.2	-0.1
	COL-3	May 20, 2015	7.9	12	0.00052	0.00067	0.3	-1.1	0.0

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5 Discussion

5.1 Overview

The overall geochemical characterization program outlined by SRK (2015) was developed to provide information on the potential for leaching from the spilled tailings. The non-sulphide copper analysis results can be broadly applied to both subaerial and subaqueous leaching, whereas the kinetic tests are specifically for subaerial weathering of the spilled tailings along Hazeltine Creek. Both of these are discussed further below.

Previous interpretations by SRK (2015) indicated that the risk of ARD in the spilled tailings was low. The kinetic tests continue to support that ARD is a low risk and contact water from the Hazeltine Creek tailings will be under neutral pH conditions. As a result, the focus of the discussion below is on neutral metal leaching.

5.2 Non-sulphide Copper

The tailings at Mount Polley are expected to be depleted in sulphide minerals relative to ore due to metal recovery during ore processing (i.e. sulphide flotation) and as a result, the non-sulphide fraction is expected to be enriched in the tailings compared to typical ore. This was confirmed in the spilled tailings collected in this study, with non-sulphide copper representing up to 66% of the total copper present, with the remaining copper (44%) associated with the sulphide fraction. This is also consistent with previous findings reported by SRK (2015).

The mineral form of this non-sulphide copper is likely the silicate chlorite (a common rock-forming, iron magnesium aluminum silicate mineral) based on previous mineralogical characterization work (SRK 2015). In terms of environmental significance, previous work (Taplin 2002; Henry 2009) and this study have shown that the non-sulphide fraction is relatively insoluble and copper leaching from this fraction can be considered a low leaching risk regardless of whether it is in a subaerial or subaqueous environment.

The non-sulphide fraction also contained a small portion of selenium, with an average of 14% and a maximum value of 23% calculated. While this may lower leaching rates expected if selenium was only associated with the sulphide fraction, the tailings would still contain over 1 mg/kg of 'reactive' selenium and be considered enriched when compared to typical crustal averages.

5.3 Tailings Weathering Rates

Weathering rates for subaerial tailings situated along Hazeltine Creek are being established, with testing now past half way of the recommended 40 weeks. As sample selection included materials that represented median and upper 95th percentile materials in terms of sulphur, copper and selenium concentration, leaching variability is also being established.

Any future use of laboratory leaching rates for predicting contact water chemistry (i.e. geochemical source terms) will need to consider a number of factors such as the surface area of the tailings, site temperature and the length of the water flow path through the tailings (Day et al, 2014). Particle size and water contact factors do not need to be considered as for tailings specifically, testing is performed on as-received materials and water contact is also expected to be much higher than more coarse grained material such as waste rock. For water chemistry predictions that involve coarse waste rock, differences in water contact can be significant.

The influence of flow path on the test materials can already be seen in the preliminary results presented in this report. The longer flow paths in the columns containing magnetite sands samples resulted in calcite saturation, as well as tenorite and increases in malachite saturation, whereas these minerals were not saturated in the humidity cell tests (Table 4-3). As discussed in SRK (2015), the presence of secondary copper minerals will tend to keep the concentration of copper at a 'ceiling' concentration, which is supported by measured concentrations at other copper porphyry sites at neutral pH (Day and Rees, 2006). For locations along Hazeltine Creek where the tailings settled in thin layers (i.e. less than 0.5 metres), dilution from precipitation is expected to be high and concentrations could be even lower than predicted by mineral solubility limits.

Selenium is not expected to be influenced by a mineral solubility control at neutral pH and fully oxygenated conditions, but there was a difference in leaching rates between the columns and humidity cells that was not observed with the sulphate leaching rates. Sulphate in the humidity cells and columns is considered a conservative tracer as concentrations are not high enough for mineral precipitation of sulphate minerals that could have a significant control on concentrations (i.e. precipitation of gypsum) and extremely low redox conditions are needed to reduce sulphate to sulphide. Selenium does not need to have very low reducing conditions to transition from its oxidized form selenate to selenite or even elemental selenium (MEND 2015). More reduced forms of selenium will be preferentially removed from solution as selenite has a much higher sorption affinity for mineral surfaces than selenate and elemental selenium will precipitate. As a result, the difference observed for selenium leaching rates between the humidity cells and columns may be a function of redox differences. Continued monitoring of the tests will help confirm this interpretation.

6 Conclusions

The results and interpretations presented in this report are a continuation of the geochemical characterization studies undertaken on representative samples of tailings that spilled into Hazeltine Creek in August 2014 from the MPM dam failure. The continued studies have included non-sulphide copper association, humidity cells and column testing.


The results indicate that a significant amount of copper (up to 66%) is associated with the non-sulphide portion (likely chlorite) of the tailings and is considered to be non-reactive. This is based on previous studies and the results provided in this report that required acidic conditions to leach copper associated with the non-sulphide fraction.

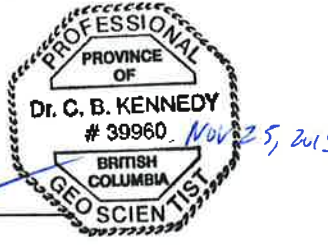
Kinetic testing confirmed that leaching considerations are under neutral to alkaline conditions and continue to support the previous assessment that ARD is not expected in these materials. Based on 32 weeks of testing, leaching rates are beginning to stabilize and general downward trends are expected to continue as the testing progresses. Variability in leaching rates is also being established and water contact chemistry predictions (i.e. geochemical source terms) should be possible after 40 weeks of testing.

For any tailings materials with water flow paths longer than half a metre, mineral solubility controls for copper are expected. Longer flow paths in the fine grained materials may also be conducive to lower rates of oxygen diffusion and therefore conditions that support selenium reduction to its more insoluble forms such as selenite and elemental selenium.

Testing is on-going and the current assessment of tailings reactivity and leaching rates will be updated once testing passes 40 weeks.

This report, Mount Polley Mine Tailings Dam Failure: Update on Geochemical Characterization of Spilled Tailings, was prepared by


Chris Kennedy, PGeo
Principal Consultant (Geochemistry)



and reviewed by


Stephen Day, PGeo
Corporate Consultant (Geochemistry)

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

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The opinions expressed in this report have been based on the information available to SRK at the time of preparation. SRK has exercised all due care in reviewing information supplied by others for use on this project. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information, except to the extent that SRK was hired to verify the data.

7 References

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- SRK 2015. Mount Polley Mine Tailings Dam Failure: Geochemical Characterization of Spilled Tailings. Provided in Mount Polley Mining Corporation Post Event Environmental Impact Assessment Report. Prepared by Golder Associates for Mount Polley Mining Corporation. July 2015.

Appendix A – Non-Sulphide Copper Analysis Results

Sample ID	Al mg/kg	As mg/kg	B mg/kg	Cd mg/kg	Co mg/kg	Cu mg/kg	Fe mg/kg	Pb mg/kg	Mn mg/kg	Mo mg/kg	Ni mg/kg	Se mg/kg	Ag mg/kg	Zn mg/kg
Reporting Limits	0.3	0.01	1	0.001	0.01	0.05	1.0	0.005	0.005	0.005	0.05	0.01	0.001	0.3
MB1	<0.3	<0.01	<1	<0.001	<0.01	<0.05	<1	0.016	0.0056	<0.005	<0.05	<0.01	<0.001	<0.3
L1518225-4	2000	4.9	1.5	0.081	1.2	520	1100	1.7	100	0.96	0.78	0.26	0.0075	6.9
L1518225-8	1900	3.4	<1	0.073	1.5	170	1700	0.72	170	0.089	1.4	0.037	<0.001	4.8
L1518225-37	1500	2.9	<1	0.063	1.1	290	1100	1.1	88	0.25	1.1	0.092	0.0029	4.1
L1518225-44	1000	2.3	1.0	0.072	1.4	100	1300	0.77	150	0.038	1.7	0.035	<0.001	5.8
L1518225-60	1300	5.0	<1	0.069	1.2	740	1200	1.3	110	0.68	0.6	0.23	0.0063	3.2
L1518225-72	1500	3.8	<1	0.094	0.81	390	1000	1.3	78	0.58	0.52	0.21	0.0029	6.4
L1518225-72DUP	1400	3.9	<1	0.10	0.86	450	1000	1.4	95	0.7	0.53	0.18	0.0048	7.7
L1518225-74	1900	4.3	1.1	0.072	0.85	440	1000	1.2	78	0.48	0.59	0.21	0.0042	5.2
L1519001-3	2200	3.9	<1	0.081	1.4	320	1300	1.1	120	0.25	1.4	0.12	0.0028	5.0
L1519001-9	1700	5.4	<1	0.09	0.97	450	1500	1.7	110	0.45	0.84	0.22	0.0034	5.3
L1519001-26	2300	4.9	1.4	0.083	1.3	480	1300	1.8	110	0.54	0.85	0.24	0.0054	6.2
L1519001-35	2300	5.3	1.4	0.086	1.4	510	1300	1.6	120	0.56	0.81	0.28	0.0076	7.1
L1519001-38	1200	4.0	<1	0.072	0.69	400	1100	1.2	72	0.51	0.64	0.18	0.0028	4.1
L1519001-39	1300	4.2	<1	0.08	0.77	440	1200	1.3	80	0.57	0.61	0.2	0.0024	4.6
L1519001-40	2700	6.2	1.9	0.10	1.6	590	1600	1.9	130	0.84	0.98	0.3	0.0062	8.0
L1520490-2	2200	4.5	<1	0.045	0.42	370	520	0.77	39	0.43	0.48	0.23	0.002	2.2
L1520490-5	2400	5.0	1.3	0.078	1.3	430	1300	1.2	110	0.26	0.83	0.23	0.0034	5.3
Quality Assurance and Quality Control														
Duplicate Pair: L1518225-72 & L1518225-72DUP														
RPD	7%	-4%	-	-8%	-6%	-10%	1%	-8%	-20%	-20%	-1%	16%	-50%	-20%
Duplicate Pair: L1519001-38 & L1519001-39														
RPD	-5%	-6%	-	-10%	-10%	-9%	-8%	-10%	-10%	-10%	5%	-9%	14%	-10%

Note: results have been rounded to two significant figures.

Appendix B -- Geochemical Properties of Tailings

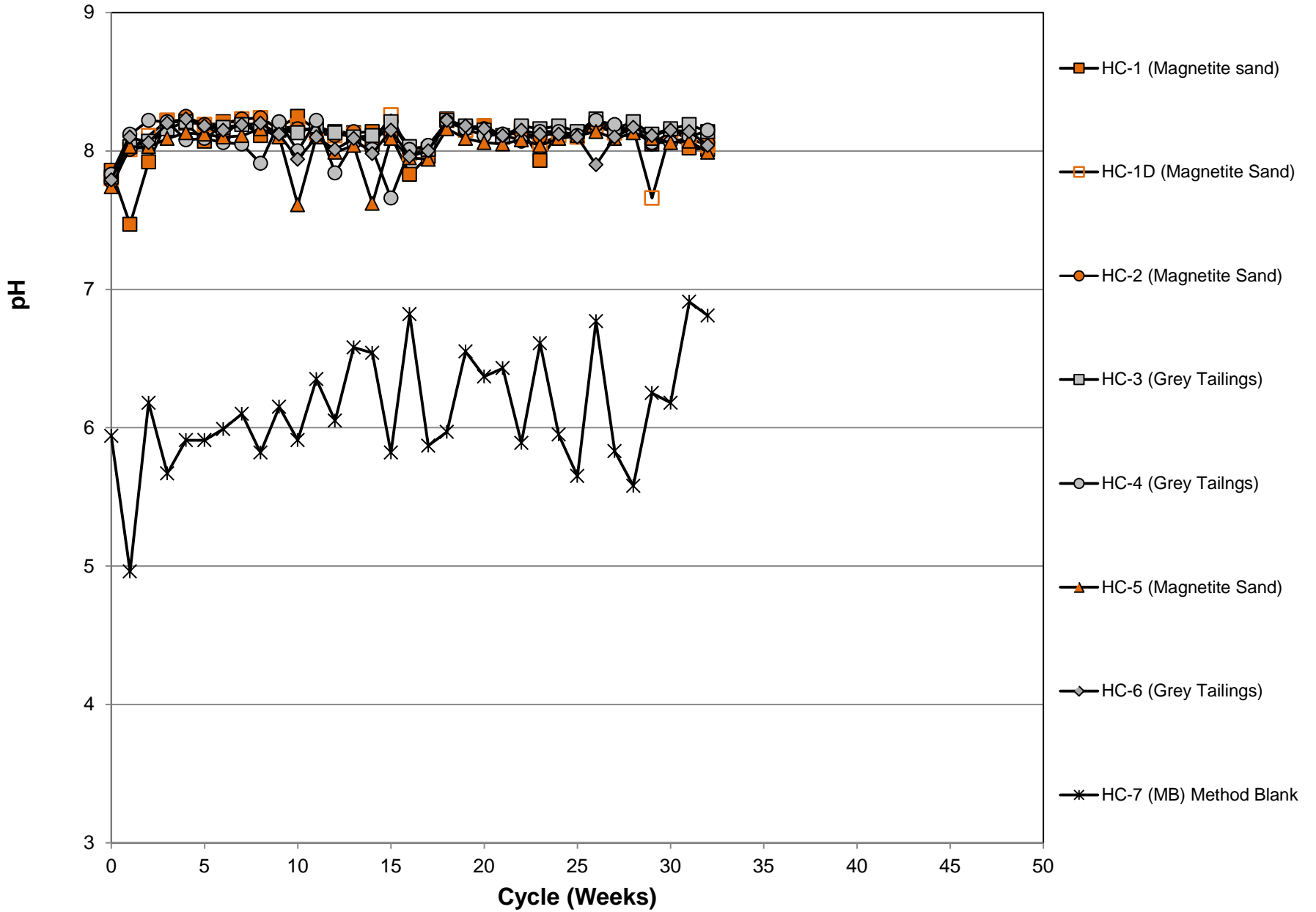
Composition

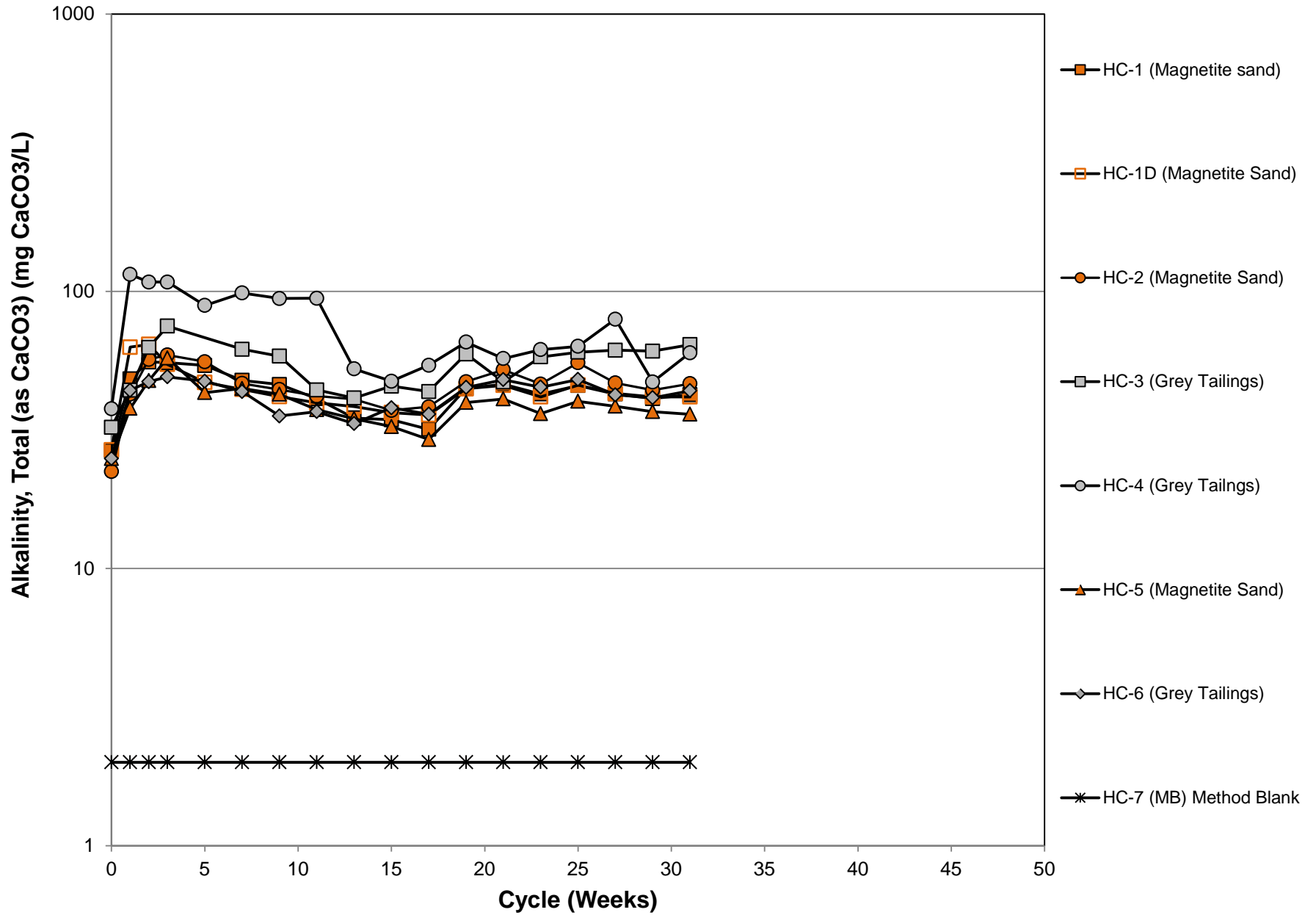
Kinetic Test	Tailings Type	Leco	Aqua Regia	Al	As	B	Cd	Co	Cu	Fe	Hg	Mn	Mo	Ni	Pb	Se	Ag	Zn
		S %	S %	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
HC-1/COL-1	Magnetite Sand	0.26	0.27	1.2	13	<10	0.22	19	1200	8.0	0.14	630	5.6	9.2	6.8	1.5	0.51	82
HC-1D	Magnetite Sand	0.27	0.27	1.2	14	<10	0.17	19	1200	8.2	0.13	610	5.1	9.0	5.5	1.7	0.60	63
HC-2/COL-2	Magnetite Sand	0.16	0.15	1.3	11	<10	0.15	16	950	5.7	0.1	520	4.3	7.1	4.6	1.3	0.33	54
HC-3/COL-3	Grey Tailings	0.16	0.15	1.8	13	<10	0.13	21	940	5.0	0.08	710	4.7	10	5.6	1.6	0.33	70
HC-4	Grey Tailings	0.17	0.09	1.3	9.6	10	0.16	12	320	4.2	0.08	600	1.8	16	5.4	0.9	0.18	55
HC-5	Magnetite Sand	0.18	0.13	1.4	10	10	0.16	12	720	4.3	0.1	560	3.6	13	9.0	1.2	0.34	53
HC-6	Grey Tailings	0.21	0.23	1.4	11	10	0.24	15	1300	4.9	0.11	620	5.1	8.2	6.0	1.8	0.53	59

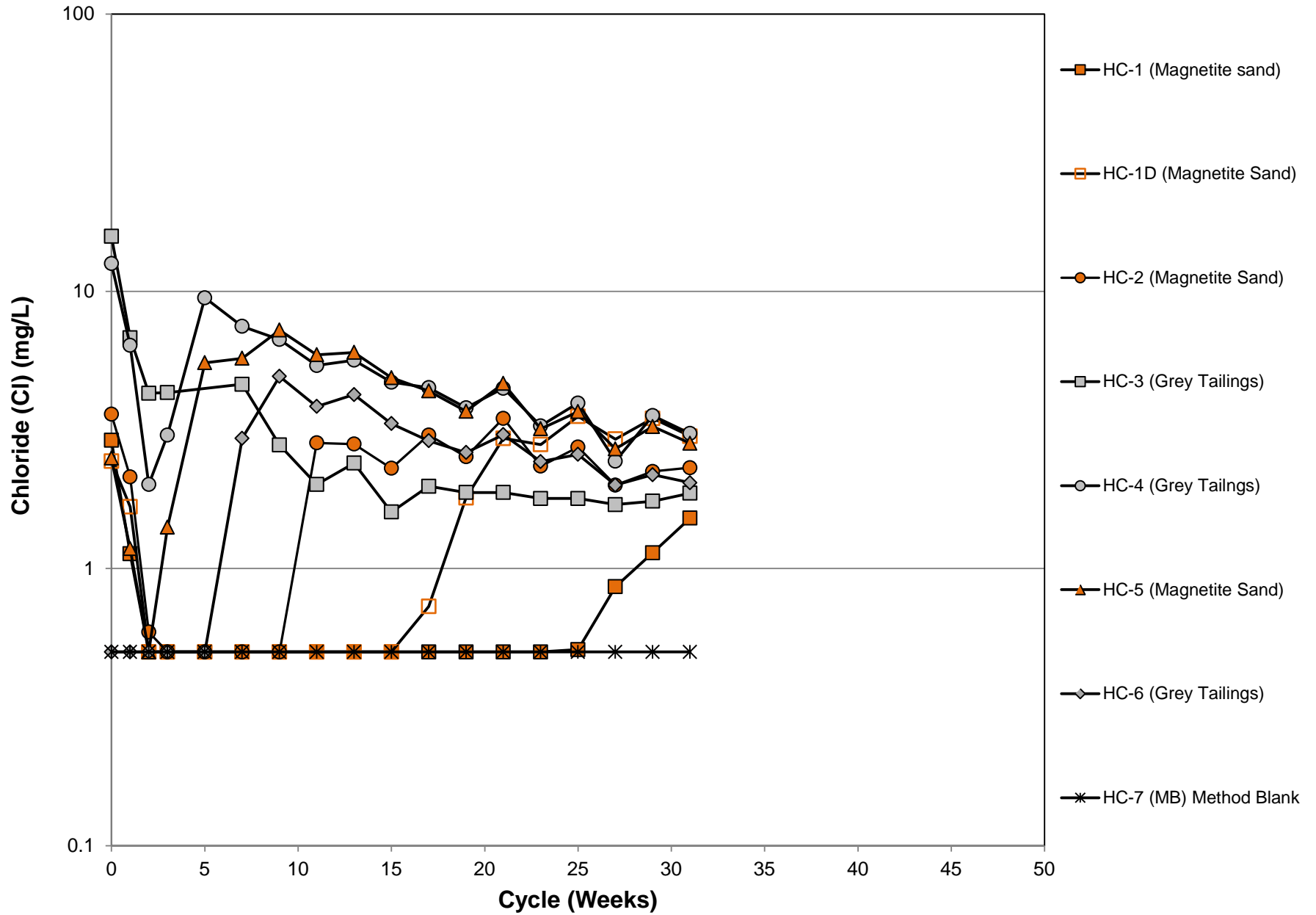
Mineralogy

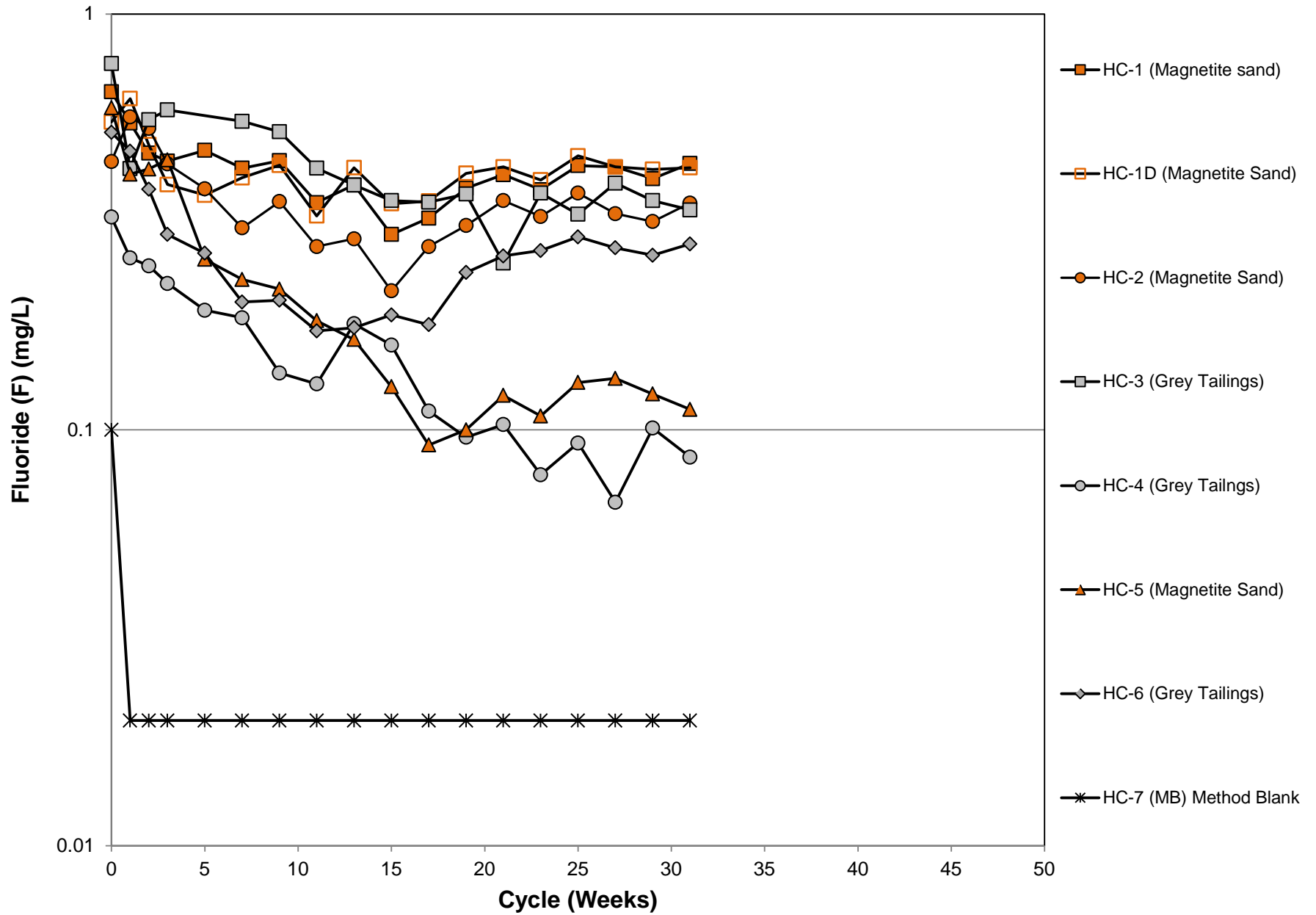
Kinetic Test	Tailings Type	Sulphides			Carbonates			Silicates											Oxides and Other			
		Pyrite	Chalcopyrite	Bornite	Calcite	Dolomite	Malachite	Quartz	Plagioclase	K-Feldspar	Sericite/Muscovite	Biotite	Clinopyroxene	Epidote Group	Garnet	Chlorite	Clays	Other Silicates	Fe-Oxides	Ti (Fe) Oxides	Apatite	Other
		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
HC-1/COL-1	Magnetite Sand	0.24	0.24	0.035	2.2	0.11	0.0081	3.8	24	43	1.5	1.7	4.3	0.87	2.2	3.8	1.8	1.9	7	0.29	0.7	0.027
HC-1D	Magnetite Sand	0.32	0.24	0.02	2.5	0.051	0.013	5	25	41	1.4	1.4	5.9	0.49	2.5	3.7	1.7	2	6.5	0.23	0.6	0.051
HC-2/COL-2	Magnetite Sand	0.19	0.18	0.019	2.3	0.037	0.00048	1.3	29	43	1.1	2.2	5.1	0.47	1.8	3.6	1.9	1.9	5.3	0.24	0.68	0.027
HC-3/COL-3	Grey Tailings	0.33	0.024	0.0	2.6	0.018	0.0	1.1	27	39	1.5	3.2	5	0.28	1.3	6.9	2.3	3.1	4.9	0.11	0.88	0.054
HC-4	Grey Tailings	0.08	0.021	0.00029	0.72	0.43	0.0	27	19	24	1.7	1.2	3.9	1.1	3.4	5.2	5.3	2.9	2.8	0.64	0.44	0.036
HC-5	Magnetite Sand	0.16	0.16	0.015	1.3	0.15	0.0028	21	21	31	1.1	1.3	3.9	0.89	2.5	4.1	4.3	1.9	3.8	0.73	0.51	0.032
HC-6	Grey Tailings	0.40	0.23	0.016	4.5	0.048	0.013	3	27	39	1.8	1.6	4.6	0.4	1.8	3.8	2.8	2.2	4.9	0.28	0.81	0.021

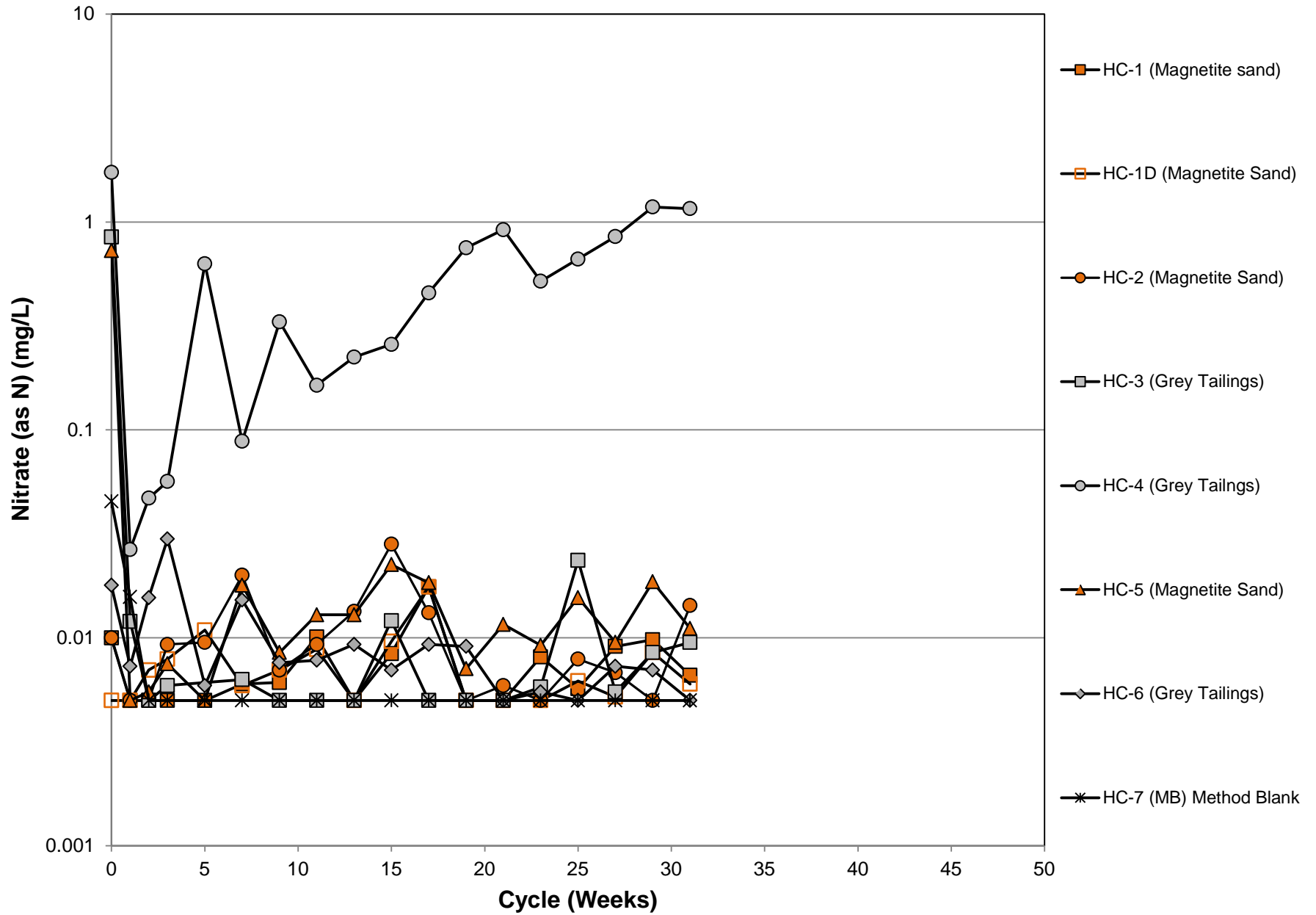
Appendix C – Humidity Cell Concentrations Charts

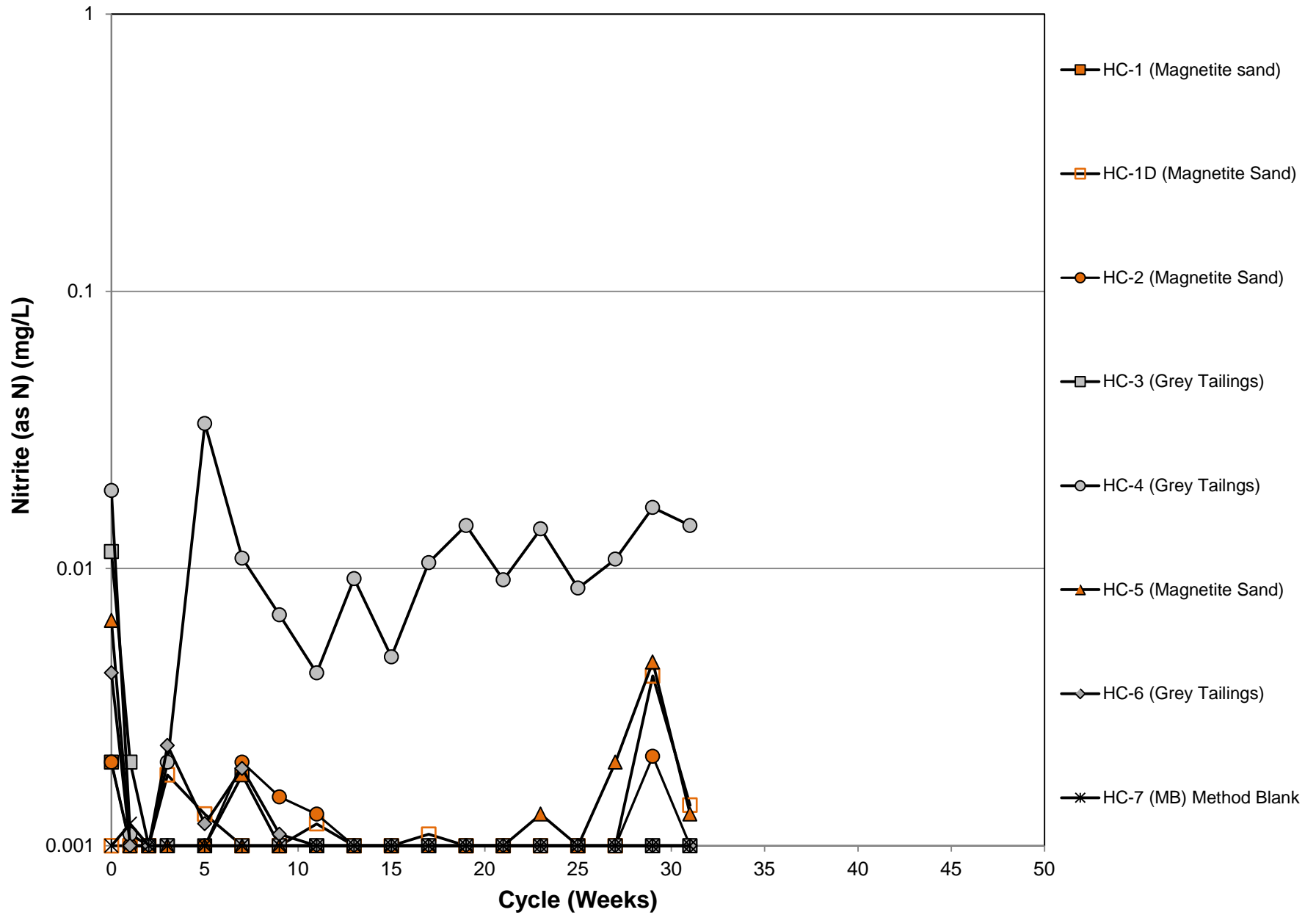


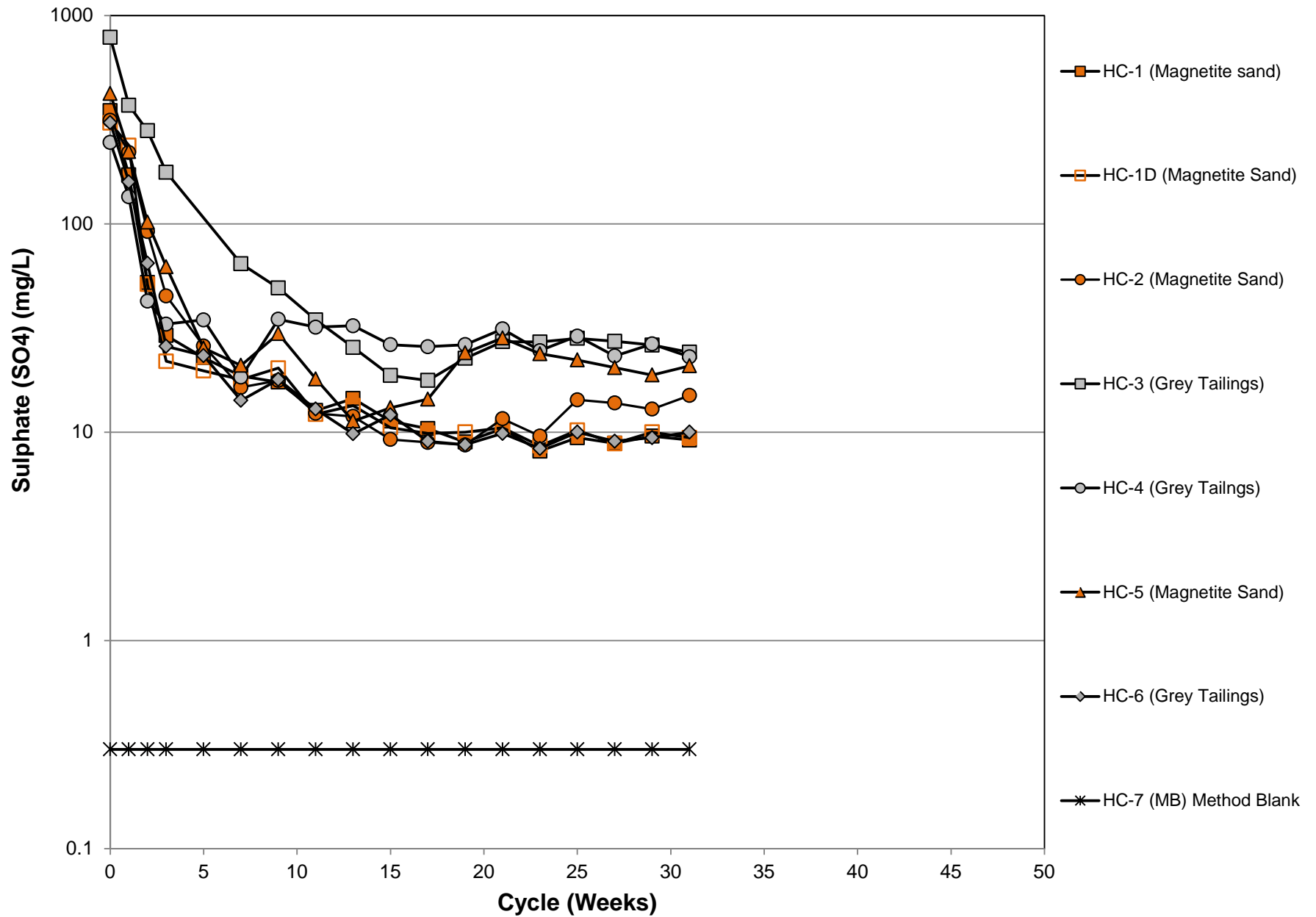


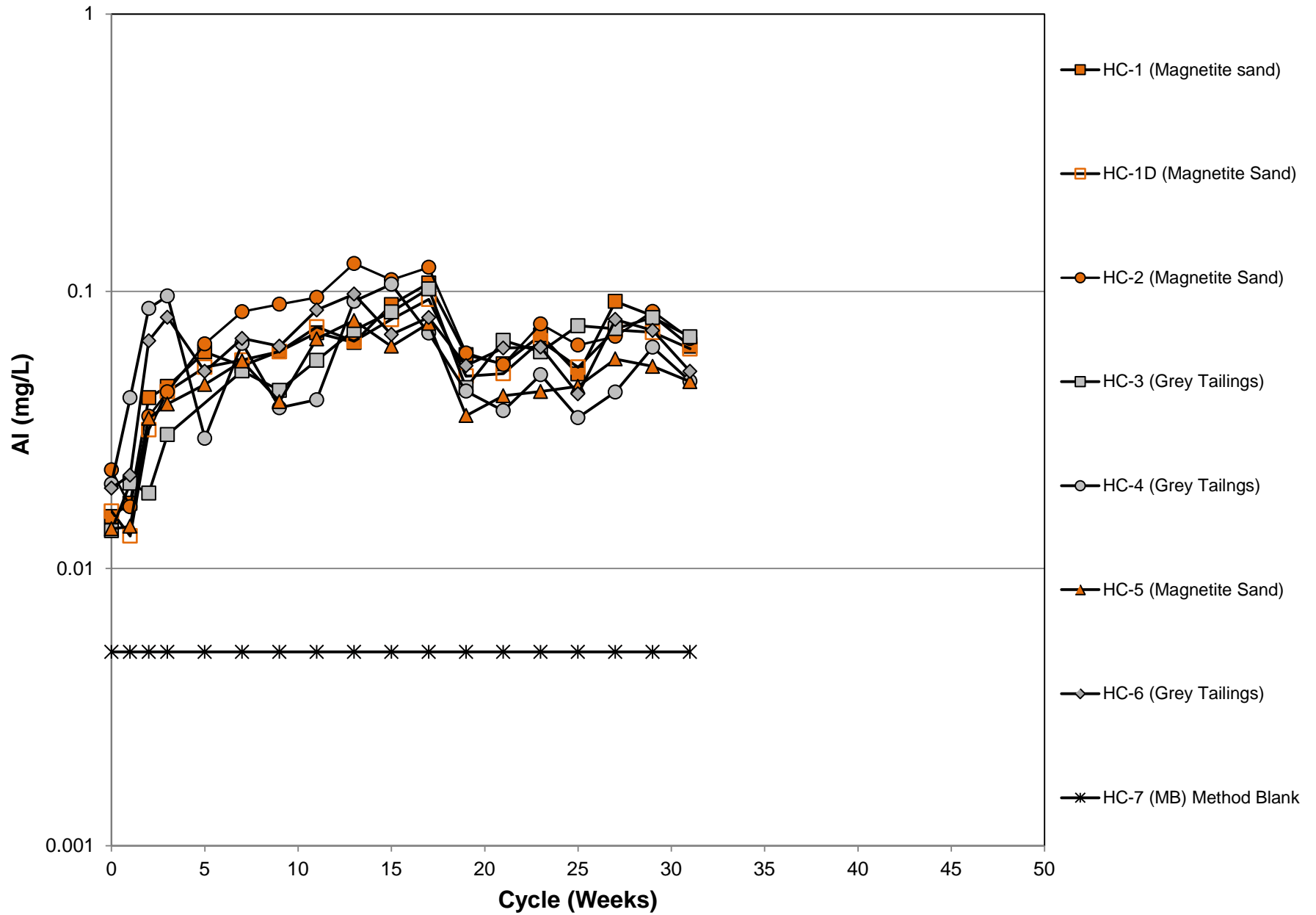


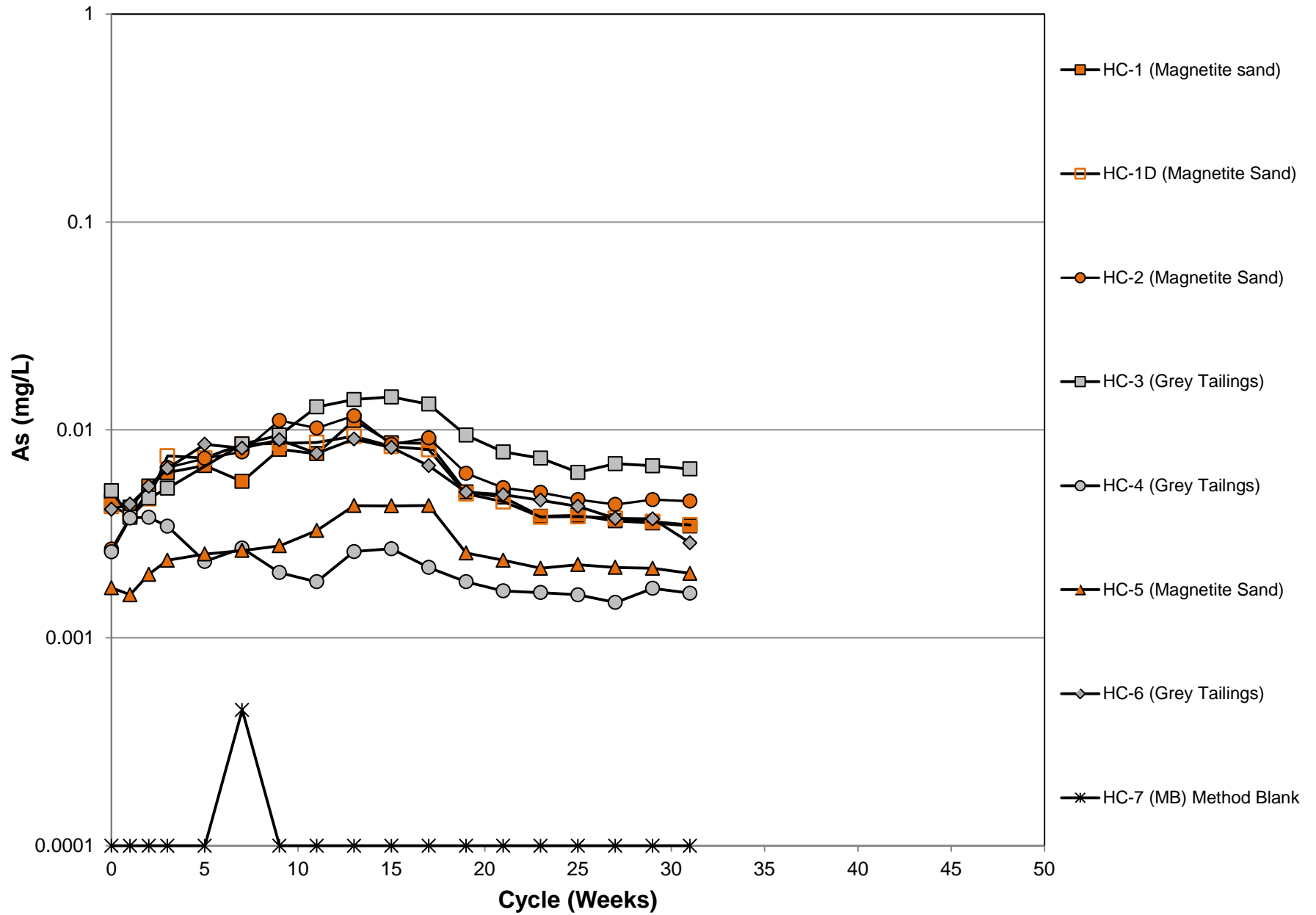


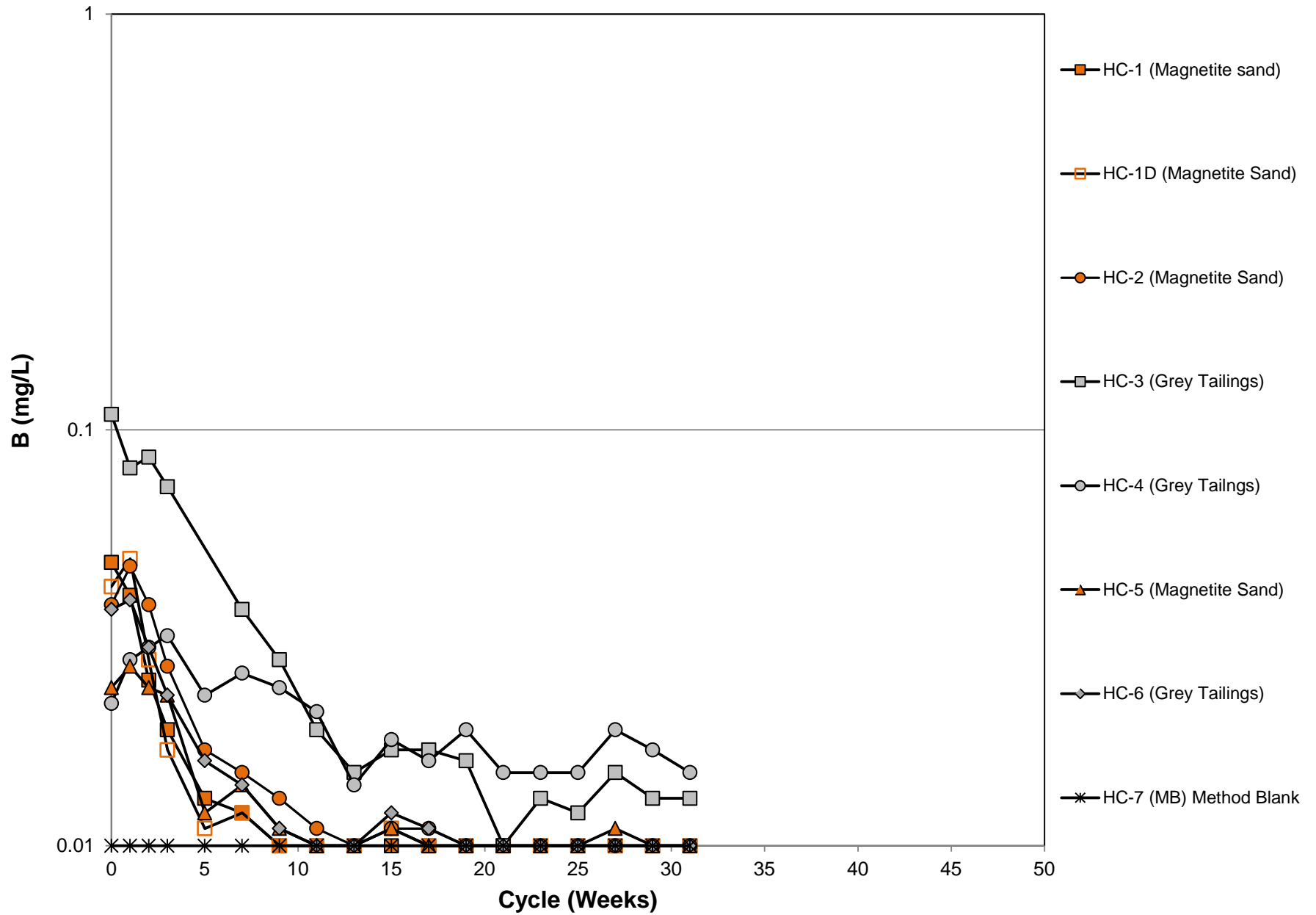


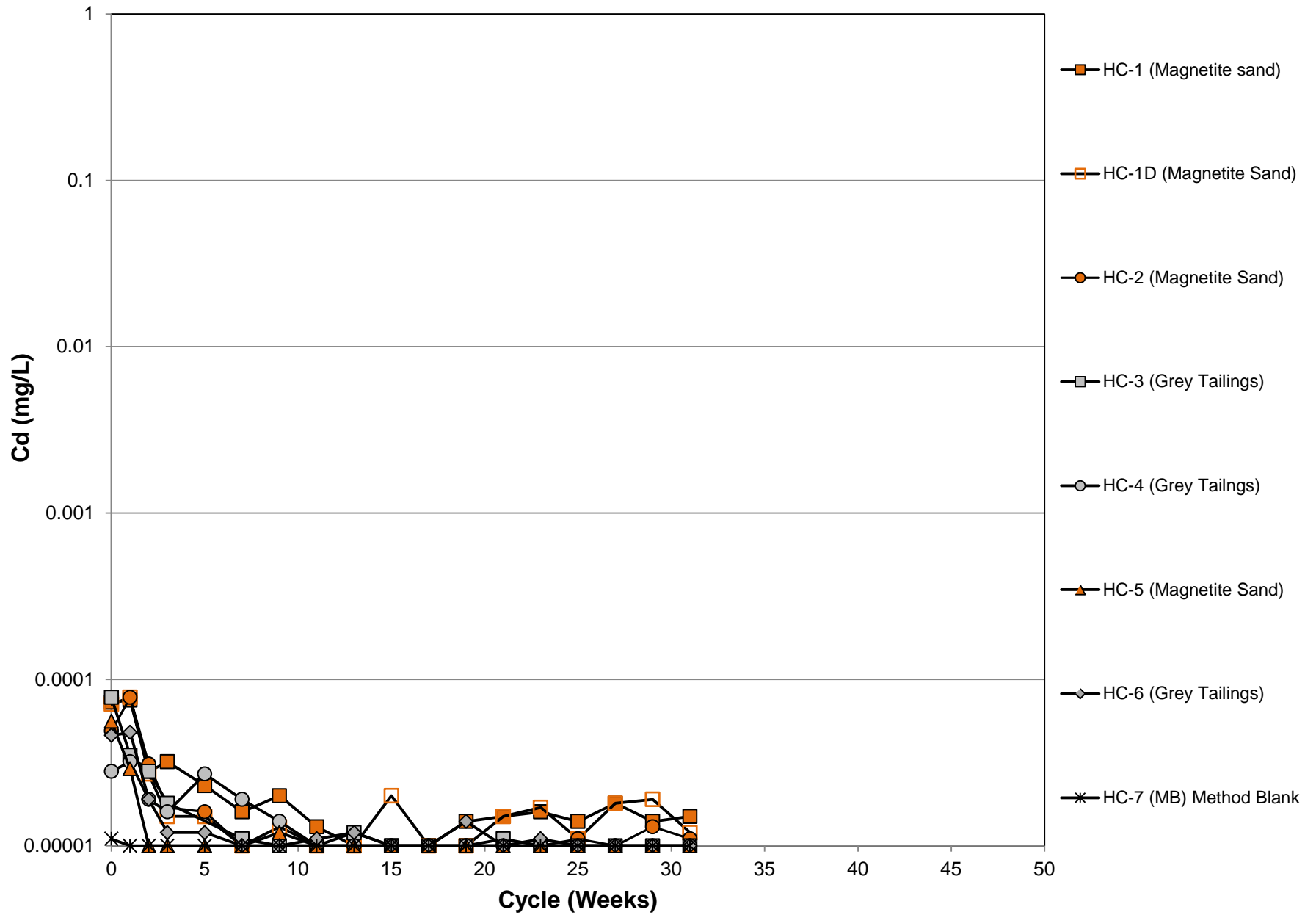


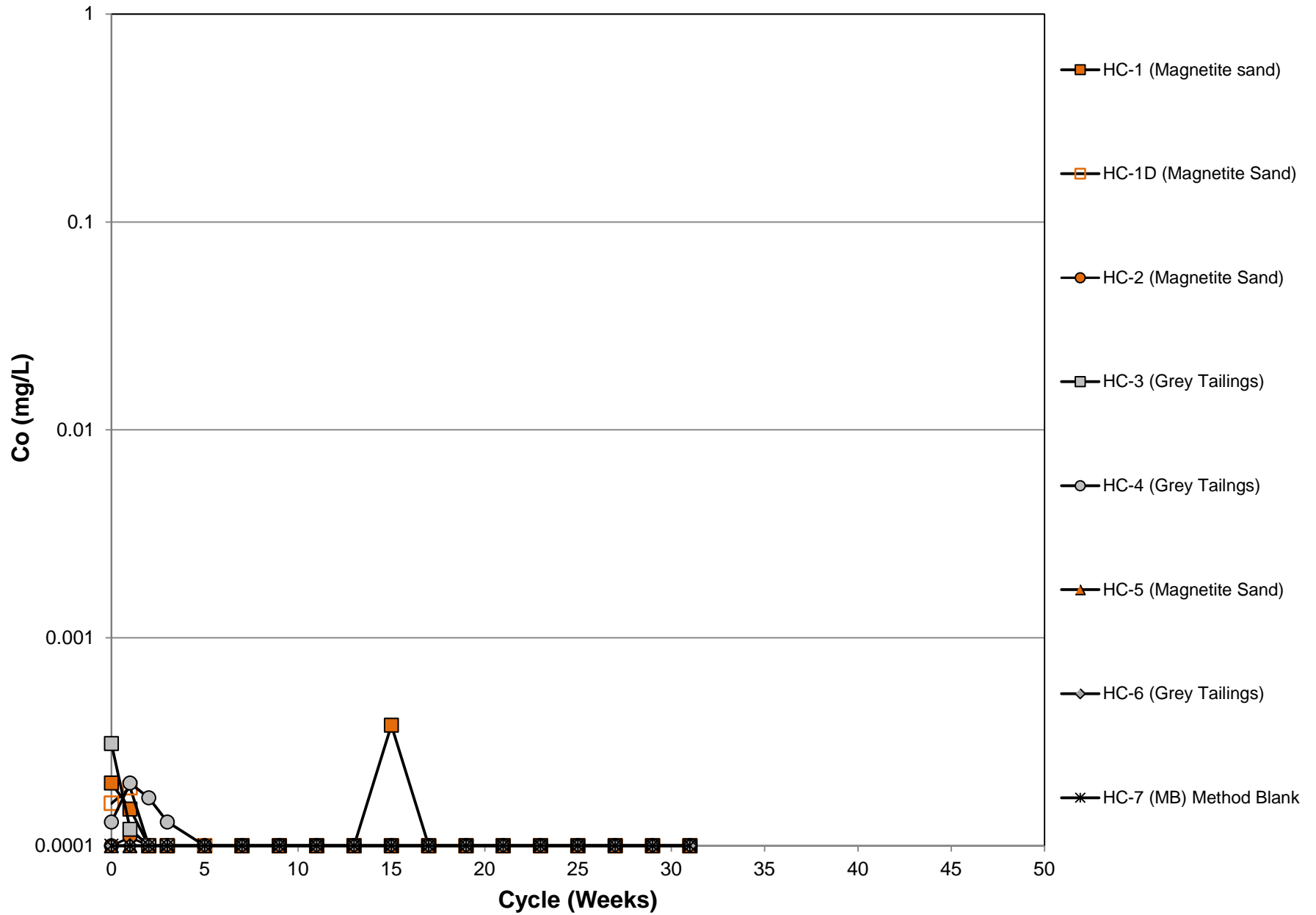


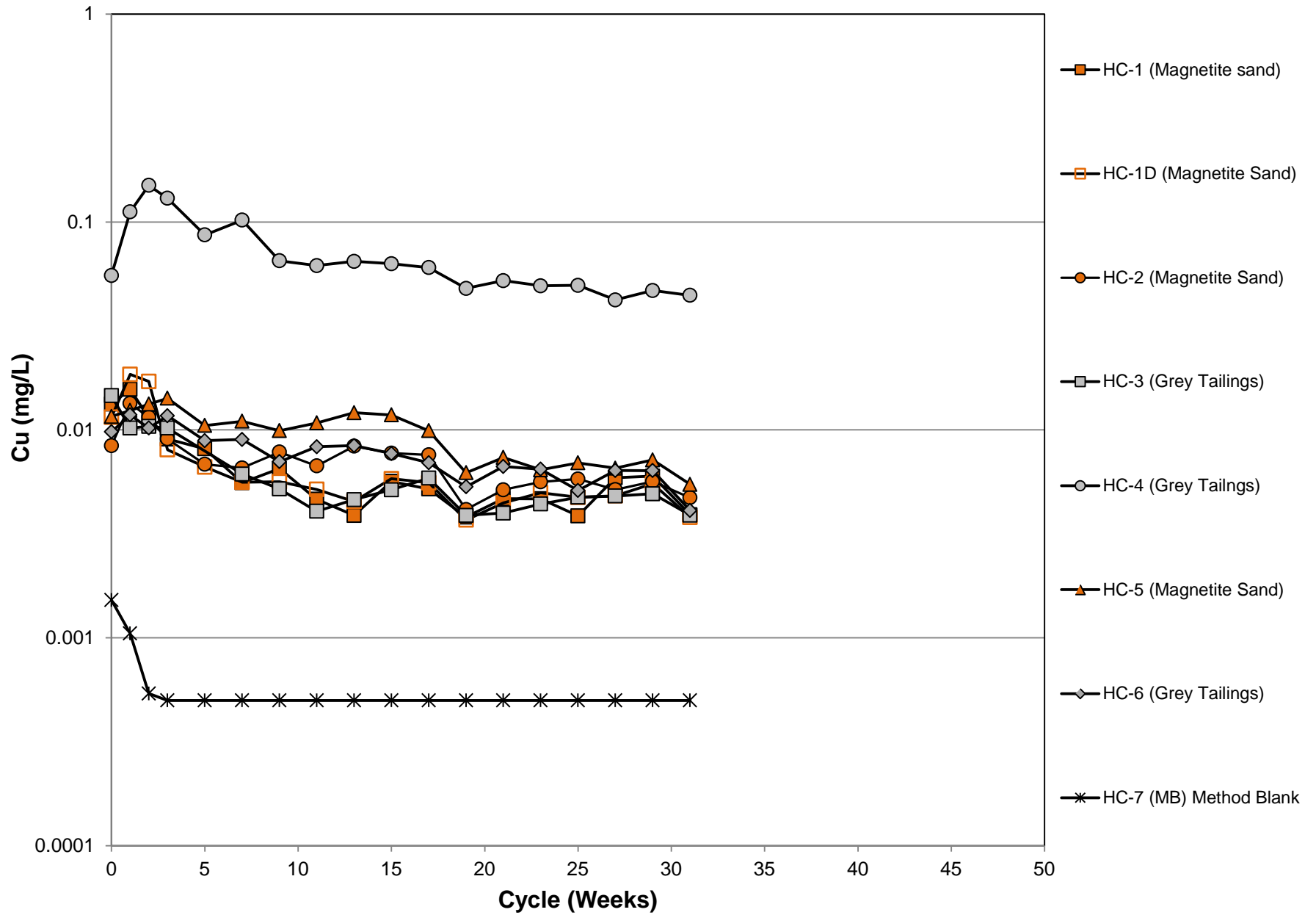


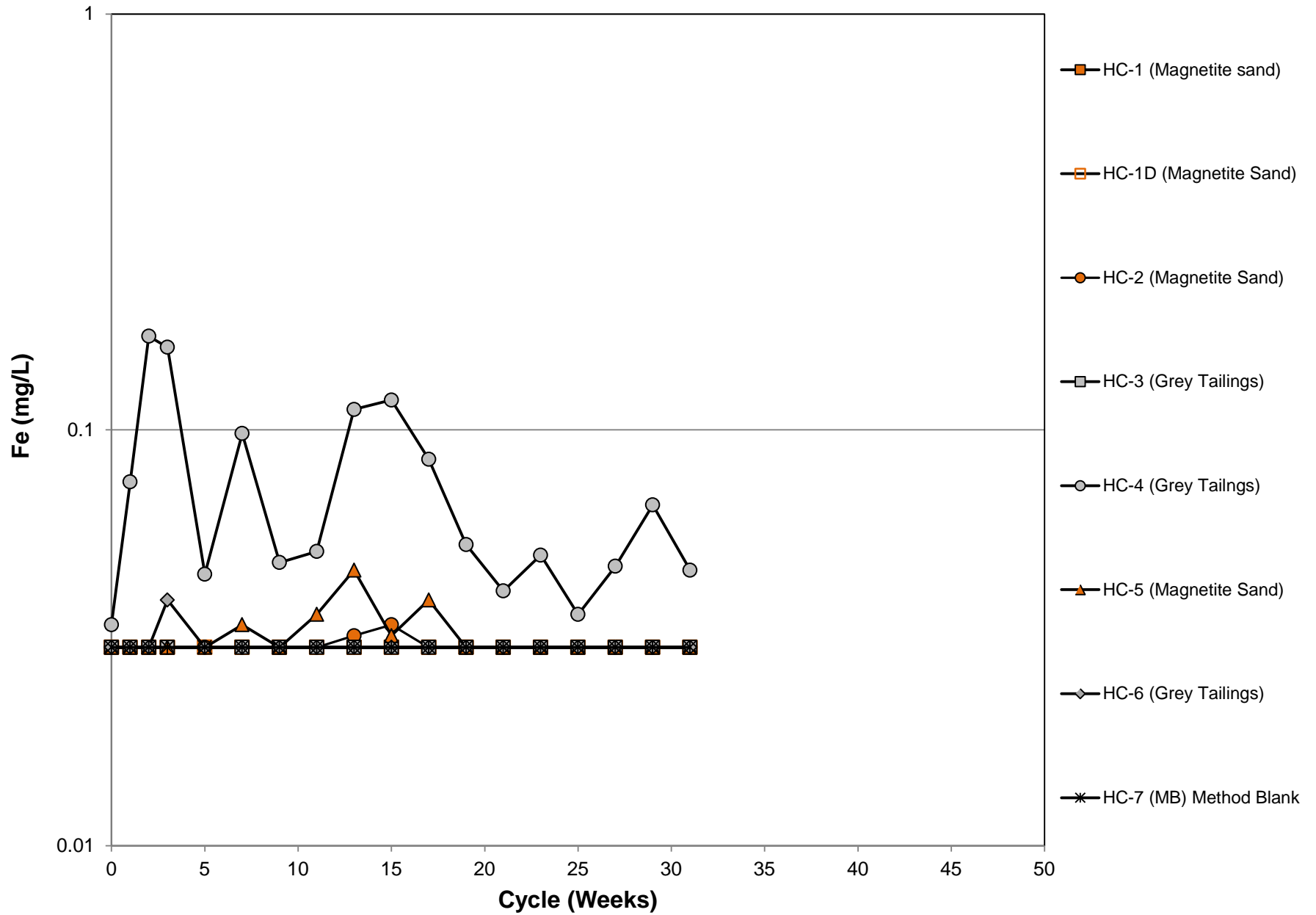


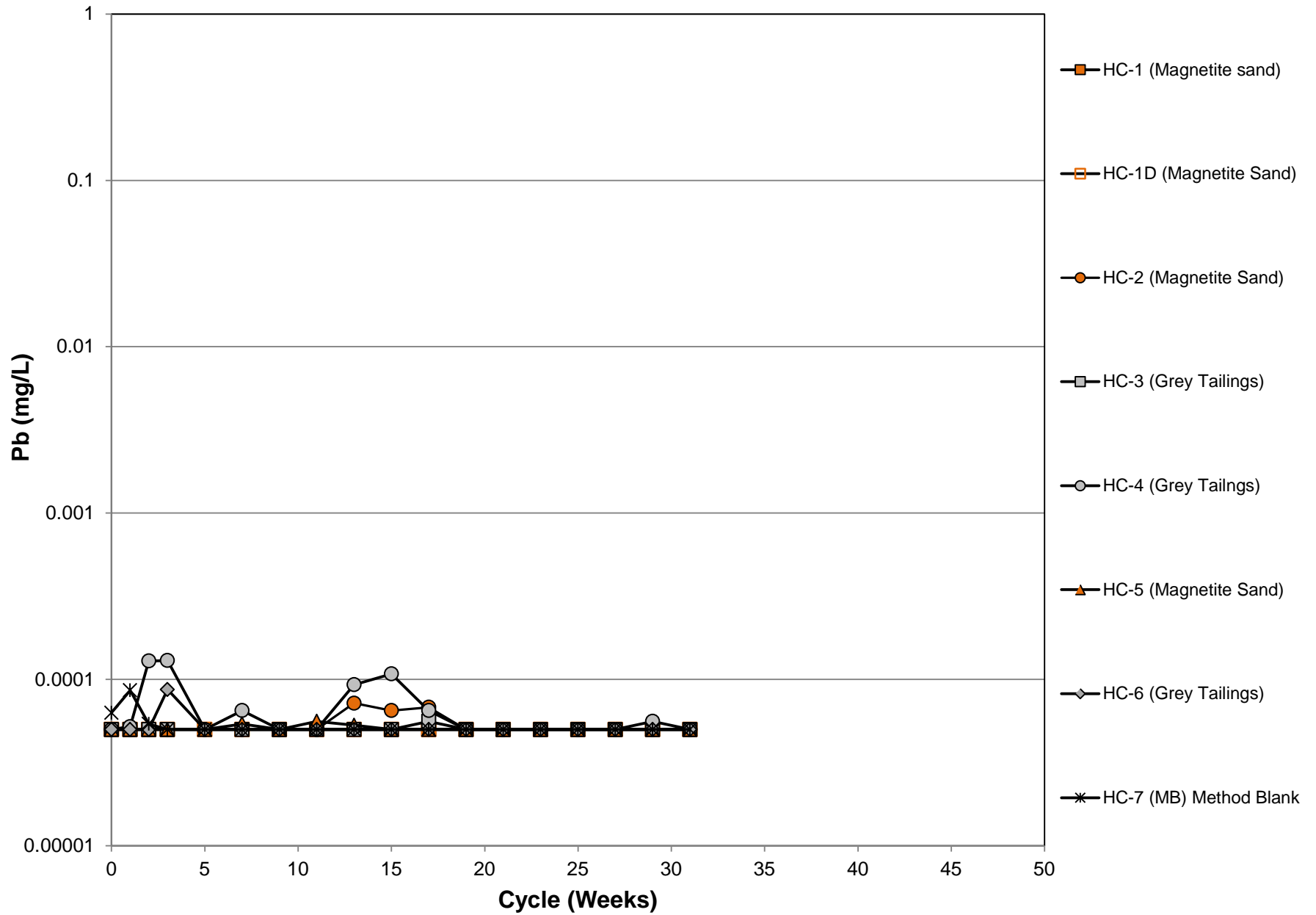


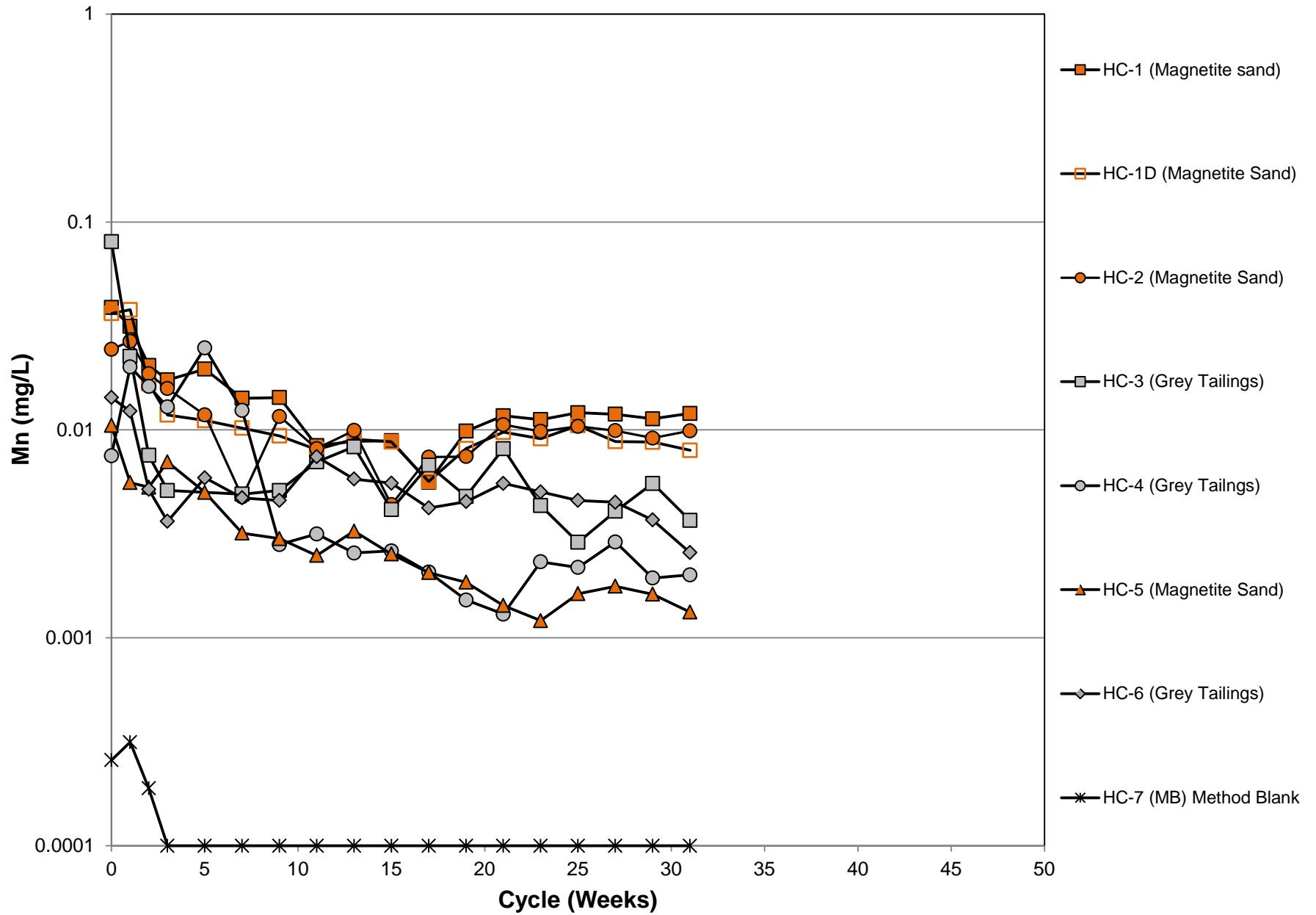


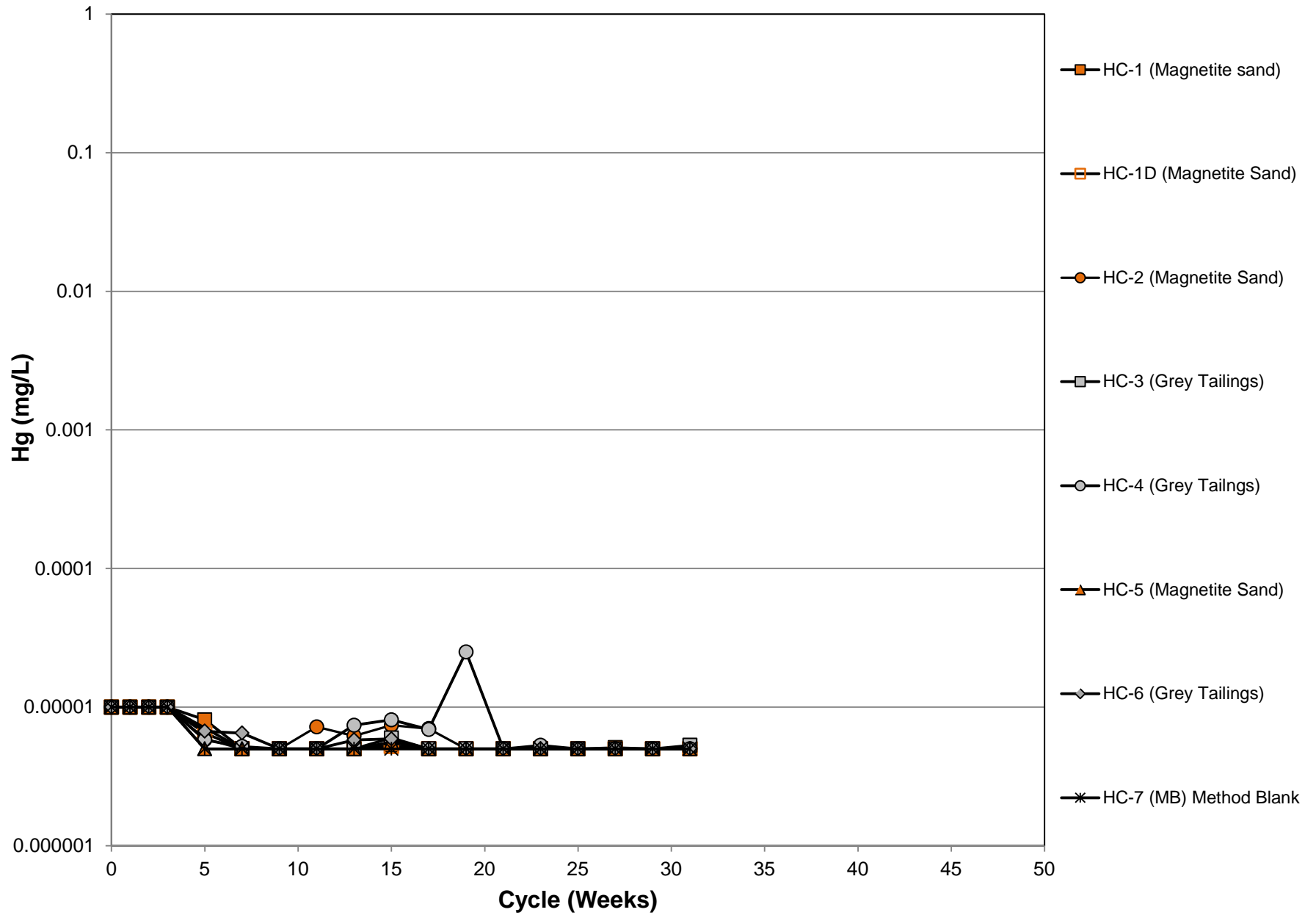


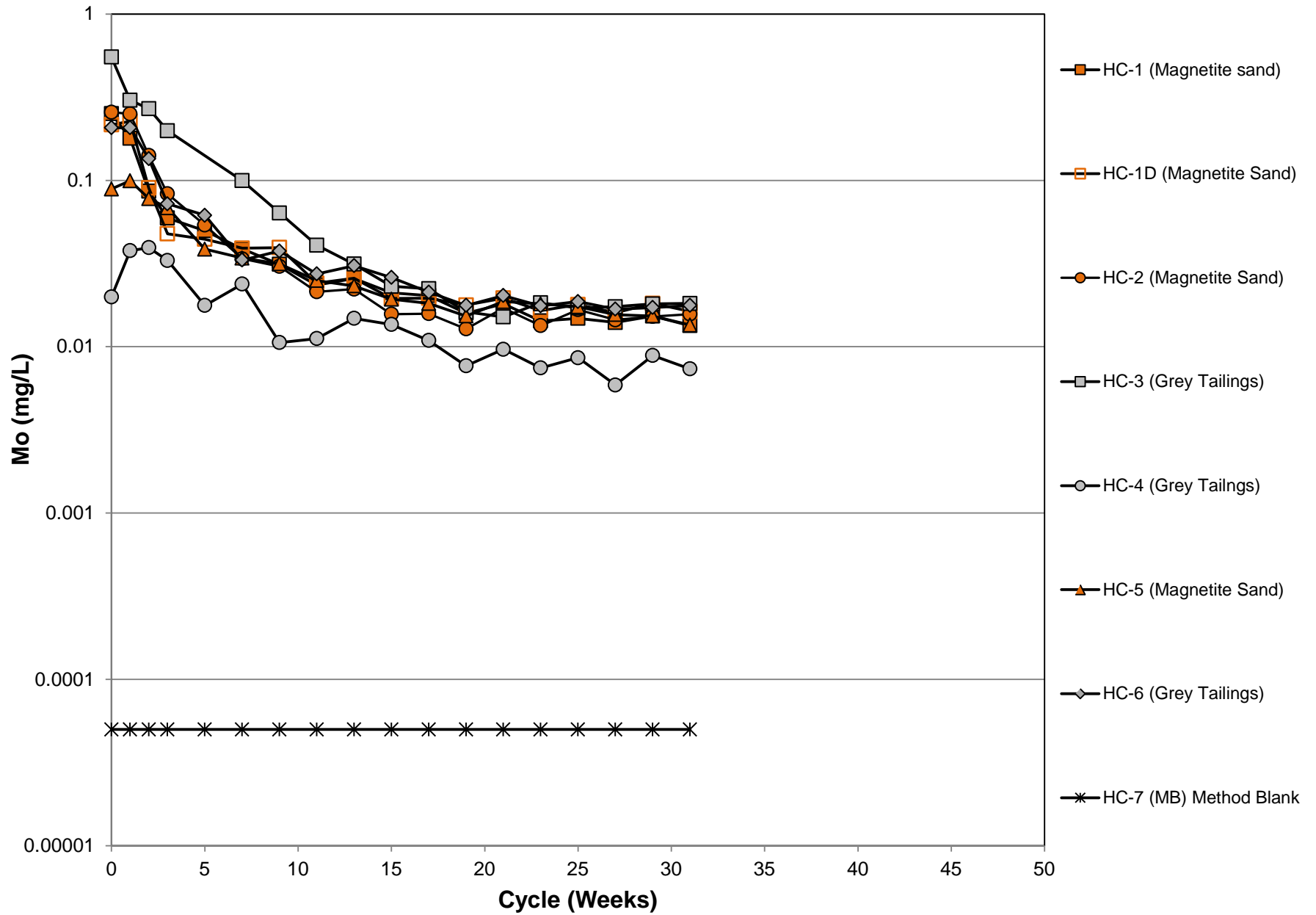


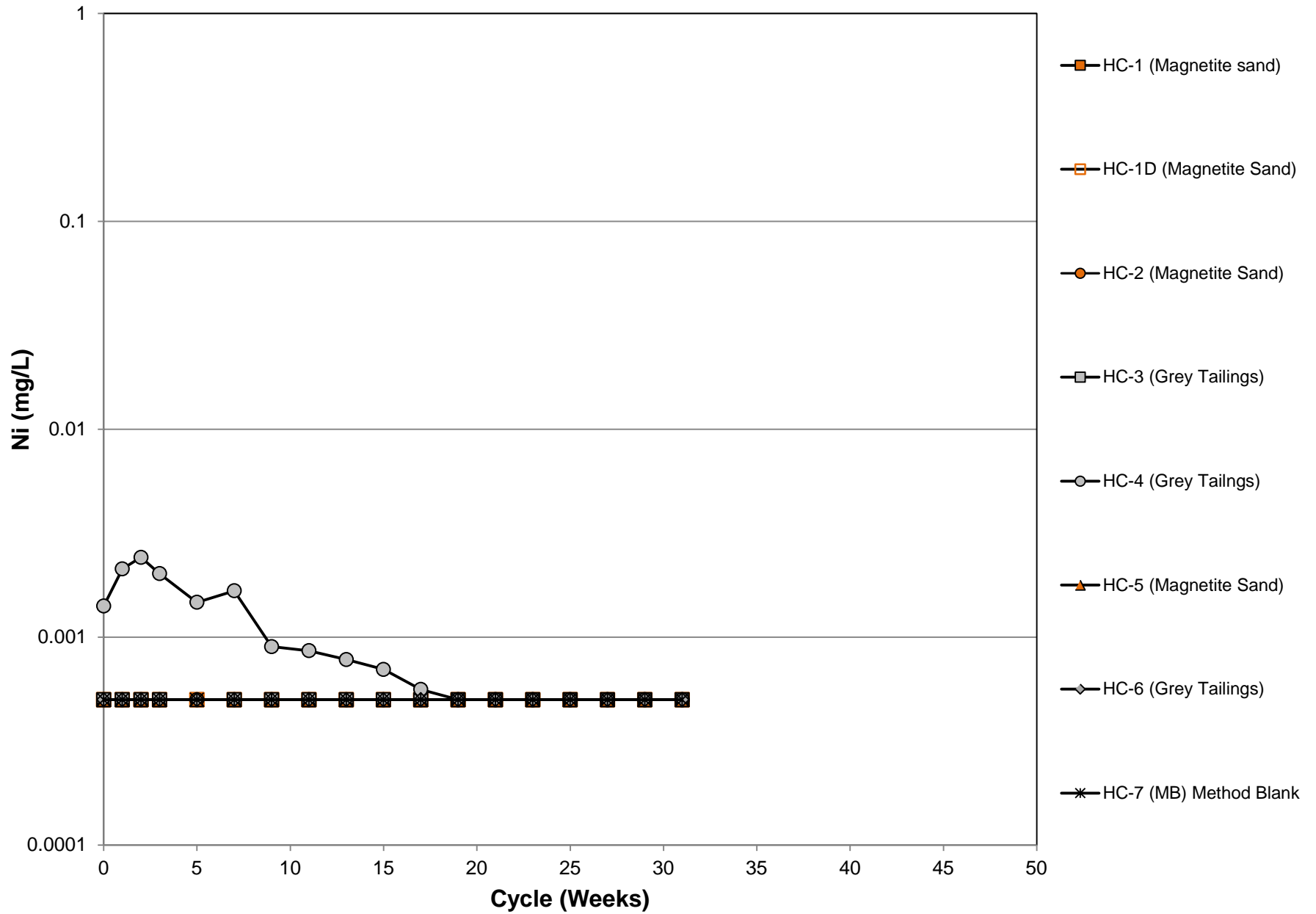


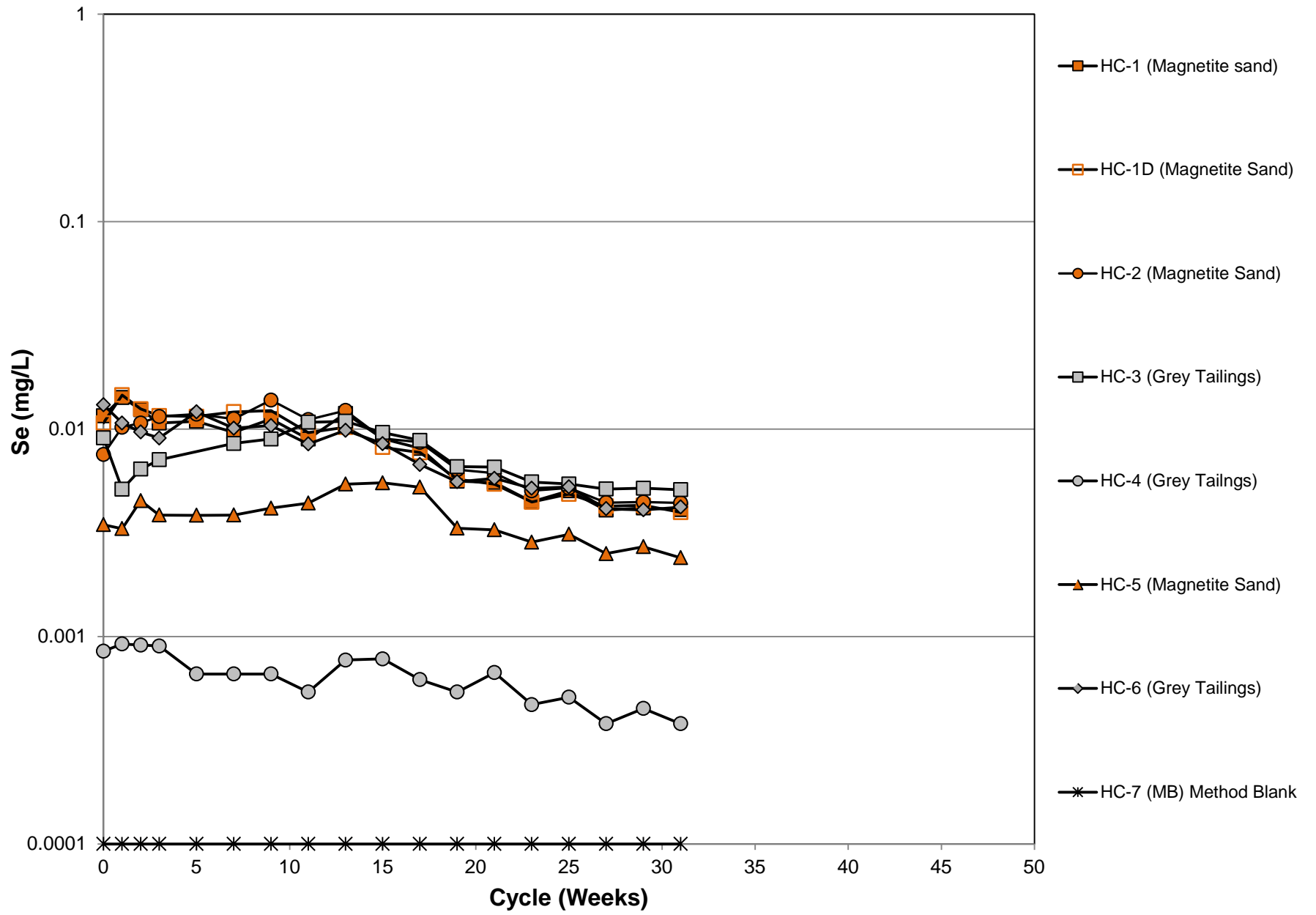


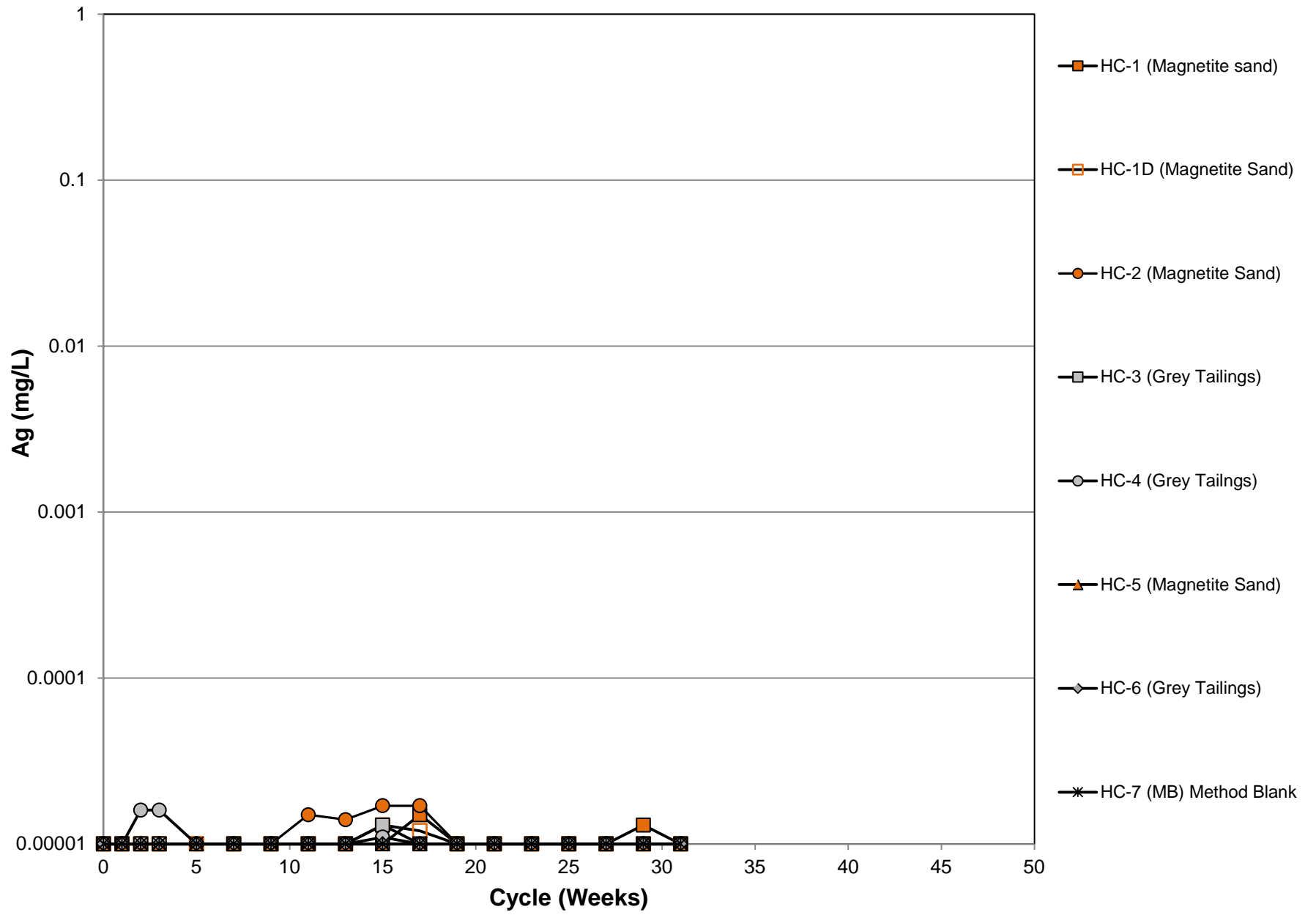


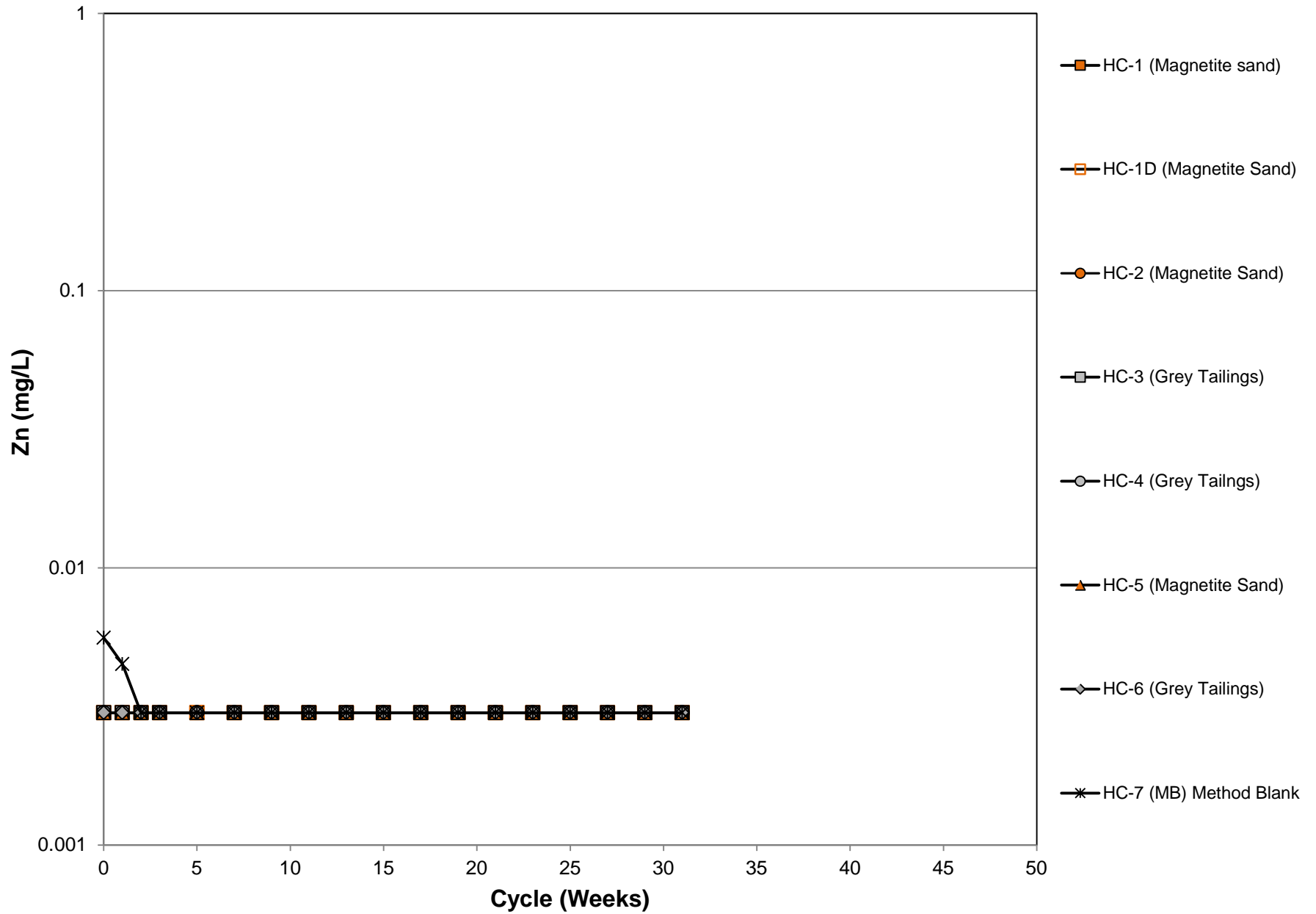








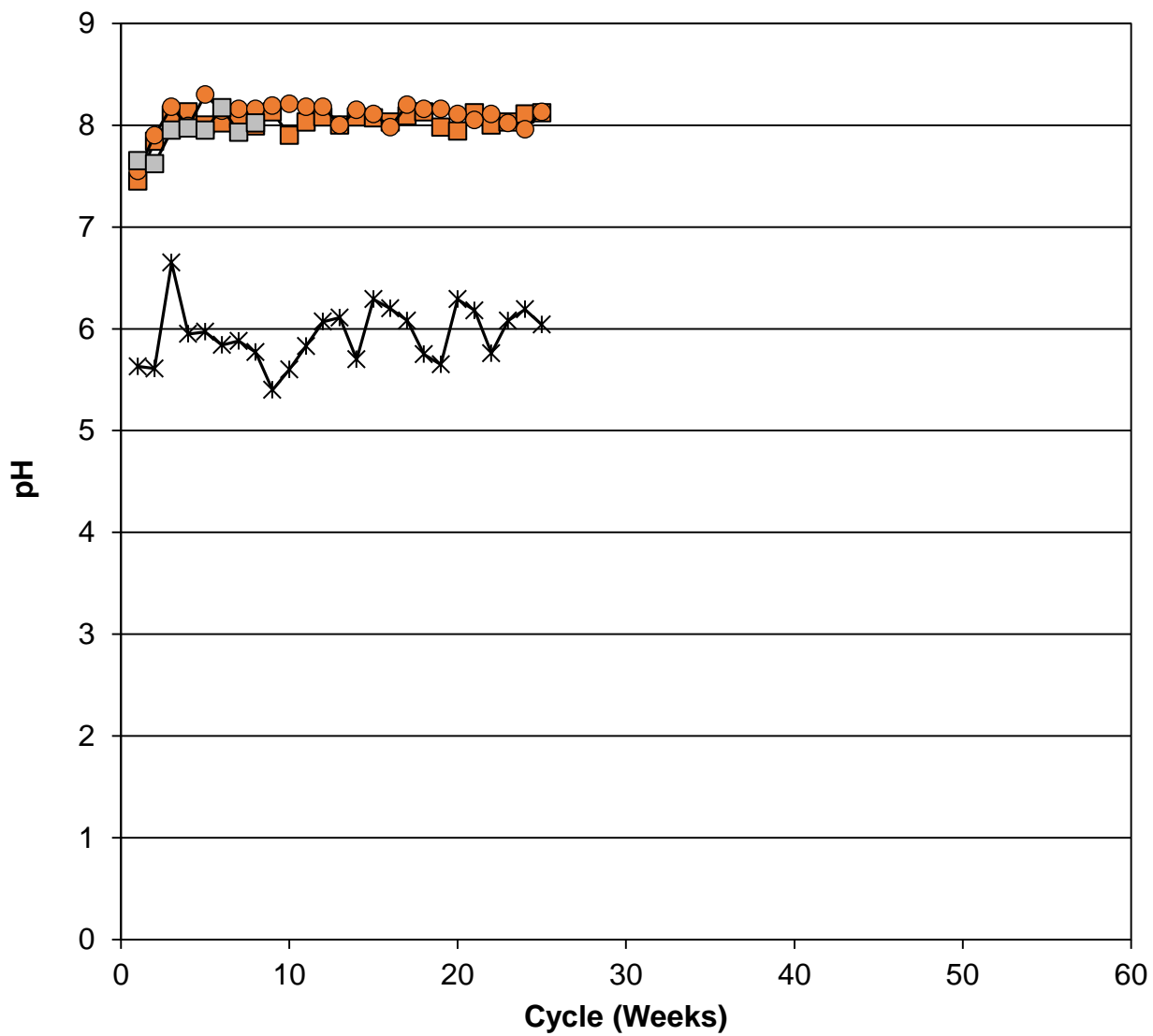




Appendix D – Leaching Rates for Humidity Cells and Columns

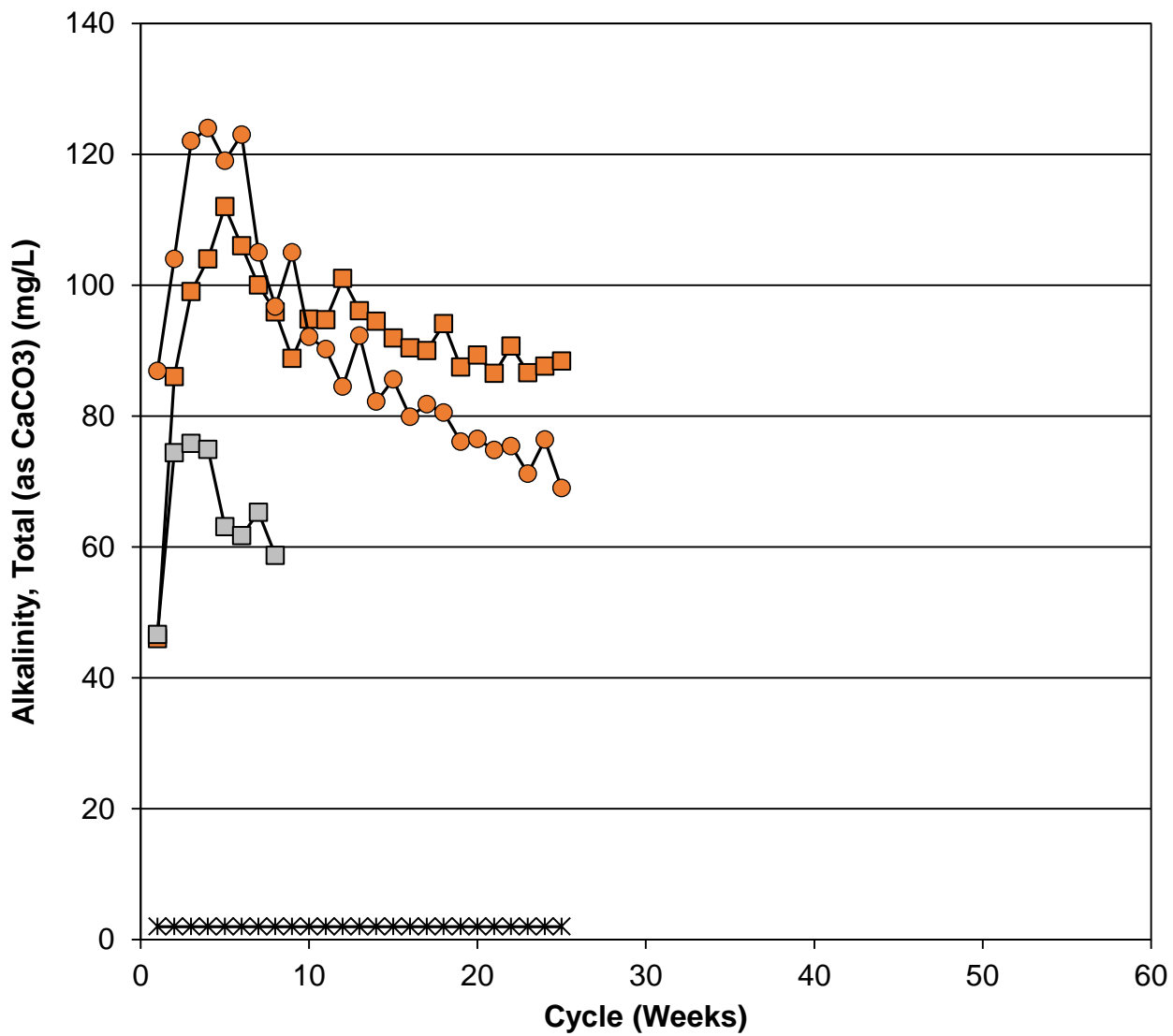
Kinetic Test	Tailings Type	Cl mg/kg/wk	F mg/kg/wk	NO ₃ mg/kg/wk	NO ₂ mg/kg/wk	SO ₄ mg/kg/wk	Al mg/kg/wk	As mg/kg/wk	B mg/kg/wk	Cd mg/kg/wk	Co mg/kg/wk	Cu mg/kg/wk	Fe mg/kg/wk	Pb mg/kg/wk	Mn mg/kg/wk	Hg mg/kg/wk	Mo mg/kg/wk	Ni mg/kg/wk	Se mg/kg/wk	Ag mg/kg/wk	Zn mg/kg/wk
HC-1	Magnetite Sand	0.31	0.17	0.0036	0.00043	4.1	0.032	0.0021	0.0043	0.0000061	0.000055	0.0021	0.013	0.000022	0.0045	0.0000022	0.007	0.00022	0.0024	0.0000047	0.0013
HC-1D	Magnetite Sand	1.1	0.18	0.0032	0.0006	4.3	0.029	0.0021	0.0044	0.0000064	0.000044	0.0021	0.013	0.000022	0.0038	0.0000022	0.0078	0.00022	0.0024	0.0000046	0.0013
COL-1	Magnetite Sand	0.05	0.087	0.00055	0.000099	5.8	0.00088	0.00055	0.0015	0.0000061	0.0000099	0.0023	0.003	0.000005	0.000089	0.0000005	0.015	0.000053	0.0013	0.0000099	0.0003
HC-2	Magnetite Sand	1.1	0.14	0.0043	0.00049	5	0.034	0.0025	0.0044	0.0000046	0.000043	0.0025	0.013	0.000023	0.0038	0.0000024	0.0066	0.00022	0.0025	0.0000049	0.0013
COL-2	Magnetite Sand	0.051	0.057	0.00057	0.0001	1.7	0.0016	0.00099	0.0016	0.0000016	0.00001	0.0013	0.003	0.000005	0.000079	0.0000005	0.0064	0.00005	0.00059	0.000001	0.0003
HC-3	Grey Tailings	0.8	0.15	0.004	0.00044	11	0.032	0.0038	0.0062	0.0000045	0.000044	0.002	0.013	0.000022	0.0022	0.0000023	0.0081	0.00022	0.0028	0.0000046	0.0013
COL-3	Grey Tailings	0.2	0.043	0.0029	0.000099	12	0.0029	0.00036	0.0038	0.0000019	0.0000099	0.00052	0.003	0.0000049	0.00036	0.00000049	0.016	0.000049	0.00067	0.0000099	0.0003
HC-4	Grey Tailings	1.7	0.045	0.34	0.0052	12	0.025	0.00083	0.0076	0.0000046	0.000046	0.023	0.027	0.000027	0.00096	0.0000036	0.004	0.00024	0.00024	0.0000046	0.0014
HC-5	Magnetite Sand	1.8	0.056	0.0065	0.00076	9.9	0.025	0.0013	0.0049	0.0000048	0.000048	0.0036	0.015	0.000024	0.00082	0.0000024	0.008	0.00024	0.0016	0.0000048	0.0014
HC-6	Grey Tailings	1.1	0.11	0.003	0.00045	4.3	0.029	0.0022	0.0046	0.0000047	0.000045	0.0027	0.013	0.000022	0.002	0.0000023	0.0086	0.00022	0.0024	0.0000045	0.0013

Appendix E – Column Concentrations Charts

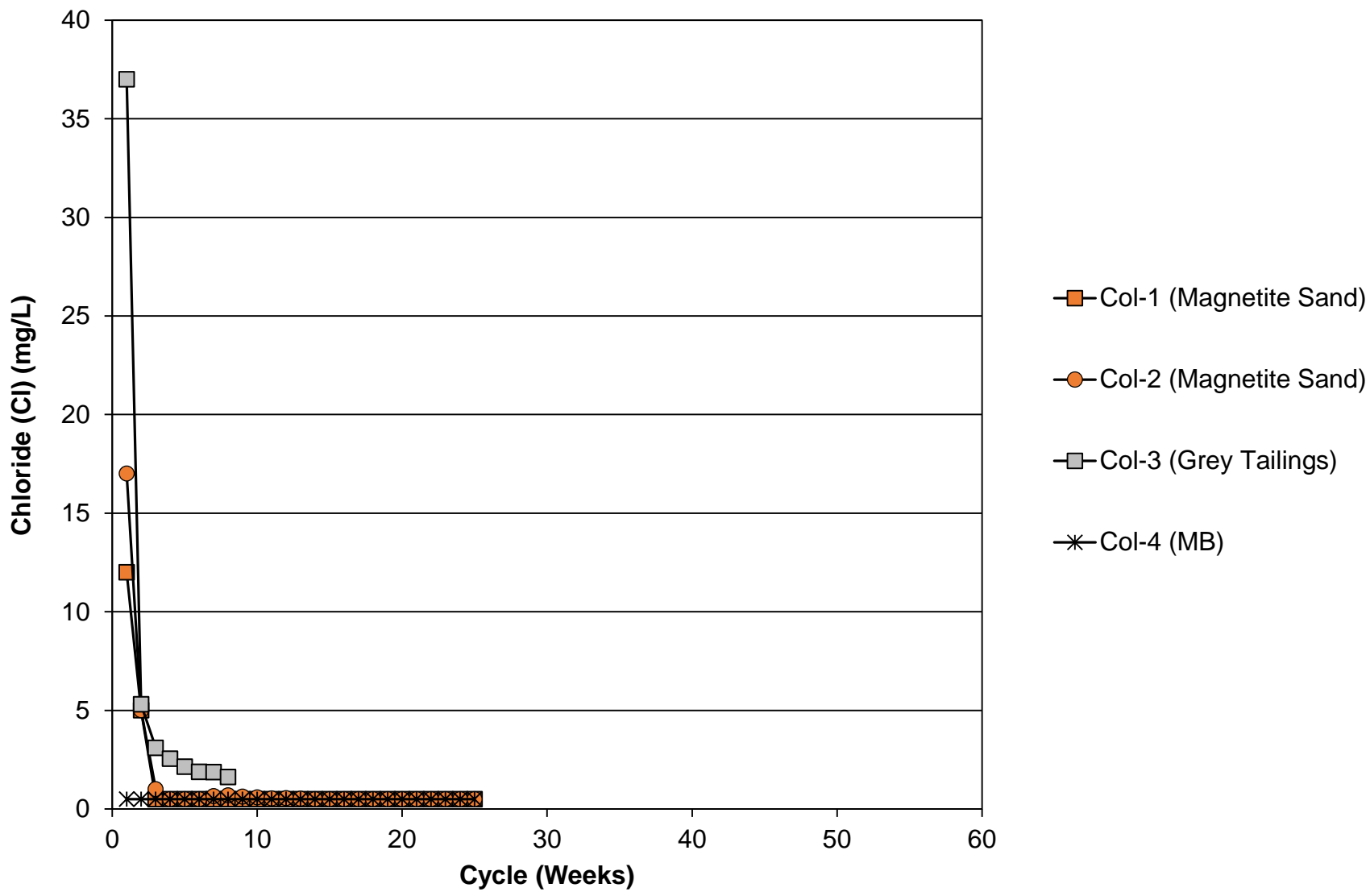


- Col-1 (Magnetite Sand)
- Col-2 (Magnetite Sand)
- Col-3 (Grey Tailings)
- *— Col-4 (MB)

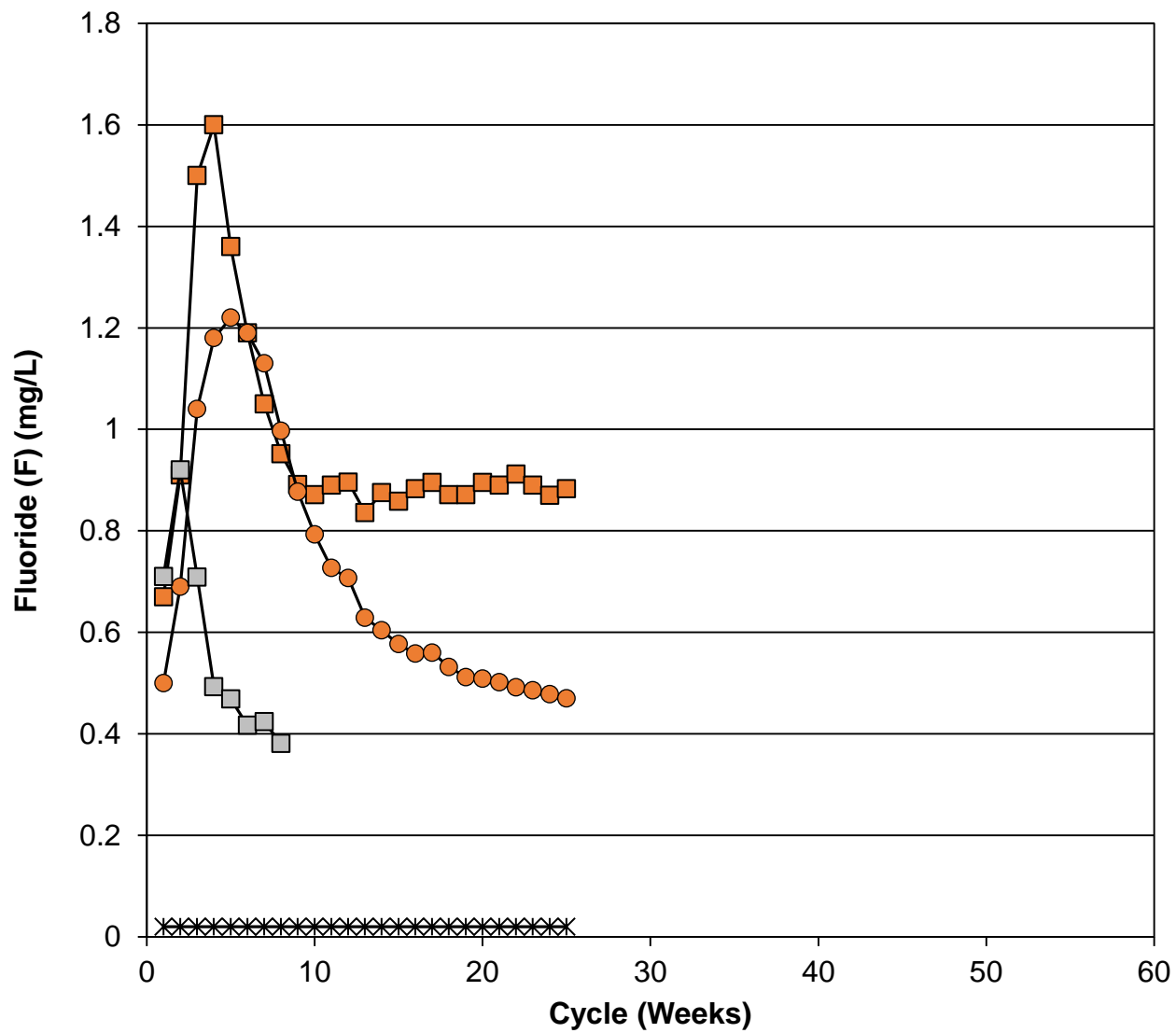
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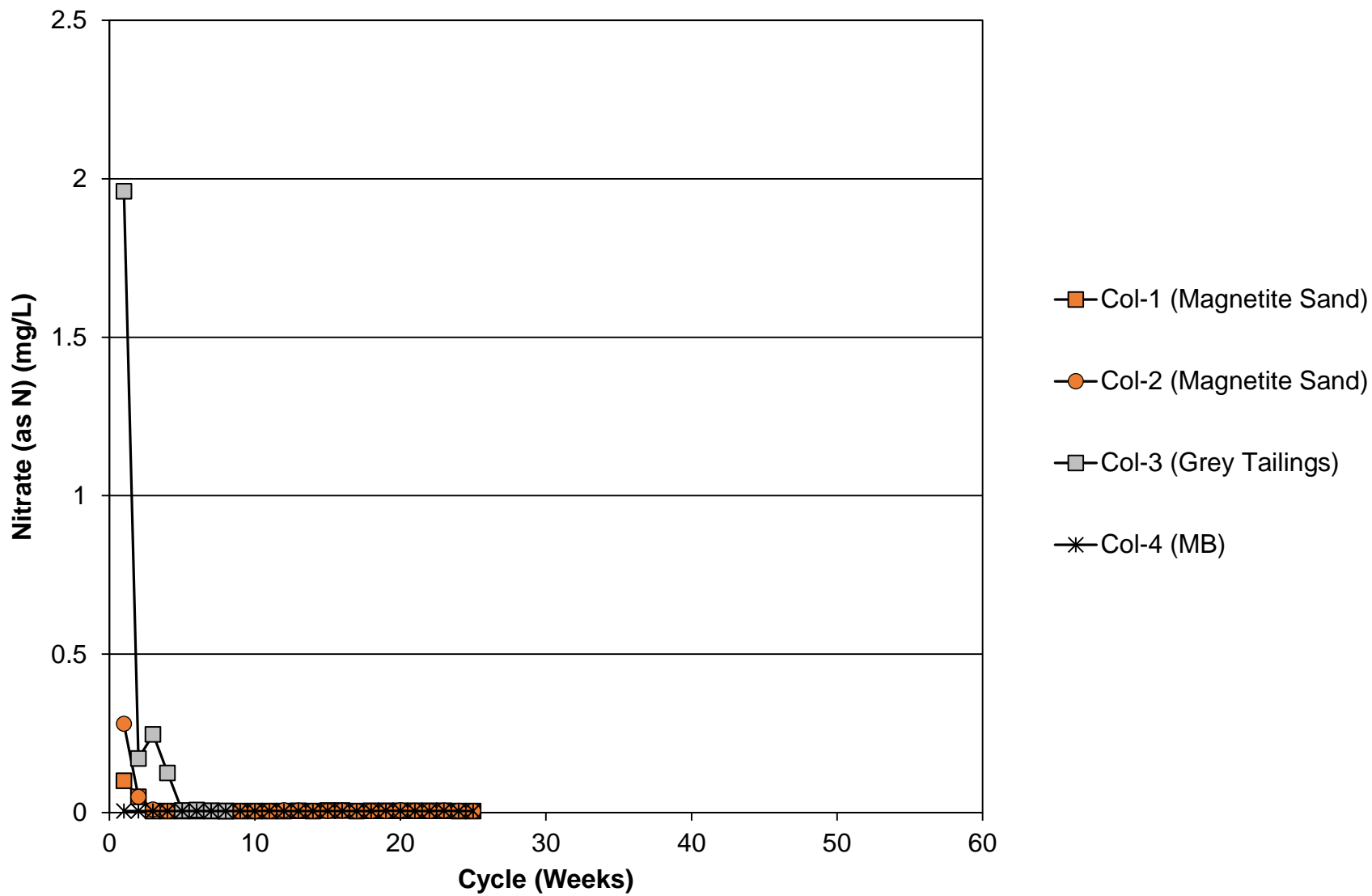
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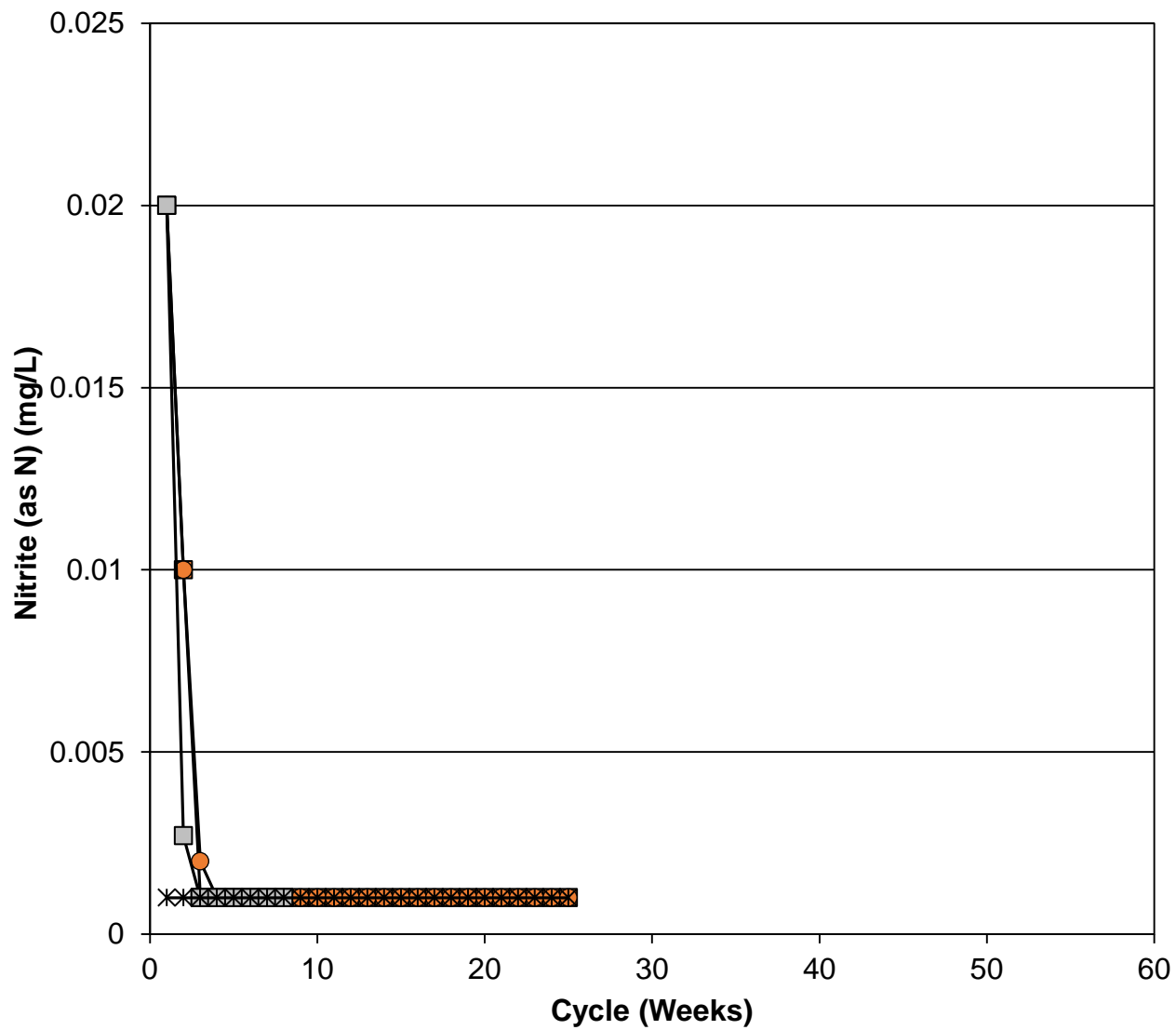
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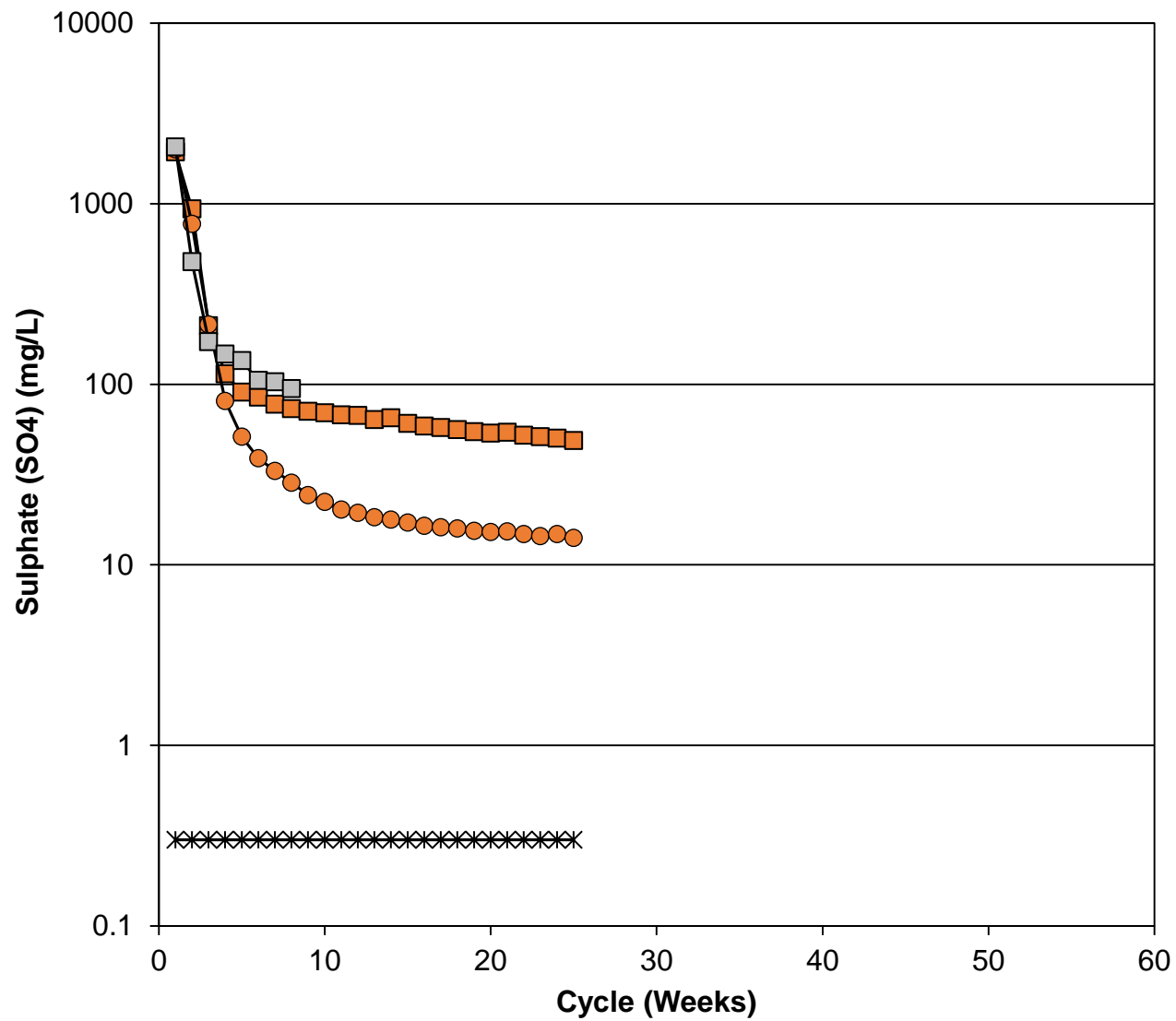
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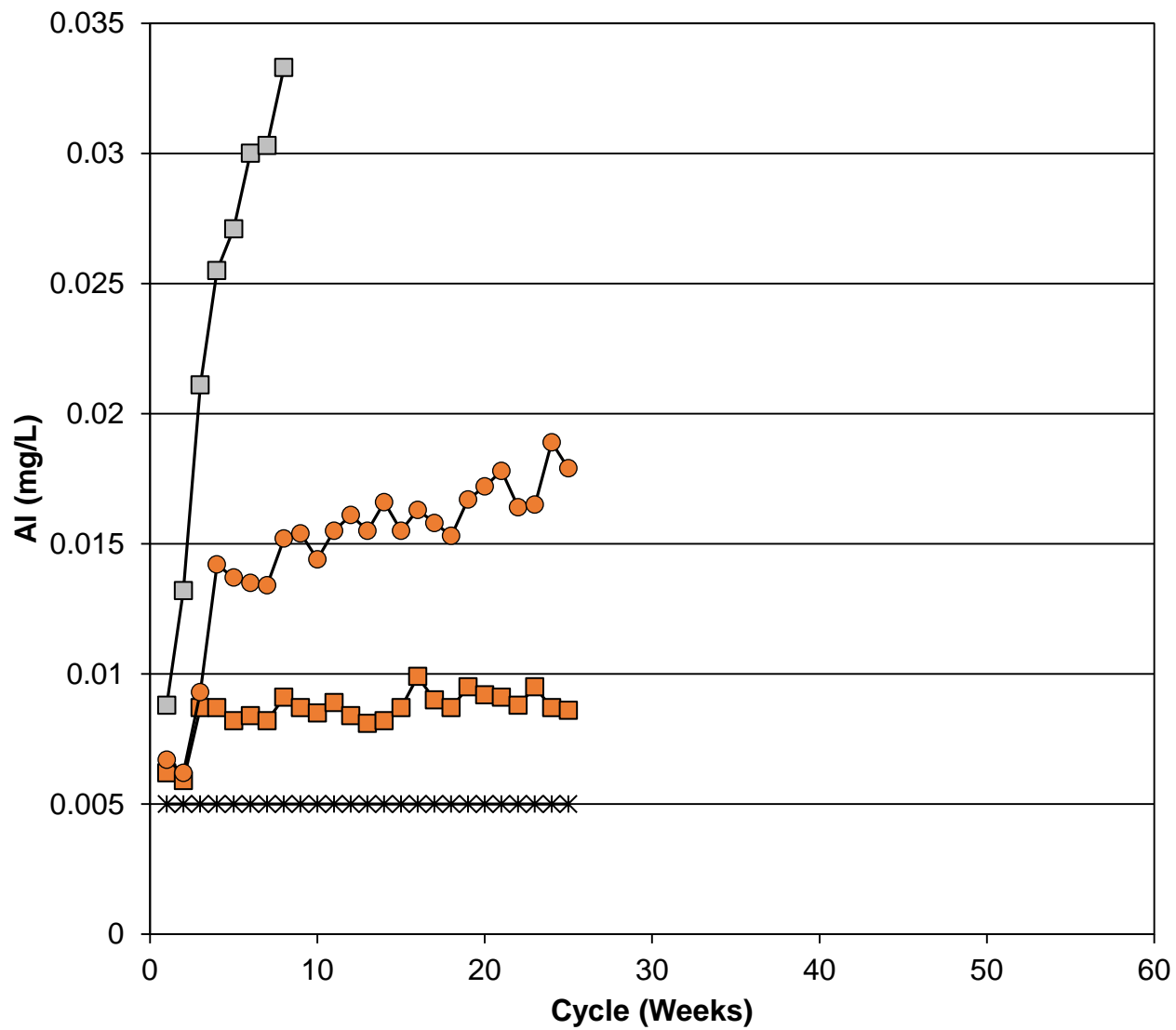
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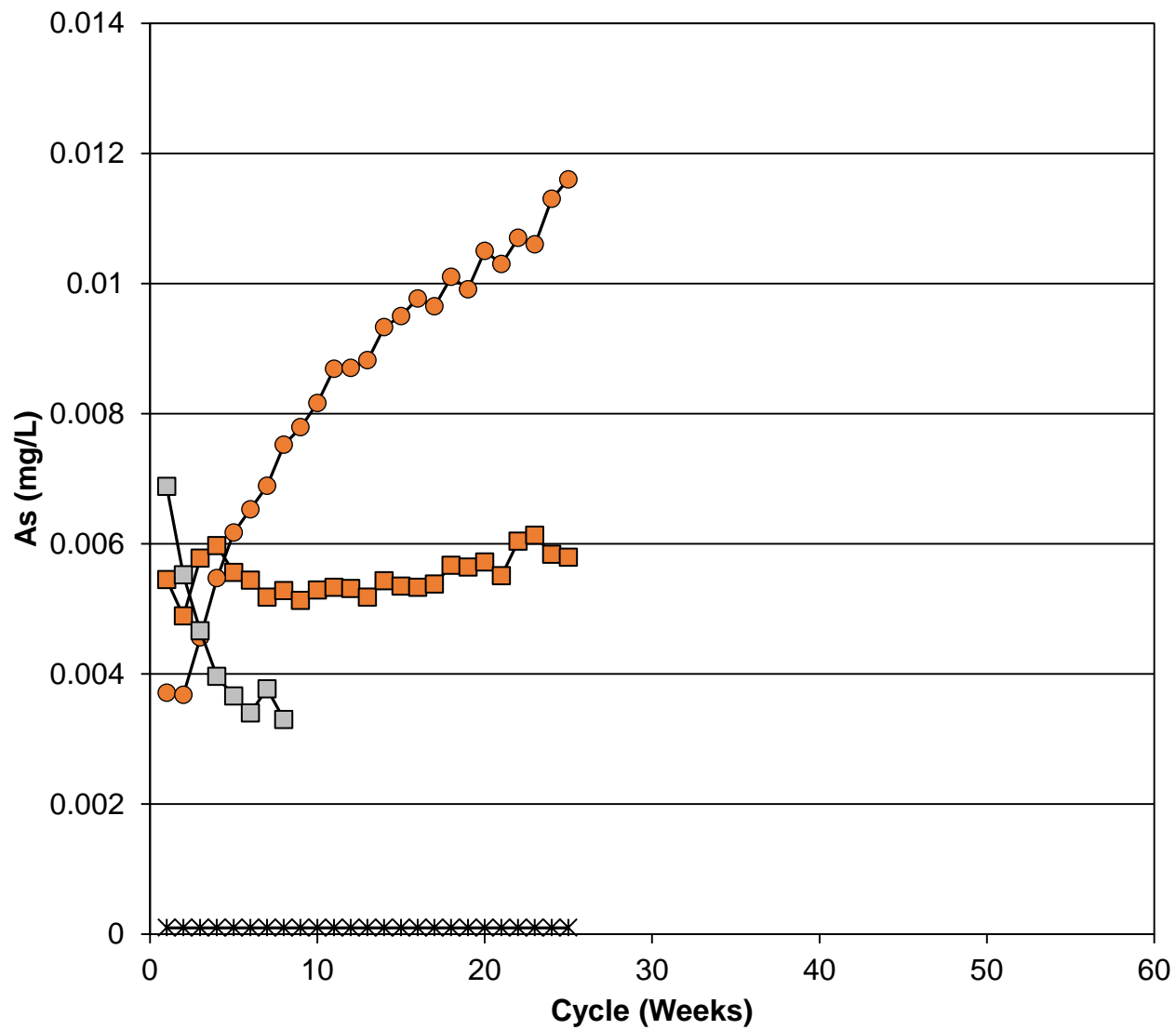
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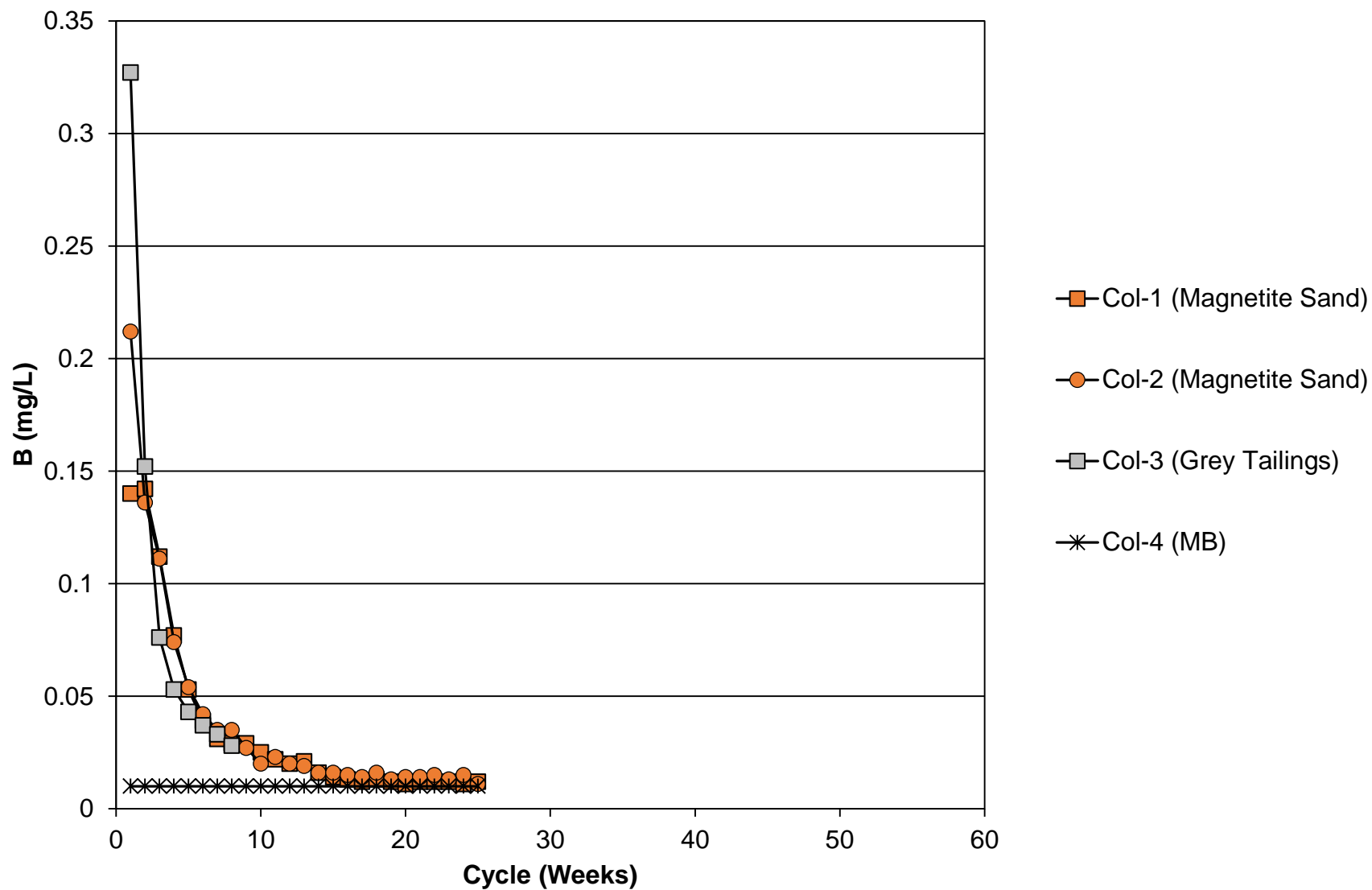
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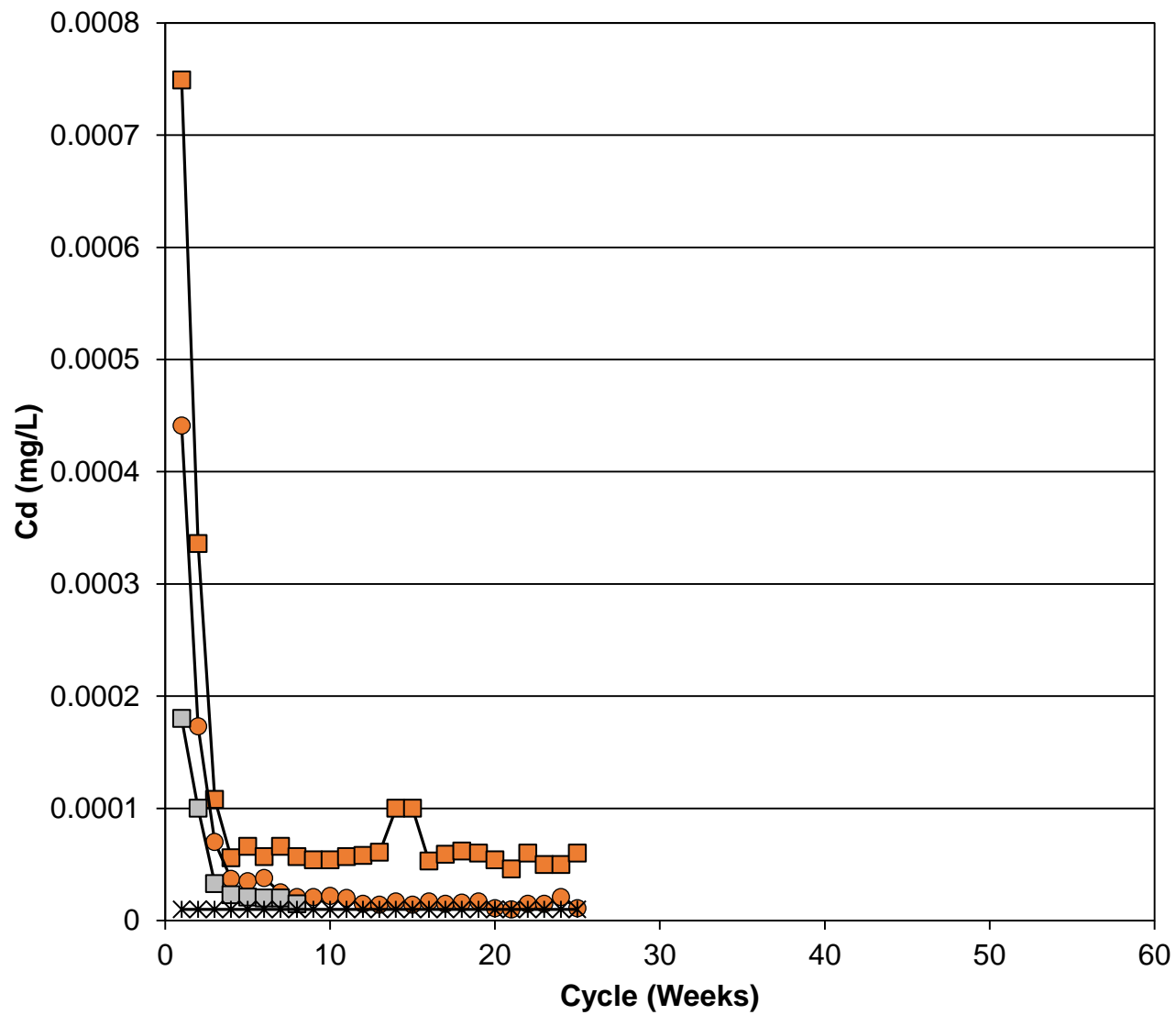
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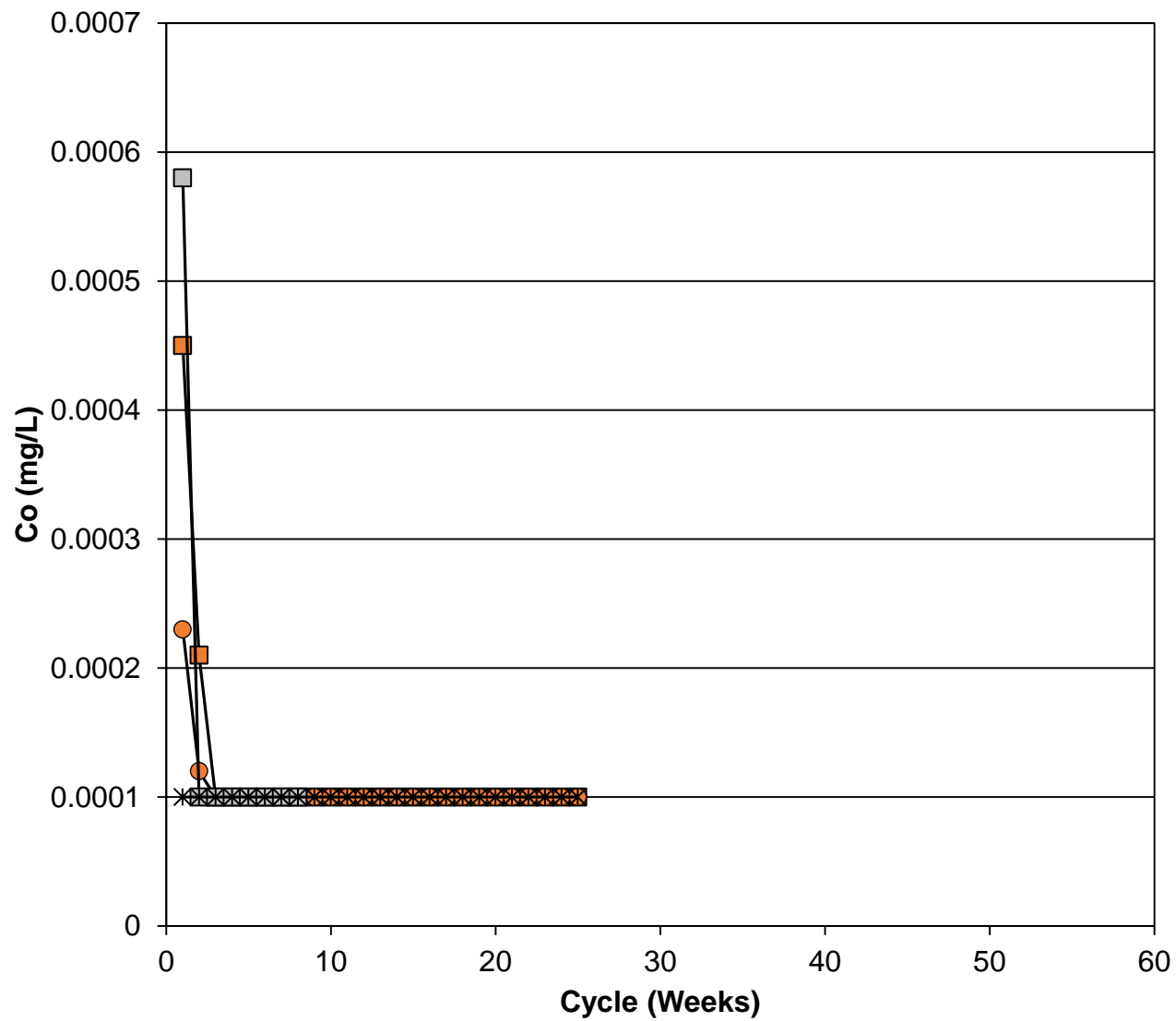
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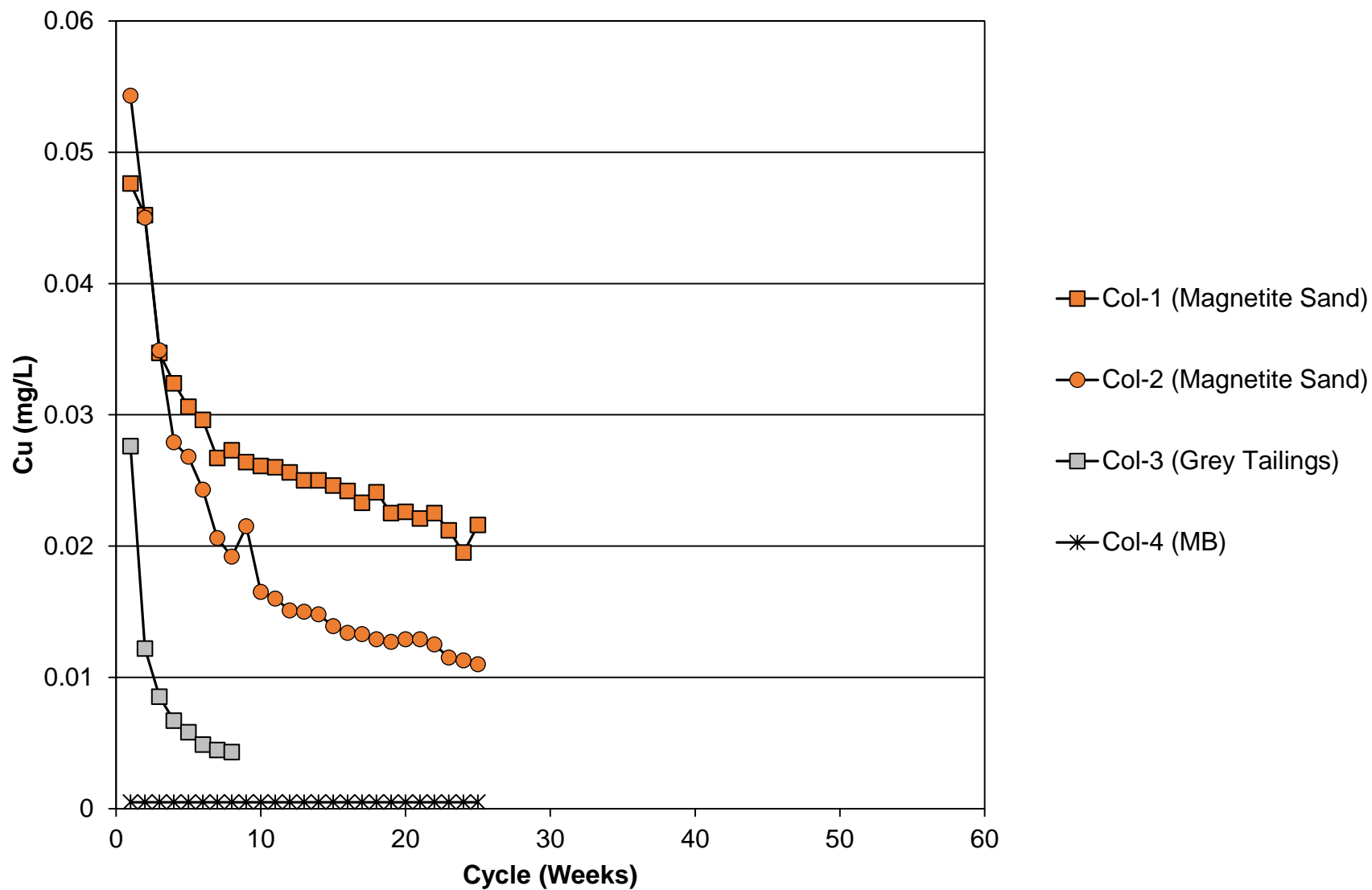
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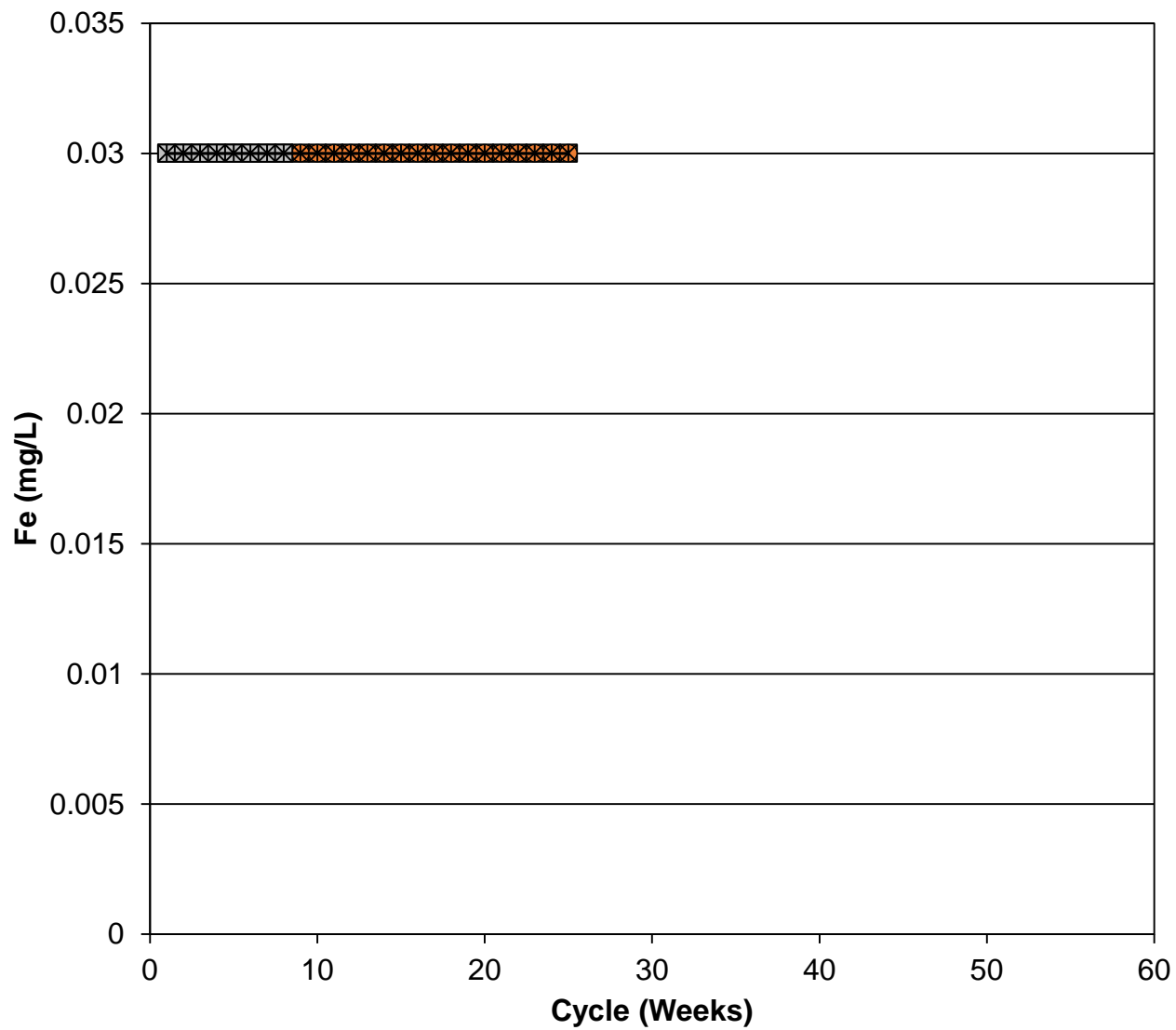
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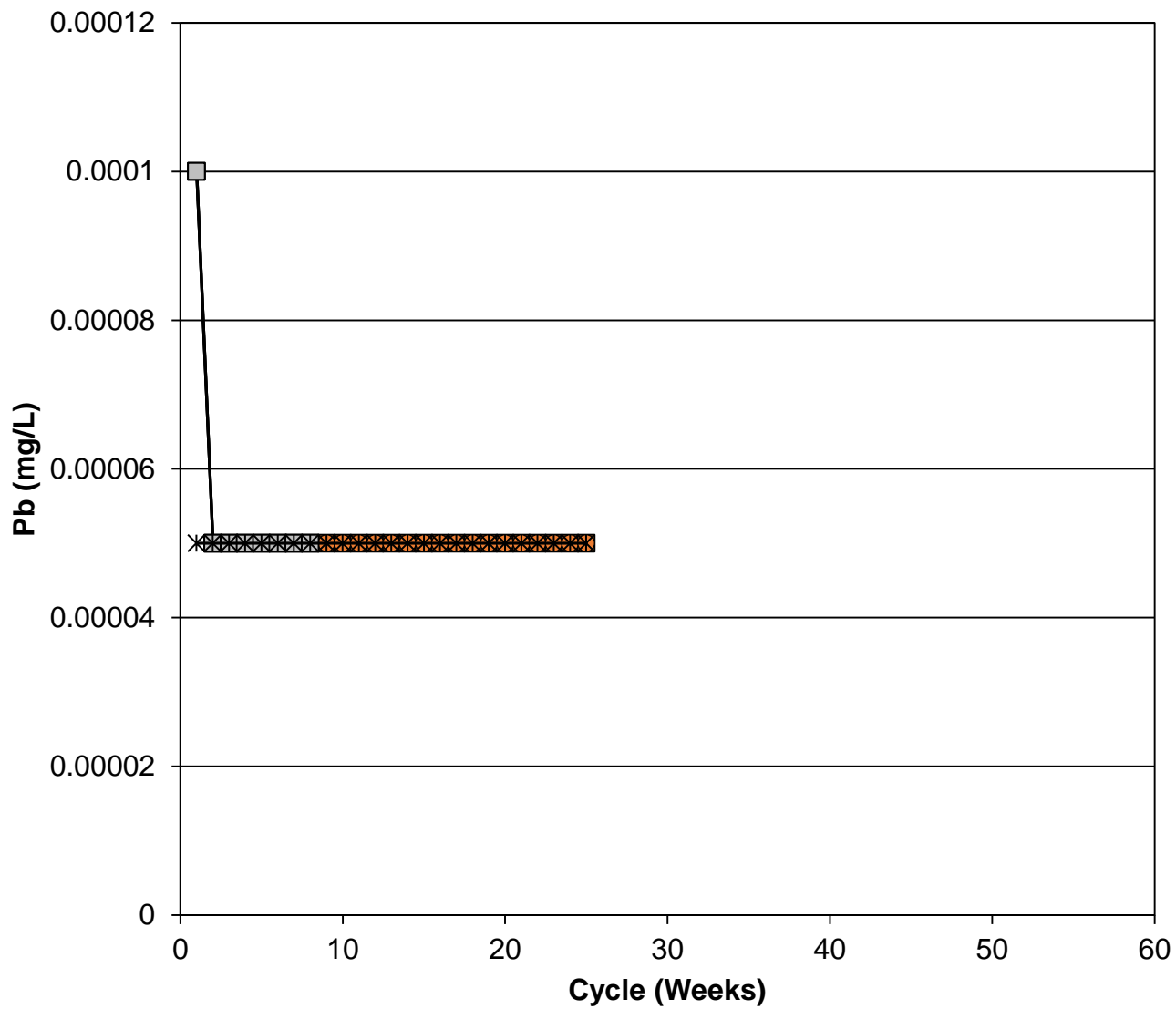
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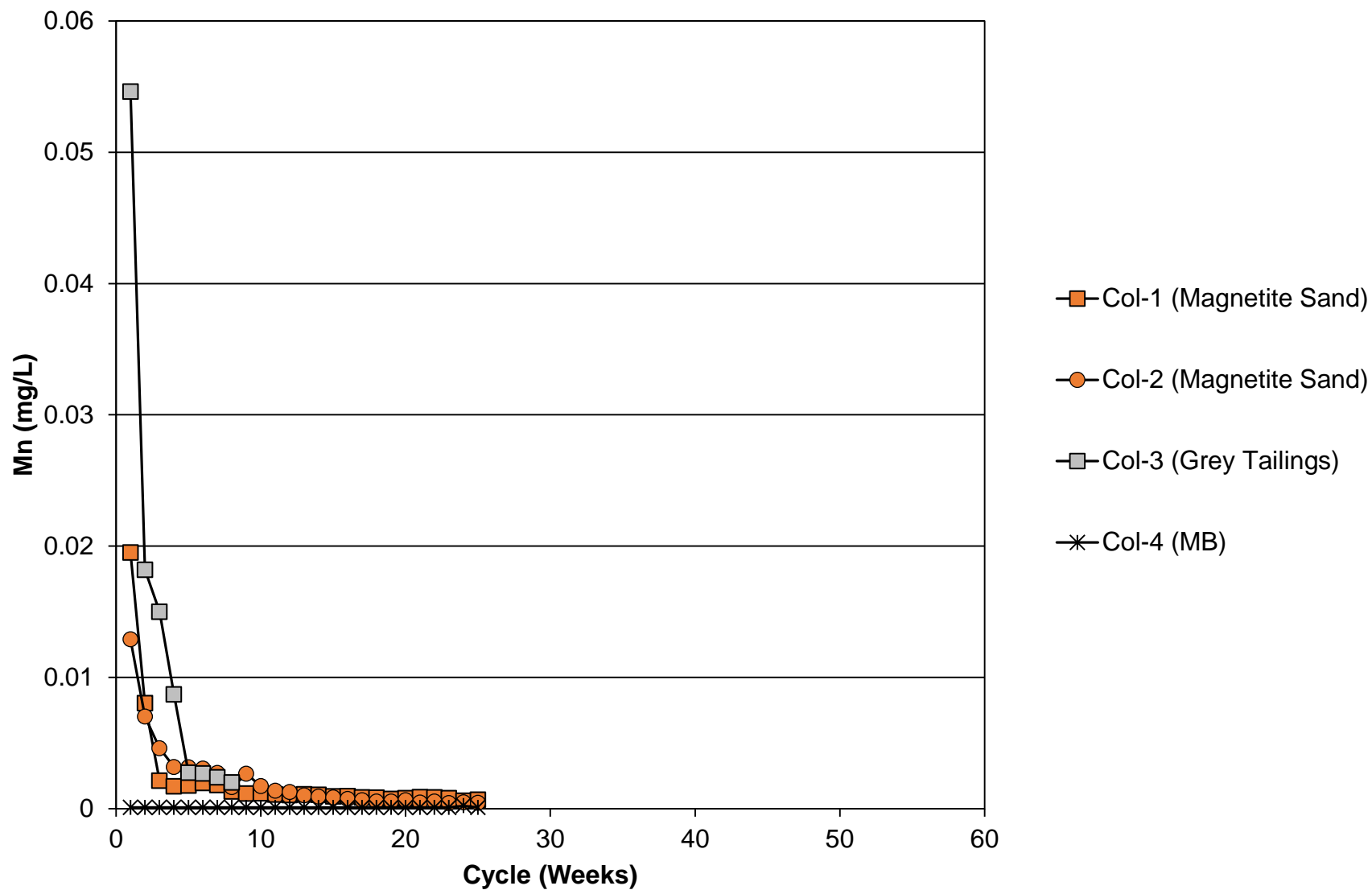


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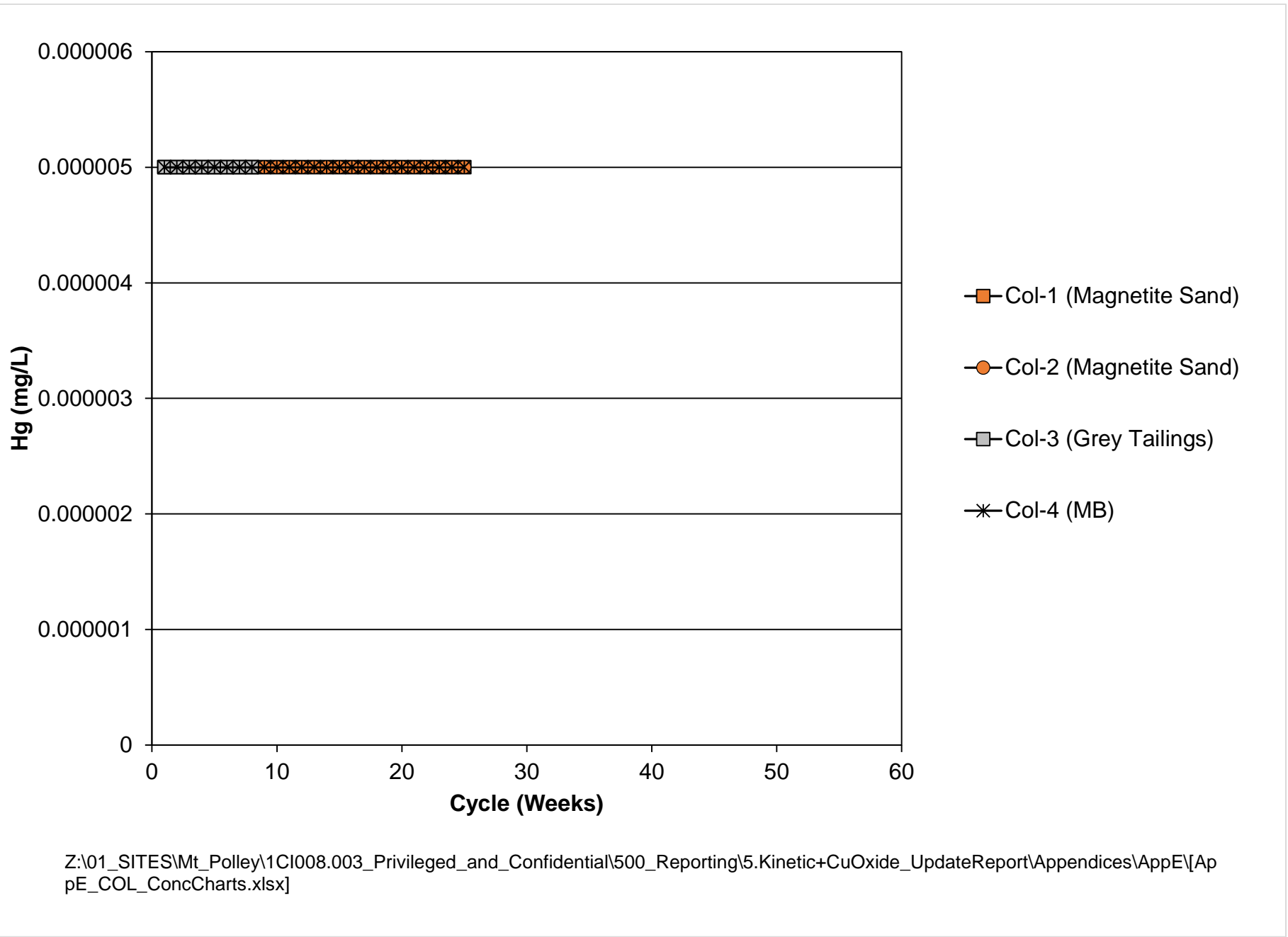


- Col-1 (Magnetite Sand)
- Col-2 (Magnetite Sand)
- Col-3 (Grey Tailings)
- Col-4 (MB)

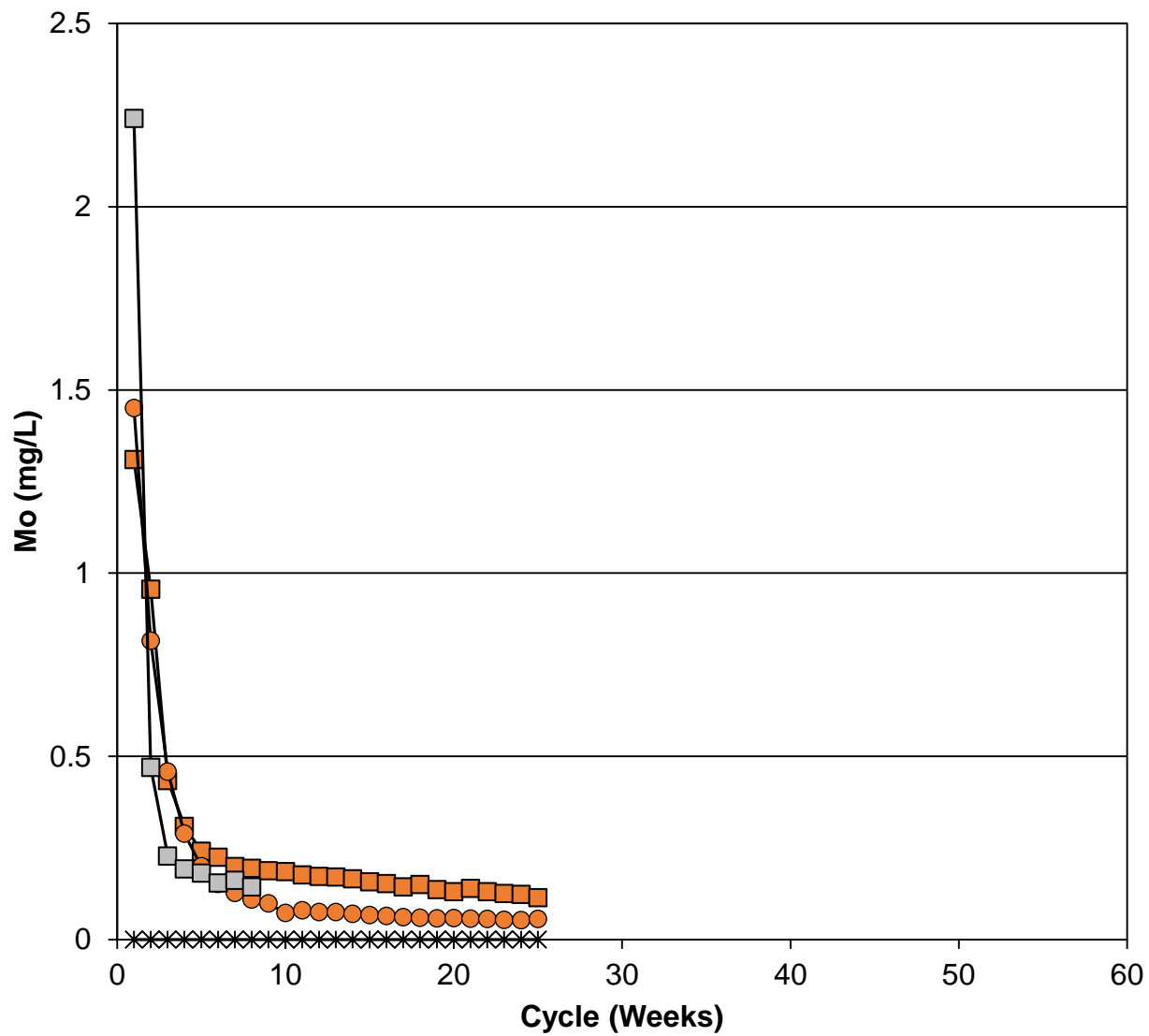
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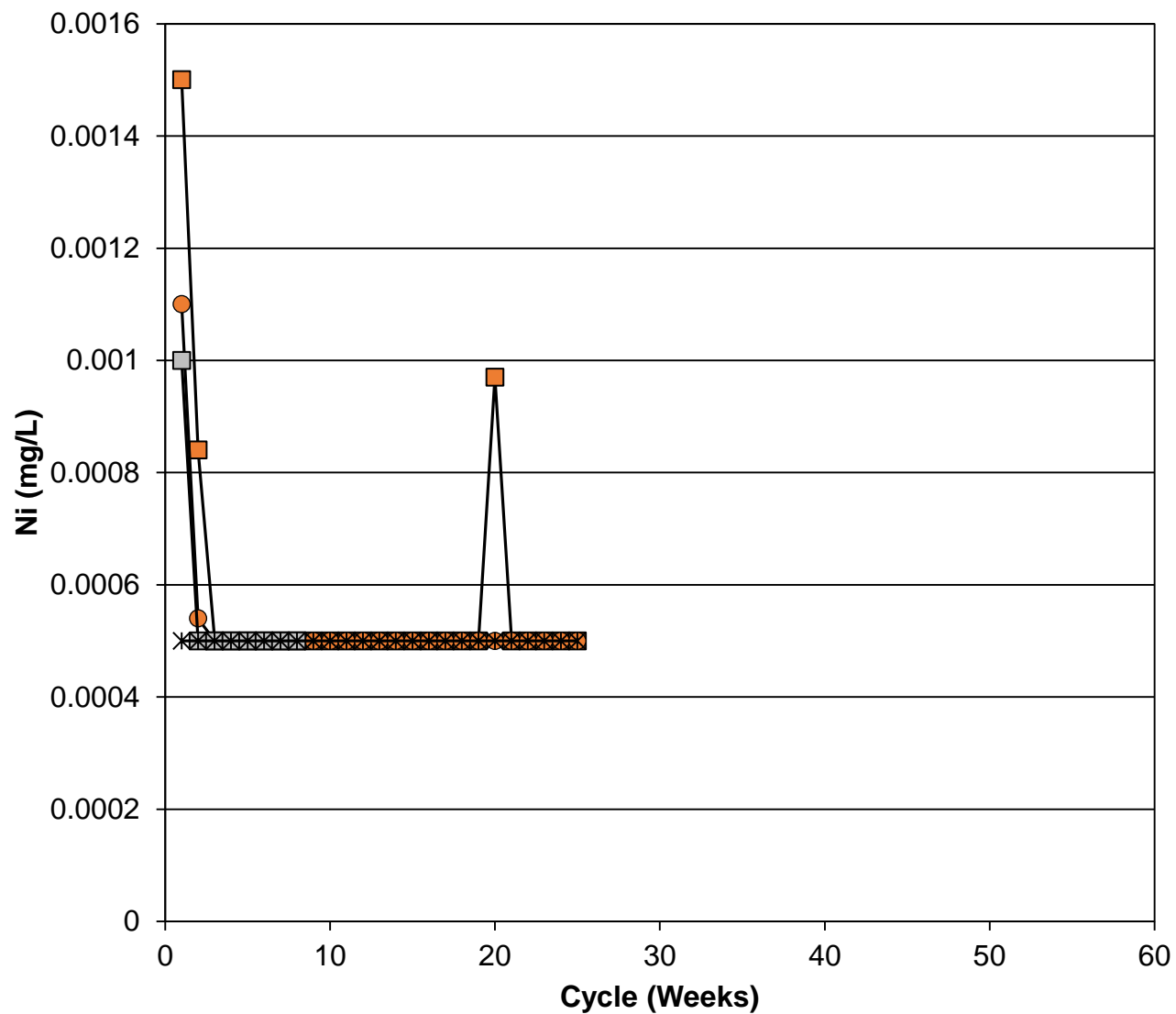
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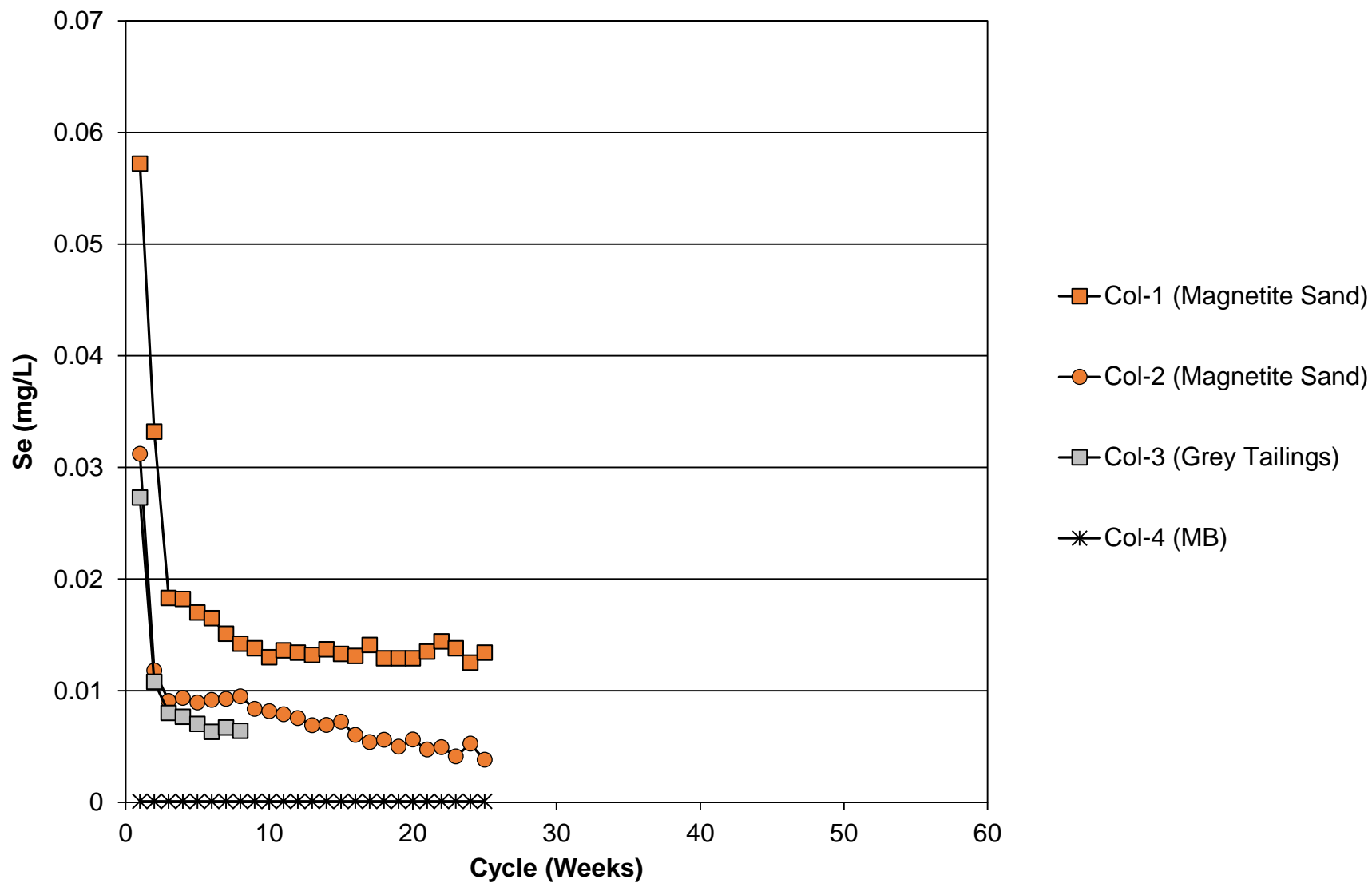
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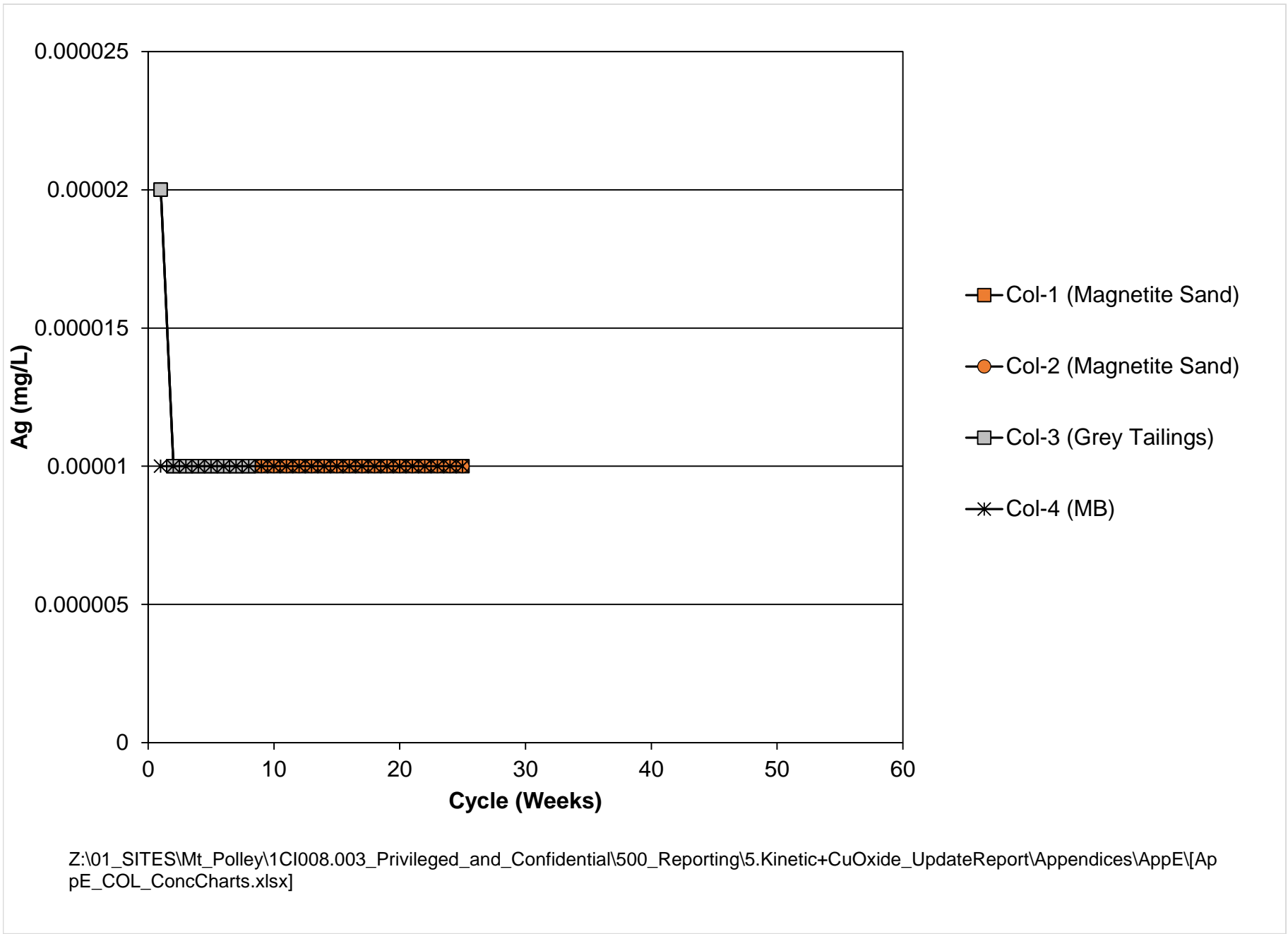
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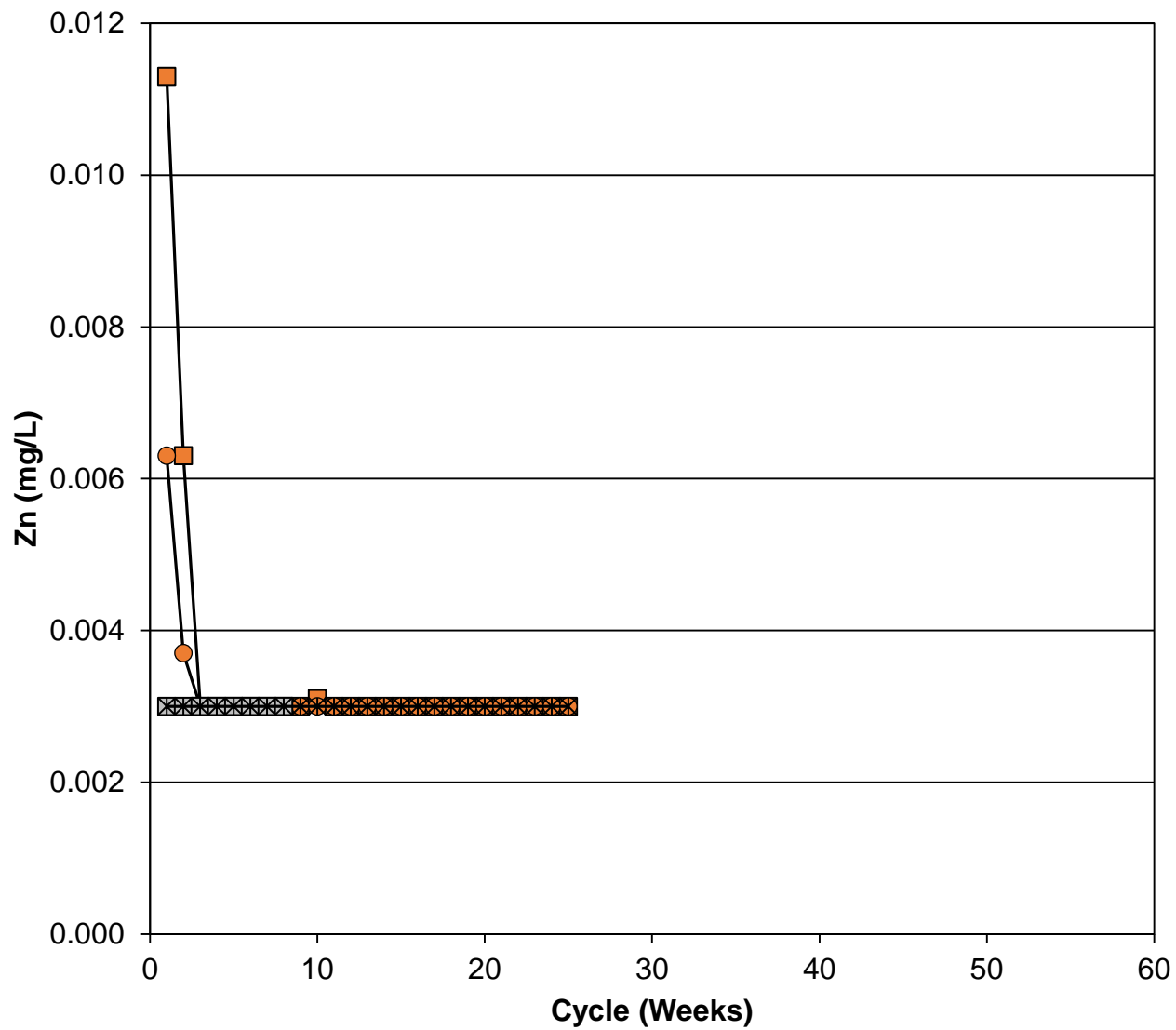
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APPENDIX B

Soil Quality

Factual Report for Soil Investigation, Hazeltine Creek Floodplain

Prepared by:

Andrew Bruemmer, P.Eng., Trish Miller, M.Sc., CSAP and Reidar Zapf-Gilje, P.Eng., Ph.D., CSAP

Golder Associates Ltd.

DATE January 26, 2016**REFERENCE No.** 1411734-112-TM-Rev0-11000**TO** Colleen Hughes
Mount Polley Mining Corporation**FROM** Andrew Bruemmer, Reidar Zapf-Gilje, Trish Miller**EMAIL** Andrew_Bruemmer@golder.com;
Reidar_Zapf-Gilje@golder.com;
Trish_Miller@golder.com**FACTUAL REPORT FOR SOIL INVESTIGATION, HAZELTINE CREEK FLOODPLAIN****1.0 INTRODUCTION**

Golder Associates Ltd. (Golder) is pleased to provide Mount Polley Mining Corporation (MPMC) with this factual report that presents the results of the soil investigation work completed within the Hazeltine Creek floodplain, adjacent to the Mount Polley mine, located near Likely, BC (the Site). The soil investigation at the Site was completed as part of the Detailed Site Investigation (DSI) to address potential contamination following the failure of the Tailings Storage Facility (TSF) at the Mount Polley Mine (the Site) on August 4, 2014. The results of the soil investigation presented in this factual report detail work completed in July and August, 2015.

1.1 Background

Following the failure of the TSF at the Site, a Soil Quality Impact Assessment (SQIA) was prepared by SNC Lavalin Inc. (SNC). This document was submitted to the BC Ministry of Environment (MoE) as part of the Post-Event Environmental Impact Assessment Report (PEEIAR) in June 2015 (Golder 2015a). The soil characterization work completed by SNC focused on the Hazeltine Creek study area, which extends approximately 9 km from the eastern edge of the TSF to the western shoreline of Quesnel Lake. The study area was approximately 1 km at its widest point, in the lower portion of Hazeltine Creek near Quesnel Lake. The study area was further divided to align with the remediation areas that were identified by Golder as part of the PEEIAR.

SNC's soil characterization program was developed based on preliminary field observations that defined the extent of the tailings deposition and established eighteen (18) transects at approximately 500 m intervals along Hazeltine Creek. At each transect location the extent of tailings deposition was documented and representative samples of tailings and native soils were collected across the width of the transect. Local reference soil samples were also collected from undisturbed locations in the forest beyond the area impacted by tailings from the debris flow.

Soils samples collected as part of the SQIA were submitted to an accredited laboratory (ALS Environmental, in Burnaby, BC) for analysis of a combination of Potential Contaminants of Concern (PCOCs), including total metals, light and heavy extractable petroleum hydrocarbons (LEPH/HEPH), polycyclic aromatic hydrocarbons (PAHs), glycols, volatile organic compounds (VOCs) and xanthanates. The preliminary list of PCOCs was based on a review of reagents and products used as part of the milling process at the mine. Additional analyses were also completed for soil nutrient and salinity parameters, and selected physical tests such as grain size and bulk density.



The analytical laboratory results identified concentrations of copper and vanadium in multiple tailings samples that exceeded the applicable CSR park land use (PL) standards. A single arsenic exceedance was also noted in the tailings samples, though the concentration was considered isolated. Copper and vanadium concentrations in native soil samples (i.e., native soil underlying deposited tailings material – referred to as “native”) and local reference samples (from areas beyond the tailings deposits flow – referred to as “local reference”) were less than applicable CSR PL standards, though concentrations of chromium, manganese, nickel, and selenium exceeded CSR PL standards for selected local reference samples. Concentrations of PCOCs associated with mine processing reagents were less than laboratory detection limits.

Laboratory pH results indicated that tailings samples were basic (i.e., pH greater than 7). Native soil samples were approximately neutral, while local reference soil samples were somewhat acidic. Available nutrient concentrations in tailings samples were generally lower than in native and/or local reference soil samples.

The results of SNC's soil assessment provided a preliminary understanding of Site conditions following the failure of the TSF. The results also provided the basis for the soil investigation described in this factual report.

1.2 Objectives and Scope of Work

The overall objective of the soil investigation was to collect sufficient soil quality data to support the completion of a Detailed Site Investigation (DSI) and Human Health and Ecological Risk Assessment (HHERA) for the Site. The DSI and HHERA are required under the CSR, as part of the overall rehabilitation of the Site.

Specifically, the objectives were to increase the sampling density within the areas affected by the debris flow and to delineate the vertical and lateral extent of soil contamination at the Site.

In order to meet the objectives of the assessment, Golder developed a scope of work that included the following tasks:

- Review of previous soil quality data collected as part of the SQIA completed by SNC;
- Identification of data gaps and finalization of soil characterization program;
- Collection of soil samples from deposited tailings and surrounding native soils and submission of selected samples to an analytical laboratory for analysis of Contaminants of Concern (COCs);
- Documentation of rehabilitation works within the Hazeltine Creek Channel, to monitor movement and excavation of deposited tailings and to assess the validity of previous soil quality data collected by SNC;
- Comparison of laboratory results to applicable regulatory criteria;
- Calculation of statistical parameters, to assist the interpretation of the laboratory results and to improve the overall understanding of soil quality at the Site; and
- Preparation of a technical memorandum (this memorandum), presenting the results of the previous and current soil investigation.

A summary of the applicable regulatory framework for the assessment is provided in Section 2.0, below. The sampling methods are described in Section 3.0.

2.0 REGULATORY FRAMEWORK

The Contaminated Sites Regulation (CSR; BC Reg. 375/96, O.C. 1480/96 and M271/2004, as updated [includes amendments up to BC Reg. 4/2014, updated to January 31, 2014]) is the principal document for the evaluation of the environmental quality of soil at the Site. The standards listed in the CSR provide numerical concentrations for the evaluation of soil quality and the identification of remediation requirements. The CSR soil standards are divided into six categories based on land use: Agricultural (AL), Urban Park (PL), Wildland (WL), Residential (RL), Commercial (CL), and Industrial (IL).

Wildland is considered to be the applicable land use at the Site and is defined in the CSR, as follows:

“The use of land for the primary purpose of supporting natural ecosystems, including the use of land for ecological reserves, national or provincial parks, protected wetlands or woodlands, native forests, tundra and alpine meadows, but does not include uses defined as urban park land use.”

Although there are no wildlands standards specified in the CSR, Section 11 of the CSR states that where the use of land is for wildlands, the urban park land use standards would apply in the soil at a depth of less than 3 metres and the commercial land use standards would apply to substances in the soil at a depth of 3 metres or more.

The CSR includes standards for the protection of human health (including intake of contaminated soil) and environmental protection in consideration of environmental receptors. The following site-specific factors were considered applicable for comparison to analytical soil results:

- Human health protection for groundwater used for drinking water;
- Human health protection for intake of contaminated soil;
- Environmental protection for toxicity to soil invertebrates and plants; and
- Environmental protection for groundwater flow to freshwater surface water used by aquatic life.

The site-specific factors for groundwater used for livestock or irrigation water were not considered applicable as there are not considered to be agricultural land uses in the vicinity of the Site.

Further to the generic and numerical CSR soil standards, the BC MoE has developed methods for determining background soil quality, which are summarized in the MoE’s “*Protocol 4 for Contaminated Sites – Determining Background Soil Quality*” (Protocol 4, dated October, 2010). Protocol 4 provides regional background soil quality estimates for metals in BC. Based on the regional outlines specified in Protocol 4, the Site is located within Region 5 – Cariboo. Protocol #4 specifies background concentration of 150 µg/g for chromium, 150 µg/g for nickel, and 4.0 µg/g for selenium. These background concentrations are considered applicable to the Site and are also higher than the most conservative applicable CSR standards at the Site. Therefore, the background concentrations were considered applicable for screening the soil results collected at the Site. Background concentrations for other metals parameters were not retained for further consideration, as the established concentrations are less than applicable CSR soil standards.

3.0 APPROACH AND METHODS

The approach and rationale for the soil investigation are presented in “*Sampling and Analysis Plan – Mount Polley Mine Detailed Site Investigation and Human Health and Ecological Risk Assessment and Confirmation of Remediation Report*” (Golder, July, 2015).

In summary, seven of eighteen representative sections established by SNC were retained by Golder for further assessment. The seven sections were retained based on identified data gaps and to increase the sampling density in selected areas of the Site. The locations of the representative sections are shown on Figure 1; the sections that were retained include: ST01, ST02, ST06, and ST10 (Lower Hazeltine Creek); ST14 and ST15 (Hazeltine Canyon); and ST18 (Upper Hazeltine Creek/Polley Plug). Additional samples were collected from Terrestrial Ecological Risk Assessment (TERA) plots, to support the completion of the risk assessment. The selection and locations of TERA plots are summarized in detail in the Problem Formulation for the ERA.

This factual report combines the data from SNC’s report with the new data from this DSI investigation, and presents the combined data on figures, in tables and statistics.

3.1 Soil Investigation

The purpose of the investigation work was to characterize the quality of soil at the Site and to delineate the vertical and lateral extent of soil contamination. For the purposes of this report, the term “soil” refers to the three following material types that were sampled during investigation work:

- Tailings. Samples were classified as tailings based on visual observations and chemistry results (refer to Section 3.3.1, below);
- Native soils underlying deposited tailings (native); and
- Native background soils (local reference).

Soil quality was characterized using the following methods:

- Laboratory analyses of selected parameters including metals, plant available nutrients, total organic carbon and inorganic carbon; and
- Collection of field parameters including dissolved oxygen content (DO), pH, oxidation-reduction potential (ORP) and specific conductivity during sample preparation and collection.

Delineation of contaminated soil was achieved by:

- Comparing the laboratory chemistry results to applicable CSR soil standards, regional background concentrations, and local reference concentrations;
- Documenting field observations, including visual evidence of tailings deposition; and
- Reviewing aerial photographs collected following the event.

Soil samples were collected between July 28 and August 25, 2015 by Golder field staff, with support from Soda Creek First Nation field assistants and MPMC Environmental Department staff. Soil sampling was conducted using either hand shovels or augers, depending on the stability and thickness of the substrate. Where the tailings layer was thick, it was also typically saturated making hand digging impractical so a hand auger was used. Pits were terminated when the underlying native forest floor was reached. At TERA plot locations, samples of the tailings and forest floor layers were also collected, if possible.

The depth and a description of tailings and forest layers were recorded on test pits and auger hole logs. Standard soil samplings methods were followed throughout the investigation work; the soil sampling methods are included in Attachment #1. The observations made at each of the sampling locations were documented on test pits and auger hole logs are included in Attachment #2

The sampling locations and exceedances are shown plans and cross-sections on Figures A-2 through A-14. Detailed results and stratigraphy for the representative cross-sections investigated as part of this DSI are shown on figures included in Attachment #3.

3.2 Laboratory Analysis

ALS Laboratory Group (ALS) of Burnaby, BC performed chemical analyses of soil samples collected during the characterization work. Environmental samples were transported to the laboratory in coolers with ice packs and chain-of-custody forms. The laboratory methods used by ALS to complete the analyses followed BC CSR approved methods.

Copies of the analytical reports, and the corresponding Chain of Custody forms, are presented in Attachment #4.

3.3 Statistical Analyses

Summary statistics, including minimum and maximum values, mean, median, 90th and 95th percentiles, and 95% Upper Confidence Limit on the Mean (UCLM) were calculated for the soil sample sets in order to support the data interpretation. The statistics were calculated using Microsoft Excel, with the exception of 95% UCLM values, which were calculated using ProUCL.

The summary statistics were calculated using soil sample results from Golder's 2015 soil investigation, as well as results collected as part of SNC's SQIA completed in 2014.

3.3.1 Sample Population

Prior to establishing a sample population for statistical analysis, sample locations, field observations, and analytical results were reviewed to identify characteristics unique to each type of material.

Based on the results provided by SNC, tailings samples were characterized as having high concentrations of copper and vanadium, and low levels of nutrients. By comparison, native under tailings and local reference soils showed concentrations of copper and vanadium that were generally less than the applicable CSR standards. Nutrient levels were also higher in native soils.

Some of the samples which were initially classified as native based on field observations were, upon closer scrutiny, determined to be representative tailings material. Such samples were encountered in areas where significant mixing of tailings and native soil occurred. Therefore, if a sample initially classified as native showed the following characteristics, it was re-classified as a tailings sample:

- The sample was collected at a location where mixing of tailings and native soil occurred;
- The sample contained concentrations of copper and vanadium above the 95th percentile of native samples; and
- The sample contained concentrations of copper and vanadium above the maximum concentration in local reference samples.

The following samples were reclassified as tailings samples: SS15-10 (AH layer), Willow Stake Soil-5, Willow Stake Soil-2, P2 – B layer, Willow Stake Soil-3.

Similarly, selected samples initially classified as tailings were reclassified as native because they were located in an area of Hazeltine Creek where mixing occurred following the TSF failure and where the channel had been rehabilitated. This re-classification was based on field observations, sample location, activity that has occurred since the TSF failure, and chemistry results.

Tailings chemistry data collected by SNC as part of the SQIA indicated that tailings samples contained concentrations of copper greater than the most conservative applicable soil standard of 150 mg/kg. By comparison, copper concentrations of native soil underlying tailings were less than 150 mg/kg.

Therefore, samples initially classified as tailings were re-classified as native if they had the following attributes:

- The sample was collected in area of the creek that had been rehabilitated; and
- The copper concentration was less than 150 mg/kg,

The following samples were reclassified as native: Rye grass soil-2, rye grass soil-6, and rye grass soil-8.

3.4 Soil Excavations

Rehabilitation works, including construction of a new channel within Hazeltine Creek, have been ongoing since the October 2014. Channel construction and armoring was completed in May, 2015.

Golder reviewed information provided by MPMC that summarized volumes of excavated material that were displaced during the channel reconstruction and sediment control works in areas adjacent to the creek. The soil volumes were reviewed to develop an understanding of the current Site conditions. The excavation volumes presented in this factual memorandum are considered preliminary, as it is expected that rehabilitation work will continue in the future.

3.5 Quality Assurance and Quality Control Procedures

To document that the sampling and analytical data were interpretable, meaningful and reproducible, the Golder quality assurance and quality control (QA/QC) program was followed. This involved using QA/QC measures in both the collection (field program) and analysis (laboratory) of environmental samples.

The following discussion includes a brief summary of the QA/QC measures implemented by Golder during the field program and during our review of the data, as well as the QA/QC measures implemented by the analytical laboratory.

Quality control measures use in sample collection and shipment included the following:

- Sampling methods were consistent with established Golder protocols and provincial/federal requirements;
- Field notes were recorded during the investigation and have been stored in the project file;
- UTM coordinates of sample locations were recorded in the field using a hand-held GPS; and
- Samples were kept cool and subsequently transported to the laboratory using Golder chain-of-custody procedures.

The quality assurance measures for the field program included:

- Submission of blind field duplicate samples. A blind field duplicate sample is a second sample of soil from the same location that is submitted to the analytical lab under a separate label such that the lab has no prior knowledge that it is a duplicate. A field duplicate analysis rate of 10% was established as the QA objective for the field program.
- For duplicate samples, either the relative percent difference (RPD) or difference factor (DF) was used to evaluate the sample result variability, depending on the magnitude of the concentrations. The RPD is a measure of the variability between two outcomes from the same procedure is calculated by

$$absolute\left(\frac{(x_1 - x_2)}{average(x_1, x_2)}\right) \times 100$$

where x_1 is the original sample result and x_2 is the blind field duplicate result. In general, Golder's Data Quality Objective (DQO) outlines an RPD of less than 35% on average, or a maximum of 50%, depending on the parameter, the concentration and associated laboratory data quality objective. A RPD greater than 30% may reflect "in bottle" variability or variation in the test process. RPD is calculated when sample results are equal to or greater than five times the laboratory method detection limit. DF is the absolute difference between the two values divided by the method detection limit and is calculated when sample results are less than five times the method detection limit but not less than the method detection limit. In general, DF should be less than 2.

The following criteria were considered acceptable for laboratory QA/QC samples:

- For organic and inorganic analytes, analytical duplicates should exhibit less than 35% RPD on average, and no more than 50% for a specific analyte;
- Analytical results for reference materials or spiked standards should be within 10% of certified values for inorganic elements or 30% of certified values for organic compounds;
- Analytical blanks should be less than the detection limits used for the specific analysis;
- Certification by the Canadian Association for Laboratory Accreditation Inc. (CALA) for analytical methods used for this program; and
- Reports from the laboratory were internally reviewed prior to submission to Golder. If internal QA/QC problems are encountered, the field samples and internal QA/QC samples are re-analysed.

4.0 RESULTS

This section of the factual report presents the results of the soil investigation, including stratigraphy, field and analytical results, statistical analyses, and results of QA/QC analyses.

4.1 Stratigraphy

Representative photographs of the Site stratigraphy are included in Attachment #4, at the end of this report.

As documented in the PEEIAR, tailings samples consisted of a grey layer of fine-grained material overlying a red-black layer of sandy material. The deposited tailings overlaid native, organic forest soil and/or till.

The stratigraphy observed along the length of Hazeltine Creek can be summarized as follows:

- The thickest deposits of tailings were observed in the vicinity of Polley Lake Plug (i.e., the depositional area immediately downstream of the TSF failure location and at the outlet of Polley Lake), where tailings were observed to be greater than 3 m thick in certain locations. The layer of fine-grained tailings material was observed to be up to 1 m thick. At the time of the soil investigation work, tailings material within the plug area had not been removed as part of the rehabilitation efforts at the Site;
- The thickness of tailings material within Upper Hazeltine Creek was less than observed at the Polley Plug, but thicknesses of up to 2.5 m (at ST15) were observed during soil sampling work. Tailings material was being excavated as part of rehabilitation efforts at the time of the soil investigation;
- Measurable deposits of tailings material were not observed within Hazeltine Canyon, as material within the canyon was scoured to bedrock and deposited within Lower Hazeltine Creek; and
- A mixture of native till and tailings deposition was observed in Lower Hazeltine Creek and at the mouth of Edney Creek. The soil mixture is considered to be consisted with the scouring and deposition that occurred following the event.

4.2 Field Analyses

The following field data were collected for soils: temperature, DO, specific conductivity, total dissolved solids (TDS), salinity, pH, and ORP.

The field pH measurements observed by Golder were consistent with the observations made by SNC: local reference soils were slightly acidic, native soils were approximately neutral, and tailings samples were slightly basic.

The results of field analyses are presented in Table 1.

4.3 Analytical Results

Soil quality results are presented for tailings, native soils under tailings, and local reference soils in Tables 2, 3, and 4, respectively, at the end of this report. Results were screened against applicable BC CSR PL soil standards from Schedules 4, 5 and 10. The analytical results presented below do not include soil samples collected by SNC.

4.3.1 Tailings Samples

Tailings samples were collected and submitted to the laboratory for analysis of metals, plant available nutrients, and total carbon analysis as part of the soil characterization work completed by Golder.

The results were consistent with the sampling work completed by SNC, as concentrations of copper exceeded applicable CSR PL soil standards for all samples that were analyzed. Vanadium also frequently exceeded applicable CSR PL soil standards in 37 of 126 samples that were analyzed. A single arsenic result (15.1 mg/kg) was marginally above CSR PL standard of 15 mg/kg. When rounding this concentration, the result is considered to meet the standard. Nutrient and total carbon concentrations in the tailings were low, compared to local reference and native under tailings samples (refer to Section 4.5, below).

Copper and vanadium exceedances were observed in tailings samples collected in both the scour zone and the forested halo zone. As discussed in Section 4.1, deposited tailings consisted of a fine, grey layer of material, overlying a coarse, red-black layer of sandy material. The magnitude of the vanadium and copper concentrations was generally similar within the two separate layers of tailings material.

Remaining metal parameters were less than the applicable CSR PL soil standards.

4.3.2 Native Soils underlying Tailings

Native, under tailings soil samples were collected as part of the soil characterization work completed by Golder. Selected samples were submitted to the laboratory for analysis of metals, pH, and plant available nutrients.

Analytical laboratory results were generally less than the applicable CSR PL standards though exceedances of arsenic, cadmium, chromium, and copper were noted.

4.3.3 Local Reference Soils

Local reference soil samples were collected and submitted to the laboratory analysis of metals, plant available nutrients, and total carbon, as part of the soil characterization work completed by Golder.

The laboratory results for metals were less than the applicable CSR PL soil standards, with the exception of one chromium result, which exceeded the CSR standard of 60 mg/kg. However, the magnitude of the concentration (60.9 mg/kg) was less than the regional background concentration for chromium (150 mg/kg), outlined in BC MoE Protocol 4.

The results of local reference oil sample analyses were combined with background results collected by SNC, in order to develop local reference concentrations for the Site. The reference concentrations are described in Section 4.4.2, below.

4.4 Statistical Analyses

As indicated in Section 3.3, the summary statistics were calculated using data collected by SNC in 2014, as well as additional data collected by Golder in 2015. The results of the statistical analyses for tailings, native under tailings, and local reference samples, are summarized in the following sections.

4.4.1 Tailings Samples

The summary statistics for tailings samples that were analyzed as part of the DSI are shown in Table 5, at the end of this technical memorandum. The statistical analyses for tailings samples can be summarized as follows:

- The upper 90th percentiles of metal parameters in tailings samples were less than the most conservative applicable CSR soil standard, with the exception of copper and vanadium;
- The upper 90th percentile for copper (1,070 mg/kg) was nearly an order of magnitude greater than the applicable ecological soil standard of 150 mg/kg. The 90th percentile was, however, more than an order of magnitude lower than the applicable soil standard for protection of human health (15,000 mg/kg);
- The upper 90th percentile for vanadium (229 mg/kg) was approximately 10 percent higher than the applicable CSR soil standard (200 mg/kg);
- The 95% UCLM for copper (830 mg/kg) was greater than the applicable ecological soil standard of 150 mg/kg;
- The 95% UCLM for vanadium (189 mg/kg) was less than the applicable CSR soil standard of 200 mg/kg; and
- The maximum concentration of arsenic (16.5 mg/kg) was greater than the applicable CSR soil standard of 15 mg/kg, but the 90th percentile and 95% UCLM concentrations were less than the applicable CSR standard.

Summary statistics for remaining parameters were less than applicable CSR standards.

4.4.2 Native Under Tailings Soils

The summary statistics for native, under tailings soil samples are shown on Table 5, at the end of this technical memorandum. The statistical analyses for native, under tailings soil samples can be summarized as follows:

The maximum concentrations for metal parameters that were analyzed were less than the most conservative applicable CSR standard, with the exception of arsenic, copper, and chromium. However, the upper 90th percentiles for these parameters were less than the most conservative applicable CSR standard.

4.4.3 Local Reference Soils

The summary statistics for local reference samples that were analyzed as part of the DSI are shown on Table 6, at the end of this technical memorandum.

The upper 95th percentile of the reference soil sample set was considered the local reference concentration (consistent with BC MoE Protocol #4) for comparison to tailings and native under tailings soil samples. The calculated local reference concentrations, shown on Table 6 at the end of this report, were less than applicable CSR PL standards and were less than CSR Protocol #4 Regional Background Concentrations.

4.5 Summary of Data Results

Tailings and native under tailings samples were screened against the applicable CSR PL standards, regional background concentrations, and local reference concentrations. The screening was completed in order to develop a list of contaminants of concern (COCs) at the Site. The summary below is considered factual.

4.5.1 Tailings

Nutrient and total carbon concentrations in tailings samples were consistent with previous results collected at the Site and were lower than native and local reference concentrations. The average concentrations of total available nitrogen and total carbon in tailings were calculated to be 5.9 mg/kg and 1.2 mg/kg, respectively. By comparison, average concentrations of total available nitrogen and total carbon in local reference soils were 10.9 mg/kg and 12.6 mg/kg, respectively).

The upper 90th percentile concentrations of the following metals (with an applicable CSR standard) were greater than local reference concentrations for:

- Arsenic, copper, molybdenum, selenium, strontium and vanadium.

BC MoE Protocol #4 provides regional background concentrations for the six metals identified above with the exception of strontium. The upper 90th percentiles for the parameters were also greater than the regional background concentrations, with the exception of selenium.

The upper 90th percentile concentrations of the following metals (without an applicable CSR standard) were greater than local reference concentrations:

- Boron, calcium, phosphorus, sodium, sulphur, titanium, zirconium.

A summary of the screening of regulated CSR metal parameters against local reference, regional background, and CSR standards is provided in Table 7, below.

Table 7: Summary of Screening in Tailings

COPC	Number of Exceedances of CSR MCS	Max	Mean	95% UCLM	90 th Per.	Local Ref. ¹	Regional Bkgd. ²	CSR Standard (MCS) ³
Arsenic	2 / 126	[16.5]	11	11.1	12.6	11.9	10	15
Copper	126 / 126	[1560]	[805]	[829.7]	[1070]	75	65	150
Molybdenum	0 / 126	7.3	4.3	4.46	5.4	1.6	1	10
Selenium	0 / 126	1.7	1.0	1.03	1.2	0.61	4	3
Strontium	0 / 85	212	141	146.6	180	144	-	47000
Vanadium	37 / 126	[289]	186	189.2	[222]	113	100	200

Notes:

Concentrations shown are in mg/kg, unless otherwise noted.

mg/kg = milligrams/kilogram; UCLM = upper confidence limit of the mean; MCS = Most Conservative Standard; Ref. = Reference; Bkgd. = Background

1. Local reference (LB) is interpreted to be the 95th percentile of reference sample results. This interpretation is consistent with BC MoE Protocol #4. For sample results less than detection limit, half the detection limit was used in the calculation.

2. Regional background (RB) data based on values outlined in BC MoE Protocol 4.

3. The MCS protective of human and ecological health was used.

[Concentration] = Exceeds the most conservative CSR Standard

Concentration = Exceeds the regional background values outlined in BC MoE Protocol 4

4.5.2 Native under Tailings

The upper 90th percentile concentrations of the following metals (with an applicable CSR standard) were greater than local reference concentrations:

- Arsenic, copper, molybdenum, and selenium.

The upper 90th percentile concentrations of the following metals (without an applicable CSR standard) were also greater than local reference concentrations:

- Calcium, sodium, sulphur, and zirconium.

A summary of the screening of native under tailings soil samples, against local reference, regional background, and CSR standards is provided in Table 8.

Table 8: Summary of Screening for Native Under Tailings Samples

COPC	Number of Exceedances of CSR MCS	Max	Mean	95% UCLM	90 th Per.	Local Ref. ¹	Regional Bkgd. ²	CSR Standard (MCS) ³
Arsenic	3 / 68	[16.4]	7.7	8.40	12	11.9	10	15
Copper	7 / 68	[366]	85	103	149	75	65	150
Molybdenum	0 / 68	3.5	1.1	1.26	2	1.6	1	10
Selenium	1 / 68	[8.9]	0.5	0.79	0.7	0.61	4	3
Strontium	0 / 39	223	83.1	95.1	123	144	-	47000
Vanadium	0 / 68	121	70.4	75	94	113	100	200

Notes:

Concentrations shown are in mg/kg, unless otherwise noted.

mg/kg = milligrams/kilogram; UCLM = upper confidence limit of the mean; MCS = Most Conservative Standard; Ref. = Reference; Bkgd. = Background

1. Local reference (LB) is interpreted to be the 95th percentile of reference sample results. This interpretation is consistent with BC MoE Protocol #4. For sample results less than detection limit, half the detection limit was used in the calculation.

2. Regional background (RB) data based on values outlined in BC MoE Protocol 4.

3. The MCS protective of human and ecological health was used.

[Concentration] = Exceeds the most conservative CSR Standard

Concentration = Exceeds the regional background values outlined in BC MoE Protocol 4

4.6 Soil Excavation

The following information provides a summary of the excavation work that was completed within the Hazeltine Creek drainage as part of the channel construction. It is expected that additional information, including surveyed extents, will be available as part of the final phase of rehabilitation work.

- Upper Hazeltine Creek (from Polley Lake to Gavin Lake Road Bridge): tailings material was removed during the channel construction and taken to the TSF. Based on information available at the time of this report, approximately 269,000 m³ has been relocated to the TSF. Additional tailings material has been excavated from the reach of the drainage; however, the material is currently stockpiled in the vicinity of the Polley Plug and has not been accounted for in the overall volume of displaced material;
- Middle Hazeltine Creek: this reach of the drainage was primarily affected by erosion, and not deposition, processes. Tailings material was not removed from this portion of the drainage; and
- Lower Hazeltine Creek: deposited material, consisting of a mixture of tailings and sediment, has been excavated and stockpiled adjacent to the re-constructed channel. Approximately 6,000 m³ of material have been excavated from Lower Hazeltine Creek.

4.7 Results of QA/QC Analyses

The QA/QC analyses included a comparison of field duplicate samples that were collected in the field as well as a review of laboratory data. A summary of the results is provided in the following sections.

4.7.1 Results of Field Duplicates

Field duplicate samples were collected at a rate of 23% for metals analyses and 16% for plant available nutrients. The duplicate sampling frequency meets Golder's internal objective of 10%.

Field duplicates were tabulated and reviewed for RPD and DF values; the results are presented in Table 9, at the end of this report. The RPD and DF values that were calculated were generally below Golder's internal DQOs of 35% and 2.0, respectively, though selected RPD values were greater than 35%. The maximum RPD was 114% for a cadmium sample collected from the tailings layer.

Where calculated RPD values exceeded the DQO of 35%, further evaluation of the data was completed. For example, the cadmium concentrations associated with the RPD of 114% were approximately 4 times less than the applicable standard. Therefore, the uncertainty associated with the RPD is not considered to affect the overall interpretation of the results. The elevated RPD values for other metals parameters were evaluated in the same manner as the cadmium concentrations described above.

4.7.2 Laboratory Program

Laboratory hold times were met for parameters that were analyzed. All laboratory DQOs were met.

The data is considered reproducible and suitable for the assessment of soil quality.

4.7.3 Summary of QA/QC Review

Based on the results of the field duplicate analyses and the laboratory QA/QC review, the soil samples collected as part of the investigation generally meet the DQOs established as part of this investigation. Although the RPDs for certain paired analyses exceeded Golder's DQOs (as listed above), the data is considered reliable as the results do not affect the overall conceptual understanding of the Site.

In conclusion, the data quality review indicates that the data is sufficiently accurate and reproducible, and can be relied upon for completion of remediation works and/or risk assessment for the Site.

5.0 CONCLUSIONS

Golder Associates Ltd. completed a soil investigation on behalf of MPMC, in support of the DSI completed following the failure of the TSF at the Mount Polley Mine. The objectives of the soil investigation were to increase the sampling density within the areas affected by the debris flow and to delineate the vertical and lateral extent of soil contamination at the Site.

Based on the scope of work that was completed as part of the soil investigation, these objectives have been met. The results of the soil investigation will be used as part of the overall DSI for the Site in order to develop a current understanding of the Site conditions.

6.0 STATEMENT OF LIMITATIONS

This report was prepared for the exclusive use of MPMC. The report is based on data and information collected during investigations conducted by Golder Associates Ltd. personnel. It is based solely on the conditions of the subject property at the time of the site investigation conducted in August, 2015, as described in this technical memorandum. The data presented in this memorandum represent soil conditions encountered at the sampling locations tested during this time period. Soil conditions may vary with location, depth, time, sampling methodology, analytical techniques and other factors. Golder Associates Ltd. makes no warranty, expressed or implied, and assumes no liability with respect to the use of the information contained in this report at the subject site, or any other site, for other than its intended purpose.

The findings and conclusions documented in this report have been prepared for the specific application to this project, and have been developed in a manner consistent with that level of care normally exercised by environmental professionals currently practising under similar conditions in the jurisdiction. Golder makes no other warranty, expressed or implied and assumes no liability with respect to the use of the information contained in this report at the subject site, or any other site, for other than its intended purpose.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Golder accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or action based on this report. All third parties relying on this report do so at their own risk. Electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore no party can rely upon the electronic media versions of Golder's report or other work product. Golder is not responsible for any unauthorized use or modifications of this report.

MPMC may rely on the information contained in this report subject to the above limitations.

Golder makes no other representation whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation. These interpretations and the regulations themselves may change over time, thus MPMC should review these issues.

If new information is discovered during future work Golder should be requested to re-evaluate the conclusions of this report and to provide amendments, as required, prior to any reliance upon the information presented herein. The validity of this report is affected by any change of site conditions, purpose, development plans or significant delay from the date of this report in initiating or completing the project.

7.0 CLOSURE

We trust that this Technical Memorandum provides sufficient information for your present needs. If you have any questions, please do not hesitate to contact the undersigned at (604) 296-4200.

GOLDER ASSOCIATES LTD.



Andrew Bruemmer, P.Eng.
Environmental Engineer



Trish Miller, M.Sc., CSAP
Principal, Senior Environmental Scientist



Reidar Zapf-Gilje
Contaminated Sites Expert

AB/TAM/RZG/syd

Attachments: Table 1 – Results of Field Analyses
Table 2 – Results of Soil Analyses (Tailings Samples)
Table 3 – Results of Soil Analyses (Native Soils)
Table 4 – Results of Soil Analysis (Local Reference)
Table 5 – Results of Statistical Analyses
Table 6 – Local Reference Concentrations
Table 9 – Results of Soil QA/QC Analyses
Figure A-1 – Mount Polley Remediation Areas
Figures A-2 – A-14 – Sample Locations for Soil and Terrestrial Habitat Exceedance Results
Attachment 1 – Soil Sampling Methods
Attachment 2 – Test Pit and Auger Logs
Attachment 3 – Representative Cross-Sections and Sample Locations
Attachment 4 – Laboratory Certificates of Analysis
Attachment 5 – Site Photographs

8.0 REFERENCES

BC MoE. 2014. Contaminated Sites Regulation [BC Reg. 375/96, O.C. 1480/96 including amendments up to BC Reg. 4/2014, effective January 31, 2014]. Land Remediation. Ministry of Environment.

MPMC (Mount Polley Mining Company). 2015. Post-Event Environmental Impact Assessment Report – Key Findings Report. June 5, 2015. Submitted to Ministry of Environment.

SNC (SNC-Lavalin). 2015a. Mount Polley Tailings Dam Failure - Soil Quality Impact Assessment. June 3, 2015. Prepared for Mount Polley Mining Corporation. Appendix D of the Post-Event Environmental Impact Assessment (MPMC 2015).

Table 1 - Results of Field Soil Analyses
MPMC - Detailed Site Investigation
Mount Polley Mine, BC

Sample Area	Sample ID	Units	Local Reference Samples										Native Underlying Tailings Samples										Tailings Samples							
			P1-A Layer 2015 July 29	P1-B Layer 2015 July 29	P9-A Layer 2015 July 30	P9-B Layer 2015 July 30	P14-H Layer 2015 July 31	P14-A Layer 2015 July 31	P17-A Layer 2015 July 31	P19-H Layer 2015 August 2	P20-H Layer 2015 August 2	P2-A Layer 2015 July 29	P2-B Layer 2015 July 29	P12-H Layer 2015 July 31	P12-A Layer 2015 July 31	P13-H/A 2015 July 31	P16-H 2015 August 1s	P21-H 2015 August 2	P22-H 2015 August 2	P23-H 2015 August 2	P23-A/B 2015 August 2	P2-T Sand 2015 July 29	12-T2 Silty Sar 2015 July 31	P13-T Silt Sanc 2015 July 31	P16-T Sand 2015 August 1s	P21-T Sand 2015 August 2	P22-T Silt 2015 August 2	P23-T 2015 August 2		
Parameters																														
Temperature	°C		14.4	14.3	19.9	19.2	21.2	21.1	22.1	17.6	17.9	12.7	11.9	17.7	17.9	21.2	23.1	18.3	23.3	22.5	22.9	13.9	12.7	21.2	23.1	18.5	22	21.7		
Dissolved Oxygen	mg/L		7.31	7.73	8.94	10	7.6	8.95	7.45	9.71	9.26	0.22	0.17	0.38	0.14	6.1	8.23	6.13	8.21	7.79	8.82	3.56	0.88	8.67	8.61	3.85	6.29	4.4		
Specific Conductivity	µs/cm		52.3	20.6	24.1	17.3	45.9	21.8	44.9	39.1	48.2	99.6	293.5	281	343	223	103	57.8	224	372.4	253.2	90.4	303	140.7	968	201.3	356.2	204.2		
Total Dissolved Solids	g/L		0.0305	0.0136	0.0156	0.0117	0.0299	0.014	0.0293	0.0253	0.0312	0.065	0.1905	0.183	0.223	0.146	0.0676	0.0377	0.1456	0.2424	0.1651	0.0605	0.227	0.0917	0.6435	0.13	0.2307	0.1329		
Salinity	ppt		0.02	0.01	-	-	0.02	0.01	0.02	0.02	0.02	0.05	0.14	0.13	0.16	0.11	0.05	0.03	0.11	0.18	0.12	0.04	0.17	0.07	0.5	0.09	0.18	0.1		
pH	pH		5.65	5.76	4.99	5.55	5.91	5.52	5.08	6.89	5.8	6.53	6.3	6.75	6.73	6.12	7.63	6.49	7.61	7.6	7.98	7.5	6.87	7.14	7.38	8.06	7.79	8.21		
Oxidation-reduction Potential	mV		215.7	295.9	283.8	257.8	228.9	237	271.9	227.2	228.8	48.6	-16.1	-67.5	-69.2	216.9	199.6	117	123.8	139.9	118.2	-46.2	-100.7	206.2	209.7	10.2	160.4	105.1		

Notes:
 MPMC = Mount Polley Mining Corporation
 m bgs = metres below ground surface; mg/L = milligram per litre
 µs/cm = microsiemens per centimetre; g/L = grams per litre
 ppt. = parts per thousand; mV = millivolts

Table 2 - Results of Soil Analyses (Tailings Samples)
MPMC - Detailed Site Investigation
Mount Polley Mine, BC

Table with 18 columns for samples and 17 columns for parameters. The table is divided into sections: Physical Parameters, Grain Size, Plant Available Nutrients, Organic/Inorganic Carbon, and Strong Acid Leachable - Total Metals. Each cell contains numerical values or chemical symbols.

Notes:
MPMC = Mount Polley Mining Corporation; BC CSR = British Columbia Contaminated Sites Regulation
m bgs = metres below ground surface; QA/QC = Quality Assurance / Quality Check; FDA = Field Duplicate Available; DUP = Duplicate
mV = millivolt; mm = millimetre; mg/kg = milligram per kilogram; < = below detection limit; - = no data

- a. Guidelines for groundwater used for drinking water (residential and urban park areas)
b. Guidelines for intake of contaminated soil (residential and urban park areas)
c. Guidelines for toxicity to soil invertebrates and plants (residential and urban park areas)
d. Guidelines for groundwater flow to surface water used by aquatic life (residential and urban park areas)
e. Generic guidelines from Schedule 4
f. Generic guidelines from Schedule 10
g. Guideline is pH dependent

Legend for symbols used in the table: underline, double underline, round brackets, square brackets, braces brackets.

Table 2 - Results of Soil Analyses (Tailings Samples)
MPMC - Detailed Site Investigation
Mount Polley Mine, BC

Table with 20 columns for sample IDs (ST01-05 to ST18-05) and multiple rows for parameters such as pH, Organic Carbon, Moisture, Grain Size, Plant Available Nutrients, Organic/Inorganic Carbon, and various metals (Aluminum, Arsenic, Barium, etc.). Includes BC CSR Standards and background levels.

Notes:
MPMC = Mount Polley Mining Corporation; BC CSR = British Columbia Contaminated Sites Regulation
m bgs = metres below ground surface; QA/QC = Quality Assurance / Quality Check; FDA = Field Duplicate Available; DUP = Duplicate
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d. Guidelines for groundwater flow to surface water used by aquatic life (residential and urban park areas)
e. Generic guidelines from Schedule 4
f. Generic guidelines from Schedule 10
g. Guideline is pH dependent

Legend table mapping symbols to guideline types:
underline: exceeds BC CSR DW guideline
double underline: exceeds BC CSR ICS guideline
round brackets: exceeds BC CSR TSIP guideline
square brackets: exceeds BC CSR GWtoFSW guideline
braces brackets: exceeds BC CSR Generic guideline

Table 2 - Results of Soil Analyses (Tailings Samples)
MPMC - Detailed Site Investigation
Mount Polley Mine, BC

Table with columns for Sample ID, Easting Northing, Units, BC CSR Standards (Human Health, Ecological Health, Generic, Background), and 20 soil analysis locations (ST01-03 to ST06-03). Rows include Physical Parameters (pH, TOC, etc.), Grain Size, Plant Available Nutrients, Organic/Inorganic Carbon, and Strong Acid Leachable - Total Metals (Aluminum, Antimony, Arsenic, etc.).

Notes:
MPMC = Mount Polley Mining Corporation; BC CSR = British Columbia Contaminated Sites Regulation
m bgs = metres below ground surface; QA/QC = Quality Assurance / Quality Check; FDA = Field Duplicate Available; DUP = Duplicate
mV = millivolt; mm = millimetre; mg/kg = milligram per kilogram; < = below detection limit; '-' = no data
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g. Guideline is pH dependent

Legend table for symbols: underline (exceeds BC CSR DW guideline), double underline (exceeds BC CSR ICS guideline), round brackets (exceeds BC CSR TSIP guideline), square brackets (exceeds BC CSR GWtoFSW guideline), braces brackets (exceeds BC CSR Generic guideline).

Table 2 - Results of Soil Analyses (Tailings Samples)
MPMC - Detailed Site Investigation
Mount Polley Mine, BC

Main data table with columns for Sample ID, Coordinates, Easting Northing, Units, BC CSR Standards (Human Health, Ecological Health, Generic, Background), and various parameters (pH, Organic Carbon, Moisture, Grain Size, Plant Available Nutrients, Organic/Inorganic Carbon, Stong Acid Leachable - Total Metals).

Notes:
MPMC = Mount Polley Mining Corporation; BC CSR = British Columbia Contaminated Sites Regulation
m bgs = metres below ground surface; QA/QC = Quality Assurance / Quality Check; FDA = Field Duplicate Available; DUP = Duplicate
mV = millivolt; mm = millimetre; mg/kg = milligram per kilogram; < = below detection limit; '-' = no data
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g. Guideline is pH dependent

Table 2 - Results of Soil Analyses (Tailings Samples)
MPMC - Detailed Site Investigation
Mount Polley Mine, BC

Table with columns for Sample ID, Coordinates, Easting Northing, Units, BC CSR Standards (Human Health, Ecological Health, Generic, Background), and 17 sampling locations (ST11-02 to ST17-03). Rows include Physical Parameters (pH, TOC, etc.), Grain Size, Plant Available Nutrients, Organic/Inorganic Carbon, and Strong Acid Leachable - Total Metals.

Notes:
MPMC = Mount Polley Mining Corporation; BC CSR = British Columbia Contaminated Sites Regulation
m bgs = metres below ground surface; QA/QC = Quality Assurance / Quality Check; FDA = Field Duplicate Available; DUP = Duplicate
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Legend table defining symbols: underline (exceeds BC CSR DW guideline), double underline (exceeds BC CSR ICS guideline), round brackets (exceeds BC CSR TSIP guideline), square brackets (exceeds BC CSR GWtoFSW guideline), braces brackets (exceeds BC CSR Generic guideline).

Table 2 - Results of Soil Analyses (Tailings Samples)
MPMC - Detailed Site Investigation
Mount Polley Mine, BC

Main data table with columns for Sample ID, Coordinates, Easting Northing, Units, BC CSR Standards (Human Health, Ecological Health, Generic, Background), and various physical parameters like pH, Total Organic Carbon, Grain Size, Plant Available Nutrients, Organic/Inorganic Carbon, and Strong Acid Leachable - Total Metals.

Notes:
MPMC = Mount Polley Mining Corporation; BC CSR = British Columbia Contaminated Sites Regulation
m bgs = metres below ground surface; QA/QC = Quality Assurance / Quality Check; FDA = Field Duplicate Available; DUP = Duplicate
mV = millivolt; mm = millimetre; mg/kg = milligram per kilogram; < = below detection limit; '-' = no data
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Legend table for symbols: underline (exceeds BC CSR DW guideline), double underline (exceeds BC CSR ICS guideline), round brackets (exceeds BC CSR TSIP guideline), square brackets (exceeds BC CSR GWtoFSW guideline), braces brackets (exceeds BC CSR Generic guideline)

Table 2 - Results of Soil Analyses (Tailings Samples)
MPMC - Detailed Site Investigation
Mount Polley Mine, BC

Main data table with columns for Sample ID, Easting Northing, Units, BC CSR Standards (Human Health, Ecological Health, Generic, Background), and 19 sample locations (SS15-07 to SS15-19, P21 - T Sand, P15 - T Sand). Rows include Physical Parameters (pH, TOC, etc.), Grain Size, Plant Available Nutrients, Organic / Inorganic Carbon, and Strong Acid Leachable - Total Metals.

Notes:
MPMC = Mount Polley Mining Corporation; BC CSR = British Columbia Contaminated Sites Regulation
m bgs = metres below ground surface; QA/QC = Quality Assurance / Quality Check; FDA = Field Duplicate Available; DUP = Duplicate
mV = millivolt; mm = millimetre; mg/kg = milligram per kilogram; < = below detection limit; '-' = no data
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g. Guideline is pH dependent

Table 2 - Results of Soil Analyses (Tailings Samples)
MPMC - Detailed Site Investigation
Mount Polley Mine, BC

Main data table with columns for Sample ID, Coordinates, Easting Northing, Units, BC CSR Standards (Human Health, Ecological Health, Generic, Background), and various physical parameters like pH, Organic Carbon, Moisture, Grain Size, Plant Available Nutrients, and Total Metals.

Notes:
MPMC = Mount Polley Mining Corporation; BC CSR = British Columbia Contaminated Sites Regulation
m bgs = metres below ground surface; QA/QC = Quality Assurance / Quality Check; FDA = Field Duplicate Available; DUP = Duplicate
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e. Generic guidelines from Schedule 4
f. Generic guidelines from Schedule 10
g. Guideline is pH dependent

Legend table for symbols: underline, double underline, round brackets, square brackets, braces brackets, and their corresponding guideline types.

Table 2 - Results of Soil Analyses (Tailings Samples)
MPMC - Detailed Site Investigation
Mount Polley Mine, BC

Sample ID Coordinates	Easting Northing	Units	BC CSR Standards				WILLOW STAKE SOIL-5	WILLOW STAKE SOIL-2	P2 - B Layer	WILLOW STAKE SOIL-3		
			Human Health		Ecological Health		Generic	Background (95th Percentile)	25-Aug-2015	19-Aug-2015	29-Jul-2015	19-Aug-2015
			DW ^a	ICS ^b	TSIP ^c	GWtoFSW ^d						
Date Sampled												
Sample Depth (m bgs)												
QA/QC												
ALS Sample ID												
Physical Parameters												
pH	pH	-	-	-	-	-	-	-	6.69	-	-	
Total Organic Carbon	%	-	-	-	-	-	-	-	-	-	-	
Total Inorganic Carbon	%	-	-	-	-	-	-	-	-	-	-	
Inorganic Carbon (as CaCO3)	%	-	-	-	-	-	-	-	-	-	-	
Moisture	%	-	-	-	-	15.8	14.9	46.9	-	14.2	-	
Oxidation-Reduction Potential (ORP)	mV	-	-	-	-	-	-	323	-	-	-	
Grain Size												
Gravel	%	-	-	-	-	-	-	-	-	-	-	
Sand (0.125mm - 0.063mm)	%	-	-	-	-	-	-	-	-	-	-	
Sand (0.25mm - 0.125mm)	%	-	-	-	-	-	-	-	-	-	-	
Sand (0.50mm - 0.25mm)	%	-	-	-	-	-	-	-	-	-	-	
Sand (1.00mm - 0.50mm)	%	-	-	-	-	-	-	-	-	-	-	
Sand (2.00mm - 1.00mm)	%	-	-	-	-	-	-	-	-	-	-	
Silt (0.0312mm - 0.004mm)	%	-	-	-	-	-	-	-	-	-	-	
Silt (0.063mm - 0.0312mm)	%	-	-	-	-	-	-	-	-	-	-	
Clay	%	-	-	-	-	-	-	-	-	-	-	
Plant Available Nutrients												
Total Available Nitrogen	mg/kg	-	-	-	-	-	-	-	24.4	-	-	
Total Nitrogen by LECO	%	-	-	-	-	-	-	-	0.278	-	-	
Available Ammonium-N	mg/kg	-	-	-	-	-	-	-	24.4	-	-	
Available Nitrate-N	mg/kg	-	-	-	-	-	-	-	<1.0	-	-	
Nitrate+Nitrite-N	mg/kg	-	-	-	-	-	-	-	<2.0	-	-	
Nitrate-N	mg/kg	-	-	-	-	-	-	-	<2.0	-	-	
Nitrite-N	mg/kg	-	-	-	-	-	-	-	<0.50	-	-	
Available Phosphate-P	mg/kg	-	-	-	-	-	-	-	19.7	-	-	
Available Potassium	mg/kg	-	-	-	-	-	-	-	166	-	-	
Available Sulfate-S	mg/kg	-	-	-	-	-	-	-	9.6	-	-	
Organic / Inorganic Carbon												
Total Carbon by Combustion	%	-	-	-	-	-	-	-	4.3	-	-	
Strong Acid Leachable - Total Metals												
Aluminum	mg/kg	-	-	-	-	-	44080	18000	15300	-	17600	
Antimony	mg/kg	-	-	-	-	(20) ^e	0.51	0.49	0.39	0.34	0.53	
Arsenic	mg/kg	15	100	(50)	[20]	-	11.9	14.4	11.8	7.8	11.2	
Barium	mg/kg	400	6500	(1000)	[3500]	-	342	174	148	197	253	
Beryllium	mg/kg	-	-	-	-	(4) ^e	1.1	0.66	0.59	0.75	0.59	
Bismuth	mg/kg	-	-	-	-	-	0.40	<0.20	<0.20	-	<0.20	
Boron	mg/kg	-	-	-	-	-	6.8	8.5	6.6	-	6.6	
Cadmium	mg/kg	1.5-1000 ^f	35 ^g	(70)	[2-150] ^h	-	0.92	0.194	0.161	0.44	0.157	
Calcium	mg/kg	-	-	-	-	-	20820	24600	21400	-	25600	
Chromium	mg/kg	60	100	(300)	[65]	-	77.6	21.8	16.2	37.4	35.9	
Cobalt	mg/kg	-	-	-	-	(50) ^e	22.7	16.9	15.5	16.3	16.5	
Copper	mg/kg	250-350,000 ^f	15000	(150)	[90-30,000] ^h	-	75.4	(608)	(608)	(412)	(359)	
Iron	mg/kg	-	-	-	-	-	56800	42700	42400	-	41100	
Lead	mg/kg	100-4000 ^f	400	(1000)	[150-40,000] ^h	-	14.5	5.79	5.76	7.7	5.64	
Lithium	mg/kg	-	-	-	-	(1600)	34.2	18.7	16.3	-	17.3	
Magnesium	mg/kg	-	-	-	-	-	11600	11100	9490	-	13200	
Manganese	mg/kg	-	-	-	-	(1800) ^e	2196	745	607	-	704	
Mercury	mg/kg	-	15	(100)	-	-	0.23	-	-	0.060	-	
Molybdenum	mg/kg	-	-	-	-	(10) ^e	1.6	2.92	3.17	2.9	1.87	
Nickel	mg/kg	-	-	-	-	(100) ^e	59.0	15.2	13.9	22.9	35.7	
Phosphorus	mg/kg	-	-	-	-	-	1180	1250	1150	-	1250	
Potassium	mg/kg	-	-	-	-	-	3770	1470	1340	-	1140	
Selenium	mg/kg	-	-	-	-	(3) ^e	0.61	0.83	0.83	0.5	0.55	
Silver	mg/kg	-	-	-	-	(20) ^e	0.78	<0.30	0.28	0.4	<0.20	
Sodium	mg/kg	-	-	-	-	-	275.6	803	729	-	601	
Strontium	mg/kg	-	-	-	-	(47000) ^e	143.6	153	136	-	138	
Sulphur	mg/kg	-	-	-	-	-	900	-	-	-	-	
Thallium	mg/kg	-	-	-	-	-	0.25	<0.050	<0.050	0.08	0.053	
Tin	mg/kg	-	-	-	-	(50) ^e	2.0	<2.0	<2.0	<2.0	<2.0	
Titanium	mg/kg	-	-	-	-	-	1078	1600	1270	-	1370	
Uranium	mg/kg	-	-	-	-	(16) ^e	2.3	0.997	0.928	0.84	0.761	
Vanadium	mg/kg	-	-	-	-	(200) ^e	113	156	150	152	132	
Zinc	mg/kg	200-15000 ^f	10000	(450)	[150-3,000] ^h	-	144	67.8	58.6	94.9	57.1	
Zirconium	mg/kg	-	-	-	-	-	4.5	9.4	6.4	-	8.2	

Notes:
 MPMC = Mount Polley Mining Corporation; BC CSR = British Columbia Contaminated Sites Regulation
 m bgs = metres below ground surface; QA/QC = Quality Assurance / Quality Check; FDA = Field Duplicate Available; DUP = Duplicate
 mV = millivolt; mm = millimetre; mg/kg = milligram per kilogram; < = below detection limit; '-' = no data
 a. Guidelines for groundwater used for drinking water (residential and urban park areas)
 b. Guidelines for intake of contaminated soil (residential and urban park areas)
 c. Guidelines for toxicity to soil invertebrates and plants (residential and urban park areas)
 d. Guidelines for groundwater flow to surface water used by aquatic life (residential and urban park areas)
 e. Generic guidelines from Schedule 4
 f. Generic guidelines from Schedule 10
 g. Guideline is pH dependent

<u>underline</u>	exceeds BC CSR DW guideline
<u>double underline</u>	exceeds BC CSR ICS guideline
(round brackets)	exceeds BC CSR TSIP guideline
[square brackets]	exceeds BC CSR GWtoFSW guideline
{braces brackets}	exceeds BC CSR Generic guideline

Table 3 - Results of Soil Analyses (Native Soils)
MPMC - Detailed Site Investigation
Mount Polley Mine, BC

Sample ID	Coordinates	Easting	Northing	Units	BC CSR Standards										Willow Seedling soil - 8	Willow Seedling soil - 9		
					Human Health		Ecological Health		Generic	WILLOW SEEDLING SOIL-4	WILLOW WATTLE SOIL-4	WILLOW STAKE SOIL-4	WILLOW STAKE SOIL-4X	WILLOW WATTLE SOIL-4X			WILLOW SEEDLING SOIL-5	WILLOW WATTLE SOIL-5
Date Sampled	Sample Depth (m bgs)	QA/QC	ALS Sample ID															
Physical Parameters																		
pH																	7.88	7.65
Total Organic Carbon	%																	
Total Inorganic Carbon	%																	
Inorganic Carbon (as CaCO3)	%																	
Moisture	%																	
Oxidation-Reduction Potential (ORP)	mV																	
Grain Size																		
Gravel	%																	
Sand (0.125mm - 0.063mm)	%																	
Sand (0.25mm - 0.125mm)	%																	
Sand (0.50mm - 0.25mm)	%																	
Sand (1.00mm - 0.50mm)	%																	
Sand (2.00mm - 1.00mm)	%																	
Silt (0.0312mm - 0.004mm)	%																	
Silt (0.063mm - 0.0312mm)	%																	
Clay	%																	
Plant Available Nutrients																		
Total Available Nitrogen	mg/kg																	
Total Nitrogen by LECO	%																	
Available Ammonium-N	mg/kg																	
Available Nitrate-N	mg/kg																	
Nitrate+Nitrite-N	mg/kg																	
Nitrate-N	mg/kg																	
Nitrite-N	mg/kg																	
Available Phosphate-P	mg/kg																	
Available Potassium	mg/kg																	
Available Sulfate-S	mg/kg																	
Organic / Inorganic Carbon																		
Total Carbon by Combustion	%																	
Strong Acid Leachable - Total Metals																		
Aluminum	mg/kg																	
Antimony	mg/kg																	
Arsenic	mg/kg																	
Barium	mg/kg																	
Beryllium	mg/kg																	
Bismuth	mg/kg																	
Boron	mg/kg																	
Cadmium	mg/kg																	
Calcium	mg/kg																	
Chromium	mg/kg																	
Cobalt	mg/kg																	
Copper	mg/kg																	
Iron	mg/kg																	
Lead	mg/kg																	
Lithium	mg/kg																	
Magnesium	mg/kg																	
Manganese	mg/kg																	
Mercury	mg/kg																	
Molybdenum	mg/kg																	
Nickel	mg/kg																	
Phosphorus	mg/kg																	
Potassium	mg/kg																	
Selenium	mg/kg																	
Silver	mg/kg																	
Sodium	mg/kg																	
Strontium	mg/kg																	
Sulphur	mg/kg																	
Thallium	mg/kg																	
Tin	mg/kg																	
Titanium	mg/kg																	
Uranium	mg/kg																	
Vanadium	mg/kg																	
Zinc	mg/kg																	
Zirconium	mg/kg																	

Notes:
 MPMC = Mount Polley Mining Corporation; BC CSR = British Columbia Contaminated Sites Regulation
 m bgs = metres below ground surface; QA/QC = Quality Assurance / Quality Check; FDA = Field Duplicate Available; DUP = Duplicate
 mV = millivolt; mm = millimetre; mg/kg = milligram per kilogram; < = below detection limit; '-' = no data
 a. Guidelines for groundwater used for drinking water (residential and urban park areas)
 b. Guidelines for intake of contaminated soil (residential and urban park areas)
 c. Guidelines for toxicity to soil invertebrates and plants (residential and urban park areas)
 d. Guidelines for groundwater flow to surface water used by aquatic life (residential and urban park areas)
 e. Generic guidelines from Schedule 4
 f. Generic guidelines from Schedule 10
 g. Guideline is pH dependent

underline	exceeds BC CSR DW guideline
double underline	exceeds BC CSR ICS guideline
(round brackets)	exceeds BC CSR TSIP guideline
(square brackets)	exceeds BC CSR GWtoFSW guideline
(braces brackets)	exceeds BC CSR Generic guideline

Table 4 - Results of Soil Analyses (Local Reference)
MPMC - Detailed Site Investigation
Mount Polley Mine, BC

Main data table with columns for Sample ID, Coordinates, Date Sampled, Sample Depth, Sample layer, QA/QC, ALIS Sample ID, BC CSR Standards (Human Health, Ecological Health, Generic), and various sampling locations (ST12-01 to ST18-01, P1-A Layer, P1-B Layer, 1-Spruce - AH Layer, 1-Berry - AH Layer, P9-A Layer, P9-B Layer). Rows include Physical Parameters (pH, TOC, TIC, Inorganic Carbon, Moisture, ORP), Grain Size, Plant Available Nutrients, Organic / Inorganic Carbon, and Strong Acid Leachable - Total Metals (Aluminum, Antimony, Arsenic, Barium, Beryllium, Bismuth, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Phosphorus, Potassium, Selenium, Silver, Sodium, Strontium, Sulphur, Thallium, Tin, Titanium, Uranium, Vanadium, Zinc, Zirconium).

Notes:
MPMC = Mount Polley Mining Corporation; BC CSR = British Columbia Contaminated Sites Regulation
m bgs = metres below ground surface; QA/QC = Quality Assurance / Quality Check; FDA = Field Duplicate Available; DUP = Duplicate
mV = millivolt; mm = millimetre; mg/kg = milligram per kilogram; < = below detection limit; '-' = no data
a. Guidelines for groundwater used for drinking water (residential and urban park areas)
b. Guidelines for intake of contaminated soil (residential and urban park areas)
c. Guidelines for toxicity to soil invertebrates and plants (residential and urban park areas)
d. Guidelines for groundwater flow to surface water used by aquatic life (residential and urban park areas)
e. Generic guidelines from Schedule 4
f. Generic guidelines from Schedule 10
g. Guideline is pH dependent
Legend:
underline exceeds BC CSR DW guideline
double underline exceeds BC CSR ICS guideline
[round brackets] exceeds BC CSR TSIP guideline
[square brackets] exceeds BC CSR GWtoFSW guideline
{braces brackets} exceeds BC CSR Generic guideline

**Table 6 - Summary of Local Reference Metal Concentrations
MPMC - Detailed Site Investigation
Mount Polley Mine, BC**

Total Metals	Local Reference (Background)					
	Number of Samples	Number of Exceedances of MCS ¹	Minimum	Maximum	Average	95th Percentile
Strong Acid Leachable - Total Metals						
Aluminum	33	0	6270	56100	18164	44080
Antimony	45	0	0.1	0.57	0.32	0.51
Arsenic	45	0	0.94	14	6.4	11.9
Barium	45	0	43	396	127	342
Beryllium	45	0	0.1	1.7	0.47	1.1
Bismuth	33	0	0.2	0.54	0.22	0.4
Boron	10	0	5.0	8.2	5.3	6.8
Cadmium	45	0	0.05	2.0	0.35	0.92
Calcium	33	0	1010	25200	6190	20820
Chromium	45	4	9.6	108	39	78
Cobalt	45	0	2.3	35	12	23
Copper	45	0	6.0	135	36	75
Iron	33	0	16200	75700	31224	56800
Lead	45	0	4.3	22	7.7	15
Lithium	33	0	5.7	36	18	34
Magnesium	33	0	1340	12000	6587	11600
Manganese	33	2	170	7320	819	2196
Mercury	35	0	0.05	0.3	0.079	0.23
Molybdenum	45	0	0.35	5.1	0.83	1.6
Nickel	45	1	4.4	104	29	59
Phosphorus	33	0	392	1560	762	1180
Potassium	33	0	610	4700	1281	3770
Selenium	45	1	0.2	4.3	0.35	0.61
Silver	45	0	0.1	1.2	0.27	0.78
Sodium	33	0	96	576	160	276
Strontium	33	0	15	171	51	144
Sulphur	16	0	500	900	575	900
Thallium	45	0	0.05	0.3	0.1	0.25
Tin	45	0	2.0	2.0	2.0	2.0
Titanium	33	0	198	1170	765	1078
Uranium	45	0	0.26	11	0.99	2.3
Vanadium	45	0	15	133	67	113
Zinc	45	0	16	149	69	144
Zirconium	10	0	1.0	4.7	2.6	4.5

Notes:

All concentrations are in mg/kg

1. MCS = Most conservative standard. Metal concentrations were compared to the MCS protective of human and ecological health.

Table 9 - Results of Soil QA/QC Analyses
MPMC - Detailed Site Investigation
Mount Polley Mine, BC

Sample ID		P19 - A Layer 2-Aug-2015	P19 - A Layer - DUP 2-Aug-2015	Method Detection Limit	Mean	Relative Percent Difference (RPD)	Difference Factor (DF)	P3 - T Sand 29-Jul-2015	P3 - T Sand - DUP 29-Jul-2015	Method Detection Limit	Mean	Relative Percent Difference (RPD)	Difference Factor (DF)
Date Sampled	Units	Reference	Reference					Tailings	Tailings				
Soil Type (Native, Tailing, Background)		0.13	0.13					0.65	0.65				
Sample Depth (m bgs)		FDA	DUP					FDA	DUP				
QA/QC													
ALS Sample ID		L1654527-87	L1654527-88					L1654527-5	L1654527-6				
Physical Parameters													
pH	pH	5.83	5.80	0.100	5.82	0.516%	NA	8.51	8.55	0.100	8.53	0.469%	NA
Total Organic Carbon	%	-	-	-	-	-	-	-	-	-	-	-	-
Total Inorganic Carbon	%	-	-	-	-	-	-	-	-	-	-	-	-
Inorganic Carbon (as CaCO3)	%	-	-	-	-	-	-	-	-	-	-	-	-
Moisture	%	20.1	18.9	0.250	19.5	6.15%	NA	6.71	6.34	0.250	6.53	5.67%	NA
Oxidation-Reduction Potential (ORP)	mV	301	317	-990	309	5.18%	NA	279	291	-990	285	4.21%	NA
Grain Size													
Gravel	%	-	-	-	-	-	-	-	-	-	-	-	-
Sand (0.125mm - 0.063mm)	%	-	-	-	-	-	-	-	-	-	-	-	-
Sand (0.25mm - 0.125mm)	%	-	-	-	-	-	-	-	-	-	-	-	-
Sand (0.50mm - 0.25mm)	%	-	-	-	-	-	-	-	-	-	-	-	-
Sand (1.00mm - 0.50mm)	%	-	-	-	-	-	-	-	-	-	-	-	-
Sand (2.00mm - 1.00mm)	%	-	-	-	-	-	-	-	-	-	-	-	-
Silt (0.0312mm - 0.004mm)	%	-	-	-	-	-	-	-	-	-	-	-	-
Silt (0.063mm - 0.0312mm)	%	-	-	-	-	-	-	-	-	-	-	-	-
Clay	%	-	-	-	-	-	-	-	-	-	-	-	-
Plant Available Nutrients													
Total Available Nitrogen	mg/kg	2.90	4.30	4.30	3.60	NA	0.326	2.20	2.20	2.20	2.20	NA	0.000
Total Nitrogen by LECO	%	0.197	0.240	0.0200	0.219	19.7%	NA	0.0430	0.0330	0.0200	0.0380	NA	0.500
Available Ammonium-N	mg/kg	2.90	2.80	1.60	2.85	NA	0.063	1.00	1.60	1.00	1.30	NA	0.600
Available Nitrate-N	mg/kg	1.00	1.00	1.00	1.00	NA	0.000	1.00	1.00	1.00	1.00	NA	0.000
Nitrate+Nitrite-N	mg/kg	2.00	4.00	4.00	3.00	NA	0.500	2.00	2.00	2.00	2.00	NA	0.000
Nitrate-N	mg/kg	2.00	4.00	4.00	3.00	NA	0.500	2.00	2.00	2.00	2.00	NA	0.000
Nitrite-N	mg/kg	0.500	0.800	0.800	0.650	NA	0.375	0.500	0.500	0.500	0.500	NA	0.000
Available Phosphate-P	mg/kg	2.70	3.30	2.00	3.00	NA	0.300	2.00	2.00	2.00	2.00	NA	0.000
Available Potassium	mg/kg	29.0	33.0	20.0	31.0	NA	0.200	55.0	63.0	20.0	59.0	NA	0.400
Available Sulfate-S	mg/kg	3.60	4.60	3.00	4.10	NA	0.333	20.0	24.4	3.00	22.2	19.8%	NA
Organic / Inorganic Carbon													
Total Carbon by Combustion	%	3.50	4.30	0.100	3.90	20.5%	NA	0.300	0.300	0.100	0.300	NA	0.0
Strong Acid Leachable - Total Metals													
Aluminum	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/kg	0.150	0.140	0.100	0.145	NA	0.100	-	-	-	-	-	-
Arsenic	mg/kg	1.99	1.82	0.100	1.91	8.92%	NA	-	-	-	-	-	-
Barium	mg/kg	42.5	46.3	0.50	44.4	8.56%	NA	-	-	-	-	-	-
Beryllium	mg/kg	0.14	0.1	0.1	0.120	NA	0.400	-	-	-	-	-	-
Bismuth	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/kg	1.27	1.06	0.05	1.17	18.0%	NA	-	-	-	-	-	-
Calcium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/kg	18.6	18.7	0.500	18.7	0.536%	NA	-	-	-	-	-	-
Cobalt	mg/kg	7.50	7.17	0.100	7.34	4.50%	NA	-	-	-	-	-	-
Copper	mg/kg	15.0	12.9	0.500	14.0	15.1%	NA	-	-	-	-	-	-
Iron	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/kg	6.97	6.86	0.500	6.92	1.59%	NA	-	-	-	-	-	-
Lithium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/kg	0.0500	0.0500	0.0500	0.0500	NA	0.00	-	-	-	-	-	-
Molybdenum	mg/kg	0.720	0.770	0.100	0.745	6.71%	NA	-	-	-	-	-	-
Nickel	mg/kg	8.02	8.48	0.500	8.25	5.58%	NA	-	-	-	-	-	-
Phosphorus	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	0.200	0.200	0.200	0.200	NA	0.00	-	-	-	-	-	-
Silver	mg/kg	0.140	0.140	0.100	0.140	NA	0.00	-	-	-	-	-	-
Sodium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/kg	0.0500	0.0500	0.0500	0.0500	NA	0.00	-	-	-	-	-	-
Tin	mg/kg	2.0	2.0	2.0	2.00	NA	0.00	-	-	-	-	-	-
Titanium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/kg	0.547	0.46	0.05	0.503	17.5%	NA	-	-	-	-	-	-
Vanadium	mg/kg	38.8	39.0	0.200	38.9	0.51%	NA	-	-	-	-	-	-
Zinc	mg/kg	41.9	44.6	2.0	43.3	6.24%	NA	-	-	-	-	-	-
Zirconium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
 All parameter units in milligrams per kilogram (mg/kg), unless otherwise noted.
 FDA = Field Duplicate Available; FD = Field Duplicate; QA/QC = Quality Assurance/Quality Control
 NA = Not Applicable; NC = Not Calculated; Mean = average of two values
 "-" = no data; m bgs = metres below ground surface; mV = millivolt
 Relative percent difference (RPD) = the difference between two values divided by the mean of the two values. **Golders' acceptable RPD is less than or equal to 35%.**
 RPD is calculated when the concentration is greater than five times the detection limit.
 Difference factor (DF) = absolute difference between two values divided by the method detection limit. **Golders' acceptable DF is less than or equal to 2.0.**
 DF is calculated when the concentration is less than five times the detection limit.

Table 9 - Results of Soil QA/QC Analyses
MPMC - Detailed Site Investigation
Mount Polley Mine, BC

Table with columns for Sample ID, Date Sampled, Soil Type, Sample Depth, QA/QC, ALS Sample ID, P25-T Silt, P25-T Silt - DUP, Method Detection Limit, Mean, Relative Percent Difference (RPD), Difference Factor (DF), P27-T Silt & Sand, P27-T Silt & Sand, Method Detection Limit, Mean, Relative Percent Difference (RPD), Difference Factor (DF), P29-T Sand, P29-T Sand - DUP, Method Detection Limit, Mean, Relative Percent Difference (RPD), Difference Factor (DF).

Notes:
All parameter units in milligrams per kilogram (mg/kg), unless otherwise noted.

FDA = Field Duplicate Available; FD = Field Duplicate; QA/QC = Quality Assurance/Quality Control

NA = Not Applicable; NC = Not Calculated; Mean = average of two values

*- = no data; m bgs = metres below ground surface; mV = millivolt

Relative percent difference (RPD) = the difference between two values divided by the mean of the two values. **Golders' acceptable RPD is less than or equal to 35%.**

RPD is calculated when the concentration is greater than five times the detection limit.

Difference factor (DF) = absolute difference between two values divided by the method detection limit. **Golders' acceptable DF is less than or equal to 2.0.**

DF is calculated when the concentration is less than five times the detection limit.

Table 9 - Results of Soil QA/QC Analyses
MPMC - Detailed Site Investigation
Mount Polley Mine, BC

Table with columns for Sample ID, Units, P29 - H Layer (4-Aug-2015), P29 - H Layer - DUP (4-Aug-2015), Method Detection Limit, Mean, Relative Percent Difference (RPD), Difference Factor (DF), WILLOW STAKE SOIL- 4 (25-Aug-2015), WILLOW STAKE SOIL- 4X (25-Aug-2015), Method Detection Limit, Mean, Relative Percent Difference (RPD), Difference Factor (DF), WILLOW WATTLE SOIL- 4 (25-Aug-2015), WILLOW WATTLE SOIL- 4X (25-Aug-2015), Method Detection Limit, Mean, Relative Percent Difference (RPD), Difference Factor (DF). Rows include Physical Parameters, Grain Size, Plant Available Nutrients, Organic / Inorganic Carbon, and Strong Acid Leachable - Total Metals.

Notes:
All parameter units in milligrams per kilogram (mg/kg), unless otherwise noted.
FDA = Field Duplicate Available; FD = Field Duplicate; QA/QC = Quality Assurance/Quality Control
NA = Not Applicable; NC = Not Calculated; Mean = average of two values
*- = no data; m bgs = metres below ground surface; mV = millivolt
Relative percent difference (RPD) = the difference between two values divided by the mean of the two values. Golders' acceptable RPD is less than or equal to 35%.
RPD is calculated when the concentration is greater than five times the detection limit.
Difference factor (DF) = absolute difference between two values divided by the method detection limit. Golders' acceptable DF is less than or equal to 2.0.
DF is calculated when the concentration is less than five times the detection limit.

Table 9 - Results of Soil QA/QC Analyses
MPMC - Detailed Site Investigation
Mount Polley Mine, BC

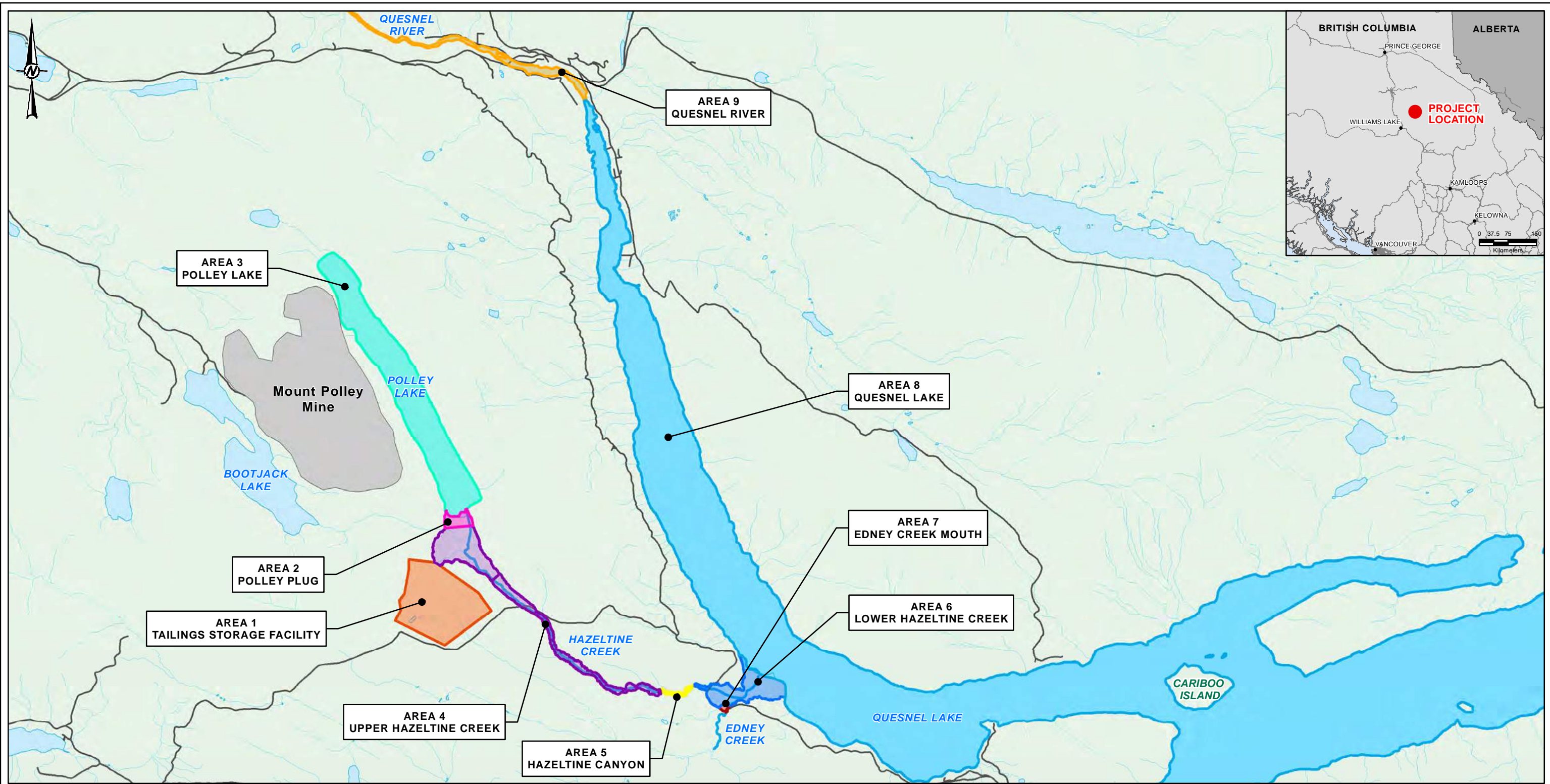
Sample ID		WILLOW SOIL-3	WILLOW SOIL-3X	Method Detection Limit	Mean	Relative Percent Difference (RPD)	Difference Factor (DF)	WILLOW SOIL-6	WILLOW SOIL-6X	Method Detection Limit	Mean	Relative Percent Difference (RPD)	Difference Factor (DF)
Date Sampled	Units	25-Aug-2015	25-Aug-2015					25-Aug-2015	25-Aug-2015				
Soil Type (Native, Tailing, Background)		Reference	Reference					Reference	Reference				
Sample Depth (m bgs)		0-0.1	0-0.1					0-0.1	0-0.1				
QA/QC		FDA	DUP					FDA	DUP				
ALS Sample ID		L1667543-35	L1667543-36					L1667543-39	L1667543-40				
Physical Parameters													
pH	pH	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon	%	-	-	-	-	-	-	-	-	-	-	-	-
Total Inorganic Carbon	%	-	-	-	-	-	-	-	-	-	-	-	-
Inorganic Carbon (as CaCO3)	%	-	-	-	-	-	-	-	-	-	-	-	-
Moisture	%	15.3	13.8	0.250	14.6	10.3%	NA	3.78	3.84	0.250	3.81	1.57%	NA
Oxidation-Reduction Potential (ORP)	mV	-	-	-	-	-	-	-	-	-	-	-	-
Grain Size													
Gravel	%	-	-	-	-	-	-	-	-	-	-	-	-
Sand (0.125mm - 0.063mm)	%	-	-	-	-	-	-	-	-	-	-	-	-
Sand (0.25mm - 0.125mm)	%	-	-	-	-	-	-	-	-	-	-	-	-
Sand (0.50mm - 0.25mm)	%	-	-	-	-	-	-	-	-	-	-	-	-
Sand (1.00mm - 0.50mm)	%	-	-	-	-	-	-	-	-	-	-	-	-
Sand (2.00mm - 1.00mm)	%	-	-	-	-	-	-	-	-	-	-	-	-
Silt (0.0312mm - 0.004mm)	%	-	-	-	-	-	-	-	-	-	-	-	-
Silt (0.063mm - 0.0312mm)	%	-	-	-	-	-	-	-	-	-	-	-	-
Clay	%	-	-	-	-	-	-	-	-	-	-	-	-
Plant Available Nutrients													
Total Available Nitrogen	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Total Nitrogen by LECO	%	-	-	-	-	-	-	-	-	-	-	-	-
Available Ammonium-N	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Available Nitrate-N	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate+Nitrite-N	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate-N	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Nitrite-N	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Available Phosphate-P	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Available Potassium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Available Sulfate-S	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Organic / Inorganic Carbon													
Total Carbon by Combustion	%	-	-	-	-	-	-	-	-	-	-	-	-
Strong Acid Leachable - Total Metals													
Aluminum	mg/kg	20200	15800	50.0	18000	24.4%	NA	13100	12900	50	13000	1.54%	NA
Antimony	mg/kg	0.520	0.430	0.100	0.475	NA	0.900	0.260	0.290	0.100	0.275	NA	0.300
Arsenic	mg/kg	11.0	10.0	0.100	10.5	9.52%	NA	6.08	6.90	0.100	6.49	12.6%	NA
Barium	mg/kg	127	96.7	0.50	112	27.1%	NA	52.4	53.0	0.500	52.7	1.14%	NA
Beryllium	mg/kg	0.520	0.400	0.1	0.460	NA	1.200	0.290	0.280	0.1	0.285	NA	0.100
Bismuth	mg/kg	0.200	0.200	0.200	0.200	NA	0.000	0.200	0.200	0.200	0.200	NA	0.00
Boron	mg/kg	5.00	5.00	5.00	5.00	NA	0.000	5.00	5.00	5.00	5.00	NA	0.00
Cadmium	mg/kg	0.348	0.229	0.02	0.289	41.2%	NA	0.0780	0.0860	0.02	0.0820	NA	0.400
Calcium	mg/kg	6420	5630	50.0	6025	13.1%	NA	3470	3570	50.0	3520	2.84%	NA
Chromium	mg/kg	47.7	40.7	0.500	44.2	15.8%	NA	38.1	36.4	0.500	37.3	4.56%	NA
Cobalt	mg/kg	16.3	12.6	0.100	14.5	25.6%	NA	9.30	9.13	0.100	9.22	1.84%	NA
Copper	mg/kg	51.2	34.3	0.500	42.8	39.5%	NA	28.4	27.9	0.500	28.2	1.78%	NA
Iron	mg/kg	37800	32200	50.0	35000	16.0%	NA	27800	27600	50.0	27700	0.72%	NA
Lead	mg/kg	9.53	8.11	0.500	8.82	16.1%	NA	4.59	4.57	0.500	4.58	0.44%	NA
Lithium	mg/kg	28.2	20.0	2.0	24.1	34.0%	NA	14.9	14.8	2.0	14.9	0.67%	NA
Magnesium	mg/kg	8630	6760	20.0	7695	24.3%	NA	5330	5340	20.0	5335	0.19%	NA
Manganese	mg/kg	654	529	1.0	592	21.1%	NA	244	244	1.0	244	0.00%	NA
Mercury	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	mg/kg	0.760	0.640	0.100	0.700	17.1%	NA	0.530	0.550	0.100	0.540	3.70%	NA
Nickel	mg/kg	39.8	30.2	0.500	35.0	27.4%	NA	24.9	23.4	0.500	24.2	6.21%	NA
Phosphorus	mg/kg	792	751	50.0	772	5.31%	NA	546	550	50.0	548	0.73%	NA
Potassium	mg/kg	1940	1410	100	1675	31.6%	NA	810	830	100	820	2.44%	NA
Selenium	mg/kg	0.390	0.350	0.200	0.370	NA	0.200	0.200	0.200	0.200	0.200	NA	0.00
Silver	mg/kg	0.200	0.100	0.200	0.150	NA	0.500	0.100	0.100	0.100	0.100	NA	0.00
Sodium	mg/kg	233	225	50.0	229	NA	0.160	112	102	50.0	107	NA	0.200
Strontium	mg/kg	62.3	53.3	0.500	57.8	15.6%	NA	30.0	29.3	0.500	29.7	2.36%	NA
Sulphur	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/kg	0.183	0.142	0.0500	0.163	NA	0.820	0.0650	0.0640	0.0500	0.0645	NA	0.0200
Tin	mg/kg	2.00	2.00	2.0	2.00	NA	0.000	2.00	2.00	2.0	2.00	NA	0.00
Titanium	mg/kg	768	695	1.00	732	9.98%	NA	814	808	1.00	811	0.74%	NA
Uranium	mg/kg	0.755	0.844	0.05	0.800	11.1%	NA	0.533	0.513	0.05	0.523	3.82%	NA
Vanadium	mg/kg	67.3	61.2	0.200	64.3	9.49%	NA	64.1	64.1	0.200	64.1	0.00%	NA
Zinc	mg/kg	92.7	69.6	2.0	81.2	28.5%	NA	38.6	38.5	2.0	38.6	0.26%	NA
Zirconium	mg/kg	1.50	1.10	1.00	1.30	NA	0.40	2.10	1.90	1.00	2.00	NA	0.200

Notes:
All parameter units in milligrams per kilogram (mg/kg), unless otherwise noted.
FDA = Field Duplicate Available; FD = Field Duplicate; QA/QC = Quality Assurance/Quality Control
NA = Not Applicable; NC = Not Calculated; Mean = average of two values
*- = no data; m bgs = metres below ground surface; mV = millivolt
Relative percent difference (RPD) = the difference between two values divided by the mean of the two values. **Golders' acceptable RPD is less than or equal to 35%.**
RPD is calculated when the concentration is greater than five times the detection limit.
Difference factor (DF) = absolute difference between two values divided by the method detection limit. **Golders' acceptable DF is less than or equal to 2.0.**
DF is calculated when the concentration is less than five times the detection limit.

Table 9 - Results of Soil QA/QC Analyses
MPMC - Detailed Site Investigation
Mount Polley Mine, BC

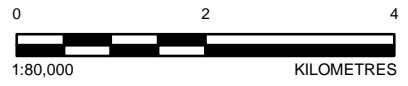
Sample ID	Units	RYE GRASS SOIL-4	RYE GRASS SOIL-4X	Method Detection Limit	Mean	Relative Percent Difference (RPD)	Difference Factor (DF)	RYE GRASS SOIL-7	RYE GRASS SOIL-7X	Method Detection Limit	Mean	Relative Percent Difference (RPD)	Difference Factor (DF)
		30-Aug-2015 Tailing 0-0.1 FDA	30-Aug-2015 Tailing 0-0.1 DUP					30-Aug-2015 Tailing 0-0.1 FDA	30-Aug-2015 Tailing 0-0.1 DUP				
ALS Sample ID		L1667543-4	L1667543-5					L1667543-8	L1667543-9				
Physical Parameters													
pH	pH	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon	%	-	-	-	-	-	-	-	-	-	-	-	-
Total Inorganic Carbon	%	-	-	-	-	-	-	-	-	-	-	-	-
Inorganic Carbon (as CaCO3)	%	-	-	-	-	-	-	-	-	-	-	-	-
Moisture	%	13.4	13.0	0.250	13.2	3.03%	NA	14.4	14.9	0.250	14.7	3.41%	NA
Oxidation-Reduction Potential (ORP)	mV	-	-	-	-	-	-	-	-	-	-	-	-
Grain Size													
Gravel	%	-	-	-	-	-	-	-	-	-	-	-	-
Sand (0.125mm - 0.063mm)	%	-	-	-	-	-	-	-	-	-	-	-	-
Sand (0.25mm - 0.125mm)	%	-	-	-	-	-	-	-	-	-	-	-	-
Sand (0.50mm - 0.25mm)	%	-	-	-	-	-	-	-	-	-	-	-	-
Sand (1.00mm - 0.50mm)	%	-	-	-	-	-	-	-	-	-	-	-	-
Sand (2.00mm - 1.00mm)	%	-	-	-	-	-	-	-	-	-	-	-	-
Silt (0.0312mm - 0.004mm)	%	-	-	-	-	-	-	-	-	-	-	-	-
Silt (0.063mm - 0.0312mm)	%	-	-	-	-	-	-	-	-	-	-	-	-
Clay	%	-	-	-	-	-	-	-	-	-	-	-	-
Plant Available Nutrients													
Total Available Nitrogen	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Total Nitrogen by LECO	%	-	-	-	-	-	-	-	-	-	-	-	-
Available Ammonium-N	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Available Nitrate-N	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate+Nitrite-N	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate-N	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Nitrite-N	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Available Phosphate-P	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Available Potassium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Available Sulfate-S	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Organic / Inorganic Carbon													
Total Carbon by Combustion	%	-	-	-	-	-	-	-	-	-	-	-	-
Strong Acid Leachable - Total Metals													
Aluminum	mg/kg	17700	16400	50.0	17050	7.62%	NA	15900	15700	50.0	15800	1.27%	NA
Antimony	mg/kg	0.380	0.410	0.100	0.395	NA	0.300	0.370	0.370	0.100	0.37	NA	0.00
Arsenic	mg/kg	12.1	11.5	0.100	11.8	5.08%	NA	11.6	11.7	0.100	11.65	0.86%	NA
Barium	mg/kg	206	202	0.500	204	1.96%	NA	163	160	0.500	162	1.86%	NA
Beryllium	mg/kg	0.680	0.650	0.1	0.665	4.51%	NA	0.600	0.600	0.1	0.6	0.00%	NA
Bismuth	mg/kg	0.200	0.200	0.200	0.200	NA	0.00	0.200	0.200	0.200	0.2	NA	0.00
Boron	mg/kg	7.50	6.60	5.00	7.05	NA	0.180	8.90	9.50	5.00	9.2	NA	0.120
Cadmium	mg/kg	0.157	0.180	0.02	0.169	13.6%	NA	0.152	0.181	0.02	0.167	17.4%	NA
Calcium	mg/kg	23600	22000	50.0	22800	7.02%	NA	24400	23500	50.0	23950	3.76%	NA
Chromium	mg/kg	12.8	13.2	0.500	13.0	3.08%	NA	11.8	13.4	0.500	12.6	12.7%	NA
Cobalt	mg/kg	18.1	17.3	0.100	17.7	4.52%	NA	16.4	16.0	0.100	16.2	2.47%	NA
Copper	mg/kg	707	638	0.500	673	10.3%	NA	775	735	0.500	755	5.30%	NA
Iron	mg/kg	43700	40100	50.0	41900	8.59%	NA	49700	50400	50.0	50050	1.40%	NA
Lead	mg/kg	5.32	5.51	0.500	5.42	3.51%	NA	5.06	5.17	0.500	5.12	2.15%	NA
Lithium	mg/kg	18.9	18.3	2.0	18.6	3.23%	NA	16.0	15.7	2.0	15.9	1.89%	NA
Magnesium	mg/kg	10900	10200	20.0	10550	6.64%	NA	9420	9390	20.0	9405	0.32%	NA
Manganese	mg/kg	735	746	1.0	741	1.49%	NA	627	610	1.0	619	2.75%	NA
Mercury	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	mg/kg	3.87	3.30	-	3.59	NC	NC	4.00	4.64	0.100	4.32	14.8%	NA
Nickel	mg/kg	10.2	10.4	0.500	10.3	1.94%	NA	8.50	9.18	0.500	8.84	7.69%	NA
Phosphorus	mg/kg	1320	1260	50.0	1290	4.65%	NA	1340	1300	50.0	1320	3.03%	NA
Potassium	mg/kg	1480	1390	100	1435	6.27%	NA	1450	1380	100	1415	4.95%	NA
Selenium	mg/kg	0.890	0.800	0.200	0.845	NA	0.450	0.960	0.910	0.200	0.935	NA	0.250
Silver	mg/kg	0.380	0.330	0.100	0.355	NA	0.500	0.340	0.320	0.100	0.33	NA	0.200
Sodium	mg/kg	840	769	50.0	805	8.83%	NA	873	847	50.0	860	3.02%	NA
Strontium	mg/kg	163	153	0.500	158	6.33%	NA	157	147	0.500	152	6.58%	NA
Sulphur	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/kg	0.0500	0.0500	0.0500	0.0500	NA	0.00	0.0500	0.0500	0.0500	0.0500	NA	0.00
Tin	mg/kg	2.00	2.00	2.0	2.00	NA	0.00	2.00	2.00	2.0	2	NA	0.00
Titanium	mg/kg	1420	1190	1.00	1305	17.6%	NA	1650	1610	1.00	1630	2.45%	NA
Uranium	mg/kg	1.06	0.966	0.05	1.01	9.28%	NA	1.06	1.00	0.05	1.03	5.83%	NA
Vanadium	mg/kg	163	150	0.200	157	8.31%	NA	195	194	0.200	195	0.51%	NA
Zinc	mg/kg	66.9	65.6	2.0	66.3	1.96%	NA	55.4	55.8	2.0	55.6	0.72%	NA
Zirconium	mg/kg	3.20	2.70	1.00	2.95	NA	0.500	6.30	5.70	1.00	6.0	10.0%	NA

Notes:
 All parameter units in milligrams per kilogram (mg/kg), unless otherwise noted.
 FDA = Field Duplicate Available; FD = Field Duplicate; QA/QC = Quality Assurance/Quality Control
 NA = Not Applicable; NC = Not Calculated; Mean = average of two values
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 Relative percent difference (RPD) = the difference between two values divided by the mean of the two values. **Golders' acceptable RPD is less than or equal to 35%.**
 RPD is calculated when the concentration is greater than five times the detection limit.
 Difference factor (DF) = absolute difference between two values divided by the method detection limit. **Golders' acceptable DF is less than or equal to 2.0.**
 DF is calculated when the concentration is less than five times the detection limit.



LEGEND

1 - TAILINGS STORAGE FACILITY	MOUNT POLLEY MINE SITE
2 - POLLEY PLUG	ROAD
3 - POLLEY LAKE	WATERCOURSE
4 - UPPER HAZELTINE CREEK	WATERBODY
5 - HAZELTINE CANYON	
6 - LOWER HAZELTINE CREEK	
7 - EDNEY CREEK MOUTH	
8 - QUESNEL LAKE	
9 - QUESNEL RIVER	



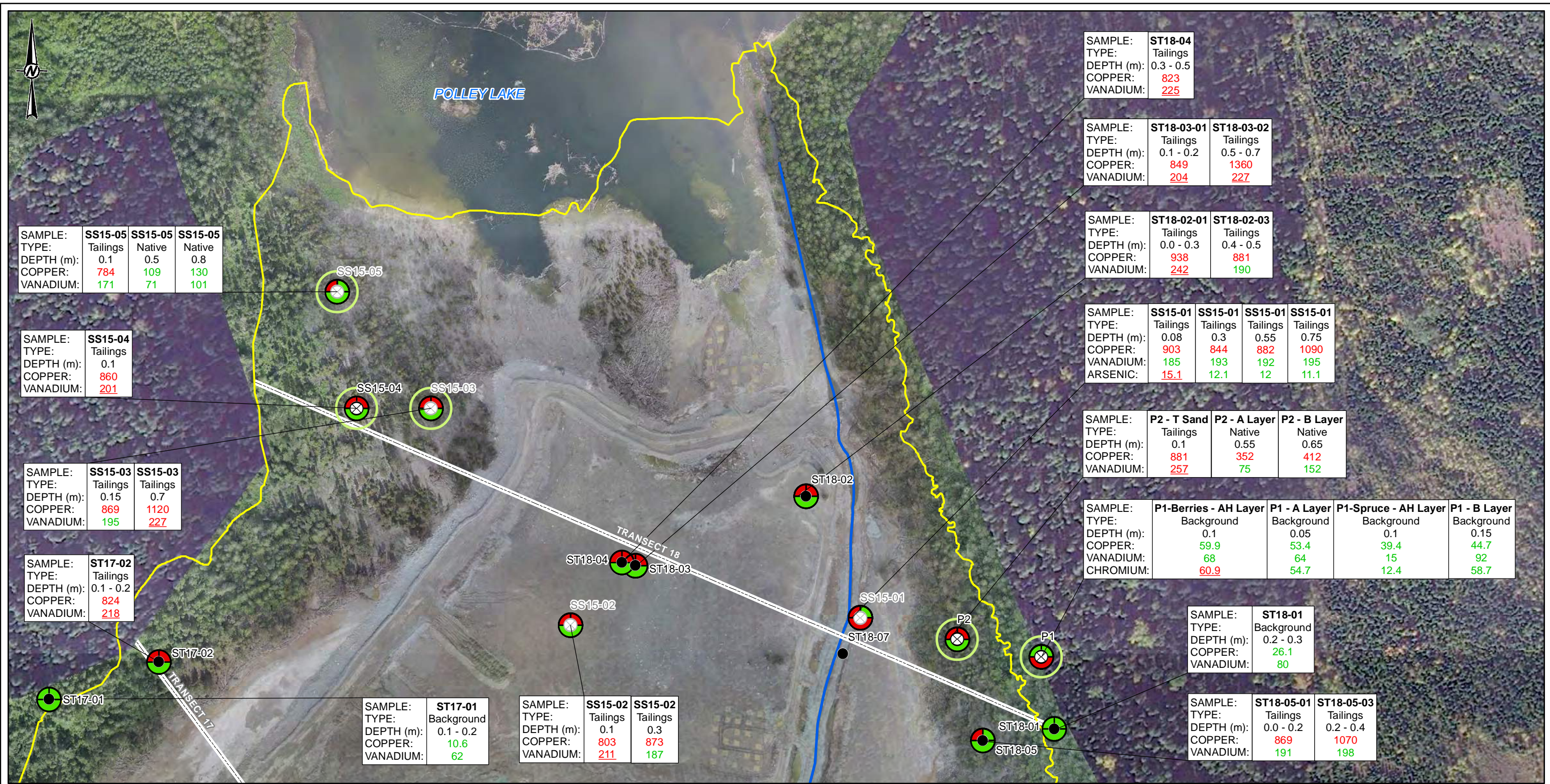
REFERENCES
 1. WATERCOURSE, LAKE, ROAD, CITY AND PROVINCE DATA OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
 2. PROJECTION: NAD 1983 UTM ZONE 10

CLIENT	IMPERIAL METALS MOUNT POLLEY MINING CORPORATION
CONSULTANT	Golder Associates
DATE	2016-01-12
DESIGNED	AA
PREPARED	RH
REVIEWED	AB
APPROVED	TM

PROJECT	DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT
TITLE	MOUNT POLLEY TAILINGS DAM FAILURE - REMEDIATION AREAS
PROJECT NO.	1411734
CONTROL	11000 / 2000
REV.	0
FIGURE	A-1

PATH: \\golder\golder\Bunbury\CAD\GIS\client\1411734\PROJECT\PHASE_2016\01\11\1734_11000_Figure_A_01_Remediation_Areas.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



SAMPLE:	SS15-05	SS15-05	SS15-05
TYPE:	Tailings	Native	Native
DEPTH (m):	0.1	0.5	0.8
COPPER:	784	109	130
VANADIUM:	171	71	101

SAMPLE:	SS15-04
TYPE:	Tailings
DEPTH (m):	0.1
COPPER:	860
VANADIUM:	201

SAMPLE:	SS15-03	SS15-03
TYPE:	Tailings	Tailings
DEPTH (m):	0.15	0.7
COPPER:	869	1120
VANADIUM:	195	227

SAMPLE:	ST17-02
TYPE:	Tailings
DEPTH (m):	0.1 - 0.2
COPPER:	824
VANADIUM:	218

SAMPLE:	ST17-01
TYPE:	Background
DEPTH (m):	0.1 - 0.2
COPPER:	10.6
VANADIUM:	62

SAMPLE:	SS15-02	SS15-02
TYPE:	Tailings	Tailings
DEPTH (m):	0.1	0.3
COPPER:	803	873
VANADIUM:	211	187

SAMPLE:	ST18-04
TYPE:	Tailings
DEPTH (m):	0.3 - 0.5
COPPER:	823
VANADIUM:	225

SAMPLE:	ST18-03-01	ST18-03-02
TYPE:	Tailings	Tailings
DEPTH (m):	0.1 - 0.2	0.5 - 0.7
COPPER:	849	1360
VANADIUM:	204	227

SAMPLE:	ST18-02-01	ST18-02-03
TYPE:	Tailings	Tailings
DEPTH (m):	0.0 - 0.3	0.4 - 0.5
COPPER:	938	881
VANADIUM:	242	190

SAMPLE:	SS15-01	SS15-01	SS15-01	SS15-01
TYPE:	Tailings	Tailings	Tailings	Tailings
DEPTH (m):	0.08	0.3	0.55	0.75
COPPER:	903	844	882	1090
VANADIUM:	185	193	192	195
ARSENIC:	15.1	12.1	12	11.1

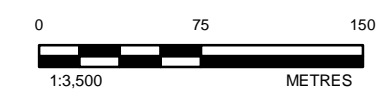
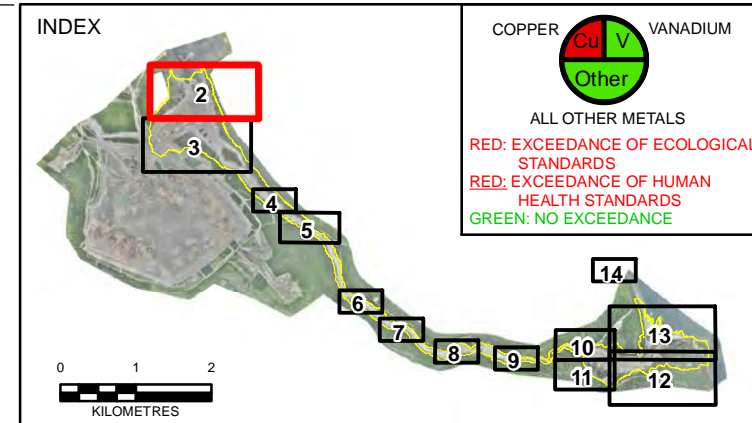
SAMPLE:	P2 - T Sand	P2 - A Layer	P2 - B Layer
TYPE:	Tailings	Native	Native
DEPTH (m):	0.1	0.55	0.65
COPPER:	881	352	412
VANADIUM:	257	75	152

SAMPLE:	P1-Berries - AH Layer	P1 - A Layer	P1-Spruce - AH Layer	P1 - B Layer
TYPE:	Background	Background	Background	Background
DEPTH (m):	0.1	0.05	0.1	0.15
COPPER:	59.9	53.4	39.4	44.7
VANADIUM:	68	64	15	92
CHROMIUM:	60.9	54.7	12.4	58.7

SAMPLE:	ST18-01
TYPE:	Background
DEPTH (m):	0.2 - 0.3
COPPER:	26.1
VANADIUM:	80

SAMPLE:	ST18-05-01	ST18-05-03
TYPE:	Tailings	Tailings
DEPTH (m):	0.0 - 0.2	0.2 - 0.4
COPPER:	869	1070
VANADIUM:	191	198

- LEGEND**
- GOLDER SOIL SAMPLE LOCATION
 - ⊗ METALS
 - ⊗ NUTRIENTS
 - ⊗ NUTRIENTS AND METALS
 - SNC SOIL SAMPLE LOCATION
 - TERRESTRIAL HABITAT SAMPLE LOCATION
 - ▭ POST BREACH AFFECTED AREA EXTENT
 - SOIL TRANSECT
 - NEW HAZELTINE CREEK CHANNEL (APPROXIMATE)
 - BERRY
 - RYE GRASS
 - WILLOW



CLIENT	MOUNT POLLEY MINING CORPORATION	
	IMPERIAL METALS	
CONSULTANT	YYYY-MM-DD	2016-01-12
	DESIGNED	AA
	PREPARED	RH
	REVIEWED	AB
	APPROVED	TM

NOTES

- ST = SOIL TRANSECT
- SS15-XX = SOIL SAMPLE LOCATION (GOLDER 2015)
- PX = TERRESTRIAL HABITAT PLOT LOCATION (GOLDER 2015)

REFERENCES

- WATERBODY AND ROAD DATA OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
- POST BREACH AFFECTED AREA, HAZELTINE CREEK CHANNEL, SOIL SAMPLE LOCATIONS AND PROJECT IMAGERY OBTAINED FROM SNC LAVALIN LTD.
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PROJECT

DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

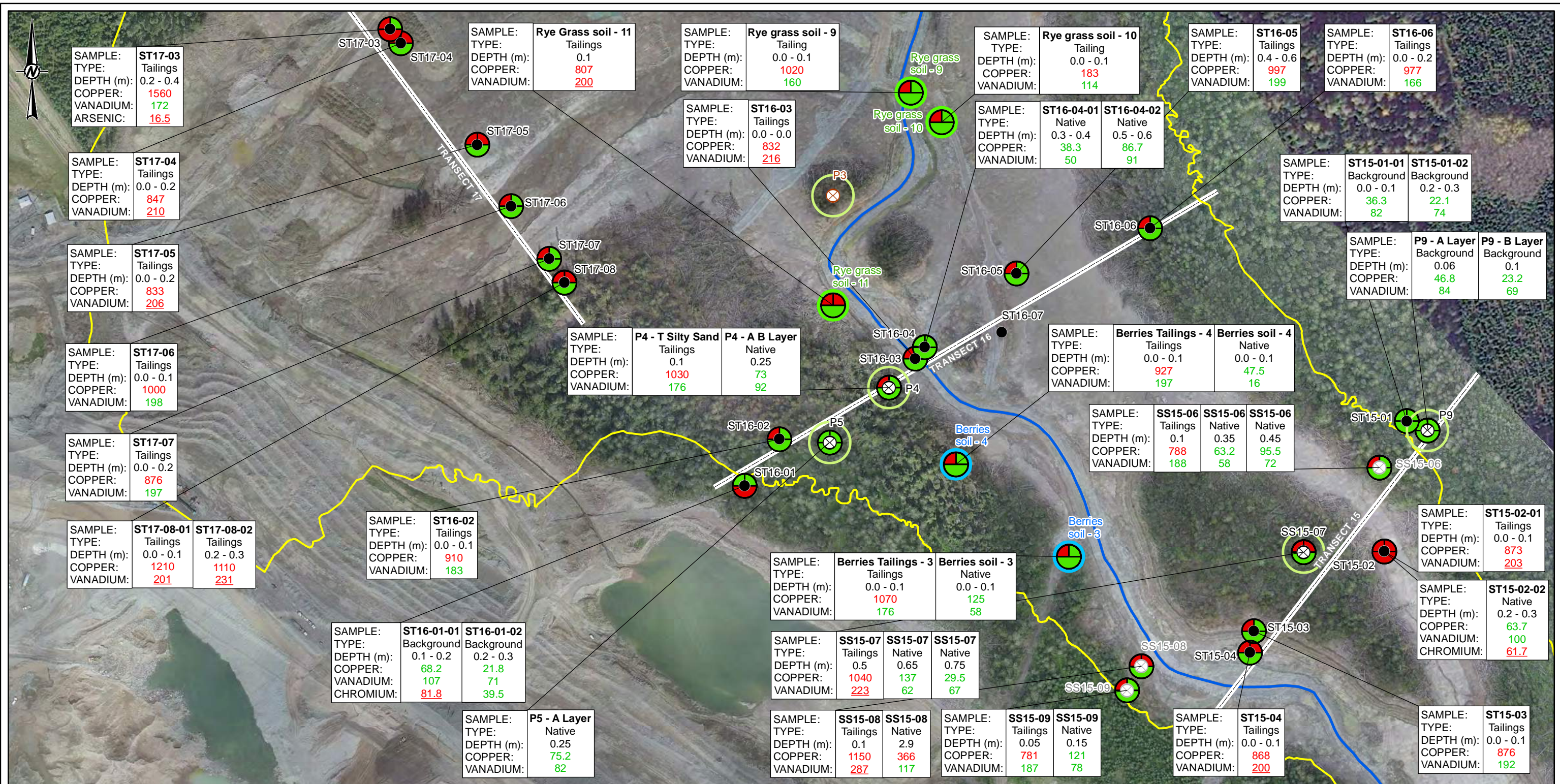
TITLE

SAMPLE LOCATIONS FOR SOIL AND TERRESTRIAL HABITAT EXCEEDANCE RESULTS - SOIL TRANSECTS 17 AND 18

PROJECT NO.	CONTROL	REV.	FIGURE
1411734	11000 / 2000	0	A-2

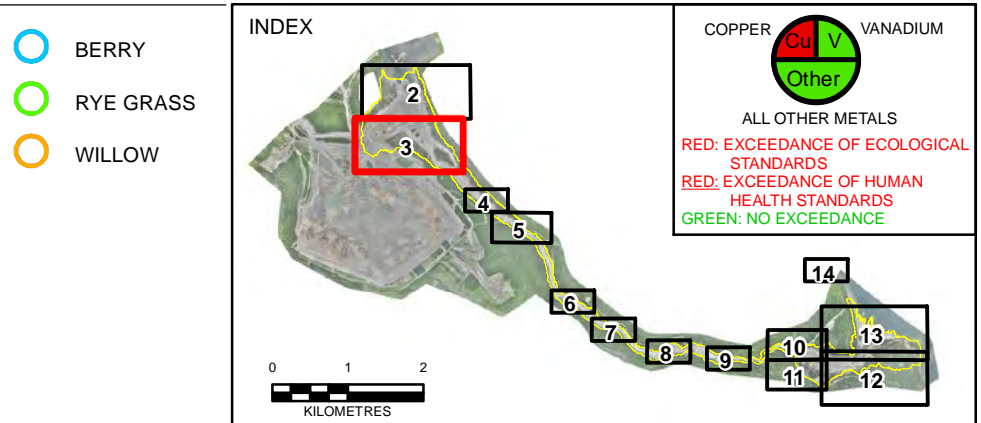
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND

	METALS		BERRY
	NUTRIENTS		RYE GRASS
	NUTRIENTS AND METALS		WILLOW
	SNC SOIL SAMPLE LOCATION		
	TERRESTRIAL HABITAT SAMPLE LOCATION		
	POST BREACH AFFECTED AREA EXTENT		
	SOIL TRANSECT		
	NEW HAZELTINE CREEK CHANNEL (APPROXIMATE)		



CLIENT
MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

CONSULTANT
Golder Associates

YYYY-MM-DD: 2016-01-12

DESIGNED:	AA
PREPARED:	RH
REVIEWED:	AB
APPROVED:	TM

SCALE
0 75 150 METRES
1:3,500

NOTES

- ST = SOIL TRANSECT
- SS15-XX = SOIL SAMPLE LOCATION (GOLDER 2015)
- PX = TERRESTRIAL HABITAT PLOT LOCATION (GOLDER 2015)

REFERENCES

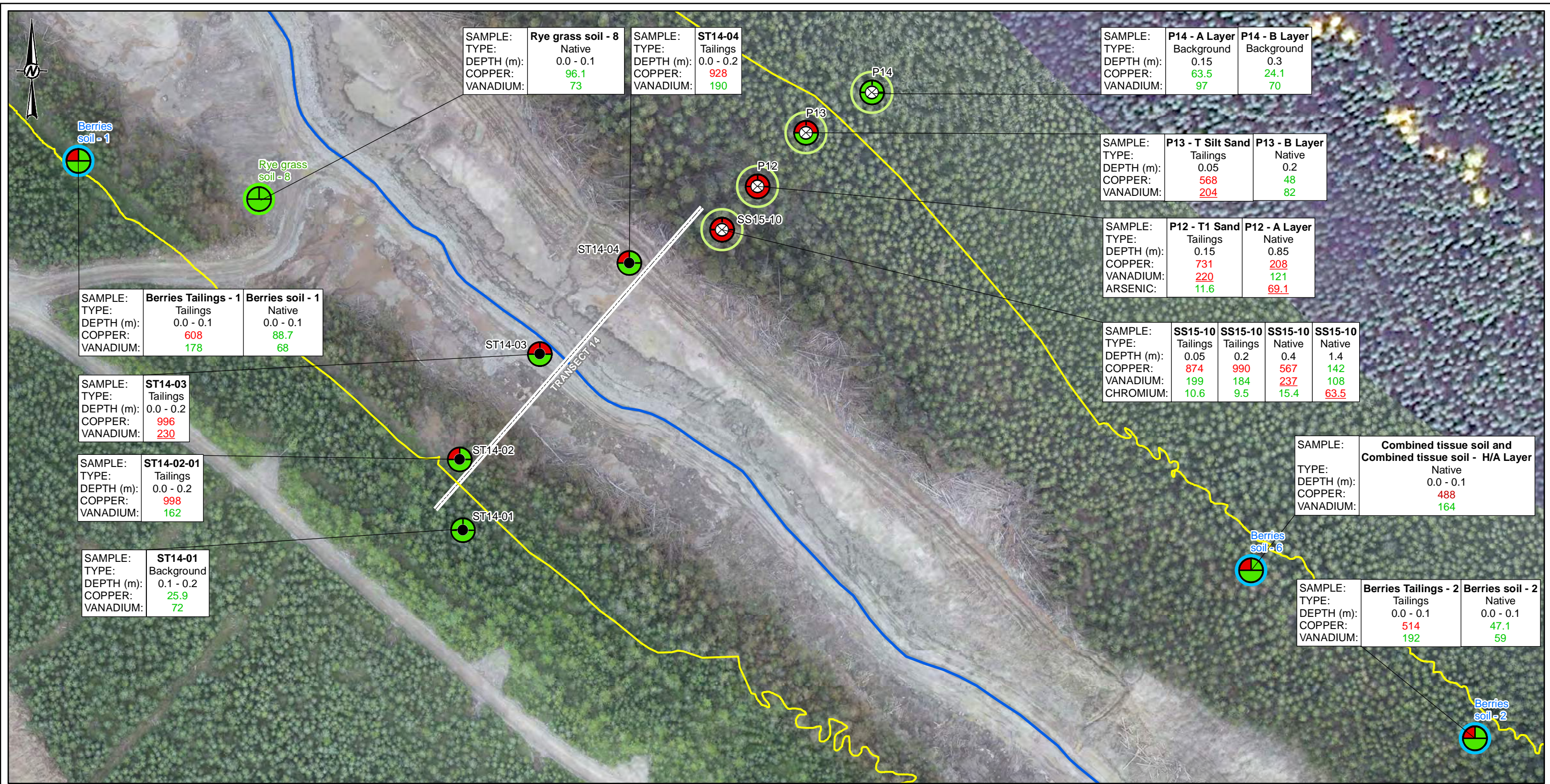
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PROJECT
DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

TITLE
SAMPLE LOCATIONS FOR SOIL AND TERRESTRIAL HABITAT EXCEEDANCE RESULTS - SOIL TRANSECTS 15, 16 AND 17

PROJECT NO.	CONTROL	REV.	FIGURE
1411734	11000 / 2000	0	A-3

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 IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



SAMPLE:	Rye grass soil - 8
TYPE:	Native
DEPTH (m):	0.0 - 0.1
COPPER:	96.1
VANADIUM:	73

SAMPLE:	ST14-04
TYPE:	Tailings
DEPTH (m):	0.0 - 0.2
COPPER:	928
VANADIUM:	190

SAMPLE:	P14 - A Layer	P14 - B Layer
TYPE:	Background	Background
DEPTH (m):	0.15	0.3
COPPER:	63.5	24.1
VANADIUM:	97	70

SAMPLE:	Berries Tailings - 1	Berries soil - 1
TYPE:	Tailings	Native
DEPTH (m):	0.0 - 0.1	0.0 - 0.1
COPPER:	608	88.7
VANADIUM:	178	68

SAMPLE:	ST14-03
TYPE:	Tailings
DEPTH (m):	0.0 - 0.2
COPPER:	996
VANADIUM:	230

SAMPLE:	ST14-02-01
TYPE:	Tailings
DEPTH (m):	0.0 - 0.2
COPPER:	998
VANADIUM:	162

SAMPLE:	ST14-01
TYPE:	Background
DEPTH (m):	0.1 - 0.2
COPPER:	25.9
VANADIUM:	72

SAMPLE:	P13 - T Silt Sand	P13 - B Layer
TYPE:	Tailings	Native
DEPTH (m):	0.05	0.2
COPPER:	568	48
VANADIUM:	204	82

SAMPLE:	P12 - T1 Sand	P12 - A Layer
TYPE:	Tailings	Native
DEPTH (m):	0.15	0.85
COPPER:	731	208
VANADIUM:	220	121
ARSENIC:	11.6	69.1

SAMPLE:	SS15-10	SS15-10	SS15-10	SS15-10
TYPE:	Tailings	Tailings	Native	Native
DEPTH (m):	0.05	0.2	0.4	1.4
COPPER:	874	990	567	142
VANADIUM:	199	184	237	108
CHROMIUM:	10.6	9.5	15.4	63.5

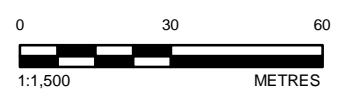
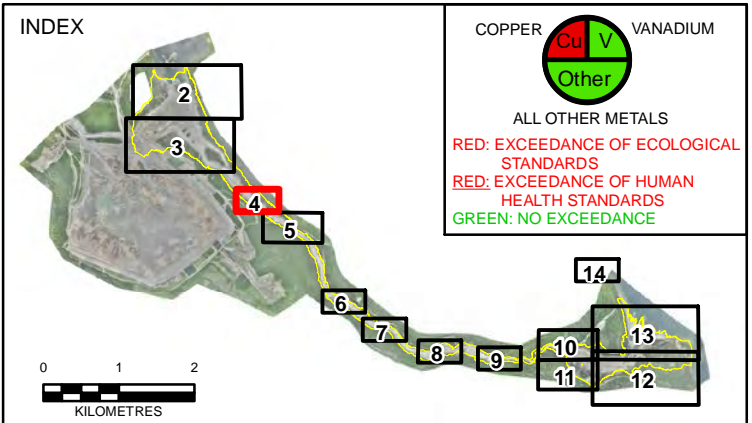
SAMPLE:	Combined tissue soil and Combined tissue soil - H/A Layer
TYPE:	Native
DEPTH (m):	0.0 - 0.1
COPPER:	488
VANADIUM:	164

SAMPLE:	Berries Tailings - 2	Berries soil - 2
TYPE:	Tailings	Native
DEPTH (m):	0.0 - 0.1	0.0 - 0.1
COPPER:	514	47.1
VANADIUM:	192	59

LEGEND

GOLDER SOIL SAMPLE LOCATION

- BERRY
- RYE GRASS
- WILLOW
- METALS
- NUTRIENTS
- NUTRIENTS AND METALS
- SNC SOIL SAMPLE LOCATION
- TERRESTRIAL HABITAT SAMPLE LOCATION
- POST BREACH AFFECTED AREA EXTENT
- SOIL TRANSECT
- NEW HAZELTINE CREEK CHANNEL (APPROXIMATE)



CLIENT	MOUNT POLLEY MINING CORPORATION	
	IMPERIAL METALS	
CONSULTANT	YYYY-MM-DD	2016-01-12
	DESIGNED	AA
	PREPARED	RH
	REVIEWED	AB
	APPROVED	TM

NOTES

- ST = SOIL TRANSECT
- SS15-XX = SOIL SAMPLE LOCATION (GOLDER 2015)
- PX = TERRESTRIAL HABITAT PLOT LOCATION (GOLDER 2015)

REFERENCES

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PROJECT

DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

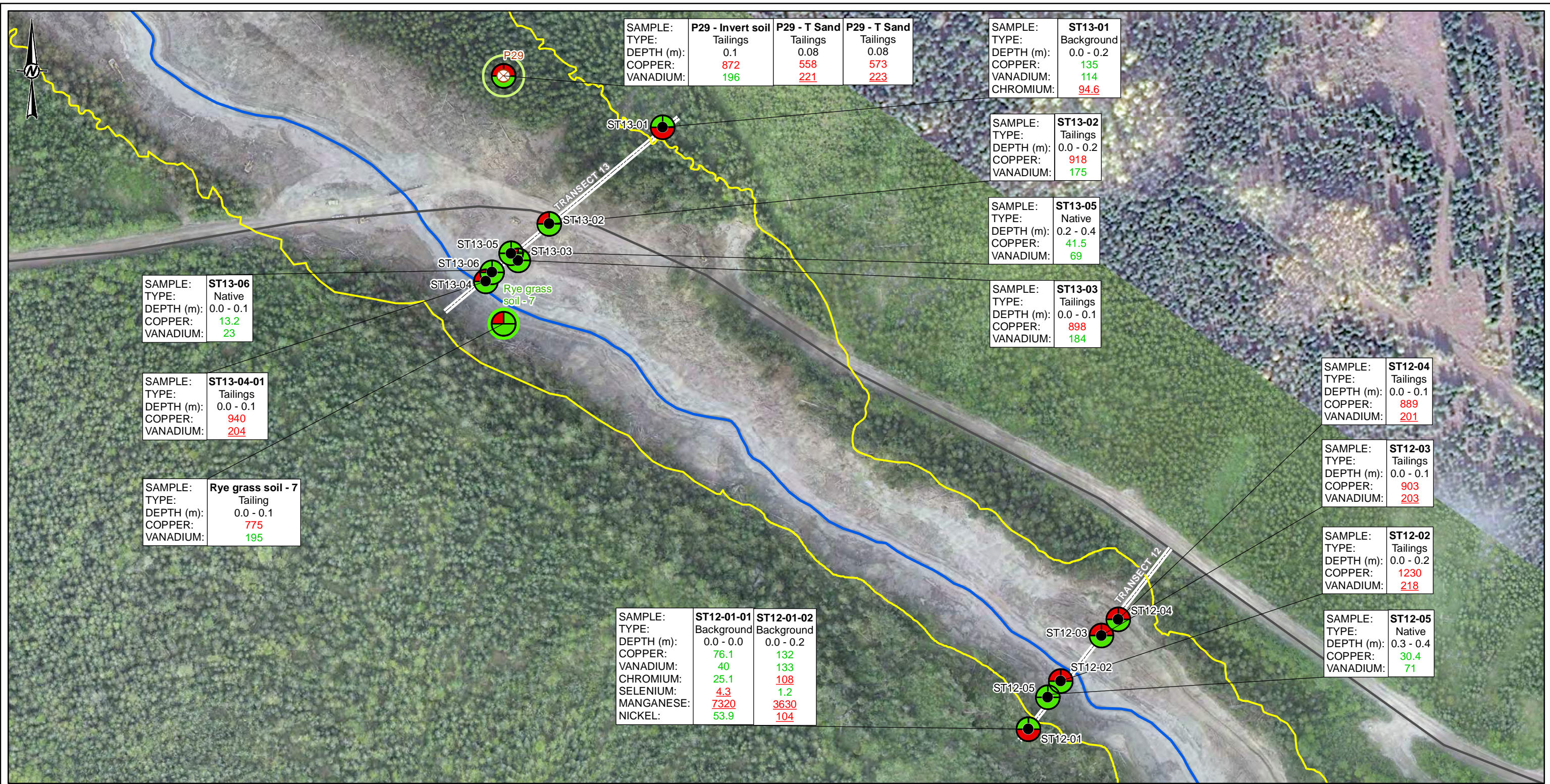
TITLE

SAMPLE LOCATIONS FOR SOIL AND TERRESTRIAL HABITAT EXCEEDANCE RESULTS - SOIL TRANSECT 14

PROJECT NO.	CONTROL	REV.	FIGURE
1411734	11000 / 2000	0	A-4

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B 26mm



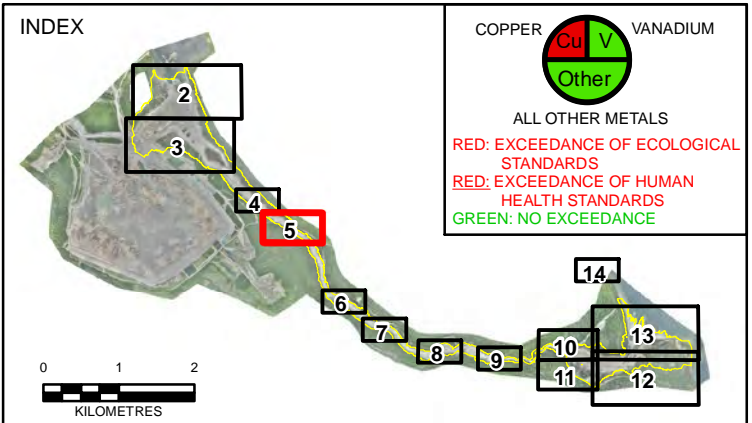
LEGEND

GOLDER SOIL SAMPLE LOCATION

- ⊗ METALS
- ⊗ NUTRIENTS
- ⊗ NUTRIENTS AND METALS
- SNC SOIL SAMPLE LOCATION
- TERRESTRIAL HABITAT SAMPLE LOCATION
- ▭ POST BREACH AFFECTED AREA EXTENT
- SOIL TRANSECT
- NEW HAZELTINE CREEK CHANNEL (APPROXIMATE)
- ROAD

Color Legend:

- Blue circle: BERRY
- Green circle: RYE GRASS
- Orange circle: WILLOW



CLIENT
MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

CONSULTANT
Golder Associates

Scale: 0 40 80 METRES
1:2,000

CLIENT
MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

CONSULTANT
Golder Associates

DATE: 2016-01-12

DESIGNED: AA
PREPARED: RH
REVIEWED: AB
APPROVED: TM

NOTES

- ST = SOIL TRANSECT
- SS15-XX = SOIL SAMPLE LOCATION (GOLDER 2015)
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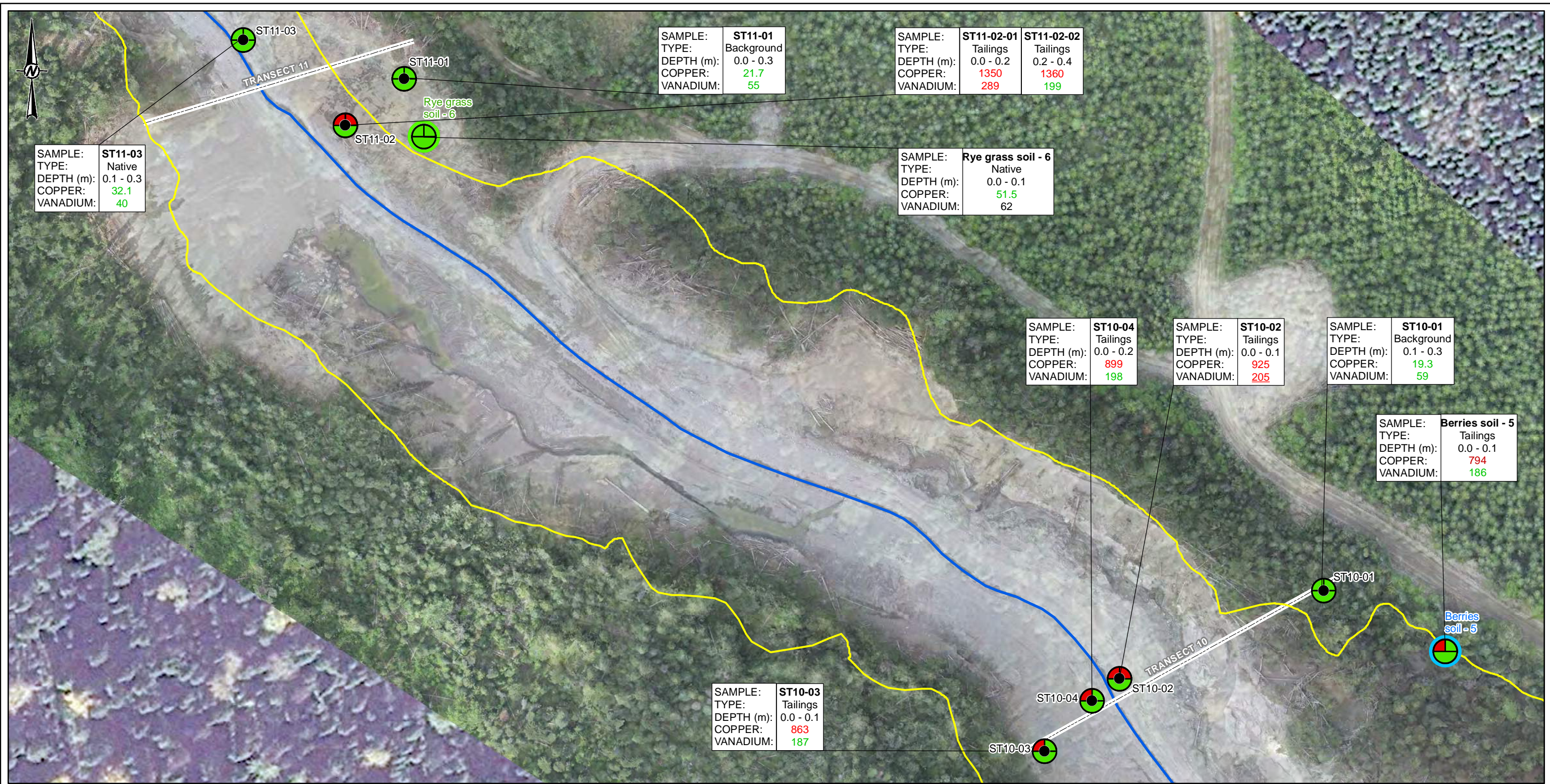
PROJECT
DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

TITLE
SAMPLE LOCATIONS FOR SOIL AND TERRESTRIAL HABITAT EXCEEDANCE RESULTS - SOIL TRANSECTS 12 AND 13

PROJECT NO. 1411734 **CONTROL** 11000 / 2000 **REV.** 0 **FIGURE** A-5

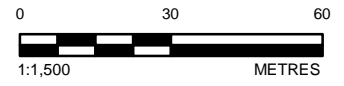
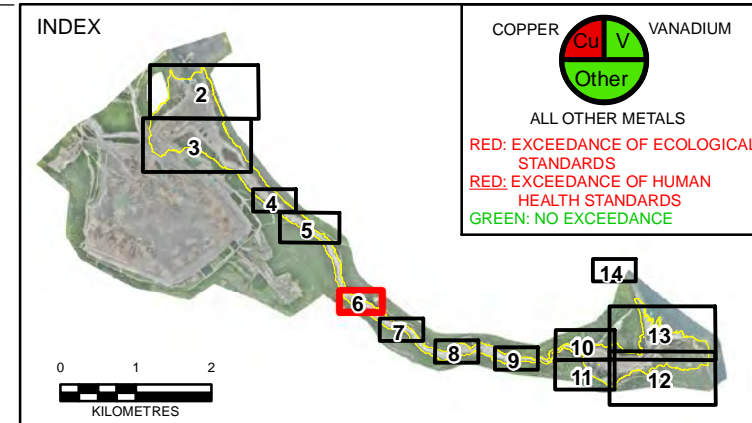
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



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- LEGEND**
- GOLDER SOIL SAMPLE LOCATION**
- ⊗ METALS
 - ⊗ NUTRIENTS
 - ⊗ NUTRIENTS AND METALS
 - SNC SOIL SAMPLE LOCATION
 - TERRESTRIAL HABITAT SAMPLE LOCATION
 - ▭ POST BREACH AFFECTED AREA EXTENT
 - SOIL TRANSECT
 - NEW HAZELTINE CREEK CHANNEL (APPROXIMATE)
- BERRY** ○
- RYE GRASS** ○
- WILLOW** ○



CLIENT
MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-01-12
DESIGNED	AA
PREPARED	RH
REVIEWED	AB
APPROVED	TM

NOTES

- ST = SOIL TRANSECT
- SS15-XX = SOIL SAMPLE LOCATION (GOLDER 2015)
- PX = TERRESTRIAL HABITAT PLOT LOCATION (GOLDER 2015)

REFERENCES

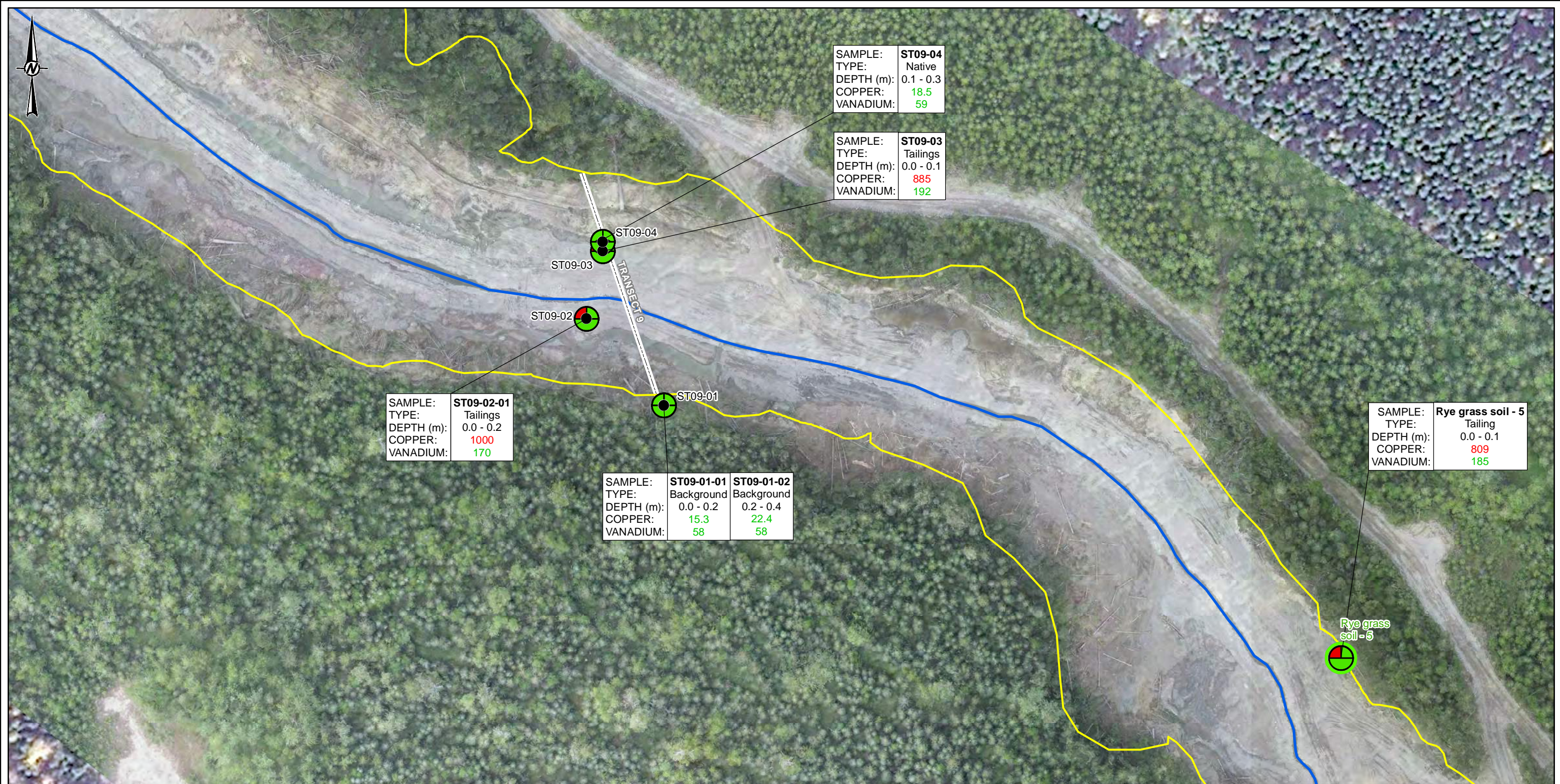
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PROJECT
DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

TITLE
SAMPLE LOCATIONS FOR SOIL AND TERRESTRIAL HABITAT EXCEEDANCE RESULTS - SOIL TRANSECTS 10 AND 11

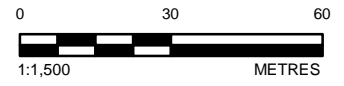
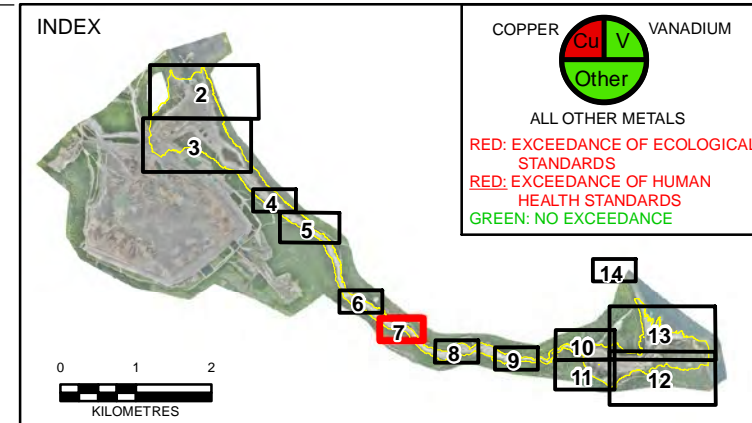
PROJECT NO.	CONTROL	REV.	FIGURE
1411734	11000 / 2000	0	A-6

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B 26mm



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- LEGEND**
- GOLDER SOIL SAMPLE LOCATION**
- ⊗ METALS
 - ⊗ NUTRIENTS
 - ⊗ NUTRIENTS AND METALS
 - SNC SOIL SAMPLE LOCATION
 - TERRESTRIAL HABITAT SAMPLE LOCATION
 - ▭ POST BREACH AFFECTED AREA EXTENT
 - SOIL TRANSECT
 - NEW HAZELTINE CREEK CHANNEL (APPROXIMATE)
- BERRY
 - RYE GRASS
 - WILLOW



CLIENT	MOUNT POLLEY MINING CORPORATION	
CONSULTANT	Golder Associates	
YYYY-MM-DD	2016-01-12	
DESIGNED	AA	
PREPARED	RH	
REVIEWED	AB	
APPROVED	TM	

NOTES

- ST = SOIL TRANSECT
- SS15-XX = SOIL SAMPLE LOCATION (GOLDER 2015)
- PX = TERRESTRIAL HABITAT PLOT LOCATION (GOLDER 2015)

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PROJECT

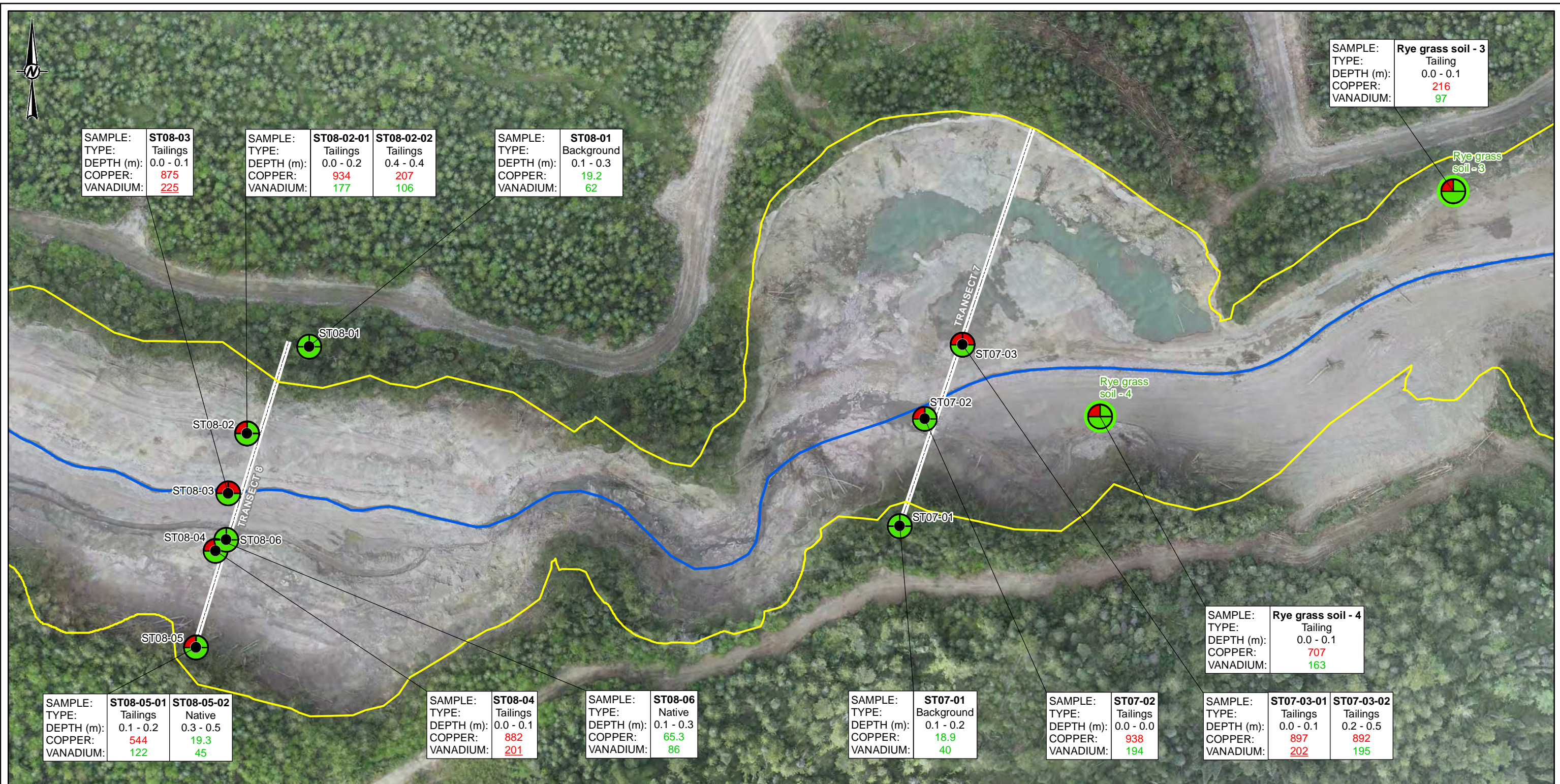
DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

TITLE

SAMPLE LOCATIONS FOR SOIL AND TERRESTRIAL HABITAT EXCEEDANCE RESULTS - SOIL TRANSECT 9

PROJECT NO.	CONTROL	REV.	FIGURE
1411734	11000 / 2000	0	A-7

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B 26mm



SAMPLE:	Rye grass soil - 3
TYPE:	Tailing
DEPTH (m):	0.0 - 0.1
COPPER:	216
VANADIUM:	97

SAMPLE:	ST08-03
TYPE:	Tailings
DEPTH (m):	0.0 - 0.1
COPPER:	875
VANADIUM:	225

SAMPLE:	ST08-02-01	ST08-02-02
TYPE:	Tailings	Tailings
DEPTH (m):	0.0 - 0.2	0.4 - 0.4
COPPER:	934	207
VANADIUM:	177	106

SAMPLE:	ST08-01
TYPE:	Background
DEPTH (m):	0.1 - 0.3
COPPER:	19.2
VANADIUM:	62

SAMPLE:	Rye grass soil - 4
TYPE:	Tailing
DEPTH (m):	0.0 - 0.1
COPPER:	707
VANADIUM:	163

SAMPLE:	ST08-05-01	ST08-05-02
TYPE:	Tailings	Native
DEPTH (m):	0.1 - 0.2	0.3 - 0.5
COPPER:	544	19.3
VANADIUM:	122	45

SAMPLE:	ST08-04
TYPE:	Tailings
DEPTH (m):	0.0 - 0.1
COPPER:	882
VANADIUM:	201

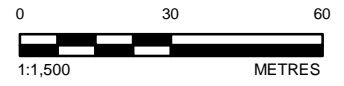
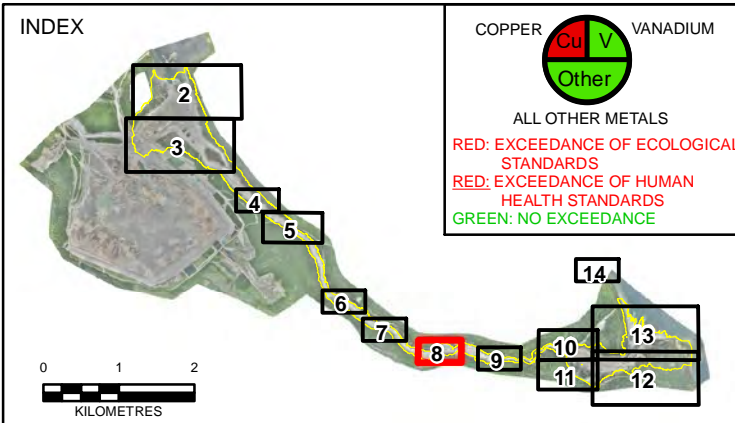
SAMPLE:	ST08-06
TYPE:	Native
DEPTH (m):	0.1 - 0.3
COPPER:	65.3
VANADIUM:	86

SAMPLE:	ST07-01
TYPE:	Background
DEPTH (m):	0.1 - 0.2
COPPER:	18.9
VANADIUM:	40

SAMPLE:	ST07-02
TYPE:	Tailings
DEPTH (m):	0.0 - 0.0
COPPER:	938
VANADIUM:	194

SAMPLE:	ST07-03-01	ST07-03-02
TYPE:	Tailings	Tailings
DEPTH (m):	0.0 - 0.1	0.2 - 0.5
COPPER:	897	892
VANADIUM:	202	195

- LEGEND**
- GOLDER SOIL SAMPLE LOCATION
 - ⊗ METALS
 - ⊗ NUTRIENTS
 - ⊗ NUTRIENTS AND METALS
 - SNC SOIL SAMPLE LOCATION
 - TERRESTRIAL HABITAT SAMPLE LOCATION
 - POST BREACH AFFECTED AREA EXTENT
 - SOIL TRANSECT
 - NEW HAZELTINE CREEK CHANNEL (APPROXIMATE)
 - BERRY
 - RYE GRASS
 - WILLOW



CLIENT	MOUNT POLLEY MINING CORPORATION
CONSULTANT	Imperial Metals
DATE	2016-01-12
DESIGNED	AA
PREPARED	RH
REVIEWED	AB
APPROVED	TM

NOTES

- ST = SOIL TRANSECT
- SS15-XX = SOIL SAMPLE LOCATION (GOLDER 2015)
- PX = TERRESTRIAL HABITAT PLOT LOCATION (GOLDER 2015)

REFERENCES

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PROJECT

DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

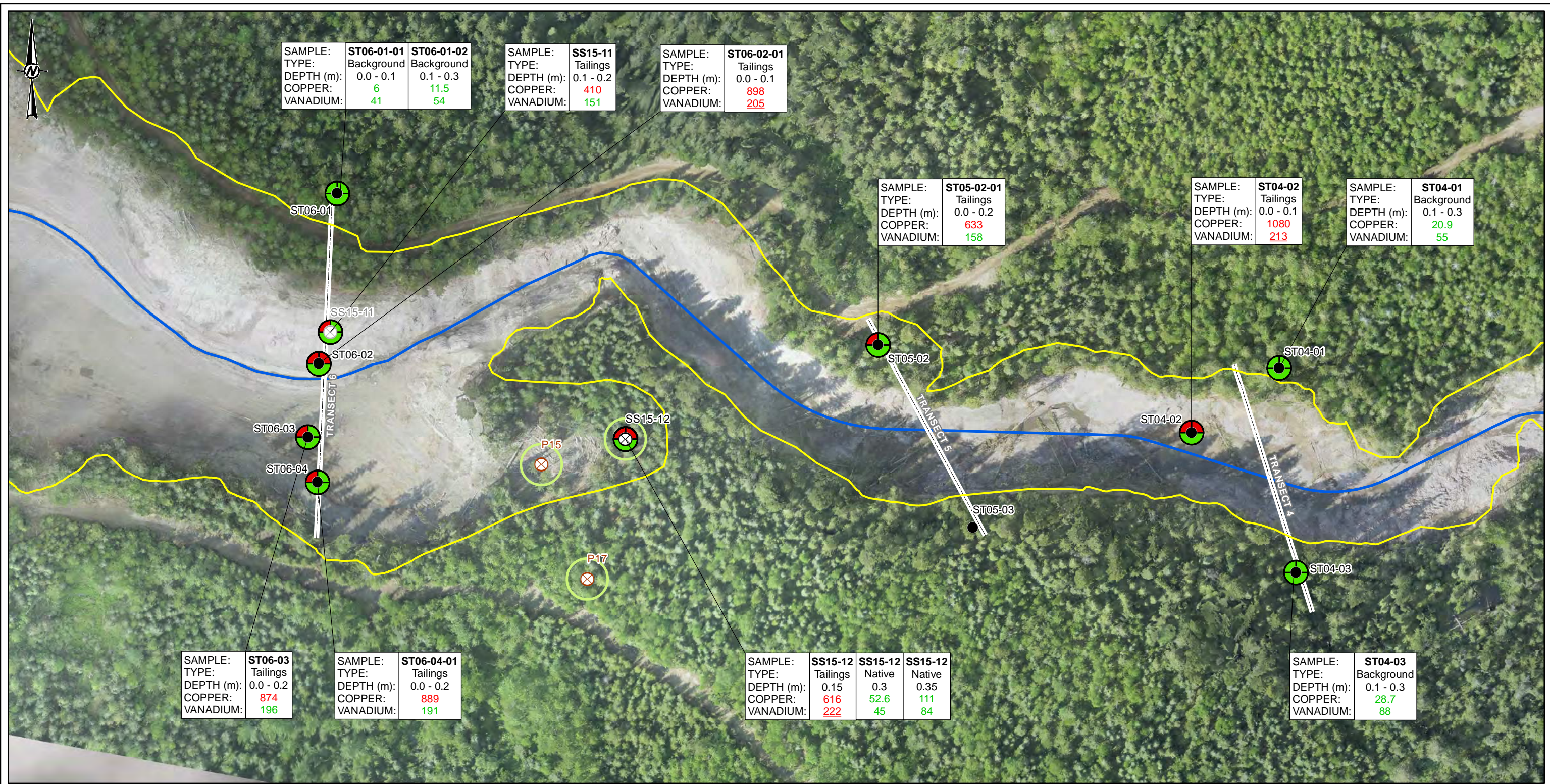
TITLE

SAMPLE LOCATIONS FOR SOIL AND TERRESTRIAL HABITAT EXCEEDANCE RESULTS - SOIL TRANSECTS 7 AND 8

PROJECT NO.	CONTROL	REV.	FIGURE
1411734	11000 / 2000	0	A-8

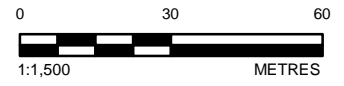
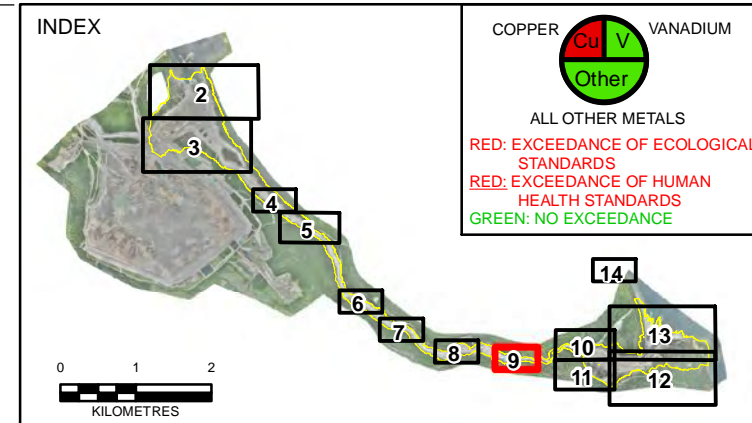
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



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- LEGEND**
- GOLDER SOIL SAMPLE LOCATION
 - ⊗ METALS
 - ⊗ NUTRIENTS
 - ⊗ NUTRIENTS AND METALS
 - SNC SOIL SAMPLE LOCATION
 - TERRESTRIAL HABITAT SAMPLE LOCATION
 - ▭ POST BREACH AFFECTED AREA EXTENT
 - SOIL TRANSECT
 - NEW HAZELTINE CREEK CHANNEL (APPROXIMATE)
 - BERRY
 - RYE GRASS
 - WILLOW



CLIENT: MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

CONSULTANT: Golder Associates

YYYY-MM-DD	2016-01-12
DESIGNED	AA
PREPARED	RH
REVIEWED	AB
APPROVED	TM

NOTES

- ST = SOIL TRANSECT
- SS15-XX = SOIL SAMPLE LOCATION (GOLDER 2015)
- PX = TERRESTRIAL HABITAT PLOT LOCATION (GOLDER 2015)

REFERENCES

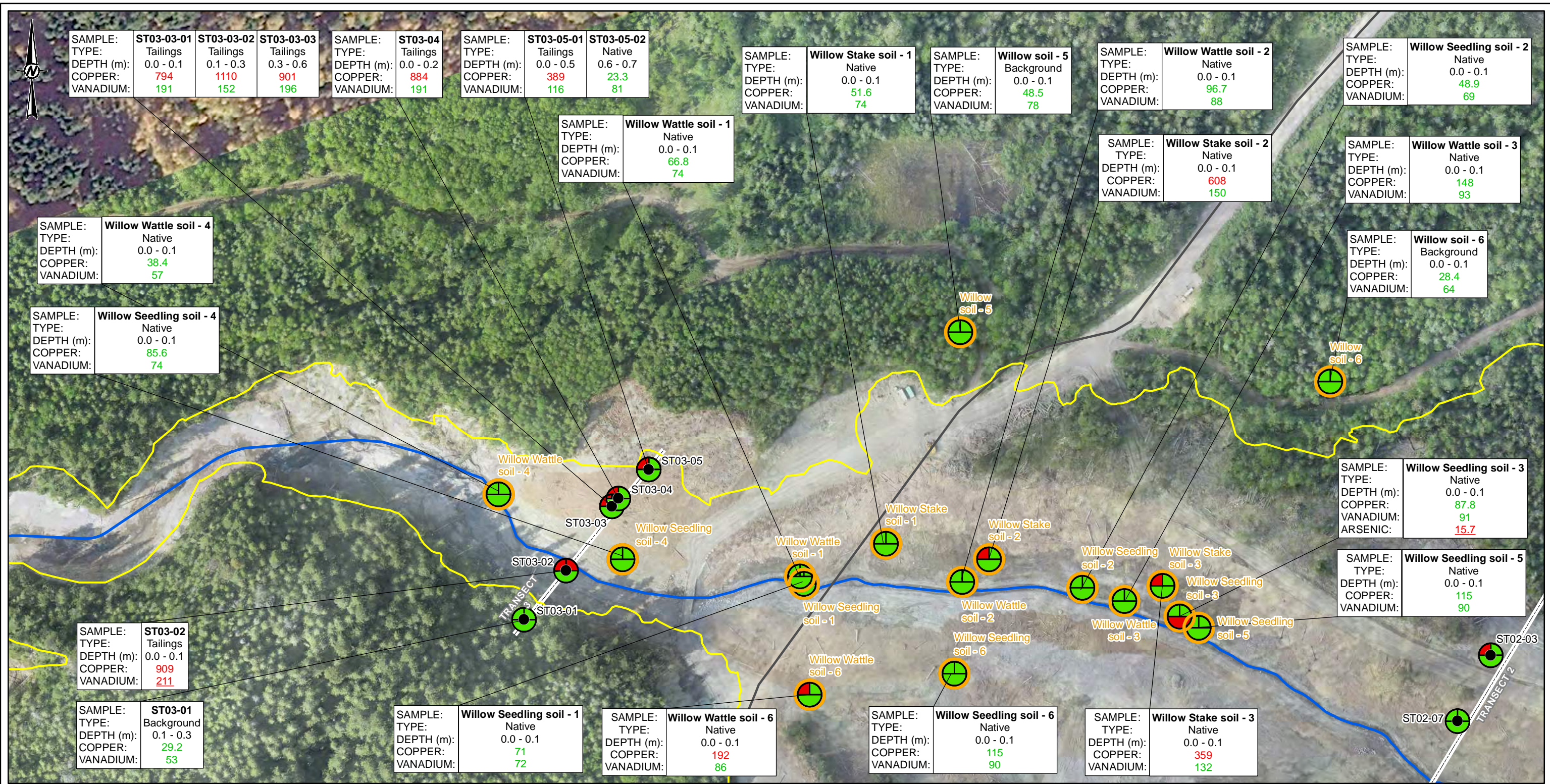
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PROJECT: DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

TITLE: **SAMPLE LOCATIONS FOR SOIL AND TERRESTRIAL HABITAT EXCEEDANCE RESULTS - SOIL TRANSECTS 4, 5 AND 6**

PROJECT NO.	CONTROL	REV.	FIGURE
1411734	11000 / 2000	0	A-9

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B 26mm



SAMPLE: ST03-03-01 TYPE: Tailings DEPTH (m): 0.0 - 0.1 COPPER: 794 VANADIUM: 191	SAMPLE: ST03-03-02 TYPE: Tailings DEPTH (m): 0.1 - 0.3 COPPER: 1110 VANADIUM: 152	SAMPLE: ST03-03-03 TYPE: Tailings DEPTH (m): 0.3 - 0.6 COPPER: 901 VANADIUM: 196	SAMPLE: ST03-04 TYPE: Tailings DEPTH (m): 0.0 - 0.2 COPPER: 884 VANADIUM: 191	SAMPLE: ST03-05-01 TYPE: Tailings DEPTH (m): 0.0 - 0.5 COPPER: 389 VANADIUM: 116	SAMPLE: ST03-05-02 TYPE: Native DEPTH (m): 0.6 - 0.7 COPPER: 23.3 VANADIUM: 81	SAMPLE: Willow Stake soil - 1 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 51.6 VANADIUM: 74	SAMPLE: Willow soil - 5 TYPE: Background DEPTH (m): 0.0 - 0.1 COPPER: 48.5 VANADIUM: 78	SAMPLE: Willow Wattle soil - 2 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 96.7 VANADIUM: 88	SAMPLE: Willow Seedling soil - 2 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 48.9 VANADIUM: 69
--	---	--	---	--	--	---	---	--	--

SAMPLE: Willow Wattle soil - 4 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 38.4 VANADIUM: 57	SAMPLE: Willow Seedling soil - 4 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 85.6 VANADIUM: 74	SAMPLE: Willow Wattle soil - 1 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 66.8 VANADIUM: 74	SAMPLE: Willow Stake soil - 2 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 608 VANADIUM: 150	SAMPLE: Willow Wattle soil - 3 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 148 VANADIUM: 93	SAMPLE: Willow soil - 6 TYPE: Background DEPTH (m): 0.0 - 0.1 COPPER: 28.4 VANADIUM: 64
--	--	--	---	---	---

SAMPLE: ST03-02 TYPE: Tailings DEPTH (m): 0.0 - 0.1 COPPER: 909 VANADIUM: 211	SAMPLE: Willow Wattle soil - 4 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 38.4 VANADIUM: 57	SAMPLE: Willow Seedling soil - 4 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 85.6 VANADIUM: 74	SAMPLE: Willow Stake soil - 1 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 51.6 VANADIUM: 74	SAMPLE: Willow Wattle soil - 1 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 66.8 VANADIUM: 74	SAMPLE: Willow Stake soil - 2 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 608 VANADIUM: 150	SAMPLE: Willow Seedling soil - 2 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 48.9 VANADIUM: 69	SAMPLE: Willow Stake soil - 3 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 96.7 VANADIUM: 88	SAMPLE: Willow Seedling soil - 3 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 48.9 VANADIUM: 69	SAMPLE: Willow Stake soil - 3 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 96.7 VANADIUM: 88
---	--	--	---	--	---	--	---	--	---

SAMPLE: ST03-01 TYPE: Background DEPTH (m): 0.1 - 0.3 COPPER: 29.2 VANADIUM: 53	SAMPLE: Willow Seedling soil - 1 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 71 VANADIUM: 72	SAMPLE: Willow Wattle soil - 6 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 192 VANADIUM: 86	SAMPLE: Willow Seedling soil - 6 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 115 VANADIUM: 90	SAMPLE: Willow Stake soil - 3 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 359 VANADIUM: 132	SAMPLE: Willow Seedling soil - 3 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 87.8 VANADIUM: 91 ARSENIC: 15.7	SAMPLE: Willow Seedling soil - 5 TYPE: Native DEPTH (m): 0.0 - 0.1 COPPER: 115 VANADIUM: 90
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LEGEND

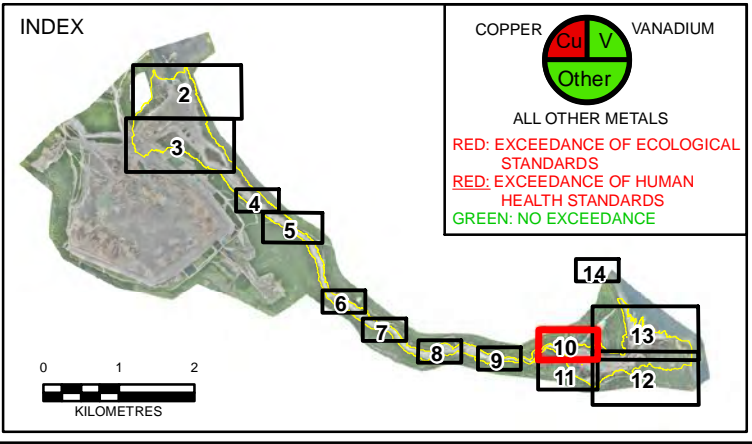
GOLDER SOIL SAMPLE LOCATION

- ⊗ METALS
- ⊗ NUTRIENTS
- ⊗ NUTRIENTS AND METALS
- SNC SOIL SAMPLE LOCATION
- TERRESTRIAL HABITAT SAMPLE LOCATION
- ▭ POST BREACH AFFECTED AREA EXTENT
- SOIL TRANSECT
- NEW HAZELTINE CREEK CHANNEL (APPROXIMATE)
- NEW EDNEY CREEK CHANNEL (APPROXIMATE)
- ROAD

BERRY (Blue circle)

RYE GRASS (Green circle)

WILLOW (Orange circle)



CLIENT
MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

CONSULTANT
Golder Associates

YYYY-MM-DD 2016-01-12

DESIGNED AA

PREPARED RH

REVIEWED AB

APPROVED TM

0 40 80 METRES
1:2,000

NOTES

- ST = SOIL TRANSECT
- SS15-XX = SOIL SAMPLE LOCATION (GOLDER 2015)
- PX = TERRESTRIAL HABITAT PLOT LOCATION (GOLDER 2015)

REFERENCES

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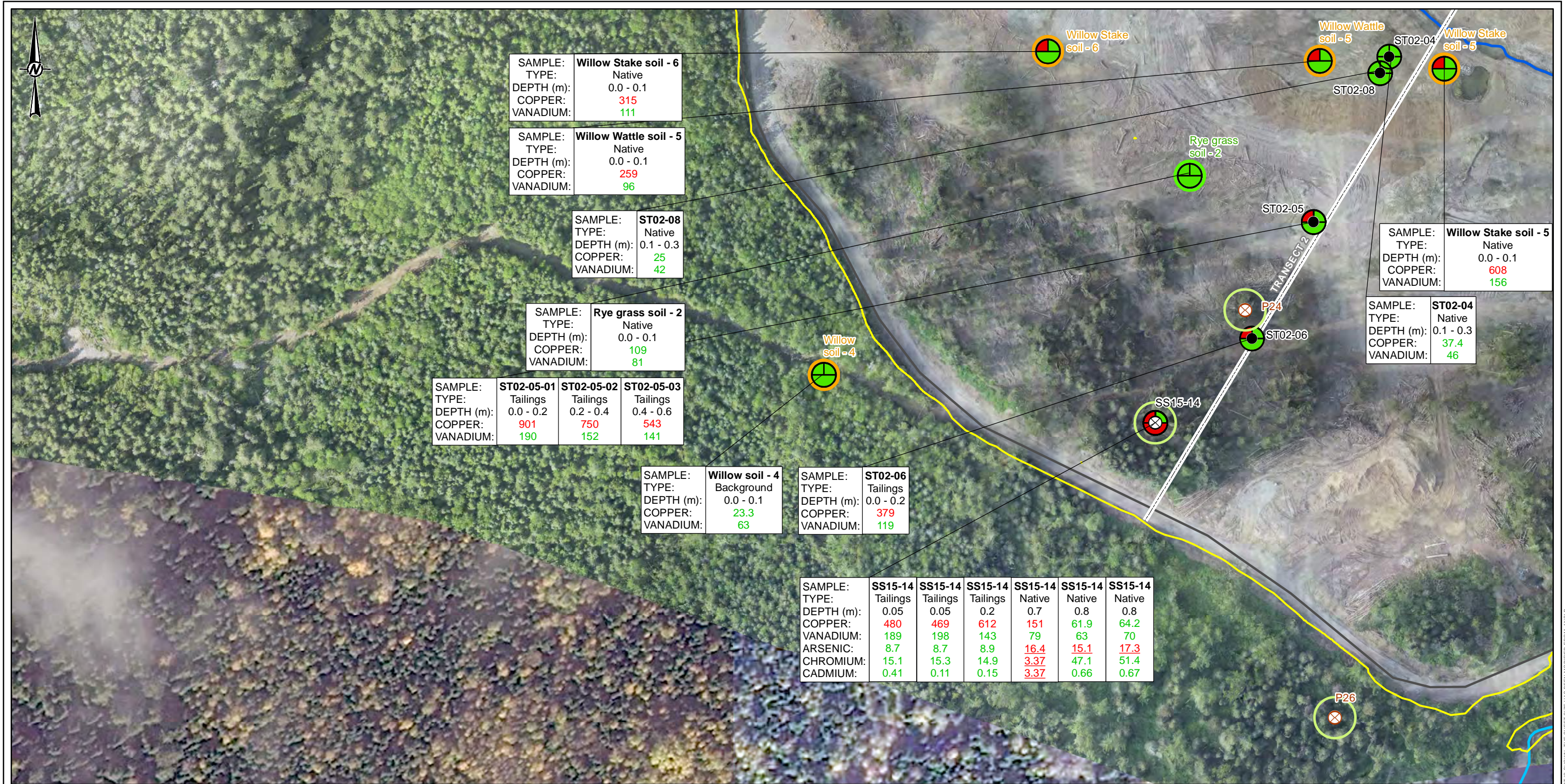
PROJECT
DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

TITLE
SAMPLE LOCATIONS FOR SOIL AND TERRESTRIAL HABITAT EXCEEDANCE RESULTS - SOIL TRANSECTS 2 AND 3

PROJECT NO. 1411734 CONTROL 11000 / 2000 REV. 0

FIGURE **A-10**

PATH: \\golder\gldg\Bumby\CD\GIS\CHIEF\411734\PROJECT\PHASE_20090504_Overlaid_Overlaid\1411734_11000_Soil_Veg_Samples_Location_Excel\main_DDP.mxd
 IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND

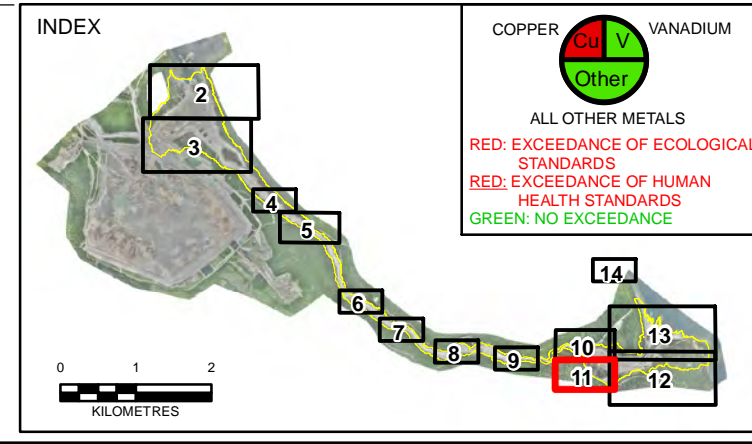
GOLDER SOIL SAMPLE LOCATION

- METALS
- NUTRIENTS
- NUTRIENTS AND METALS
- SNC SOIL SAMPLE LOCATION
- TERRESTRIAL HABITAT SAMPLE LOCATION
- POST BREACH AFFECTED AREA EXTENT
- SOIL TRANSECT
- NEW HAZELTINE CREEK CHANNEL (APPROXIMATE)
- NEW EDNEY CREEK CHANNEL (APPROXIMATE)
- ROAD

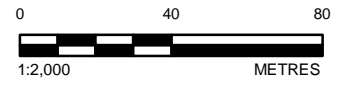
BERRY

RYE GRASS

WILLOW



SAMPLE:	SS15-14	SS15-14	SS15-14	SS15-14	SS15-14	SS15-14
TYPE:	Tailings	Tailings	Tailings	Native	Native	Native
DEPTH (m):	0.05	0.05	0.2	0.7	0.8	0.8
COPPER:	480	469	612	151	61.9	64.2
VANADIUM:	189	198	143	79	63	70
ARSENIC:	8.7	8.7	8.9	16.4	15.1	17.3
CHROMIUM:	15.1	15.3	14.9	3.37	47.1	51.4
CADMIUM:	0.41	0.11	0.15	3.37	0.66	0.67



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MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

CONSULTANT

YYYY-MM-DD	2016-01-12
DESIGNED	AA
PREPARED	RH
REVIEWED	AB
APPROVED	TM

NOTES

- ST = SOIL TRANSECT
- SS15-XX = SOIL SAMPLE LOCATION (GOLDER 2015)
- PX = TERRESTRIAL HABITAT PLOT LOCATION (GOLDER 2015)

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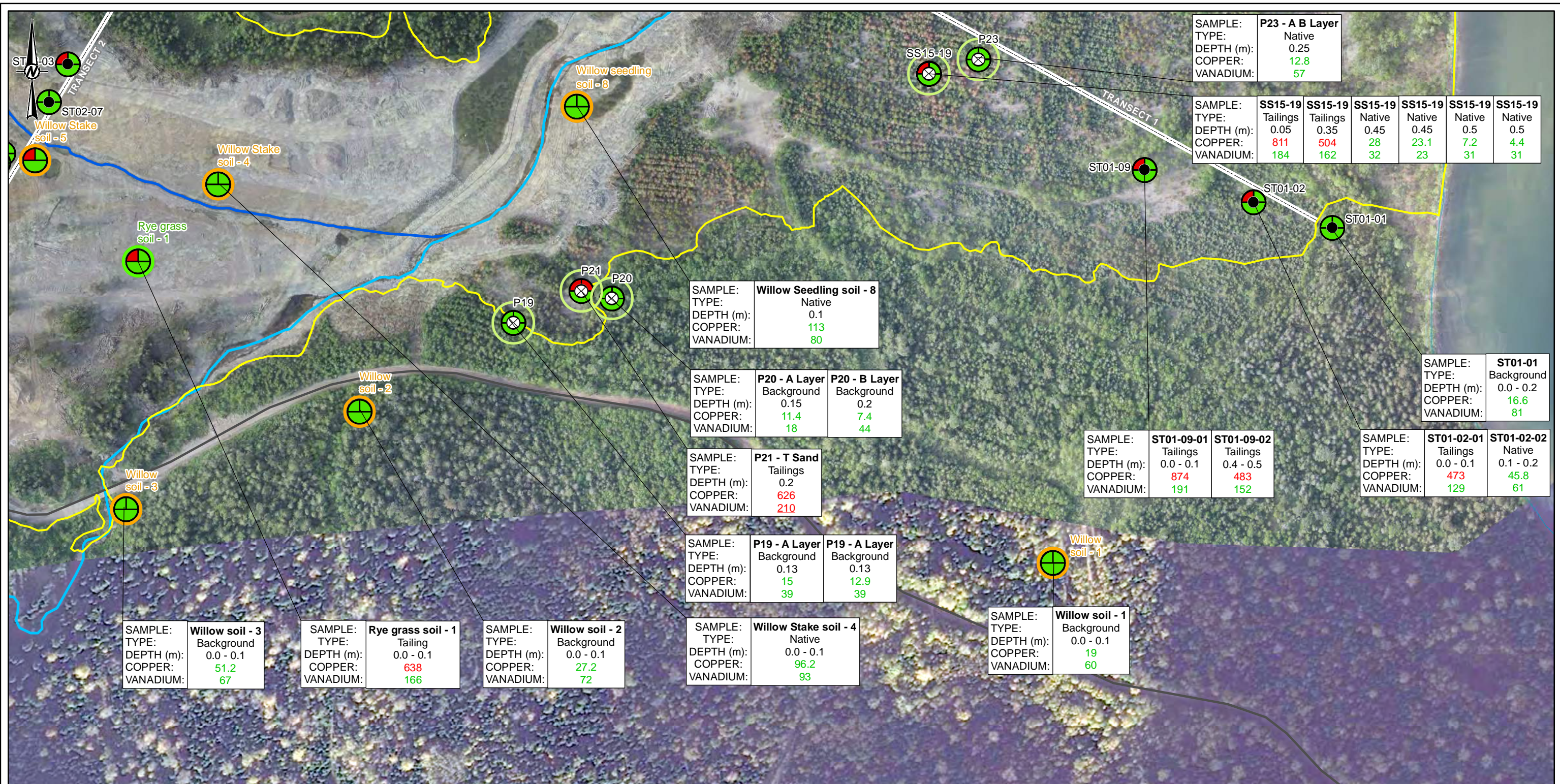
PROJECT
DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

TITLE
SAMPLE LOCATIONS FOR SOIL AND TERRESTRIAL HABITAT EXCEEDANCE RESULTS - SOIL TRANSECT 2

PROJECT NO.	CONTROL	REV.	FIGURE
1411734	11000 / 2000	0	A-11

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



SAMPLE:	P23 - A B Layer
TYPE:	Native
DEPTH (m):	0.25
COPPER:	12.8
VANADIUM:	57

SAMPLE:	SS15-19	SS15-19	SS15-19	SS15-19	SS15-19	SS15-19
TYPE:	Tailings	Tailings	Native	Native	Native	Native
DEPTH (m):	0.05	0.35	0.45	0.45	0.5	0.5
COPPER:	811	504	28	23.1	7.2	4.4
VANADIUM:	184	162	32	23	31	31

SAMPLE:	Willow Seedling soil - 8
TYPE:	Native
DEPTH (m):	0.1
COPPER:	113
VANADIUM:	80

SAMPLE:	P20 - A Layer	P20 - B Layer
TYPE:	Background	Background
DEPTH (m):	0.15	0.2
COPPER:	11.4	7.4
VANADIUM:	18	44

SAMPLE:	P21 - T Sand
TYPE:	Tailings
DEPTH (m):	0.2
COPPER:	626
VANADIUM:	210

SAMPLE:	P19 - A Layer	P19 - A Layer
TYPE:	Background	Background
DEPTH (m):	0.13	0.13
COPPER:	15	12.9
VANADIUM:	39	39

SAMPLE:	ST01-09-01	ST01-09-02
TYPE:	Tailings	Tailings
DEPTH (m):	0.0 - 0.1	0.4 - 0.5
COPPER:	874	483
VANADIUM:	191	152

SAMPLE:	ST01-02-01	ST01-02-02
TYPE:	Tailings	Native
DEPTH (m):	0.0 - 0.1	0.1 - 0.2
COPPER:	473	45.8
VANADIUM:	129	61

SAMPLE:	ST01-01
TYPE:	Background
DEPTH (m):	0.0 - 0.2
COPPER:	16.6
VANADIUM:	81

SAMPLE:	Willow soil - 3
TYPE:	Background
DEPTH (m):	0.0 - 0.1
COPPER:	51.2
VANADIUM:	67

SAMPLE:	Rye grass soil - 1
TYPE:	Tailing
DEPTH (m):	0.0 - 0.1
COPPER:	638
VANADIUM:	166

SAMPLE:	Willow soil - 2
TYPE:	Background
DEPTH (m):	0.0 - 0.1
COPPER:	27.2
VANADIUM:	72

SAMPLE:	Willow Stake soil - 4
TYPE:	Native
DEPTH (m):	0.0 - 0.1
COPPER:	96.2
VANADIUM:	93

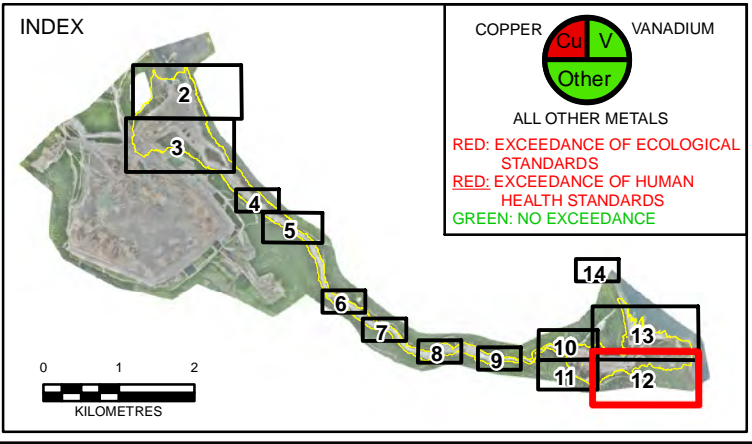
SAMPLE:	Willow soil - 1
TYPE:	Background
DEPTH (m):	0.0 - 0.1
COPPER:	19
VANADIUM:	60

LEGEND

GOLDER SOIL SAMPLE LOCATION

- ⊗ METALS
- ⊗ NUTRIENTS
- ⊗ NUTRIENTS AND METALS
- SNC SOIL SAMPLE LOCATION
- TERRESTRIAL HABITAT SAMPLE LOCATION
- ▭ POST BREACH AFFECTED AREA EXTENT
- SOIL TRANSECT
- NEW HAZELTINE CREEK CHANNEL (APPROXIMATE)
- NEW EDNEY CREEK CHANNEL (APPROXIMATE)
- ROAD

- BERRY
- RYE GRASS
- WILLOW
- WATERBODY



CLIENT
MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

CONSULTANT
Golder Associates

DATE: 2016-01-12

DESIGNED: AA

PREPARED: RH

REVIEWED: AB

APPROVED: TM

NOTES

- ST = SOIL TRANSECT
- SS15-XX = SOIL SAMPLE LOCATION (GOLDER 2015)
- PX = TERRESTRIAL HABITAT PLOT LOCATION (GOLDER 2015)

REFERENCES

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PROJECT
DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

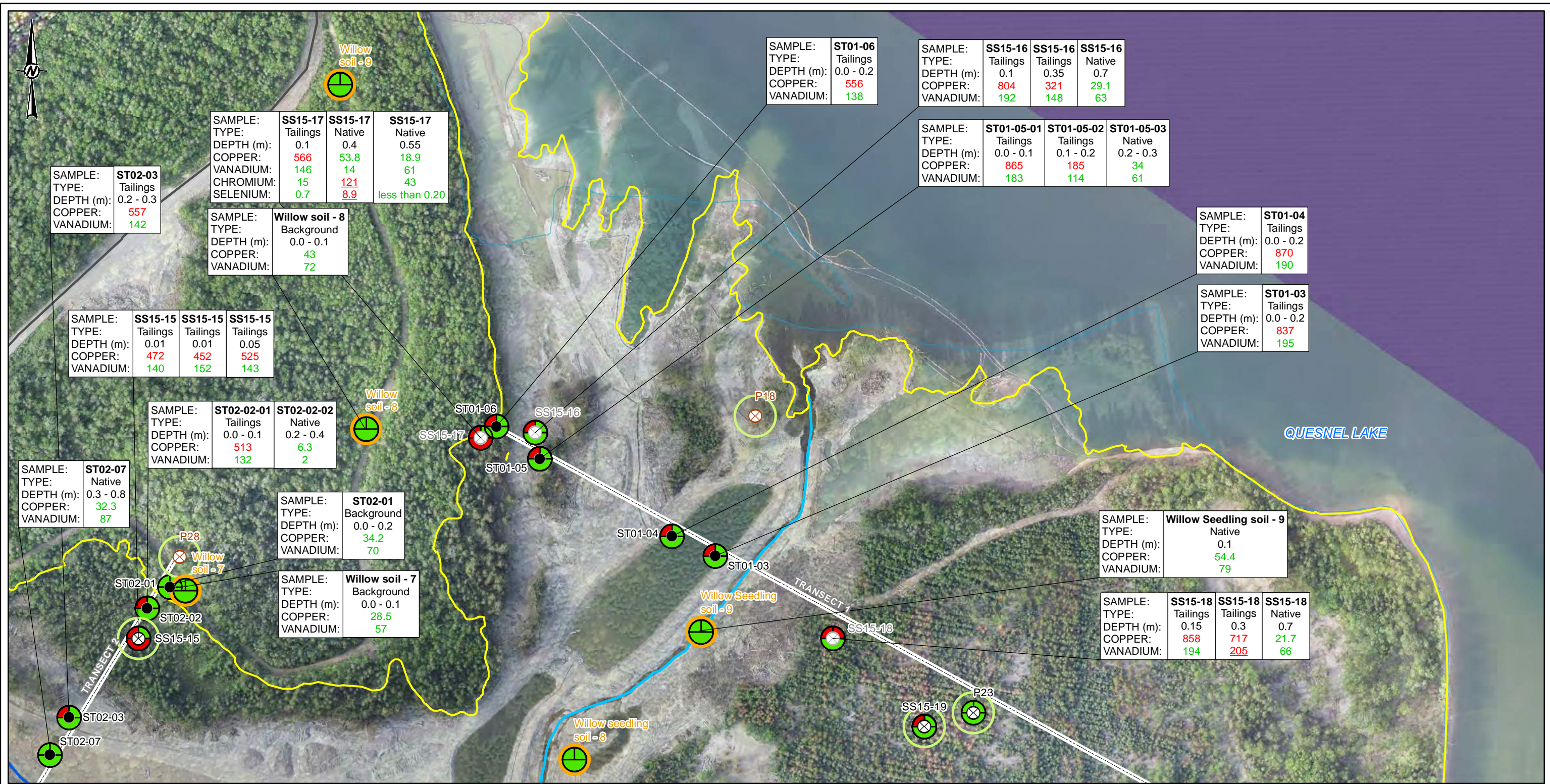
TITLE
SAMPLE LOCATIONS FOR SOIL AND TERRESTRIAL HABITAT EXCEEDANCE RESULTS - SOIL TRANSECTS 1 AND 2

PROJECT NO. 1411734 CONTROL 11000 / 2000 REV. 0

FIGURE **A-12**

PATH: \\golder\gldg\Bumby\CD\GIS\Chem\411734\PRODUCTION\11000_CSRR_REMEDIATION\KOD\Report\PHASE_20090504_Overlaid\411734_11000_Soil_Veg_Samples_Location_Excel\mapx.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



SAMPLE: **ST02-03**
 TYPE: Tailings
 DEPTH (m): 0.2 - 0.3
 COPPER: **557**
 VANADIUM: **142**

SAMPLE:	SS15-17	SS15-17	SS15-17
TYPE:	Tailings	Native	Native
DEPTH (m):	0.1	0.4	0.55
COPPER:	566	53.8	18.9
VANADIUM:	146	14	61
CHROMIUM:	15	121	43
SELENIUM:	0.7	8.9	less than 0.20

SAMPLE: **Willow soil - 8**
 TYPE: Background
 DEPTH (m): 0.0 - 0.1
 COPPER: **43**
 VANADIUM: **72**

SAMPLE:	SS15-15	SS15-15	SS15-15
TYPE:	Tailings	Tailings	Tailings
DEPTH (m):	0.01	0.01	0.05
COPPER:	472	452	525
VANADIUM:	140	152	143

SAMPLE:	ST02-02-01	ST02-02-02
TYPE:	Tailings	Native
DEPTH (m):	0.0 - 0.1	0.2 - 0.4
COPPER:	513	6.3
VANADIUM:	132	2

SAMPLE: **ST02-07**
 TYPE: Native
 DEPTH (m): 0.3 - 0.8
 COPPER: **32.3**
 VANADIUM: **87**

SAMPLE: **ST02-01**
 TYPE: Background
 DEPTH (m): 0.0 - 0.2
 COPPER: **34.2**
 VANADIUM: **70**

SAMPLE: **Willow soil - 7**
 TYPE: Background
 DEPTH (m): 0.0 - 0.1
 COPPER: **28.5**
 VANADIUM: **57**

SAMPLE: **ST01-06**
 TYPE: Tailings
 DEPTH (m): 0.0 - 0.2
 COPPER: **556**
 VANADIUM: **138**

SAMPLE:	SS15-16	SS15-16	SS15-16
TYPE:	Tailings	Tailings	Native
DEPTH (m):	0.1	0.35	0.7
COPPER:	804	321	29.1
VANADIUM:	192	148	63

SAMPLE:	ST01-05-01	ST01-05-02	ST01-05-03
TYPE:	Tailings	Tailings	Native
DEPTH (m):	0.0 - 0.1	0.1 - 0.2	0.2 - 0.3
COPPER:	865	185	34
VANADIUM:	183	114	61

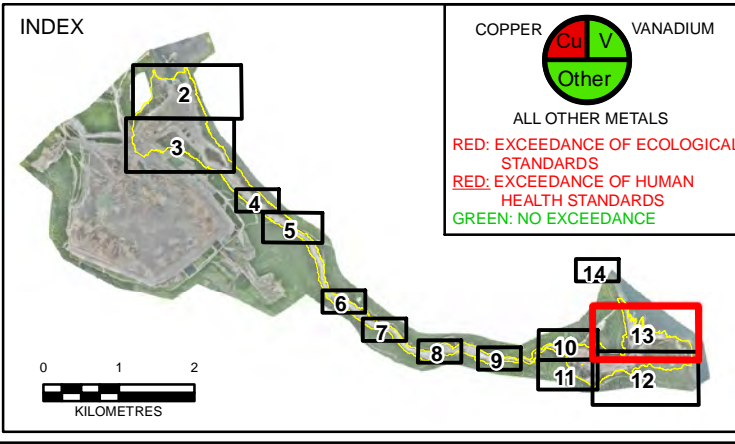
SAMPLE: **ST01-04**
 TYPE: Tailings
 DEPTH (m): 0.0 - 0.2
 COPPER: **870**
 VANADIUM: **190**

SAMPLE: **ST01-03**
 TYPE: Tailings
 DEPTH (m): 0.0 - 0.2
 COPPER: **837**
 VANADIUM: **195**

SAMPLE: **Willow Seedling soil - 9**
 TYPE: Native
 DEPTH (m): 0.1
 COPPER: **54.4**
 VANADIUM: **79**

SAMPLE:	SS15-18	SS15-18	SS15-18
TYPE:	Tailings	Tailings	Native
DEPTH (m):	0.15	0.3	0.7
COPPER:	858	717	21.7
VANADIUM:	194	205	66

- LEGEND**
- GOLDER SOIL SAMPLE LOCATION
 - ⊗ METALS
 - ⊗ NUTRIENTS
 - ⊗ NUTRIENTS AND METALS
 - SNC SOIL SAMPLE LOCATION
 - TERRESTRIAL HABITAT SAMPLE LOCATION
 - POST BREACH AFFECTED AREA EXTENT
 - SOIL TRANSECT
 - NEW HAZELTINE CREEK CHANNEL (APPROXIMATE)
 - NEW EDNEY CREEK CHANNEL (APPROXIMATE)
 - ROAD
 - BERRY
 - RYE GRASS
 - WILLOW
 - WATERBODY



CLIENT: MOUNT POLLEY MINING CORPORATION
 IMPERIAL METALS

CONSULTANT: Golder Associates

DATE: 2016-01-12

DESIGNED: AA
 PREPARED: RH
 REVIEWED: AB
 APPROVED: TM

0 75 150
 1:3,500 METRES

NOTES

- ST = SOIL TRANSECT
- SS15-XX = SOIL SAMPLE LOCATION (GOLDER 2015)
- PX = TERRESTRIAL HABITAT PLOT LOCATION (GOLDER 2015)

REFERENCES

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PROJECT: DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

TITLE: **SAMPLE LOCATIONS FOR SOIL AND TERRESTRIAL HABITAT EXCEEDANCE RESULTS - SOIL TRANSECTS 1 AND 2**

PROJECT NO. 1411734 CONTROL 11000 / 2000 REV. 0

FIGURE **A-13**

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



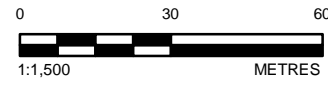
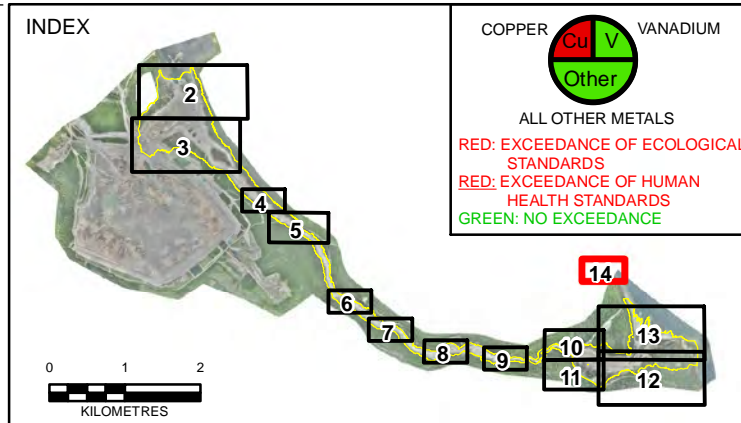
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LEGEND

GOLDER SOIL SAMPLE LOCATION

- METALS
- NUTRIENTS
- NUTRIENTS AND METALS
- SNC SOIL SAMPLE LOCATION
- TERRESTRIAL HABITAT SAMPLE LOCATION
- POST BREACH AFFECTED AREA EXTENT
- SOIL TRANSECT
- NEW HAZELTINE CREEK CHANNEL (APPROXIMATE)
- ROAD

- BERRY
- RYE GRASS
- WILLOW
- WATERBODY



CLIENT
MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

CONSULTANT

YYYY-MM-DD	2016-01-12
DESIGNED	AA
PREPARED	RH
REVIEWED	AB
APPROVED	TM

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PROJECT
DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

TITLE
SAMPLE LOCATIONS FOR SOIL AND TERRESTRIAL HABITAT EXCEEDANCE RESULTS

PROJECT NO.	CONTROL	REV.	FIGURE
1411734	11000 / 2000	0	A-14

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

ATTACHMENT 1
Soil Sampling Methods



ATTACHMENT 1 Soil Sampling Methods

Sampling procedures were carried out in accordance with the MoE Guidance document #1 Technical Guidance on Contaminated Sites - Site Characterization and Confirmation Testing (TG1, January 2009).

As the pits advanced, discrete soil samples were recovered at regular depth intervals from the auger flights or soil cores. Shallow soil samples were collected using a hand auger or shovel.

The soil samples were collected in pre-cleaned 125 millilitres (mL) glass soil sample jars supplied by the laboratory. Two jars of soil were collected for each sample interval to allow for breakage and laboratory re-analysis. At sample locations included in the TERA, a third jar of soil was collected. Samples jars were packed in cardboard boxes, placed in a cooler with a chain-of-custody form and several ice packs, and shipped to the laboratory.

During the Site reconnaissance (July 8 and 9, 2015), a sulphur-like odor and black soil were noted in several of the test pits. The observations were inferred to be indicative of anaerobic conditions in the ground sub-surface. In order to support the visual and olfactory observations of potential anaerobic conditions, field measurements of dissolved oxygen content (DO), pH, oxidation-reduction potential (ORP) and specific conductivity were measured in soil from both halo and reference plots.

In order to measure the field parameters, a volume (approximately 250 mL) of soil was collected from the target layer (i.e., native soil below tailings) in a standard 1 litre plastic water sample container. A slurry mixture was created by adding an equal volume of de-ionized water (1:1 ratio). The sample was stirred and allowed to equilibrate for approximately 10 minutes before sampling. Parameters of interest were measured using a multi meter calibrated to the manufacturer's instructions and recorded on field sheets.

Shallow soil samples and samples collected from the boreholes were submitted to the laboratory; selected soil samples were chosen for analysis. The samples selected for analysis were chosen based on visual observation, the stratigraphy encountered, the depth and location of the sample, and the results of field screening.

Selected soil samples were analyzed for total metals, plant available nutrients (including total available nitrogen, available ammonium, available nitrate, nitrate, nitrite, available phosphate, available potassium, and available sulphate), and physical parameters (including pH, moisture, and oxidation-reduction potential). Selected soil samples were also submitted to the laboratory for particle size analysis and analysis of organic and inorganic carbon.

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ATTACHMENT 2
Test Pit and Auger Logs

Soil Sample SS15-01

Location: Mount Polley Mine, BC
 Transect: 18
 UTM: 595815E, 5820542N, 10U (± 3 m)
 Area: Polley lake plug (floodplain)
 Date: 28-July-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0 – 0.2	TAILING - SILT – Clayey silt, light grey, moist, medium plasticity	08-028545-01 (0.05 – 0.15)	
0.2-0.4	TAILING - SILT – Clayey silt, trace sand, light grey, black films, moist, medium plasticity	08-028545-02 (0.25-0.35)	
0.4-0.65	TAILING - SANDY SILT – Silt, some sand, light grey to light grey brown, non-cohesive, moist	08-028545-03 (0.50-0.60)	Sampled with hand auger
0.65-0.90	TAILING - SAND – Sand, light grey brown, firm, moist	08-028545-04 (0.70-0.80)	Sampled with hand auger

Remarks: Reason for Termination: Rejection at ~90 cm (gravel)



Soil Sample SS15-02

Location: Mount Polley Mine, BC
 Transect: 18
 UTM: 595549E, 5820535N, 10U (± 5 m)
 Area: Polley lake plug (floodplain)
 Date: 29-July-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0 – 0.3	TAILING - SAND & SILT – Clayey silt and sand, light grey, non-cohesive, dry	389818-07 (0.05 – 0.15)	
0.3-0.5	TAILING - SAND & SILT – Clayey silt, light grey brown nodules, light brown sand layers, non-cohesive, moist	389818-08 (0.3-0.35)	
0.5-1.1	TAILING - SAND & SILT – Clayey silt and sand, light grey		
1.1-1.2	NATIVE - SANDY GRAVELLY GLACIAL TILL		

Remarks:



Soil Sample SS15-03 (Plot 6)

Location: Mount Polley Mine, BC
 Transect: 18
 UTM: 595421E, 5820734N, 10U (± 3 m)
 Area: Polley lake plug (floodplain)
 Date: 28-July-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.65	TAILING - SILT – Clayey silt, trace sand, light grey, low plasticity, wet	08-028545-09 (0.10-0.20)	
0.65-1.1	TAILING - SAND – Sand, some silt, light grey brown, wet	08-028545-10 (0.65-0.75)	Sampled with hand auger, sample pulled up through wet silt layer
1.1-1.2	NATIVE - A LAYER – Organic, some clayey silt, dark brown to black, moist, anaerobic smell	08-028545-11 (1.1-1.2)	Sampled with hand auger, sample pulled up through wet silt layer
1.2-1.3	NATIVE - B LAYER – Clayey silt and organic, black, strong anaerobic smell		

Remarks: Water table perched above native soil layers

Soil Sample SS15-04 (Plot 7)

Location: Mount Polley Mine, BC
 Transect: 18
 UTM: 595353E, 5820744N, 10U (± 3 m)
 Area: Polley lake plug (floodplain)
 Date: 29-July-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.35	TAILING - SILT – Clayey silt, trace sand, light great, cohesive, wet	08-028545-12 (0.05-0.15)	
0.35-0.5	TAILING - SAND & SILT – Silt and sand, light great, non-cohesive, wet	389818-01 (0.35-0.45)	Sampled with hand auger, sample pulled through wet silt layer
0.5-0.70	NATIVE - A LAYER – Organic and clayey silt, dark brown to black, rootlets, non-cohesive, moist	389818-02 (0.5-0.6)	Sampled with hand auger, sample pulled through wet silt layer
0.7-0.85	NATIVE - B LAYER – sand and clayey silt, light brown, moist to dry	389818-03 (0.75-0.85)	Sampled with hand auger, sample pulled through wet silt layer

Remarks: Water table perched above native soil layers



Soil Sample SS15-05 (Plot 8)

Location: Mount Polley Mine, BC
 Transect: 18
 UTM: 595335E, 5820841N, 10U
 Area: Polley lake plug (floodplain)
 Date: 29-July-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.25	TAILING - SILT – Clayey silt, some sand, light grey, non-cohesive, wet	389818-04 (0.05-0.15)	
0.25-0.45	TAILING - SAND & SILT – Sand and silt, light grey, wet		
0.45-0.6	NATIVE - A LAYER – organic and clayey silt, dark brown to black, cohesive, moist	389818-05 (0.45-0.55)	Sampled with hand auger, sample pulled through wet silt layer
0.6-0.75	TAILING - SAND – Sand and gravel, some silt, light grey brown, wet		
0.75-0.85	NATIVE - B LAYER – Silty clay, light grey, brown clay nodules, trace sand, moist	389818-06 (0.75-0.85)	Sampled with hand auger, sample pulled through wet silt layer

Remarks: Water table perched in tailings layers
 Picture of B Layer



Soil Sample SS15-06

Location: Mount Polley Mine, BC
 Transect: 15
 UTM: 596186E, 5819974N, 10U (± 4 m)
 Area: Upper Hazeltine
 Date: 30-July-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.3	TAILING - SAND – Sand and trace silt, light grey brown, moist	389818-09 (0.05-0.15)	
0.3-0.4	NATIVE - A LAYER – Organic and silt, dark brown to black, roots and rootlets, moist	389818-10 (0.3-0.4)	
0.4-0.5	NATIVE - B LAYER – Silt and sand, some gravel, light orange to brown, moist	389818-11 (0.4-0.5)	

Remarks:



Soil Sample SS15-07 (Plot 10)

Location: Mount Polley Mine, BC
 Transect: 10
 UTM: 596117E, 5819897N, 10U
 Area: Upper Hazeltine
 Date: 30-July-2015
 Logged By: Arainn Atkinson

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.6	TAILING - SAND – Sand, trace silt, light grey, black organic films, moist to dry	389818-12 (0.45-0.55)	
0.6-0.7	NATIVE - A LAYER – Organic and silty clay, dark brown to black, anaerobic odour, moist to dry	389819-01 (0.65-0.7)	
0.7-0.75	NATIVE - B LAYER – Clayey silt, light grey, dry	389819-02 (0.7-0.75)	

Remarks: Reason for Termination: Rejection at ~90 cm (gravel)



Soil Sample SS15-08

Location: Mount Polley Mine, BC
 Transect: 15
 UTM: 595969E, 5819793N, 10U (± 3 m)
 Area: Upper Hazeltine
 Date: 30-July-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-2.5	TAILING - SILTY SAND – Silty sand, light grey brown, layers of light grey clayey silt and light brown silty sand, loose, wet	389819-03 (0.05-0.15)	
2.5-3	NATIVE - GLACIAL TILL – Clayey silt and gravel, some sand, light grey, moist, iron nodule, compact	389819-04 (2.85-2.95)	Sampled with hand auger, sample pulled through wet silty sand layer

Remarks: perched water table in tailings above native till



Soil Sample SS15-09

Location: Mount Polley Mine, BC
Transect: 15
UTM: 595956E, 5819771N, 10U (± 4 m)
Area: Upper Hazeltine
Date: 30-July-2015
Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.1	TAILING - SAND – Sand, trace silt, light grey brown, loose, moist	389819-05 (0.05-0.10)	
0.1-0.2	NATIVE - B LAYER – Silty sand and gravel, light grey brown, roots and rootlettes, moist to dry	389819-06 (0.15-0.2)	

Remarks:



Soil Sample SS15-10 (Plot 11)

Location: Mount Polley Mine, BC
 Transect: 14
 UTM: 596647E, 5819368N, 10U
 Area: Upper Hazeltine
 Date: 31-July-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.1	TAILING - SAND - Sand, some silt, light grey, non-cohesive, moist	389819-07 (0.05-0.10)	
0.1-0.4	TAILING - SAND - Sand, light grey brown, loose, moist	389819-08 (0.15-0.25)	
0.4-0.45	NATIVE - H & A LAYER – Organic and silt, medium brown, trace sand, roots and rootlets, woody debris, anaerobic odour, moist	389819-09 (0.4-0.45)	
0.45-1.2	TAILING - SAND & SILT - Sand and silt, light grey brown, wet		
1.2-1.3	NATIVE - H & A LAYER		
1.3-1.45	NATIVE - A & B LAYER – gravely and clayey silt, trace sand, some organic, trace rootlets, dark grey, moist	389819-10 (1.3-1.45)	Sampled with hand auger, sample pulled through wet sand and silt layer
1.45-1.55	NATIVE - B2 LAYER – gravely silty clay, grey brown, clay models		

Remarks: Water table perched between 0.45m native layer down to native soil layers (1.2m)



Soil Sample SS15-11

Location: Mount Polley Mine, BC
Transect: 6
UTM: 599697E, 5817240N, 10U
Area: Upper Hazeltine
Date: 1-Aug-2015
Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.1	TAILING - SAND	389819-11 (0.05-0.15)	

Remarks:



Soil Sample SS15-12 (Plot 16)

Location: Mount Polley Mine, BC
 Transect: 6
 UTM: 599813E, 5817198N, 10U
 Area: Upper Hazeltine
 Date: 1-Aug-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.2	TAILING - SAND – Sand, trace silt, light grey-brown, loose, moist to dry	384857-08 (0.05-0.15)	
0.2-0.3	NATIVE - H LAYER - Organics and silt, trace clay, dark brown, roots, moist to dry	384857-09 (0.2-0.3)	
0.30-0.31	NATIVE - A LAYER – Silt, some clay, medium brown, cohesive, moist to dry	384856-10 (0.30-0.31)	
0.31-0.40	NATIVE - B LAYER – Silty clay (loam), light brown, cohesive	384856-11 (0.31-0.4)	

Remarks:

Soil Sample SS15-14 (Plot 25)

Location: Mount Polley Mine, BC
 Transect: 2
 UTM: 600973E, 5816984N, 10U
 Area: Lower Hazeltine
 Date: 3-Aug-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.1	TAILING - SILT – Silt, some sand, medium grey, moist	471688-07, -08 (0.05-0.1)	Duplicate
0.1-0.55	TAILING - SAND – Sand, medium grey brown, loose, moist	471688-09 (0.15-0.25)	
0.55-0.65	NATIVE - H LAYER – Organic and silt, dark brown, anaerobic odour	471688-10 (0.55-0.65)	
0.65-0.75	NATIVE - A LAYER – Silty clay, dark brown, moist	471688-11 (0.65-0.75)	
0.75-0.85	NATIVE - B LAYER – Silty clay (loam), med grey-orange, moist	471688-11 389821-01 (0.75-0.85)	

Remarks:

Soil Sample SS15-15 (Plot 27)

Location: Mount Polley Mine, BC
 Transect: 2
 UTM: 601218E, 5817329N, 10U
 Area: Lower Hazeltine
 Date: 3-Aug-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.02	TAILING - SILT – Silt, with sand, trace clay, light grey, moist	389812-04, -05 (0-0.02)	Duplicate
0.02-0.15	TAILING - SAND - Sand, medium grey brown, loose, moist	389821-06 (0.02-0.1)	
0.15-0.3	NATIVE - H1 LAYER – Organic, silt, dark brown, moist	389821-07 (0.2-0.3)	
0.3-0.9	NATIVE - fH2 LAYER – Organic, silt, dark brown, moist	389821-08 (0.3-0.4)	

Remarks:



Soil Sample SS15-16

Location: Mount Polley Mine, BC
Transect: 1
UTM: 601582E, 5817518N, 10U (± 6 m)
Area: Lower Hazeltine
Date: 1-Aug-2015
Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.3	TAILING - SILT - Clayey silt, some sand, trace gravel, light grey, cohesive, low plasticity, moist	389820-02 (0.05-0.15)	
0.3-0.6	TAILING - SAND – Sand, trace silt, trace gravel, light grey brown, well graded, coarse, moist	389820-03 (0.3-0.4)	
0.6-0.75	NATIVE - A LAYER – Sand, some organic, trace silt, dark grey, fine, moist	389820-04 (0.65-0.75)	

Remarks:

Soil Sample SS15-17

Location: Mount Polley Mine, BC
 Transect: 1
 UTM: 601532E, 5817513N, 10U (± 13 m)
 Area: Lower Hazeltine
 Date: 1-Aug-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.4	TAILING - SAND & SILT – Sand and silt, light grey brown, cohesive, low plasticity, wet	389820-05 (0.05-0.15)	
0.4-0.50	NATIVE - A LAYER – Organic, black, moist	389820-06 (0.4-0.5)	
0.5-0.6	NATIVE - B LAYER – Clay loam, clayey silt, trace sand, trace gravel, lots of clay nodules	389820-06 (0.5-0.6)	

Remarks:

Soil Sample SS15-18

Location: Mount Polley Mine, BC
 Transect: 1
 UTM: 601855E, 5817329N, 10U ($\pm 6\text{m}$)
 Area: Lower Hazeltine
 Date: 1-Aug-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.30	TAILING - SILT – Clayey silt, some sand, light grey, cohesive, wet	389829-08 (0.1-0.2)	
0.3-0.5	TAILING - SAND – Sand, trace silt, light grey brown, organic lenses, non-cohesive, moist	389820-09 (0.3-0.35)	
0.5-0.55	NATIVE - A LAYER - Organic, trace sand, black, moist	389820-10 (0.5-0.55)	Sampled with hand auger
0.55-0.75	NATIVE - B LAYER – Sand, some silt, light brown, non-cohesive, fine, moist	389820-11 (0.65-0.75)	Sampled with hand auger

Remarks:

Soil Sample SS15-19

Location: Mount Polley Mine, BC
 Transect: 1
 UTM: 601939E, 5817248N, 10U ($\pm 3\text{m}$)
 Area: Lower Hazeltine
 Date: 2-Aug-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.3	TAILING - SILT – Clayey silt, light grey, cohesive, wet	389859-05 (0.05-01)	
0.3-0.45	TAILING - SAND - Sand, light grey-brown, moist	389859-06 (0.3-0.4)	
0.45-0.5	NATIVE - H LAYER – organic, silt, trace sand, dark brown, roots and rootlets, moist	389859-07, -08 (0.45-0.5)	Duplicate
0.5-0.55	NATIVE - A LAYER - Silt with sand, medium grey, moist	389859-09, -10 (0.5-0.55)	Duplicate
0.55-0.6	NATIVE - B LAYER – clayey silt with sand, brown, moist	389859-11 (0.55-0.6)	

Remarks: Perched water table in top 30cm of tailings

Plot 1

Location: Mount Polley Mine, BC
Transect: 18
UTM: 595981E, 5820506N, 10U
Area: Background
Date: 28-July-2015
Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.1	NATIVE - A LAYER – Silt and clay, some sand, roots, rootlets, medium brown		
0.1-0.2	NATIVE - B1 LAYER – Silt and clay, some sand		
0.2-0.4	NATIVE - B2 LAYER - Sandy and clayey silt		

Remarks: Background terrestrial ecology plot



Plot 2

Location: Mount Polley Mine, BC
 Transect: 18
 UTM: 595904E, 5820522N, 10U
 Area: Polley lake plug (floodplain)
 Date: 29-July-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.5	TAILING - SAND - Sand, trace silt, light grey brown, loose, fine, uniform grade, moist	384855-01 (0.05-0.15)	
0.5-0.6	NATIVE - A LAYER – Organic and silt, dark brown, loose, woody debris, iron sheen, anaerobic odour, moist	384855-02 (0.50-0.60)	
0.6-0.7	NATIVE - B LAYER – Sand and silt and organic, dark grey brown, iron sheen, non-cohesive, wet	384855-03 (0.60-0.70)	

Remarks: Water table below A layer



Plot 3

Location: Mount Polley Mine, BC
 Transect: 17
 UTM: 595688E, 5820222NN, 10U
 Area: Polley lake plug (floodplain)
 Date: 29-July-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.55	TAILING - SILT – Clayey silt, light grey, black mottling, cohesive, moist	384855-04 (0.1-0.2)	
0.55-1.50	TAILING - SAND - Sand, light grey brown, non-cohesive, moist	384855-05 (0.6-0.7)	
1.5-1.6	NATIVE - A LAYER - Organic, dark brown, woody debris, roots	384855-06 (1.5-1.6)	
1.6-1.7	NATIVE - B LAYER – Clay and silt, mottled sand layers, cohesive,		

Remarks:



Plot 4

Location: Mount Polley Mine, BC
Transect: 16
UTM: 595739E, 5820047N, 10U
Area: Polley lake plug (floodplain)
Date: 29-July-2015
Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.2	TAILING - SILTY SAND – Silty sand, light grey brown, black mottling, non-cohesive, wet	384855-08 (0.05-0.15)	
0.2-0.3	NATIVE - A / B LAYER – organic and clayey silt, dark brown, clayey silt nodules, non-cohesive, wet	384855-09 (0.2-0.3)	
0.3-0.4	NATIVE - B2 LAYER – Gravely sand and clayey silt		

Remarks:

Plot 5

Location: Mount Polley Mine, BC
 Transect: 16
 UTM: 595685E, 5819997N, 10U
 Area: Polley lake plug (floodplain)
 Date: 29-July-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.1	TAILING - SAND - Sand, light grey brown, non-cohesive, wet		
0.1-0.2	TAILING - SILT – Clayey silt, light grey, black mottling, wet		
0.2-0.3	NATIVE - A LAYER – Clayey silt, trace sand, trace gravel, organic, roots and rootlets, medium grey brown, cohesive, wet	384855-10 (0.2-0.3)	
0.3-0.4	NATIVE - B LAYER – gravely clayey silt, trace sand, trace roots, light grey, cohesive, moist	384855-11 (0.3-0.4)	

Remarks:

Plot 9

Location: Mount Polley Mine, BC
 Transect: 15
 UTM: 596230E, 5820008N, 10U
 Area: Upper Hazeltine (Background)
 Date: 30-July-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.04	NATIVE - (LFH) LAYER – roots / humus layer		
0.04-0.06	NATIVE - A LAYER – Silt, trace clay, dark brown, non-cohesive, charcoal, dry	384856-05 (0.04-0.06)	
0.06-0.12	NATIVE - B LAYER – Silt, some clay, light grey, non-cohesive, dry	384856-06 (0i.06-0.12)	

Remarks: Background terrestrial ecology plot

Plot 12

Location: Mount Polley Mine, BC
 Transect: 14
 UTM: 596661E, 5819385N, 10U
 Area: Upper Hazeltine
 Date: 31-July-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.3	TAILING - SAND – Sand, light grey, silty-clayey models, moist	384856-07 (0.1-0.2)	
0.3-0.35	NATIVE - SILTY ORGANIC LAYER		
0.35-0.7	TAILING - SILTY SAND - Sand, some silt, light grey, non-cohesive, moist to wet	384856-08 (0.6-0.7)	
0.7-0.8	NATIVE – H LAYER	384856-09 (0.7-0.8)	
0.8-0.95	NATIVE - A LAYER – organic and silt, trace sand, trace roots and rootlets, some gravel	384856-10 (0.8-0.9)	
0.95+	NATIVE - B LAYER - Clay loam		

Remarks:



Plot 13

Location: Mount Polley Mine, BC
 Transect: 14
 UTM: 596680E, 5819406N, 10U
 Area: Upper Hazeltine
 Date: 31-July-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.1	TAILING - SAND & SILT – Sand and silt, some organic, light grey, lenses of dark organic, loose, moist	384856-11 (0.05-0.1)	
0.1-0.15	NATIVE - H LAYER	384856-12 (0.1-0.15)	
0.15-0.2	NATIVE - A LAYER - Organic and clayey silt, trace sand, roots and rootlets, dry		
0.2-0.3	NATIVE - B LAYER – Silt and sandy gravel, trace rootlets, medium grey brown, dry	384857-01 (0.2-0.25)	

Remarks:



Plot 14

Location: Mount Polley Mine, BC
 Transect: 14
 UTM: 596706E, 5819422N, 10U
 Area: Upper Hazeltine (Background)
 Date: 31-July-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.1	NATIVE - ORGANIC LAYER (LFH)		
0.1-0.25	NATIVE - A LAYER – Silt and organic and sand, medium grey brown, firm, dry	384857-02 (0.1-0.2)	
0.25+	NATIVE - B LAYER – Gravely clayey silt, light grey, brown clay models, compact, dry	384857-03 (0.25-0.35)	

Remarks: Background terrestrial ecology plot

Plot 15

Location: Mount Polley Mine, BC
 Transect: 6
 UTM: 599780E, 5817188N, 10U
 Area: Upper Hazeltine
 Date: 1-Aug-2015
 Logged By: Arainn Atkinson

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.45	TAILING - SAND – Sand, trace silt, light grey brown, loose, moist to dry	384857-04 (0.15-0.25)	
0.45-0.55	NATIVE - H LAYER – Organics, silt, dark brown, trace clay, roots, moist to dry	384857-05 (0.45-0.55)	
0.55-0.57	NATIVE - A LAYER – Silt, some clay, medium brown, cohesive, moist	384857-06 (0.55-0.57)	
0.57+	NATIVE - B LAYER – silty clay (loam), light brown, cohesive	384857-07 (0.6-0.65)	

Remarks:

Plot 17

Location: Mount Polley Mine, BC
 Transect: 6
 UTM: 599798E, 5817143N, 10U
 Area: Upper Hazeltine (Background)
 Date: 1-Aug-2015
 Logged By: Arainn Atkinson

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.1	NATIVE - H LAYER – Organics, silt, trace clay, dark brown, dry	384857-12 (0.05-0.1)	
0.1-0.15	NATIVE - A LAYER – Silt, some clay, medium brown, dry	384858-01 (0.1-0.15)	
0.15+	NATIVE - B LAYER – Clayey silt, light brown, dry	384858-02 (0.15-0.25)	

Remarks: Background terrestrial ecology plot

Plot 18

Location: Mount Polley Mine, BC
 Transect: 1
 UTM: 601784E, 5817533N, 10U
 Area: Lower Hazeltine
 Date: 1-Aug-2015
 Logged By: Arainn Atkinson

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.25	TAILING - SILT – Clayey silt, some sand, light grey		
0.25-0.85	TAILING - SAND – sand, light grey brown	384858-03 (0.75-0.85)	
0.85-0.9	NATIVE - H LAYER – Organics, clayey silt, black, moist	384858-04 (0.85-0.9)	
0.9-1.0	NATIVE - A LAYER – Clayey silt, some organics, dark grey, cohesive, moist	384858-05 (0.9-1.0)	
1-1.1	NATIVE - B LAYER – Silty clay, light grey brown, clay models (grey and brown), cohesive, dry	384858-06 (1-1.1)	

Remarks:



Plot 19

Location: Mount Polley Mine, BC
 Transect: 1
 UTM: 601560E, 5817021N, 10U
 Area: Lower Hazeltine (Background)
 Date: 2-Aug-2015
 Logged By: Arainn Atkinson

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.03	NATIVE - H LAYER – Organic, silt, some sand, dark brown, roots and rootlets, dry	384858-07 (0-0.03)	
0.03-0.09	NATIVE - A LAYER – Silt and sand, medium brown, compact, dry, evidence of logging		
0.09-0.12	NATIVE - H LAYER – Organic, silt, dark brown, roots and rootlets, trace sand, dry		
0.12-0.14	NATIVE - A LAYER – Silt and sand, trace clay, brown and grey, dry	384858-08, -09 (0.12-0.14)	Duplicate
0.14-0.25	NATIVE - B LAYER - Clayey silt and sand, light grey brown, cohesive, dry	384858-10 (0.15-0.25)	

Remarks: Evidence of logging in upper A layer (0.03-0.09)
 Background terrestrial ecology plot



Plot 20

Location: Mount Polley Mine, BC
 Transect: 1
 UTM: 601650E, 5817043N, 10U
 Area: Lower Hazeltine (Background)
 Date: 2-Aug-2015
 Logged By: Arainn Atkinson

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.15	NATIVE - H LAYER – Organic, silt, trace sand, dark brown, roots and rootlets, dry	384858-11 (0.05-0.15)	
0.15-0.20	NATIVE - A LAYER – Silt (loam), medium grey, dry	384858-12 (0.15-0.2)	
0.2+	NATIVE - B LAYER – Silt (loam), orange brown, dry	384859-01 (0.2-0.3)	

Remarks: Background terrestrial ecology plot
low quality picture

Plot 21

Location: Mount Polley Mine, BC
 Transect: 1
 UTM: 601622E, 5817050N, 10U
 Area: Lower Hazeltine
 Date: 2-Aug-2015
 Logged By: Arainn Atkinson

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.45	TAILING - SAND - Sand, grey, wet	384859-02 (0.15-0.25)	
0.45-0.6	NATIVE - H LAYER – Organic, silt, trace sand, black, roots and rootlets, moist	384859-03 (0.45-0.55)	
0.6-0.7	NATIVE - A LAYER – Silt (loam), medium grey to black, moist	384859-04 (0.6-0.7)	

Remarks:



Plot 23

Location: Mount Polley Mine, BC
 Transect: 1
 UTM: 601984E, 5817261N, 10U
 Area: Lower Hazeltine
 Date: 2-Aug-2015
 Logged By: Arainn Atkinson

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.2	TAILING - SILTY SAND - Silty sand and gravel, light grey, moist	384859-12 (0.05-0.15)	
0.2-0.25	NATIVE - H LAYER – organic, silt, dark brown, roots and rootlets,	471688-01 (0.2-0.25)	
0.25-0.3	NATIVE - A & B LAYER – Silt with sand, trace clay, med grey-brown, moist	471688-02 (0.25-0.3)	
0.3-0.31	NATIVE - ORGANIC		
0.31-0.36	NATIVE – Bf LAYER - Silty (loam), dark brown		
0.36-0.37	NATIVE - ORGANIC		
0.37-0.41	NATIVE - A LAYER – Silty (loam), light grey, dry		
0.41+	NATIVE - B LAYER – Silty (loam), brown, dry		

Remarks:



Plot 24

Location: Mount Polley Mine, BC
 Transect: 2
 UTM: 601020E, 5817043N, 10U
 Area: Lower Hazeltine
 Date: 3-Aug-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.3	TAILING - SAND – Sand, trace gravel, light grey brown, loose, dry	471688-03 (0.1-0.2)	
0.3-0.4	NATIVE - H LAYER – Organic, silt, dark brown, loose, dry	471688-04 (0.3-0.4)	
0.4-0.5	NATIVE - A LAYER – Silt (loam), dark grey, trace clay, loose, dry	471688-05 (0.4-0.5)	
0.5+	NATIVE - B LAYER – Sandy silt, dark brown, trace clay, dry	471688-06 (0.5-0.6)	

Remarks:

Plot 26

Location: Mount Polley Mine, BC
Transect: 2
UTM: 601067E, 5816830N, 10U
Area: Lower Hazeltine (Background)
Date: 3-Aug-2015
Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.2	NATIVE - H & A LAYER – Organic, silt, dark brown, roots and rootlets, moist	389821-02 (0.05-0.15)	
0.2-0.25	NATIVE - B LAYER – Silt with sand and clay, medium brown, moist	389821-03 (0.2-0.25)	

Remarks: Background terrestrial ecology plot



Plot 28

Location: Mount Polley Mine, BC
Transect: 2
UTM: 601256E, 5817404N, 10U
Area: Lower Hazeltine (Background)
Date: 3-Aug-2015
Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.35	NATIVE - H LAYER 1 – Organic, woody debris		
0.35+	NATIVE - H LAYER 2 – Organic, silt, dark brown, roots and rootlets, moist	389821-09 (0.35-0.4)	

Remarks: Background terrestrial ecology plot

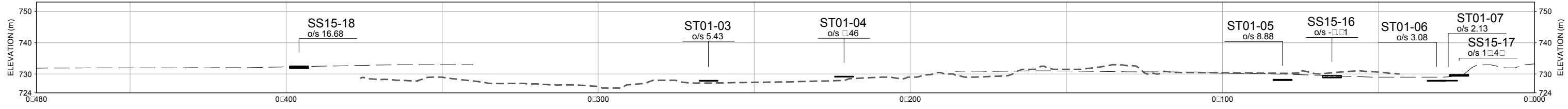
Plot 29

Location: Mount Polley Mine, BC
 Transect: 16
 UTM: 595685E, 5819997N, 10U
 Area: Polley plug area
 Date: 29-July-2015
 Logged By: Evin Zapf-Gilje

Depth (m)	Description	Sample (Interval, m)	Comments
0-0.08	TAILING - SAND	389821-10, -11 (0.03-0.08)	Duplicate
0.08-0.18	NATIVE - H LAYER	389821-12, 429590-01 (0.1-0.15)	Duplicate
0.18-0.21	NATIVE - A LAYER – Silty loam, Silt, some sand, some clay	429590-02 (0.18-0.21)	
0.21-0.25	NATIVE - B LAYER – Silty loam, silt, some sand, some clay	429590-03 (0.21-0.25)	

Remarks:

ATTACHMENT 3
Representative Cross-Sections and Sample Locations



SECTION-01
PROFILE VIEW



PLAN VIEW

LEGEND

	EXISTING GROUND NOVEMBER 2014		CONTAMINANT CONCENTRATIONS LESS THAN APPLICABLE STANDARDS
	EXISTING GROUND MAY 2015		ONE OR MORE CONTAMINANT CONCENTRATION EXCEEDS APPLICABLE STANDARDS
	SOIL SAMPLE		
	OFFSET DISTANCE FROM SECTION LINE		
	HAZELTINE CREEK ALIGNMENT - OPTION 3		

NOTE(S)
1. ALL UNITS ARE IN METRES UNLESS OTHERWISE NOTED.

REFERENCE(S)
SOIL SAMPLE LOCATIONS PROVIDED BY SNC LAVALIN, SAMPLED SEPTEMBER 2014.
BASE ORTHOPHOTO OBTAINED FROM SNC LAVALIN (2014).

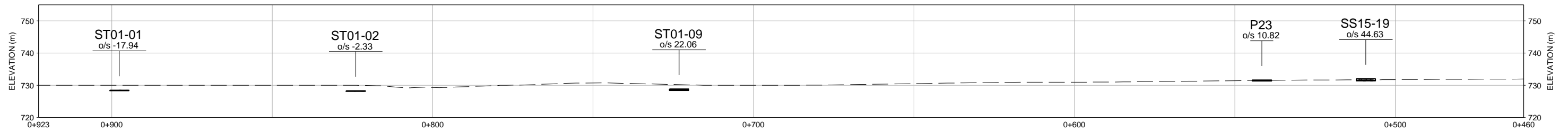


CLIENT	MOUNT POLLEY MINING CORPORATION IMPERIAL METALS	
CONSULTANT	Golder Associates	
DATE	YYYY-MM-DD	2015-11-02
DESIGNED	E. ZAPP-GILJE	
PREPARED	R. WIGGINS	
REVIEWED	A. BRUEMMER	
APPROVED	T. MILLER	

PROJECT	DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT		
TITLE	SOIL SAMPLE CROSS SECTIONS SHEET 1 OF 20		
PROJECT NO.	1411734	PHASE/TASK	11000/2000
REV.	A	REV.	A
FIGURE	01A		

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28 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANS B



SECTION-01
PROFILE VIEW



PLAN VIEW

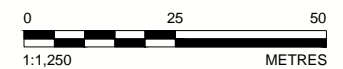
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	EXISTING GROUND NOVEMBER 2014
	EXISTING GROUND MAY 2015
	CONTAMINANT CONCENTRATIONS LESS THAN APPLICABLE STANDARDS
	ONE OR MORE CONTAMINANT CONCENTRATION EXCEEDS APPLICABLE STANDARDS
	SOIL SAMPLE
	OFFSET DISTANCE FROM SECTION LINE
	HAZELTINE CREEK ALIGNMENT - OPTION 3

NOTE(S)
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REFERENCE(S)
SOIL SAMPLE LOCATIONS PROVIDED BY SNC LAVALIN, SAMPLED SEPTEMBER 2014.
BASE ORTHOPHOTO OBTAINED FROM SNC LAVALIN (2014).



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CLIENT
MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

CONSULTANT



YYYY-MM-DD	2015-11-02
DESIGNED	E. ZAPF-GILJE
PREPARED	R. WIGGINS
REVIEWED	A. BRUEMMER
APPROVED	T. MILLER

PROJECT
DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND
ECOLOGICAL RISK ASSESSMENT

ATLÉ
SOIL SAMPLE CROSS SECTIONS SHEET 2 OF 20

PROJECT NO.
1411734

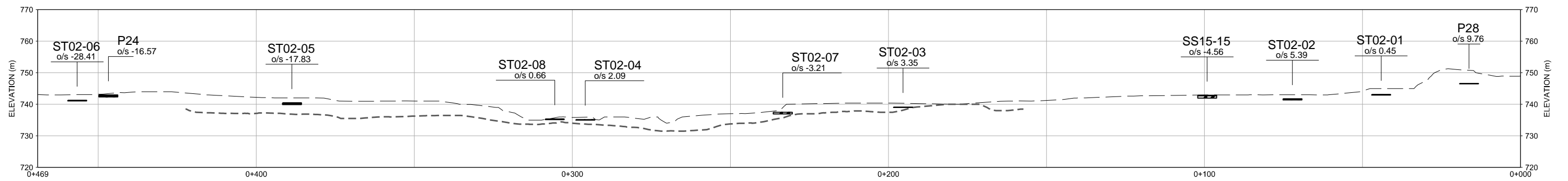
PHASE/TASK
11000/2000

REV.
A

FIGURE
01B

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SECTION-02
PROFILE VIEW



PLAN VIEW

LEGEND

---	EXISTING GROUND NOVEMBER 2014	●	CONTAMINANT CONCENTRATIONS LESS THAN APPLICABLE STANDARDS
---	EXISTING GROUND MAY 2015	●	ONE OR MORE CONTAMINANT CONCENTRATION EXCEEDS APPLICABLE STANDARDS
⊕	SOIL SAMPLE		
o/s	OFFSET DISTANCE FROM SECTION LINE		
---	HAZELTINE CREEK ALIGNMENT - OPTION 3		

NOTE(S)
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REFERENCE(S)
SOIL SAMPLE LOCATIONS PROVIDED BY SNC LAVALIN, SAMPLED SEPTEMBER 2014.
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YYYY-MM-DD	2015-11-02
DESIGNED	E. ZAPF-GILJE
PREPARED	R. WIGGINS
REVIEWED	A. BRUEMMER
APPROVED	T. MILLER

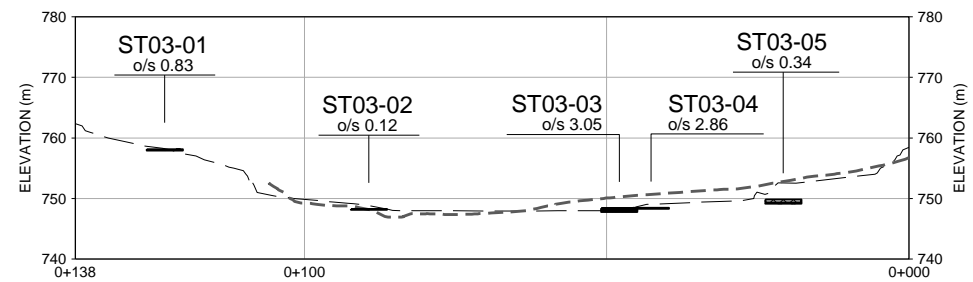
PROJECT
DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND
ECOLOGICAL RISK ASSESSMENT

SOIL SAMPLE CROSS SECTIONS SHEET 02 OF 20

PROJECT NO. 1411734	PHASE/TASK 11000/2000	REV. A	FIGURE 02
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SECTION-03
PROFILE VIEW

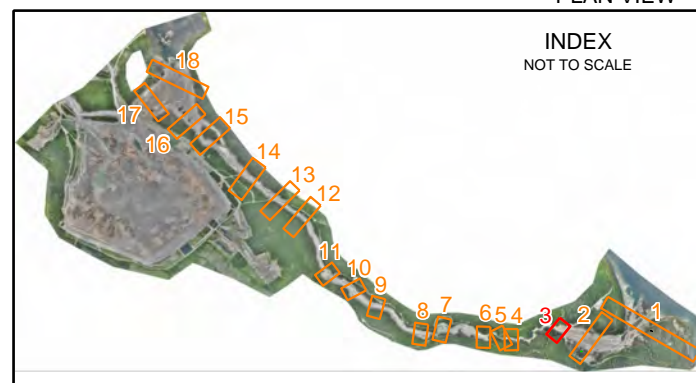


PLAN VIEW

LEGEND			
— — —	EXISTING GROUND NOVEMBER 2014	●	CONTAMINANT CONCENTRATIONS LESS THAN APPLICABLE STANDARDS
— — —	EXISTING GROUND MAY 2015	●	ONE OR MORE CONTAMINANT CONCENTRATION EXCEEDS APPLICABLE STANDARDS
	SOIL SAMPLE		
o/s	OFFSET DISTANCE FROM SECTION LINE		
— — —	HAZELTINE CREEK ALIGNMENT - OPTION 3		

NOTE(S)
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REFERENCE(S)
SOIL SAMPLE LOCATIONS PROVIDED BY SNC LAVALIN, SAMPLED SEPTEMBER 2014.
BASE ORTHOPHOTO OBTAINED FROM SNC LAVALIN (2014).



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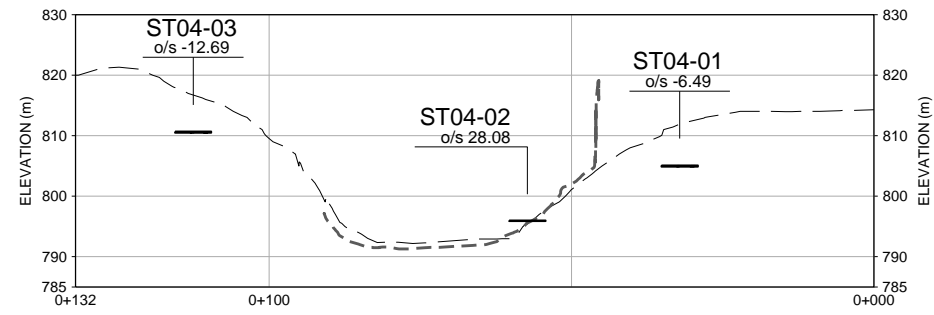


YYYY-MM-DD	2015-11-02
DESIGNED	E. ZAPF-GILJE
PREPARED	R. WIGGINS
REVIEWED	A. BRUEMMER
APPROVED	T. MILLER

PROJECT
DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

ATLÉ
SOIL SAMPLE CROSS SECTIONS SHEET □ OF 20

PROJECT NO.	PHASE/TASK	REV.	FIGURE
1411734	11000/2000	A	03



LEGEND

— — — — —	EXISTING GROUND NOVEMBER 2014	●	CONTAMINANT CONCENTRATIONS LESS THAN APPLICABLE STANDARDS
- - - - -	EXISTING GROUND MAY 2015	●	ONE OR MORE CONTAMINANT CONCENTRATION EXCEEDS APPLICABLE STANDARDS
⊕	SOIL SAMPLE		
o/s	OFFSET DISTANCE FROM SECTION LINE		
— — — — —	HAZELTINE CREEK ALIGNMENT - OPTION 3		

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BASE ORTHOPHOTO OBTAINED FROM SNC LAVALIN (2014).



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MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

CONSULTANT



YYYY-MM-DD	2015-11-02
DESIGNED	E. ZAPP-GILJE
PREPARED	R. WIGGINS
REVIEWED	A. BRUEMMER
APPROVED	T. MILLER

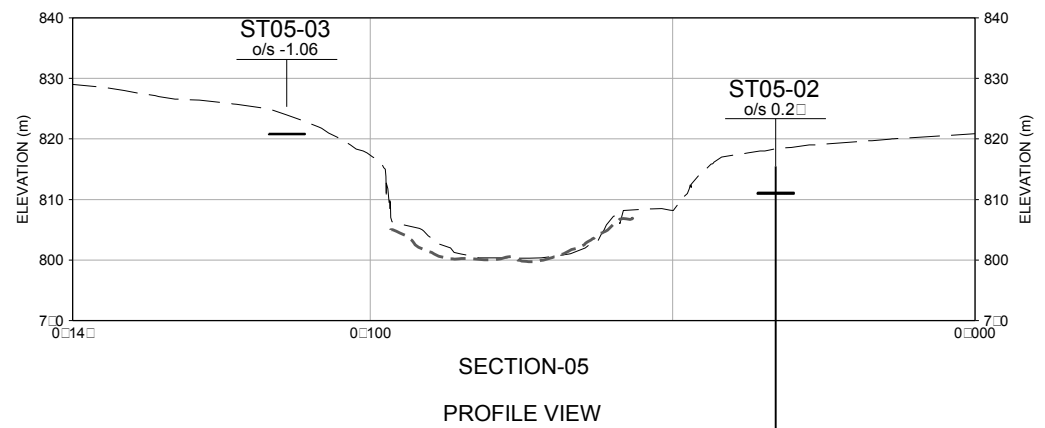
PROJECT
DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

ATL
SOIL SAMPLE CROSS SECTIONS SHEET 5 OF 20

PROJECT NO. 1411734	PHASE/TASK 11000/2000	REV. A	FIGURE 04
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LEGEND

---	EXISTING GROUND NOVEMBER 2014	●	CONTAMINANT CONCENTRATIONS LESS THAN APPLICABLE STANDARDS
---	EXISTING GROUND MAY 2015	●	ONE OR MORE CONTAMINANT CONCENTRATION EXCEEDS APPLICABLE STANDARDS
⊕	SOIL SAMPLE		
o/s	OFFSET DISTANCE FROM SECTION LINE		
---	HAZELTINE CREEK ALIGNMENT - OPTION 3		

NOTE(S)
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REFERENCE(S)
 SOIL SAMPLE LOCATIONS PROVIDED BY SNC LAVALIN, SAMPLED SEPTEMBER 2014.
 BASE ORTHOPHOTO OBTAINED FROM SNC LAVALIN (2014).

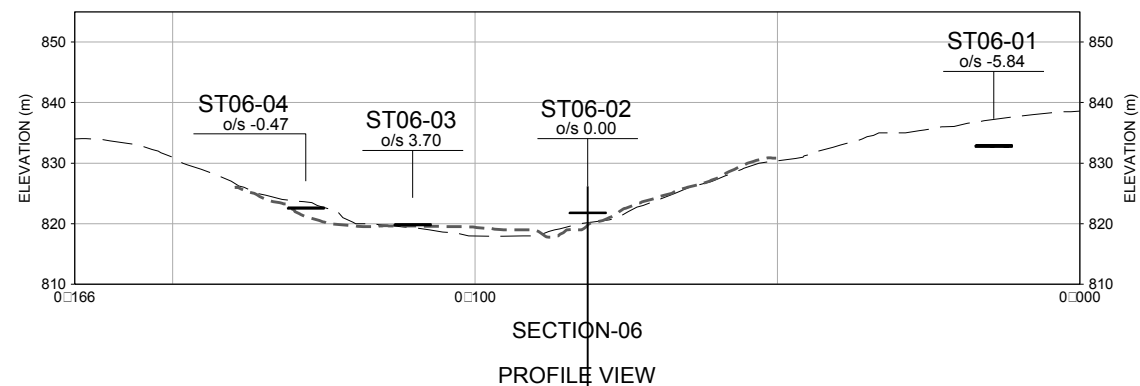


<p>CLIENT MOUNT POLLEY MINING CORPORATION IMPERIAL METALS</p>		<p>PROJECT DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT</p>	
<p>CONSULTANT </p>		<p>YYYY-MM-DD 2015-11-02</p>	<p>TITLE SOIL SAMPLE CROSS SECTIONS SHEET 05 OF 20</p>
		<p>DESIGNED E. ZAPF-GILJE</p>	<p>PROJECT NO. 1411734</p>
		<p>PREPARED R. WIGGINS</p>	<p>PHASE/TASK 11000/2000</p>
		<p>REVIEWED A. BRUEMMER</p>	<p>REV. A</p>
		<p>APPROVED T. MILLER</p>	<p>FIGURE 05</p>



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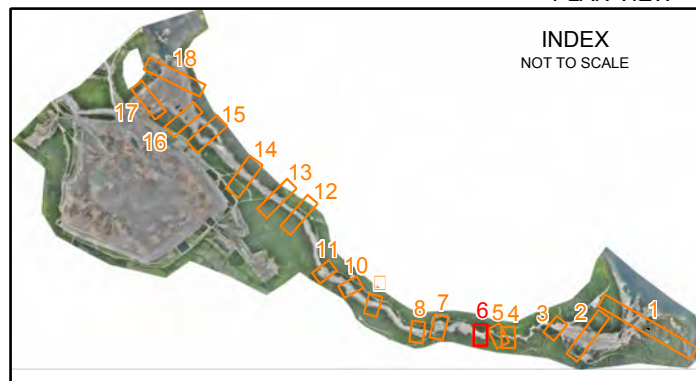


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---	EXISTING GROUND NOVEMBER 2014	●	CONTAMINANT CONCENTRATIONS LESS THAN APPLICABLE STANDARDS
---	EXISTING GROUND MAY 2015	●	ONE OR MORE CONTAMINANT CONCENTRATION EXCEEDS APPLICABLE STANDARDS
⊗	SOIL SAMPLE		
o/s	OFFSET DISTANCE FROM SECTION LINE		
---	HAZELTINE CREEK ALIGNMENT - OPTION 3		

NOTE(S)
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REFERENCE(S)
SOIL SAMPLE LOCATIONS PROVIDED BY SNC LAVALIN, SAMPLED SEPTEMBER 2014.
BASE ORTHOPHOTO OBTAINED FROM SNC LAVALIN (2014).



CLIENT
MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

CONSULTANT



YYYY-MM-DD	2015-11-02
DESIGNED	E. ZAPF-GILJE
PREPARED	R. WIGGINS
REVIEWED	A. BRUEMMER
APPROVED	T. MILLER

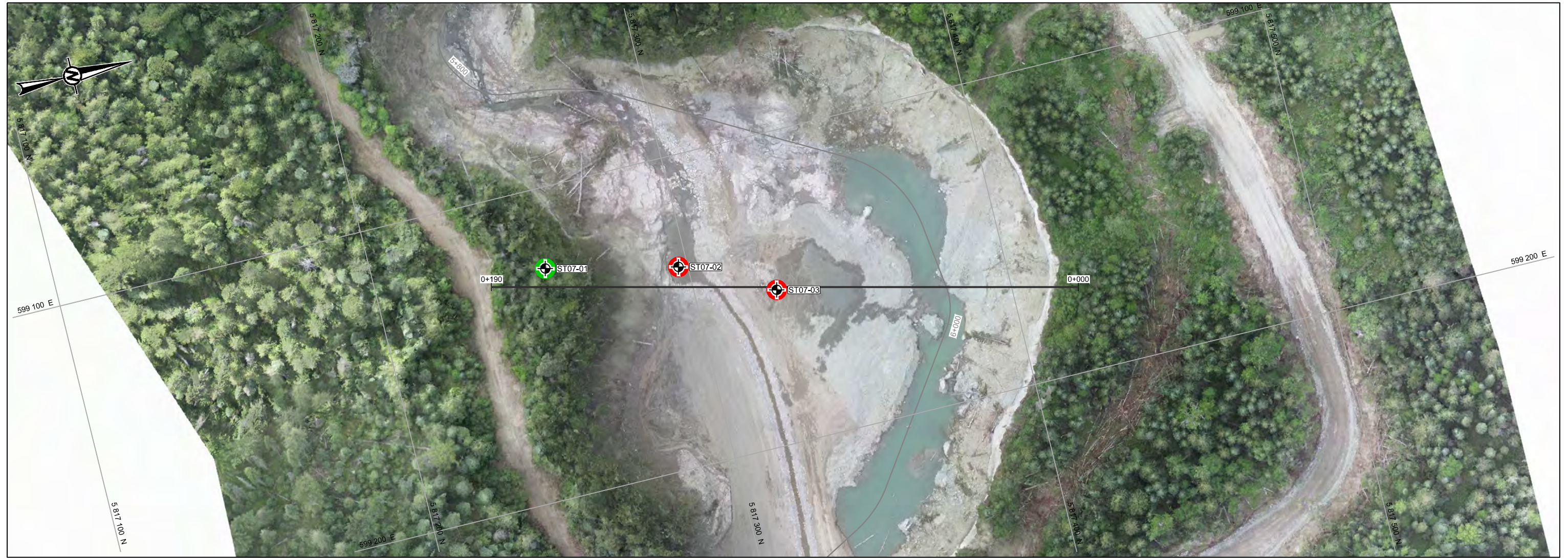
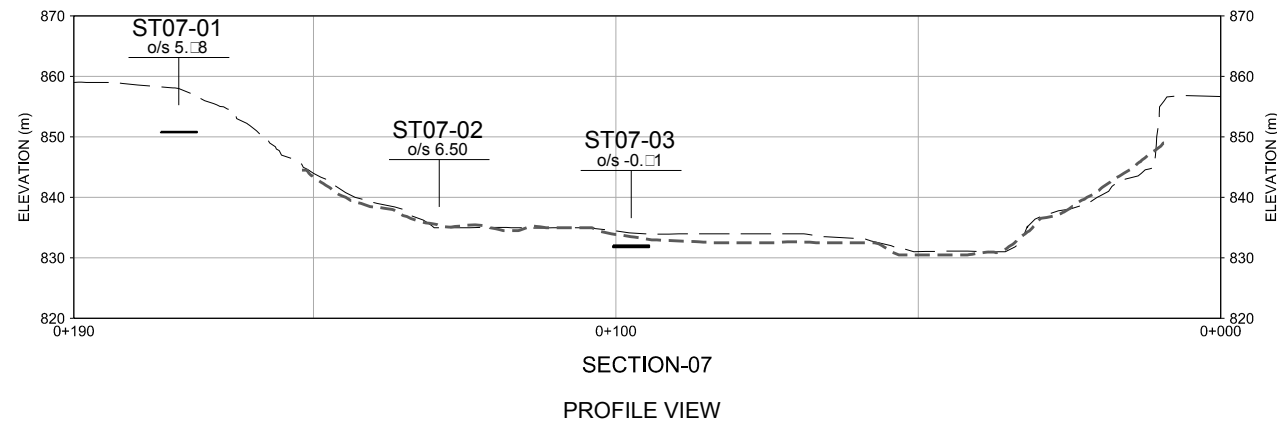
PROJECT
DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND
ECOLOGICAL RISK ASSESSMENT

TITLE
SOIL SAMPLE CROSS SECTIONS SHEET 1 OF 20

PROJECT NO.	PHASE/TASK	REV.	FIGURE
1411734	11000/2000	A	06

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28 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANS B



PLAN VIEW



LEGEND

---	EXISTING GROUND NOVEMBER 2014	●	CONTAMINANT CONCENTRATIONS LESS THAN APPLICABLE STANDARDS
---	EXISTING GROUND MAY 2015	●	ONE OR MORE CONTAMINANT CONCENTRATION EXCEEDS APPLICABLE STANDARDS
⊙	SOIL SAMPLE		
o/s	OFFSET DISTANCE FROM SECTION LINE		
---	HAZELTINE CREEK ALIGNMENT - OPTION 3		

NOTE(S)
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REFERENCE(S)
SOIL SAMPLE LOCATIONS PROVIDED BY SNC LAVALIN, SAMPLED SEPTEMBER 2014.
BASE ORTHOPHOTO OBTAINED FROM SNC LAVALIN (2014).



CLIENT
**MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS**

CONSULTANT



YYYY-MM-DD	2015-11-02
DESIGNED	E. ZAPP-GILJE
PREPARED	R. WIGGINS
REVIEWED	A. BRUEMMER
APPROVED	T. MILLER

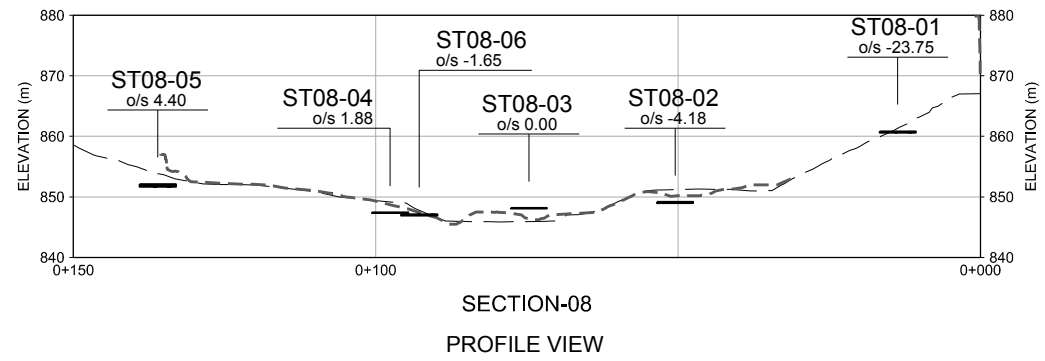
PROJECT
**DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND
ECOLOGICAL RISK ASSESSMENT**

TITLE
SOIL SAMPLE CROSS SECTIONS SHEET 07 OF 20

PROJECT NO.	PHASE/TASK	REV.	FIGURE
1411734	11000/2000	A	07

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28 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANS B



PLAN VIEW

LEGEND

---	EXISTING GROUND NOVEMBER 2014	●	CONTAMINANT CONCENTRATIONS LESS THAN APPLICABLE STANDARDS
---	EXISTING GROUND MAY 2015	●	ONE OR MORE CONTAMINANT CONCENTRATION EXCEEDS APPLICABLE STANDARDS
⊕	SOIL SAMPLE		
o/s	OFFSET DISTANCE FROM SECTION LINE		
---	HAZELTINE CREEK ALIGNMENT - OPTION 3		

NOTE(S)
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REFERENCE(S)
SOIL SAMPLE LOCATIONS PROVIDED BY SNC LAVALIN, SAMPLED SEPTEMBER 2014.
BASE ORTHOPHOTO OBTAINED FROM SNC LAVALIN (2014).

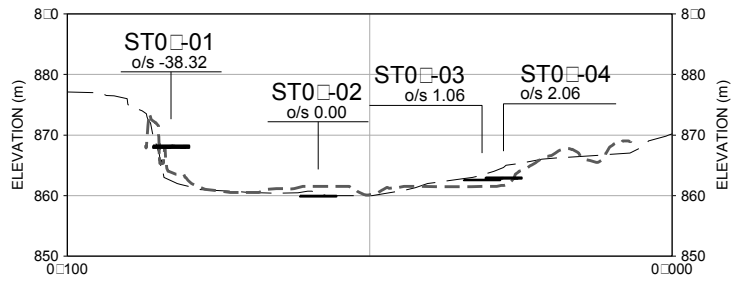


CLIENT	MOUNT POLLEY MINING CORPORATION IMPERIAL METALS	
CONSULTANT	Golder Associates	
DATE	YYYY-MM-DD	2015-11-02
DESIGNED	E. ZAPP-GILJE	
PREPARED	R. WIGGINS	
REVIEWED	A. BRUEMMER	
APPROVED	T. MILLER	

PROJECT	DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT		
TITLE	SOIL SAMPLE CROSS SECTIONS SHEET 08 OF 20		
PROJECT NO.	1411734	PHASE/TASK	11000/2000
REV.	A	REV.	A

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SECTION-01
PROFILE VIEW

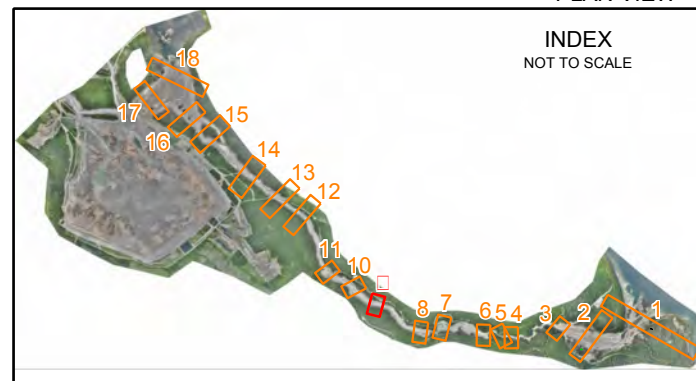


PLAN VIEW

LEGEND	
	EXISTING GROUND NOVEMBER 2014
	EXISTING GROUND MAY 2015
	SOIL SAMPLE
	OFFSET DISTANCE FROM SECTION LINE
	HAZELTINE CREEK ALIGNMENT - OPTION 3
	CONTAMINANT CONCENTRATIONS LESS THAN APPLICABLE STANDARDS
	ONE OR MORE CONTAMINANT CONCENTRATION EXCEEDS APPLICABLE STANDARDS

NOTE(S)
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REFERENCE(S)
SOIL SAMPLE LOCATIONS PROVIDED BY SNC LAVALIN, SAMPLED SEPTEMBER 2014.
BASE ORTHOPHOTO OBTAINED FROM SNC LAVALIN (2014).



CLIENT
MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

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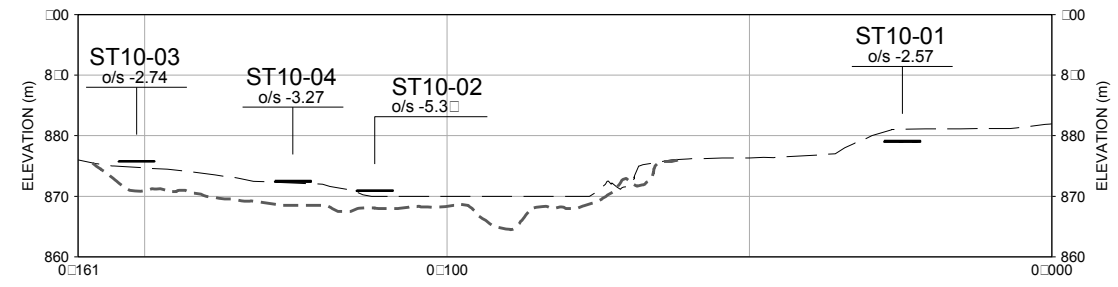
YYYY-MM-DD	2015-11-02
DESIGNED	E. ZAPF-GILJE
PREPARED	R. WIGGINS
REVIEWED	A. BRUEMMER
APPROVED	T. MILLER

PROJECT
DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND
ECOLOGICAL RISK ASSESSMENT

TITLE
SOIL SAMPLE CROSS SECTIONS SHEET 10 OF 20

PROJECT NO.	PHASE/TASK	REV.	FIGURE
1411734	11000/2000	A	0





SECTION-10
PROFILE VIEW



PLAN VIEW

LEGEND

	EXISTING GROUND NOVEMBER 2014		CONTAMINANT CONCENTRATIONS LESS THAN APPLICABLE STANDARDS
	EXISTING GROUND MAY 2015		ONE OR MORE CONTAMINANT CONCENTRATION EXCEEDS APPLICABLE STANDARDS
	SOIL SAMPLE		
	OFFSET DISTANCE FROM SECTION LINE		
	HAZELTINE CREEK ALIGNMENT - OPTION 3		

NOTE(S)
1. ALL UNITS ARE IN METRES UNLESS OTHERWISE NOTED.

REFERENCE(S)
SOIL SAMPLE LOCATIONS PROVIDED BY SNC LAVALIN, SAMPLED SEPTEMBER 2014.
BASE ORTHOPHOTO OBTAINED FROM SNC LAVALIN (2014).



INDEX
NOT TO SCALE

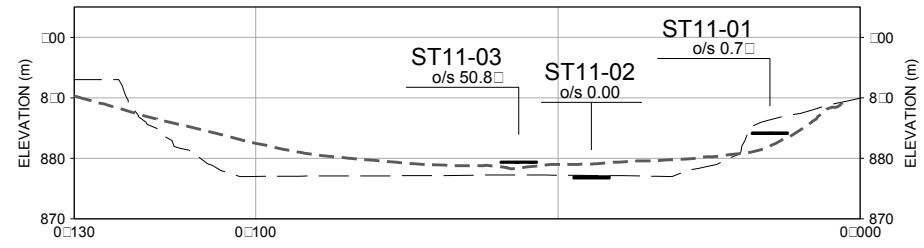


CLIENT	MOUNT POLLEY MINING CORPORATION IMPERIAL METALS	
CONSULTANT	Golder Associates	
DATE	YYYY-MM-DD	2015-11-02
DESIGNED	E. ZAPP-GILJE	
PREPARED	R. WIGGINS	
REVIEWED	A. BRUEMMER	
APPROVED	T. MILLER	

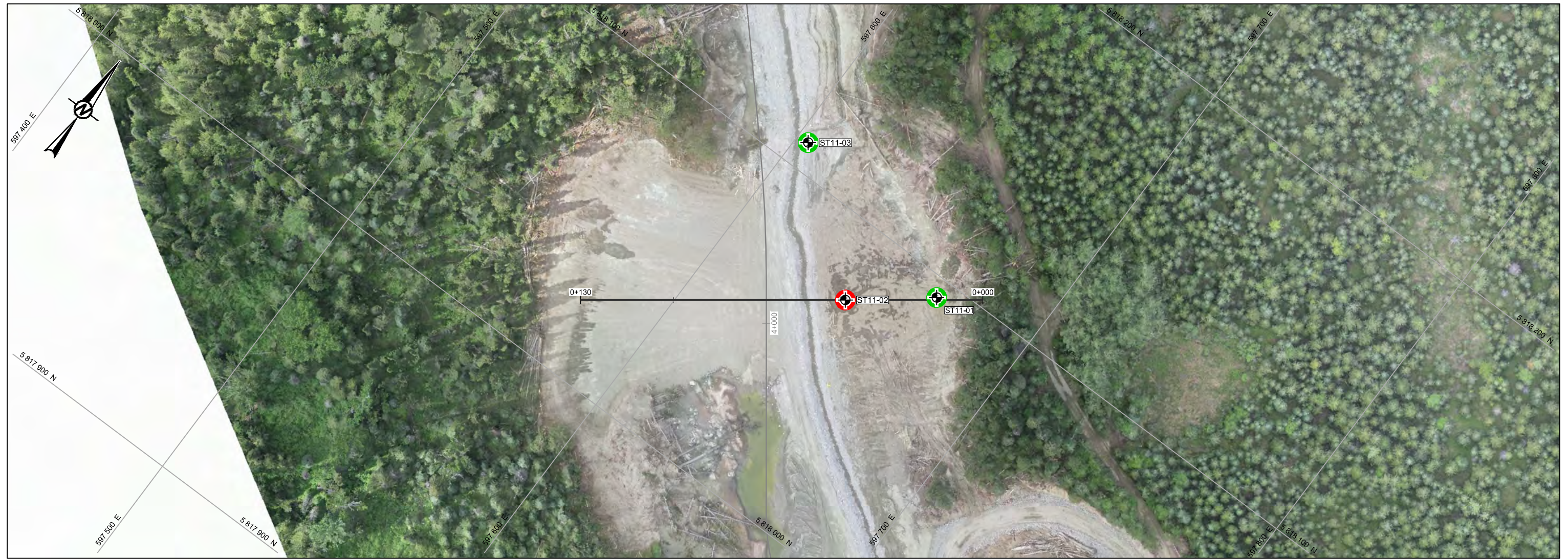
PROJECT	DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT		
TITLE	SOIL SAMPLE CROSS SECTIONS SHEET 11 OF 20		
PROJECT NO.	1411734	PHASE/TASK	11000/2000
REV.	A	REV.	A
FIGURE	10		

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANS B



SECTION-11
PROFILE VIEW



PLAN VIEW

LEGEND

---	EXISTING GROUND NOVEMBER 2014	●	CONTAMINANT CONCENTRATIONS LESS THAN APPLICABLE STANDARDS
---	EXISTING GROUND MAY 2015	●	ONE OR MORE CONTAMINANT CONCENTRATION EXCEEDS APPLICABLE STANDARDS
⊕	SOIL SAMPLE		
o/s	OFFSET DISTANCE FROM SECTION LINE		
---	HAZELTINE CREEK ALIGNMENT - OPTION 3		

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REFERENCE(S)
SOIL SAMPLE LOCATIONS PROVIDED BY SNC LAVALIN, SAMPLED SEPTEMBER 2014.
BASE ORTHOPHOTO OBTAINED FROM SNC LAVALIN (2014).



CLIENT
MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

CONSULTANT

YYYY-MM-DD	2015-11-02
DESIGNED	E. ZAPF-GILJE
PREPARED	R. WIGGINS
REVIEWED	A. BRUEMMER
APPROVED	T. MILLER



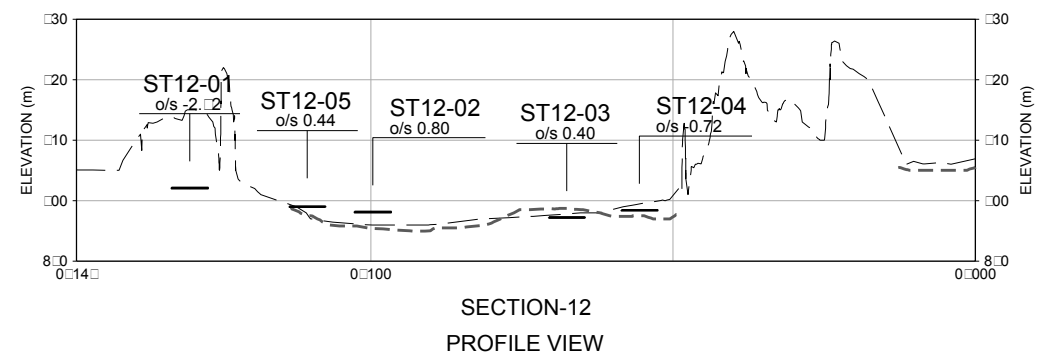
PROJECT
DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

TITLE
SOIL SAMPLE CROSS SECTIONS SHEET 12 OF 20

PROJECT NO.	PHASE/TASK	REV.	FIGURE
1411734	11000/2000	A	11

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANS B 28 mm



PLAN VIEW

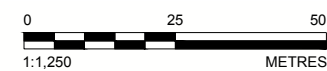
LEGEND	
	EXISTING GROUND NOVEMBER 2014
	EXISTING GROUND MAY 2015
	CONTAMINANT CONCENTRATIONS LESS THAN APPLICABLE STANDARDS
	ONE OR MORE CONTAMINANT CONCENTRATION EXCEEDS APPLICABLE STANDARDS
	SOIL SAMPLE
	OFFSET DISTANCE FROM SECTION LINE
	HAZELTINE CREEK ALIGNMENT - OPTION 3

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REFERENCE(S)
SOIL SAMPLE LOCATIONS PROVIDED BY SNC LAVALIN, SAMPLED SEPTEMBER 2014.
BASE ORTHOPHOTO OBTAINED FROM SNC LAVALIN (2014).



INDEX
NOT TO SCALE



CLIENT
MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

CONSULTANT



YYYY-MM-DD	2015-11-02
DESIGNED	E. ZAPP-GILJE
PREPARED	R. WIGGINS
REVIEWED	A. BRUEMMER
APPROVED	T. MILLER

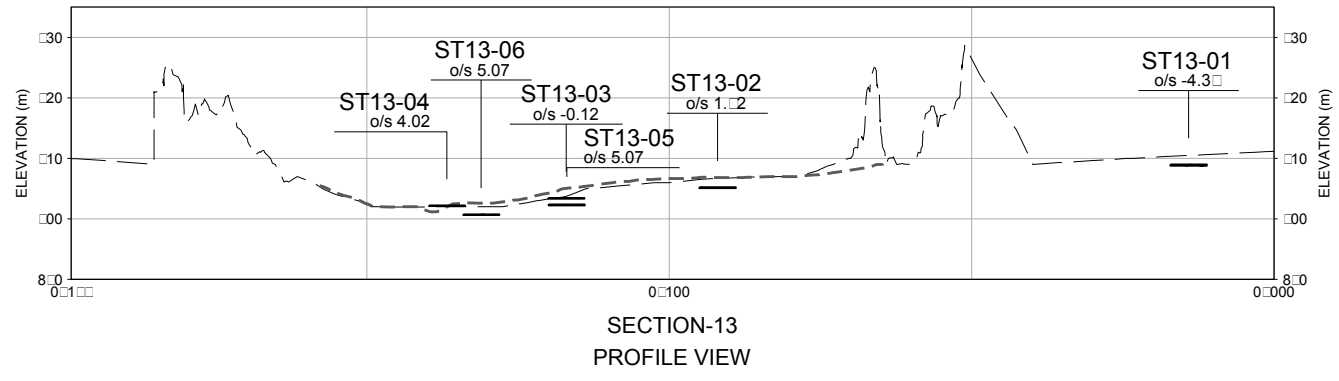
PROJECT
DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND
ECOLOGICAL RISK ASSESSMENT

TITLE
SOIL SAMPLE CROSS SECTIONS SHEET 1 OF 20

PROJECT NO.	PHASE/TASK	REV.	FIGURE
1411734	11000/2000	A	12

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28 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANS B

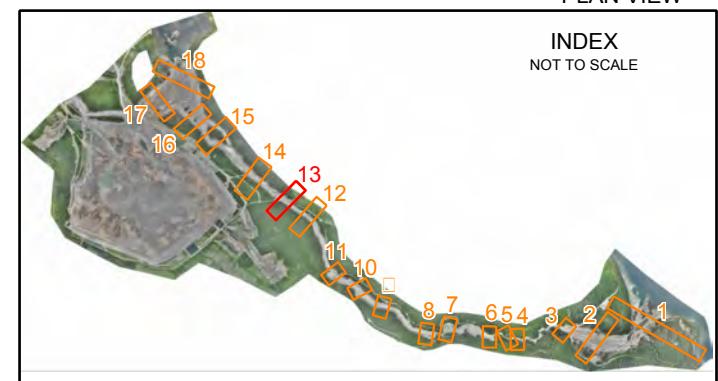


LEGEND

— — — — —	EXISTING GROUND NOVEMBER 2014	●	CONTAMINANT CONCENTRATIONS LESS THAN APPLICABLE STANDARDS
- - - - -	EXISTING GROUND MAY 2015	●	ONE OR MORE CONTAMINANT CONCENTRATION EXCEEDS APPLICABLE STANDARDS
⊙	SOIL SAMPLE		
o/s	OFFSET DISTANCE FROM SECTION LINE		
— — — — —	HAZELTINE CREEK ALIGNMENT - OPTION 3		

NOTE(S)
1. ALL UNITS ARE IN METRES UNLESS OTHERWISE NOTED.

REFERENCE(S)
SOIL SAMPLE LOCATIONS PROVIDED BY SNC LAVALIN, SAMPLED SEPTEMBER 2014.
BASE ORTHOPHOTO OBTAINED FROM SNC LAVALIN (2014).



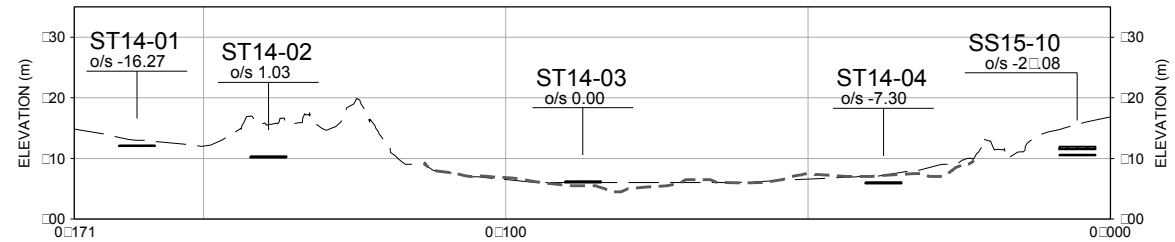
CLIENT	MOUNT POLLEY MINING CORPORATION
PROJECT	IMPERIAL METALS
CONSULTANT	Golder Associates
DATE	2015-11-02
DESIGNED	E. ZAPF-GILJE
PREPARED	R. WIGGINS
REVIEWED	A. BRUEMMER
APPROVED	T. MILLER

PROJECT	DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT
TITLE	SOIL SAMPLE CROSS SECTIONS SHEET 1 OF 20
PROJECT NO.	1411734
PHASE/TASK	11000/2000
REV.	A
FIGURE	13



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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANS B



SECTION-14
PROFILE VIEW



PLAN VIEW

LEGEND	
	EXISTING GROUND NOVEMBER 2014
	EXISTING GROUND MAY 2015
	SOIL SAMPLE
	OFFSET DISTANCE FROM SECTION LINE
	HAZELTINE CREEK ALIGNMENT - OPTION 3
	CONTAMINANT CONCENTRATIONS LESS THAN APPLICABLE STANDARDS
	ONE OR MORE CONTAMINANT CONCENTRATION EXCEEDS APPLICABLE STANDARDS

NOTE(S)
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REFERENCE(S)
SOIL SAMPLE LOCATIONS PROVIDED BY SNC LAVALIN, SAMPLED SEPTEMBER 2014.
BASE ORTHOPHOTO OBTAINED FROM SNC LAVALIN (2014).



INDEX
NOT TO SCALE



CLIENT
MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

CONSULTANT



YYYY-MM-DD 2015-11-02
DESIGNED E. ZAPF-GILJE
PREPARED R. WIGGINS
REVIEWED A. BRUEMMER
APPROVED T. MILLER

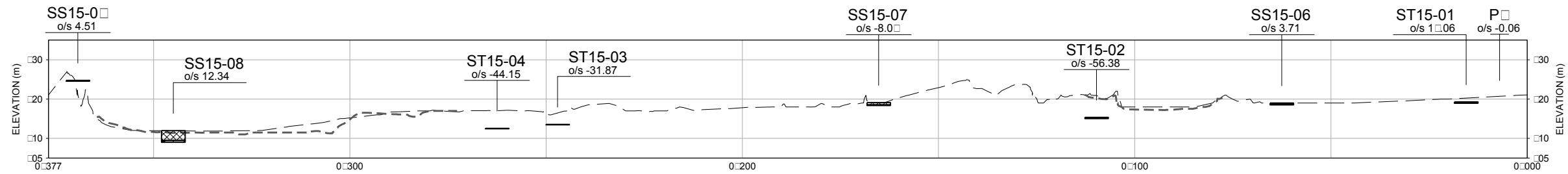
PROJECT
DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND
ECOLOGICAL RISK ASSESSMENT

TITLE
SOIL SAMPLE CROSS SECTIONS SHEET 15 OF 20

PROJECT NO. 1411734	PHASE/TASK 11000/2000	REV. A	FIGURE 14
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANS B 28 mm



SECTION-15
PROFILE VIEW



PLAN VIEW

LEGEND

— — — — —	EXISTING GROUND NOVEMBER 2014	●	CONTAMINANT CONCENTRATIONS LESS THAN APPLICABLE STANDARDS
- - - - -	EXISTING GROUND MAY 2015	●	ONE OR MORE CONTAMINANT CONCENTRATION EXCEEDS APPLICABLE STANDARDS
⊕	SOIL SAMPLE		
o/s	OFFSET DISTANCE FROM SECTION LINE		
— — — — —	HAZELTINE CREEK ALIGNMENT - OPTION 3		

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REFERENCE(S)
SOIL SAMPLE LOCATIONS PROVIDED BY SNC LAVALIN, SAMPLED SEPTEMBER 2014.
BASE ORTHOPHOTO OBTAINED FROM SNC LAVALIN (2014).



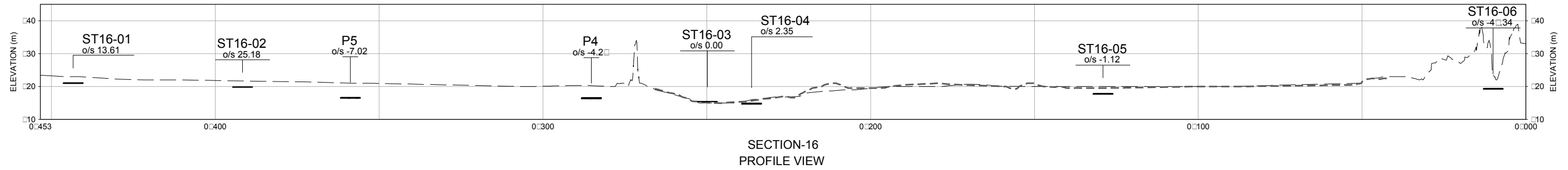
CLIENT	MOUNT POLLEY MINING CORPORATION IMPERIAL METALS	
CONSULTANT	Golder Associates	
DATE	YYYY-MM-DD	2015-11-02
DESIGNED	E. ZAPP-GILJE	
PREPARED	R. WIGGINS	
REVIEWED	A. BRUEMMER	
APPROVED	T. MILLER	

PROJECT	DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT		
TITLE	SOIL SAMPLE CROSS SECTIONS SHEET 1 OF 20		
PROJECT NO.	1411734	PHASE/TASK	11000/2000
REV.	A	REV.	A
FIGURE	15		



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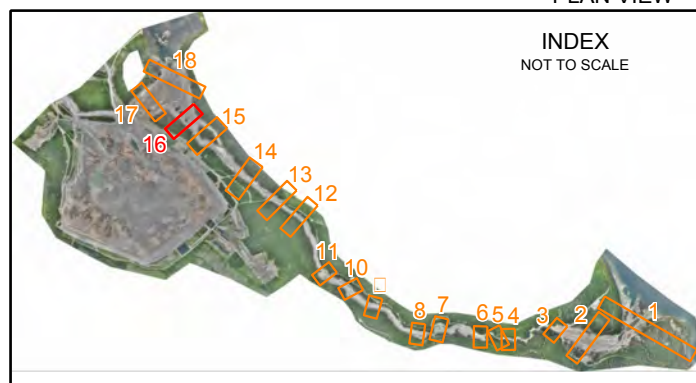


LEGEND

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	EXISTING GROUND MAY 2015		ONE OR MORE CONTAMINANT CONCENTRATION EXCEEDS APPLICABLE STANDARDS
	SOIL SAMPLE		
	OFFSET DISTANCE FROM SECTION LINE		
	HAZELTINE CREEK ALIGNMENT - OPTION 3		

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BASE ORTHOPHOTO OBTAINED FROM SNC LAVALIN (2014).



CLIENT
MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

CONSULTANT

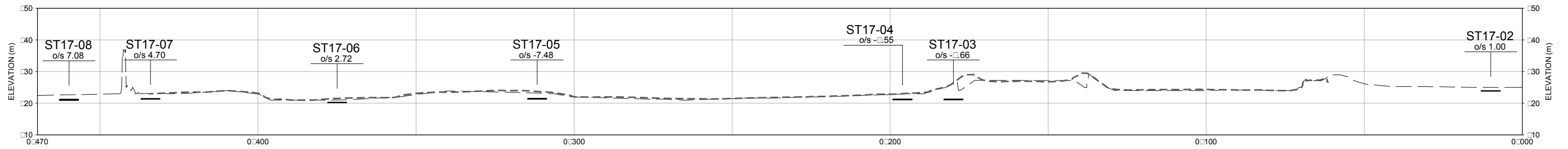


YYYY-MM-DD	2015-11-02
DESIGNED	E. ZAPP-GILJE
PREPARED	R. WIGGINS
REVIEWED	A. BRUEMMER
APPROVED	T. MILLER

PROJECT
DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

TITLE
SOIL SAMPLE CROSS SECTIONS SHEET 1 OF 20

PROJECT NO.	PHASE/TASK	REV.	FIGURE
1411734	11000/2000	A	16



SECTION-17
PROFILE VIEW



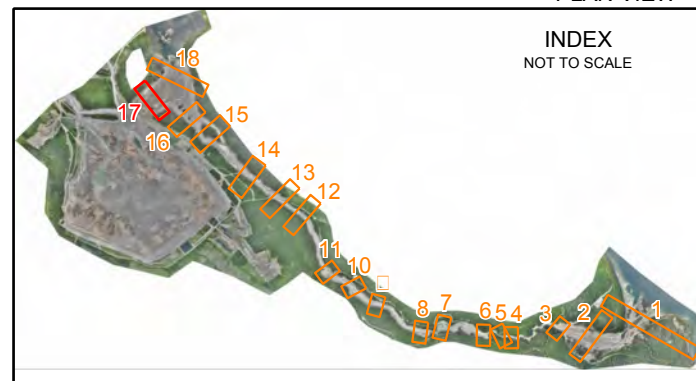
PLAN VIEW

LEGEND

— — — — —	EXISTING GROUND NOVEMBER 2014	●	CONTAMINANT CONCENTRATIONS LESS THAN APPLICABLE STANDARDS
- - - - -	EXISTING GROUND MAY 2015	●	ONE OR MORE CONTAMINANT CONCENTRATION EXCEEDS APPLICABLE STANDARDS
⊕	SOIL SAMPLE		
o/s	OFFSET DISTANCE FROM SECTION LINE		
— — — — —	HAZELTINE CREEK ALIGNMENT - OPTION 3		

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BASE ORTHOPHOTO OBTAINED FROM SNC LAVALIN (2014).



INDEX
NOT TO SCALE



CLIENT
MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

CONSULTANT

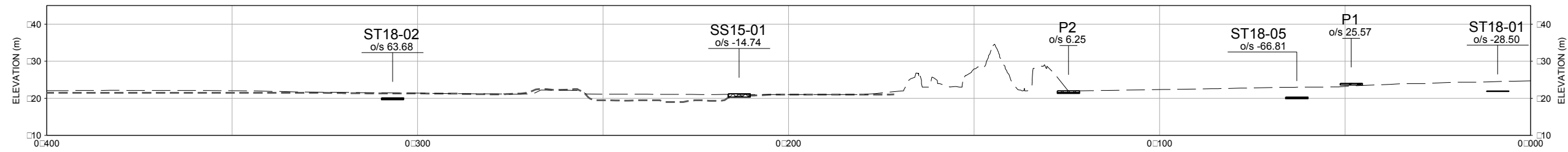


YYYY-MM-DD	2015-11-02
DESIGNED	E. ZAPP-GILJE
PREPARED	R. WIGGINS
REVIEWED	A. BRUEMMER
APPROVED	T. MILLER

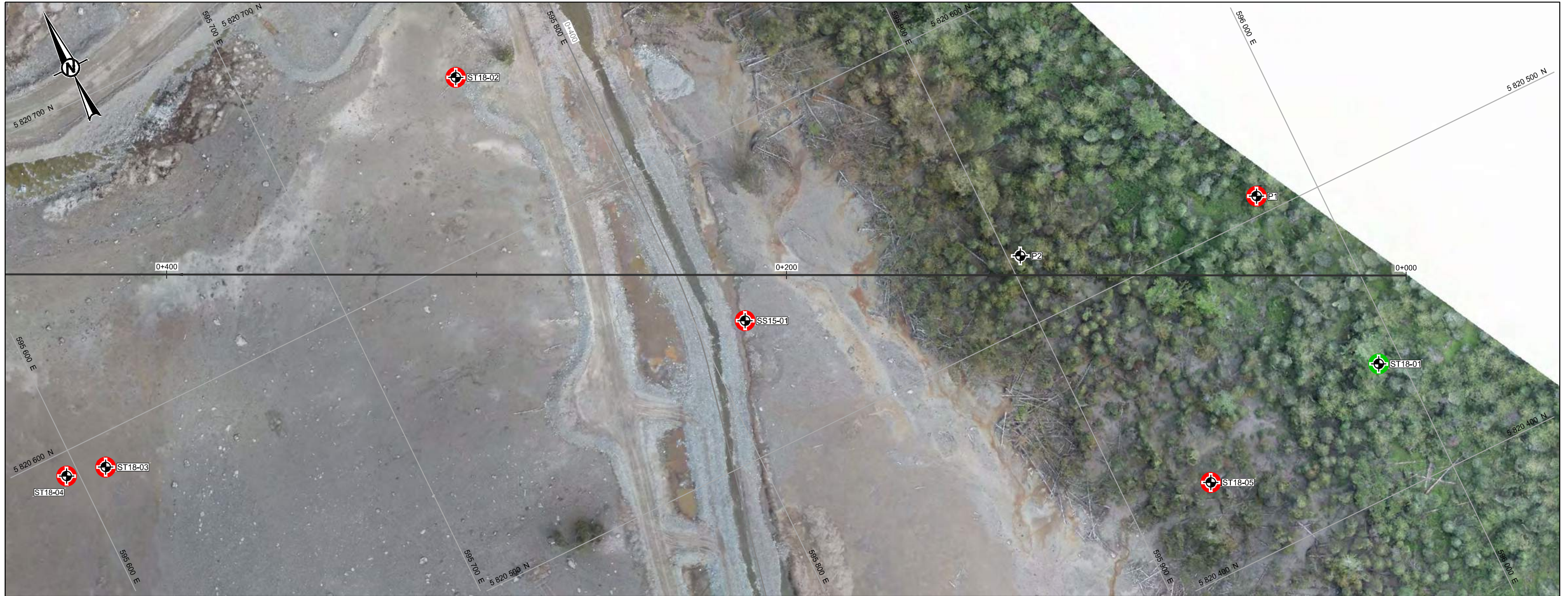
PROJECT
DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND
ECOLOGICAL RISK ASSESSMENT

TITLE
SOIL SAMPLE CROSS SECTIONS SHEET 1 OF 20

PROJECT NO.	PHASE/TASK	REV.	FIGURE
1411734	11000/2000	A	17



SECTION-18
PROFILE VIEW



PLAN VIEW

LEGEND

---	EXISTING GROUND NOVEMBER 2014	●	CONTAMINANT CONCENTRATIONS LESS THAN APPLICABLE STANDARDS
- - -	EXISTING GROUND MAY 2015	●	ONE OR MORE CONTAMINANT CONCENTRATION EXCEEDS APPLICABLE STANDARDS
⊕	SOIL SAMPLE		
o/s	OFFSET DISTANCE FROM SECTION LINE		
---	HAZELTINE CREEK ALIGNMENT - OPTION 3		

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BASE ORTHOPHOTO OBTAINED FROM SNC LAVALIN (2014).



CLIENT
MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

CONSULTANT

YYYY-MM-DD	2015-11-02
DESIGNED	E. ZAPF-GILJE
PREPARED	R. WIGGINS
REVIEWED	A. BRUEMMER
APPROVED	T. MILLER



PROJECT
DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

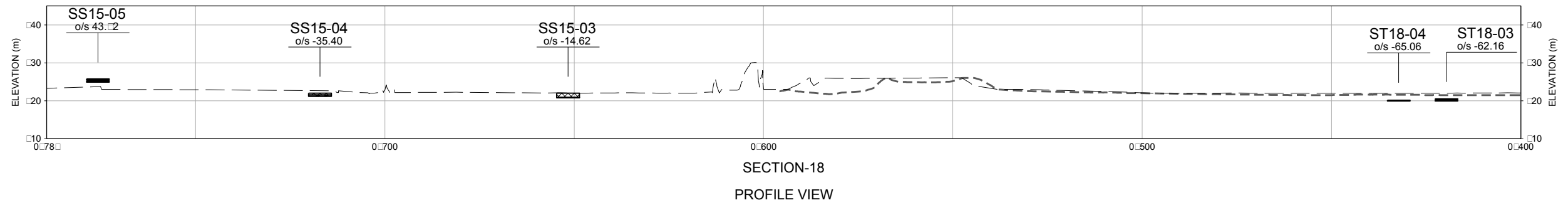
TITLE
SOIL SAMPLE CROSS SECTIONS SHEET 1 OF 20

PROJECT NO.	PHASE/TASK	REV.	FIGURE
1411734	11000/2000	A	18A



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28 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANS B

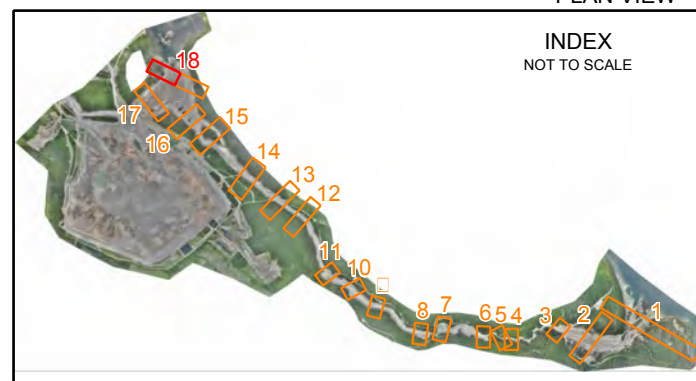


LEGEND

EXISTING GROUND NOVEMBER 2014	CONTAMINANT CONCENTRATIONS LESS THAN APPLICABLE STANDARDS
EXISTING GROUND MAY 2015	ONE OR MORE CONTAMINANT CONCENTRATION EXCEEDS APPLICABLE STANDARDS
SOIL SAMPLE	
OFFSET DISTANCE FROM SECTION LINE	
HAZELTINE CREEK ALIGNMENT - OPTION 3	

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 BASE ORTHOPHOTO OBTAINED FROM SNC LAVALIN (2014).



CLIENT
 MOUNT POLLEY MINING CORPORATION
 IMPERIAL METALS

CONSULTANT



YYYY-MM-DD 2015-11-02
 DESIGNED E. ZAPF-GILJE
 PREPARED R. WIGGINS
 REVIEWED A. BRUEMMER
 APPROVED T. MILLER

PROJECT
 DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND
 ECOLOGICAL RISK ASSESSMENT

TITLE
 SOIL SAMPLE CROSS SECTIONS SHEET 20 OF 20

PROJECT NO.	PHASE/TASK	REV.	FIGURE
1411734	11000/2000	---	18B

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANS B

ATTACHMENT 4
Laboratory Certificates of Analysis



GOLDER ASSOCIATES LTD.
ATTN: Evin Zapf-Gilje
200-2920 Virtual Way
Vancouver BC V5M 0C4

Date Received: 07-AUG-15
Report Date: 26-OCT-15 15:30 (MT)
Version: FINAL REV. 3

Client Phone: 604-298-6623

Certificate of Analysis

Lab Work Order #: L1654527
Project P.O. #: NOT SUBMITTED
Job Reference: GOL200-MPM100-VA
C of C Numbers: 08-028545, 10-384855, 10-384856, 10-384857, 10-384858, 10-384859, 10-389818, 10-389819, 10-389820, 10-389821, 10-471688, 14-429590
Legal Site Desc:

Comments:

pH ratio adjustments have been applied to several samples due to matrix absorbency leading to lower dry weight. Samples with pH ratio adjustments: 2, 19, 34, 61, 68, 83, 90, 94, 98, 99, 107, 113, 117, 122, 124, 127, and 128. Please have this in consideration when reviewing the results.

22-SEP-2015 Metals/pH data has been added for L1654527-136.

26-OCT-2015 Metals data has been added for L1654527 -90 and -103.

Amber Springer, B.Sc
Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1654527-1 Soil 29-JUL-15 384855-01	L1654527-2 Soil 29-JUL-15 384855-02	L1654527-3 Soil 29-JUL-15 384855-03	L1654527-4 Soil 29-JUL-15 384855-04	L1654527-5 Soil 29-JUL-15 384855-05	
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	19.4	77.7	46.9	22.2	6.71
	pH (1:2 soil:water) (pH)	8.46	6.30	6.69	8.41	8.51
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)	<2.2	38.7	24.4	<2.2	<2.2
	Oxidation-Reduction Potential (ORP) (mV)	292	351	323	272	279
Anions and Nutrients	Total Nitrogen by LECO (%)	0.041	0.589	0.278	0.038	0.043
Organic / Inorganic Carbon	Total Carbon by Combustion (%)	0.3	18.4	4.3	0.5	0.3
Plant Available Nutrients	Available Ammonium-N (mg/kg)	1.7	38.7 ^{DLM}	24.4	2.0	<1.0
	Available Nitrate-N (mg/kg)	<1.0	<6.0 ^{DLM}	<1.0	<1.0	<1.0
	Nitrate+Nitrite-N (mg/kg)	<2.0	<6.0 ^{DLM}	<2.0	<2.0	<2.0
	Nitrate-N (mg/kg)	<2.0	<6.0 ^{DLM}	<2.0	<2.0	<2.0
	Nitrite-N (mg/kg)	<0.50	<1.2 ^{DLM}	<0.50	<0.50	<0.50
	Available Phosphate-P (mg/kg)	<2.0	10.2	19.7	<2.0	<2.0
	Available Potassium (mg/kg)	65	117	166	222	55
	Available Sulfate-S (mg/kg)	15.2	60.4 ^{DLM}	9.6	57.7	20.0
Metals	Antimony (Sb) (mg/kg)	0.36	0.29	0.34		
	Arsenic (As) (mg/kg)	11.3	4.84	7.81		
	Barium (Ba) (mg/kg)	120	193	197		
	Beryllium (Be) (mg/kg)	0.55	0.31	0.75		
	Cadmium (Cd) (mg/kg)	0.167	0.426	0.439		
	Chromium (Cr) (mg/kg)	11.7	13.7	37.4		
	Cobalt (Co) (mg/kg)	14.7	9.39	16.3		
	Copper (Cu) (mg/kg)	881	352	412		
	Lead (Pb) (mg/kg)	4.69	6.29	7.67		
	Mercury (Hg) (mg/kg)	0.079	0.223	0.060		
	Molybdenum (Mo) (mg/kg)	4.49	3.50	2.94		
	Nickel (Ni) (mg/kg)	6.97	12.2	22.9		
	Selenium (Se) (mg/kg)	1.08	0.60	0.53		
	Silver (Ag) (mg/kg)	0.39	0.22	0.42		
	Thallium (Tl) (mg/kg)	<0.050	<0.050	0.080		
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0		
	Uranium (U) (mg/kg)	0.954	0.633	0.842		
	Vanadium (V) (mg/kg)	257	74.7	152		
	Zinc (Zn) (mg/kg)	52.7	106	94.9		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	Description	L1654527-6	L1654527-7	L1654527-8	L1654527-9	L1654527-10
	Soil	Soil	Soil	Soil	Soil	Soil
	Sampled Date	29-JUL-15	29-JUL-15	29-JUL-15	29-JUL-15	29-JUL-15
	Sampled Time					
	Client ID	384855-06	384855-07	384855-08	384855-09	384855-10
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	6.34	40.7	20.5	47.4	45.7
	pH (1:2 soil:water) (pH)	8.55	5.99	8.40	6.04	6.00
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)	<2.2	9.3	5.4	29.1	27.9
	Oxidation-Reduction Potential (ORP) (mV)	291	330	284	349	349
Anions and Nutrients	Total Nitrogen by LECO (%)	0.033	0.305	0.047	0.290	0.456
Organic / Inorganic Carbon	Total Carbon by Combustion (%)	0.3	7.2	0.4	5.9	7.9
Plant Available Nutrients	Available Ammonium-N (mg/kg)	1.6	9.3 ^{DLM}	5.4	29.1 ^{DLM}	27.9 ^{DLM}
	Available Nitrate-N (mg/kg)	<1.0	<1.0 ^{DLM}	<1.0	<4.0 ^{DLM}	<4.0 ^{DLM}
	Nitrate+Nitrite-N (mg/kg)	<2.0	<4.0 ^{DLM}	<2.0	<4.0 ^{DLM}	<4.0 ^{DLM}
	Nitrate-N (mg/kg)	<2.0	<4.0 ^{DLM}	<2.0	<4.0 ^{DLM}	<4.0 ^{DLM}
	Nitrite-N (mg/kg)	<0.50	<0.80 ^{DLM}	<0.50	<0.80 ^{DLM}	<0.80 ^{DLM}
	Available Phosphate-P (mg/kg)	<2.0	3.9	<2.0	4.1	4.4
	Available Potassium (mg/kg)	63	77	57	107	126
	Available Sulfate-S (mg/kg)	24.4	93.8	4.8	22.9 ^{DLM}	15.2 ^{DLM}
Metals	Antimony (Sb) (mg/kg)			0.30	0.26	0.32
	Arsenic (As) (mg/kg)			8.80	5.43	4.67
	Barium (Ba) (mg/kg)			115	138	144
	Beryllium (Be) (mg/kg)			0.46	0.65	0.65
	Cadmium (Cd) (mg/kg)			0.133	0.329	0.293
	Chromium (Cr) (mg/kg)			8.72	49.3	49.8
	Cobalt (Co) (mg/kg)			12.8	20.4	26.0
	Copper (Cu) (mg/kg)			1030	73.0	75.2
	Lead (Pb) (mg/kg)			3.84	13.6	17.4
	Mercury (Hg) (mg/kg)			0.080	0.125	0.063
	Molybdenum (Mo) (mg/kg)			4.43	1.82	1.63
	Nickel (Ni) (mg/kg)			6.06	26.9	28.8
	Selenium (Se) (mg/kg)			1.06	0.36	0.22
	Silver (Ag) (mg/kg)			0.40	1.20	0.51
	Thallium (Tl) (mg/kg)			<0.050	0.157	0.164
	Tin (Sn) (mg/kg)			<2.0	<2.0	<2.0
	Uranium (U) (mg/kg)			0.588	0.976	0.736
	Vanadium (V) (mg/kg)			176	92.4	82.2
	Zinc (Zn) (mg/kg)			43.9	70.6	93.8

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1654527-11 Soil 29-JUL-15 384855-11	L1654527-12 Soil 29-JUL-15 384855-12	L1654527-13 Grab 29-JUL-15 13:00 08-028545-01	L1654527-14 Grab 29-JUL-15 13:00 08-028545-02	L1654527-15 Grab 29-JUL-15 13:00 08-028545-03
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	22.4				
	pH (1:2 soil:water) (pH)	5.79	7.76	8.08	8.16	8.26
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)	9.4				
	Oxidation-Reduction Potential (ORP) (mV)	435				
Anions and Nutrients	Total Nitrogen by LECO (%)	0.110				
Organic / Inorganic Carbon	Total Carbon by Combustion (%)	1.1				
Plant Available Nutrients	Available Ammonium-N (mg/kg)	9.4				
	Available Nitrate-N (mg/kg)	<1.0				
	Nitrate+Nitrite-N (mg/kg)	<2.0				
	Nitrate-N (mg/kg)	<2.0				
	Nitrite-N (mg/kg)	<0.50				
	Available Phosphate-P (mg/kg)	2.7				
	Available Potassium (mg/kg)	47				
	Available Sulfate-S (mg/kg)	<3.0				
Metals	Antimony (Sb) (mg/kg)		0.43	0.52	0.43	0.38
	Arsenic (As) (mg/kg)		12.4	15.1	12.1	12.0
	Barium (Ba) (mg/kg)		177	223	181	185
	Beryllium (Be) (mg/kg)		0.63	0.84	0.64	0.65
	Cadmium (Cd) (mg/kg)		0.145	0.175	0.155	0.147
	Chromium (Cr) (mg/kg)		11.3	11.2	10.1	10.1
	Cobalt (Co) (mg/kg)		17.1	20.8	18.0	18.0
	Copper (Cu) (mg/kg)		807	903	844	882
	Lead (Pb) (mg/kg)		5.43	6.94	5.25	5.56
	Mercury (Hg) (mg/kg)		0.070	0.080	0.068	0.066
	Molybdenum (Mo) (mg/kg)		4.31	5.72	4.85	5.26
	Nickel (Ni) (mg/kg)		8.67	10.7	8.39	8.43
	Selenium (Se) (mg/kg)		1.08	1.18	1.13	1.12
	Silver (Ag) (mg/kg)		0.33	0.46	0.34	0.34
	Thallium (Tl) (mg/kg)		<0.050	<0.050	<0.050	<0.050
	Tin (Sn) (mg/kg)		<2.0	<2.0	<2.0	<2.0
	Uranium (U) (mg/kg)		1.04	1.33	1.01	0.956
	Vanadium (V) (mg/kg)		200	185	193	192
	Zinc (Zn) (mg/kg)		60.5	82.0	59.9	60.6

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

26-OCT-15 15:30 (MT)

Version: FINAL REV. 3

Sample ID Description Sampled Date Sampled Time Client ID	L1654527-16 Grab 29-JUL-15 13:00 08-028545-04	L1654527-17 Grab 29-JUL-15 16:00 08-028545-09	L1654527-18 Grab 29-JUL-15 16:00 08-028545-10	L1654527-19 Grab 29-JUL-15 16:00 08-028545-11	L1654527-20 Grab 29-JUL-15 16:00 08-028545-12
Grouping	Analyte				
SOIL					
Physical Tests	Moisture (%)				59.3
	pH (1:2 soil:water) (pH)				8.35
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)				8.64
	Oxidation-Reduction Potential (ORP) (mV)				8.82
Anions and Nutrients	Total Nitrogen by LECO (%)				6.27
Organic / Inorganic Carbon	Total Carbon by Combustion (%)				8.84
Plant Available Nutrients	Available Ammonium-N (mg/kg)				34.5
	Available Nitrate-N (mg/kg)				365
	Nitrate+Nitrite-N (mg/kg)				0.427
	Nitrate-N (mg/kg)				7.1
	Nitrite-N (mg/kg)				34.5 ^{DLM}
	Available Phosphate-P (mg/kg)				<6.0 ^{DLM}
	Available Potassium (mg/kg)				<4.0 ^{DLM}
	Available Sulfate-S (mg/kg)				<4.0 ^{DLM}
					<0.80 ^{DLM}
					2.5
					113
					15.9 ^{DLM}
Metals	Antimony (Sb) (mg/kg)	0.34	0.43	0.34	0.41
	Arsenic (As) (mg/kg)	11.1	12.2	10.7	12.1
	Barium (Ba) (mg/kg)	109	176	120	165
	Beryllium (Be) (mg/kg)	0.50	0.65	0.53	0.62
	Cadmium (Cd) (mg/kg)	0.190	0.166	0.128	0.251
	Chromium (Cr) (mg/kg)	10.3	9.97	11.4	11.1
	Cobalt (Co) (mg/kg)	12.9	17.7	14.2	16.7
	Copper (Cu) (mg/kg)	1090	869	1120	860
	Lead (Pb) (mg/kg)	4.47	5.08	4.66	5.01
	Mercury (Hg) (mg/kg)	0.085	0.084	0.071	0.081
	Molybdenum (Mo) (mg/kg)	5.36	4.40	4.82	4.00
	Nickel (Ni) (mg/kg)	6.86	8.79	7.74	8.68
	Selenium (Se) (mg/kg)	1.25	1.19	1.19	1.05
	Silver (Ag) (mg/kg)	0.40	0.38	0.41	0.36
	Thallium (Tl) (mg/kg)	<0.050	<0.050	<0.050	<0.050
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0
	Uranium (U) (mg/kg)	0.687	1.00	0.800	1.03
	Vanadium (V) (mg/kg)	195	195	227	201
	Zinc (Zn) (mg/kg)	49.6	60.4	50.0	60.1

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1654527-21 Soil 28-JUL-15 384856-01	L1654527-22 Soil 28-JUL-15 384856-02	L1654527-23 Soil 28-JUL-15 384856-03	L1654527-24 Soil 28-JUL-15 384856-04	L1654527-25 Soil 30-JUL-15 384856-05
Grouping	Analyte				
SOIL					
Physical Tests	Moisture (%)	47.4	21.9		34.9
	pH (1:2 soil:water) (pH)	4.84	5.01	5.11	5.38
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)	13.2	4.4		10.6
	Oxidation-Reduction Potential (ORP) (mV)	359	406		376
Anions and Nutrients	Total Nitrogen by LECO (%)	1.09	0.292		0.808
Organic / Inorganic Carbon	Total Carbon by Combustion (%)	19.7	4.2		16.2
Plant Available Nutrients	Available Ammonium-N (mg/kg)	13.2 ^{DLM}	4.4		10.6 ^{DLM}
	Available Nitrate-N (mg/kg)	<10 ^{DLM}	<4.0 ^{DLM}		<6.0 ^{DLM}
	Nitrate+Nitrite-N (mg/kg)	<4.0 ^{DLM}	<2.0		<6.0 ^{DLM}
	Nitrate-N (mg/kg)	<4.0 ^{DLM}	<2.0		<6.0 ^{DLM}
	Nitrite-N (mg/kg)	<0.80 ^{DLM}	<0.50		<1.2 ^{DLM}
	Available Phosphate-P (mg/kg)	6.8 ^{DLM}	2.8		12.4 ^{DLM}
	Available Potassium (mg/kg)	349 ^{DLM}	127		280 ^{DLM}
	Available Sulfate-S (mg/kg)	26 ^{DLM}	<6.0 ^{DLM}		16.4 ^{DLM}
Metals	Antimony (Sb) (mg/kg)	0.30	0.28	0.23	0.36
	Arsenic (As) (mg/kg)	4.55	6.30	1.82	4.38
	Barium (Ba) (mg/kg)	204	185	173	236
	Beryllium (Be) (mg/kg)	0.89	0.80	0.58	0.95
	Cadmium (Cd) (mg/kg)	0.938	0.330	0.844	0.617
	Chromium (Cr) (mg/kg)	54.7	58.7	12.4	60.9
	Cobalt (Co) (mg/kg)	13.1	15.2	8.81	20.9
	Copper (Cu) (mg/kg)	53.4	44.7	39.4	59.9
	Lead (Pb) (mg/kg)	7.34	10.2	5.30	8.95
	Mercury (Hg) (mg/kg)	0.229	<0.050	0.304	0.230
	Molybdenum (Mo) (mg/kg)	1.01	0.75	0.96	1.04
	Nickel (Ni) (mg/kg)	35.7	35.4	15.7	43.4
	Selenium (Se) (mg/kg)	0.33	<0.20	0.27	0.39
	Silver (Ag) (mg/kg)	0.74	0.27	0.78	0.62
	Thallium (Tl) (mg/kg)	0.143	0.137	0.065	0.156
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0
	Uranium (U) (mg/kg)	1.14	0.697	0.792	1.33
	Vanadium (V) (mg/kg)	64.2	92.4	14.8	68.4
	Zinc (Zn) (mg/kg)	130	131	54.6	139

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1654527-26 Soil 30-JUL-15 384856-06	L1654527-27 Soil 31-JUL-15 384856-07	L1654527-28 Soil 31-JUL-15 384856-08	L1654527-29 Soil 31-JUL-15 384856-09	L1654527-30 Soil 31-JUL-15 384856-10	
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	16.7		27.2	62.0	44.6
	pH (1:2 soil:water) (pH)	5.06	8.05	7.28	6.33	6.24
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)	3.0		17.6	72.5	85.0
	Oxidation-Reduction Potential (ORP) (mV)	393		349	347	330
Anions and Nutrients	Total Nitrogen by LECO (%)	0.203		0.195	0.580	0.557
Organic / Inorganic Carbon	Total Carbon by Combustion (%)	3.2		3.5	9.2	8.6
Plant Available Nutrients	Available Ammonium-N (mg/kg)	3.0		17.6 ^{DLM}	72.5	85.0
	Available Nitrate-N (mg/kg)	<1.0		<1.0 ^{DLM}	<4.0 ^{DLM}	<1.0
	Nitrate+Nitrite-N (mg/kg)	<2.0		<4.0 ^{DLM}	<2.0	<2.0
	Nitrate-N (mg/kg)	<2.0		<4.0 ^{DLM}	<2.0	<2.0
	Nitrite-N (mg/kg)	<0.50		<0.80 ^{DLM}	<0.50	<0.50
	Available Phosphate-P (mg/kg)	6.1		4.2	<2.0	<2.0
	Available Potassium (mg/kg)	74		74	219	258
	Available Sulfate-S (mg/kg)	<3.0		27.1	18.5 ^{DLM}	6.8
Metals	Antimony (Sb) (mg/kg)	0.23	0.29			0.37
	Arsenic (As) (mg/kg)	4.12	9.67			9.73
	Barium (Ba) (mg/kg)	112	143			306
	Beryllium (Be) (mg/kg)	0.42	0.46			1.26
	Cadmium (Cd) (mg/kg)	0.191	0.130			1.02
	Chromium (Cr) (mg/kg)	37.7	11.6			69.1
	Cobalt (Co) (mg/kg)	11.1	13.9			20.6
	Copper (Cu) (mg/kg)	23.2	731			208
	Lead (Pb) (mg/kg)	6.35	4.47			11.6
	Mercury (Hg) (mg/kg)	<0.050	0.065			0.071
	Molybdenum (Mo) (mg/kg)	0.41	4.44			1.40
	Nickel (Ni) (mg/kg)	21.0	7.85			63.0
	Selenium (Se) (mg/kg)	<0.20	0.99			0.42
	Silver (Ag) (mg/kg)	0.21	0.30			0.90
	Thallium (Tl) (mg/kg)	0.069	<0.050			0.171
	Tin (Sn) (mg/kg)	<2.0	<2.0			<2.0
	Uranium (U) (mg/kg)	0.611	0.729			1.79
	Vanadium (V) (mg/kg)	68.5	220			121
	Zinc (Zn) (mg/kg)	61.6	46.0			128

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1654527-31 Soil 31-JUL-15 384856-11	L1654527-32 Soil 31-JUL-15 384856-12	L1654527-33 Grab 30-JUL-15 384818-01	L1654527-34 Grab 30-JUL-15 384818-02	L1654527-35 Grab 30-JUL-15 384818-03
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	25.8	35.3	24.4	55.1	30.4
	pH (1:2 soil:water) (pH)	7.61	5.93	8.40	6.90	7.00
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)	3.6	20.0	8.5	64.7	8.4
	Oxidation-Reduction Potential (ORP) (mV)	282	267	247	281	281
Anions and Nutrients	Total Nitrogen by LECO (%)	0.123	0.726	0.037	0.637	0.105
Organic / Inorganic Carbon	Total Carbon by Combustion (%)	2.2	17.0	0.5	9.5	1.4
Plant Available Nutrients	Available Ammonium-N (mg/kg)	3.6	20.0 ^{DLM}	8.5	28.9 ^{DLM}	8.4
	Available Nitrate-N (mg/kg)	1.4	<6.0 ^{DLM}	<1.0	34.4 ^{DLM}	<1.0
	Nitrate+Nitrite-N (mg/kg)	<2.0	<6.0 ^{DLM}	<2.0	35.8 ^{DLM}	<2.0
	Nitrate-N (mg/kg)	<2.0	<6.0 ^{DLM}	<2.0	35.8 ^{DLM}	<2.0
	Nitrite-N (mg/kg)	<0.50	<1.2 ^{DLM}	<0.50 ^{DLM}	<1.2 ^{DLM}	<0.50
	Available Phosphate-P (mg/kg)	3.6	14.8 ^{DLM}	<4.0 ^{DLM}	10.6 ^{DLM}	4.0
	Available Potassium (mg/kg)	79	253 ^{DLM}	99 ^{DLM}	122 ^{DLM}	39
	Available Sulfate-S (mg/kg)	43.6	525 ^{DLM}	9.1	16.1 ^{DLM}	7.0
Metals	Antimony (Sb) (mg/kg)	0.40				
	Arsenic (As) (mg/kg)	9.00				
	Barium (Ba) (mg/kg)	159				
	Beryllium (Be) (mg/kg)	0.54				
	Cadmium (Cd) (mg/kg)	0.211				
	Chromium (Cr) (mg/kg)	16.7				
	Cobalt (Co) (mg/kg)	13.9				
	Copper (Cu) (mg/kg)	568				
	Lead (Pb) (mg/kg)	4.34				
	Mercury (Hg) (mg/kg)	0.079				
	Molybdenum (Mo) (mg/kg)	3.70				
	Nickel (Ni) (mg/kg)	11.6				
	Selenium (Se) (mg/kg)	0.83				
	Silver (Ag) (mg/kg)	0.28				
	Thallium (Tl) (mg/kg)	<0.050				
	Tin (Sn) (mg/kg)	<2.0				
	Uranium (U) (mg/kg)	1.10				
	Vanadium (V) (mg/kg)	204				
	Zinc (Zn) (mg/kg)	45.8				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1654527-36 Grab 30-JUL-15 384818-04	L1654527-37 Grab 30-JUL-15 384818-05	L1654527-38 Grab 30-JUL-15 384818-06	L1654527-39 Grab 30-JUL-15 384818-07	L1654527-40 Grab 30-JUL-15 384818-08
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%) pH (1:2 soil:water) (pH)	8.56	6.09	7.00	8.27	8.14
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg) Oxidation-Reduction Potential (ORP) (mV)					
Anions and Nutrients	Total Nitrogen by LECO (%)					
Organic / Inorganic Carbon	Total Carbon by Combustion (%)					
Plant Available Nutrients	Available Ammonium-N (mg/kg) Available Nitrate-N (mg/kg) Nitrate+Nitrite-N (mg/kg) Nitrate-N (mg/kg) Nitrite-N (mg/kg) Available Phosphate-P (mg/kg) Available Potassium (mg/kg) Available Sulfate-S (mg/kg)					
Metals	Antimony (Sb) (mg/kg)	0.44	0.25	0.76	0.37	0.52
	Arsenic (As) (mg/kg)	11.6	4.85	12.1	11.7	12.7
	Barium (Ba) (mg/kg)	162	153	254	183	240
	Beryllium (Be) (mg/kg)	0.72	0.43	0.78	0.57	0.63
	Cadmium (Cd) (mg/kg)	0.162	0.427	0.055	0.144	0.153
	Chromium (Cr) (mg/kg)	9.31	33.7	55.3	10.8	9.12
	Cobalt (Co) (mg/kg)	18.1	8.31	23.4	16.2	21.9
	Copper (Cu) (mg/kg)	784	109	130	803	873
	Lead (Pb) (mg/kg)	4.53	7.45	10.4	4.49	5.75
	Mercury (Hg) (mg/kg)	0.070	0.078	0.171	0.073	<0.050
	Molybdenum (Mo) (mg/kg)	4.64	1.32	2.50	4.31	5.17
	Nickel (Ni) (mg/kg)	8.47	22.4	31.8	7.48	6.22
	Selenium (Se) (mg/kg)	1.05	0.50	1.08	0.98	1.49
	Silver (Ag) (mg/kg)	0.40	0.27	<0.10	0.33	0.30
	Thallium (Tl) (mg/kg)	<0.050	0.102	0.167	<0.050	<0.050
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	2.2
	Uranium (U) (mg/kg)	0.988	1.81	4.33	0.932	0.923
	Vanadium (V) (mg/kg)	171	71.0	101	211	187
	Zinc (Zn) (mg/kg)	55.5	45.7	64.8	54.6	74.9

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1654527-41 Grab 30-JUL-15 384818-09	L1654527-42 Grab 30-JUL-15 384818-10	L1654527-43 Grab 30-JUL-15 384818-11	L1654527-44 Grab 30-JUL-15 384818-12	L1654527-45 Grab 30-JUL-15 389819-01	
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)				18.1	46.3
	pH (1:2 soil:water) (pH)	7.93	5.78	4.97	8.03	6.26
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)				4.1	40.3
	Oxidation-Reduction Potential (ORP) (mV)				269	252
Anions and Nutrients	Total Nitrogen by LECO (%)				0.036	0.570
Organic / Inorganic Carbon	Total Carbon by Combustion (%)				0.4	13.2
Plant Available Nutrients	Available Ammonium-N (mg/kg)				4.1	40.3 DLM
	Available Nitrate-N (mg/kg)				<1.0	<4.0 DLM
	Nitrate+Nitrite-N (mg/kg)				<2.0	<6.0 DLM
	Nitrate-N (mg/kg)				<2.0	<6.0 DLM
	Nitrite-N (mg/kg)				<0.50	<1.2 DLM
	Available Phosphate-P (mg/kg)				<2.0	41.9
	Available Potassium (mg/kg)				67	96
	Available Sulfate-S (mg/kg)				29.5	143 DLM
Metals	Antimony (Sb) (mg/kg)	0.34	0.33	0.33	0.36	0.29
	Arsenic (As) (mg/kg)	9.22	3.35	4.07	10.5	4.63
	Barium (Ba) (mg/kg)	141	132	97.3	119	124
	Beryllium (Be) (mg/kg)	0.51	0.23	0.32	0.55	0.26
	Cadmium (Cd) (mg/kg)	0.139	0.496	0.325	0.152	0.359
	Chromium (Cr) (mg/kg)	10.4	29.4	41.9	10.4	21.8
	Cobalt (Co) (mg/kg)	12.9	9.27	7.57	14.6	7.52
	Copper (Cu) (mg/kg)	788	63.2	95.5	1040	137
	Lead (Pb) (mg/kg)	3.76	9.86	5.92	4.99	6.94
	Mercury (Hg) (mg/kg)	0.066	0.131	<0.050	0.079	0.088
	Molybdenum (Mo) (mg/kg)	4.80	1.42	1.13	7.15	1.44
	Nickel (Ni) (mg/kg)	7.19	15.6	19.0	6.89	11.5
	Selenium (Se) (mg/kg)	0.91	0.24	0.25	1.15	0.25
	Silver (Ag) (mg/kg)	0.32	1.54	0.26	0.40	0.45
	Thallium (Tl) (mg/kg)	<0.050	0.080	0.053	<0.050	0.074
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Uranium (U) (mg/kg)	0.720	0.423	0.446	0.818	0.509
	Vanadium (V) (mg/kg)	188	57.6	72.3	223	62.4
	Zinc (Zn) (mg/kg)	43.6	78.8	69.2	51.3	76.7

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1654527-46 Grab 30-JUL-15 389819-02	L1654527-47 Grab 30-JUL-15 389819-03	L1654527-48 Grab 30-JUL-15 389819-04	L1654527-49 Grab 30-JUL-15 389819-05	L1654527-50 Grab 30-JUL-15 389819-06
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	21.7				
	pH (1:2 soil:water) (pH)	6.07	8.40	8.40	8.37	5.68
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)	16.2				
	Oxidation-Reduction Potential (ORP) (mV)	276				
Anions and Nutrients	Total Nitrogen by LECO (%)	0.122				
Organic / Inorganic Carbon	Total Carbon by Combustion (%)	1.8				
Plant Available Nutrients	Available Ammonium-N (mg/kg)	16.2				
	Available Nitrate-N (mg/kg)	<1.0				
	Nitrate+Nitrite-N (mg/kg)	<2.0				
	Nitrate-N (mg/kg)	<2.0				
	Nitrite-N (mg/kg)	<0.50				
	Available Phosphate-P (mg/kg)	97.8				
	Available Potassium (mg/kg)	80				
	Available Sulfate-S (mg/kg)	13.7				
Metals	Antimony (Sb) (mg/kg)	0.31	0.41	0.35	0.29	0.29
	Arsenic (As) (mg/kg)	5.33	12.0	7.89	8.81	4.86
	Barium (Ba) (mg/kg)	83.9	76.3	141	139	102
	Beryllium (Be) (mg/kg)	0.34	0.48	0.39	0.47	0.51
	Cadmium (Cd) (mg/kg)	0.284	0.232	0.135	0.135	0.404
	Chromium (Cr) (mg/kg)	34.0	16.8	21.9	11.2	36.4
	Cobalt (Co) (mg/kg)	9.30	15.4	12.7	12.8	10.7
	Copper (Cu) (mg/kg)	29.5	1150	366	781	121
	Lead (Pb) (mg/kg)	6.56	4.77	5.44	3.75	7.17
	Mercury (Hg) (mg/kg)	<0.050	0.100	0.053	0.080	0.053
	Molybdenum (Mo) (mg/kg)	0.76	3.42	2.44	4.35	1.30
	Nickel (Ni) (mg/kg)	17.4	8.76	18.6	7.34	24.7
	Selenium (Se) (mg/kg)	<0.20	1.20	0.50	0.93	0.28
	Silver (Ag) (mg/kg)	0.38	0.53	0.18	0.33	0.57
	Thallium (Tl) (mg/kg)	0.064	<0.050	0.054	<0.050	0.091
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Uranium (U) (mg/kg)	0.515	0.713	0.586	0.651	0.625
	Vanadium (V) (mg/kg)	66.5	287	117	187	77.6
	Zinc (Zn) (mg/kg)	77.3	61.1	49.6	40.5	71.8

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1654527-51 Grab 31-JUL-15 389819-07	L1654527-52 Grab 31-JUL-15 389819-08	L1654527-53 Grab 31-JUL-15 389819-09	L1654527-54 Grab 31-JUL-15 389819-10	L1654527-55 Grab 01-AUG-15 389819-11
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)					
	pH (1:2 soil:water) (pH)	8.80	8.50	7.94	6.47	8.06
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)	<2.2	<2.2	5.8	37.2	
	Oxidation-Reduction Potential (ORP) (mV)					
Anions and Nutrients	Total Nitrogen by LECO (%)	0.030	0.037	0.079	0.434	
Organic / Inorganic Carbon	Total Carbon by Combustion (%)	0.4	0.3	1.3	5.8	
Plant Available Nutrients	Available Ammonium-N (mg/kg)	1.9	1.6	5.8	37.2	
	Available Nitrate-N (mg/kg)	<1.0	<1.0	<1.0	<1.0	
	Nitrate+Nitrite-N (mg/kg)	<2.0	<2.0	<2.0	<2.0	
	Nitrate-N (mg/kg)	<2.0	<2.0	<2.0	<2.0	
	Nitrite-N (mg/kg)	<0.50	<0.50	<0.50	<0.50	
	Available Phosphate-P (mg/kg)	4.8 ^{DLM}	<2.0	4.1	<2.0	
	Available Potassium (mg/kg)	139 ^{DLM}	62	87	245	
	Available Sulfate-S (mg/kg)	18.2	23.2	30.2	20.8	
Metals	Antimony (Sb) (mg/kg)	0.36	0.33	0.33	0.32	0.35
	Arsenic (As) (mg/kg)	11.3	10.1	9.58	9.61	7.84
	Barium (Ba) (mg/kg)	156	126	159	233	86.6
	Beryllium (Be) (mg/kg)	0.58	0.55	0.52	0.87	0.36
	Cadmium (Cd) (mg/kg)	0.134	0.148	0.156	0.560	0.110
	Chromium (Cr) (mg/kg)	10.6	9.52	15.4	63.5	23.3
	Cobalt (Co) (mg/kg)	15.6	13.0	14.7	18.7	10.9
	Copper (Cu) (mg/kg)	874	990	567	142	410
	Lead (Pb) (mg/kg)	4.76	4.45	4.68	10.7	3.98
	Mercury (Hg) (mg/kg)	0.083	0.070	0.077	0.054	<0.050
	Molybdenum (Mo) (mg/kg)	4.21	5.70	4.22	1.21	1.69
	Nickel (Ni) (mg/kg)	8.20	6.50	10.2	47.6	10.7
	Selenium (Se) (mg/kg)	1.08	1.10	0.89	0.34	0.61
	Silver (Ag) (mg/kg)	0.38	0.40	0.31	0.48	0.18
	Thallium (Tl) (mg/kg)	<0.050	<0.050	<0.050	0.129	<0.050
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Uranium (U) (mg/kg)	0.990	0.832	0.953	1.15	0.602
	Vanadium (V) (mg/kg)	199	184	237	108	151
	Zinc (Zn) (mg/kg)	52.3	43.0	46.9	121	41.4

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1654527-57 Soil 31-JUL-15 384857-01	L1654527-58 Soil 31-JUL-15 384857-02	L1654527-59 Soil 31-JUL-15 384857-03	L1654527-60 Soil 01-AUG-15 384857-04	L1654527-61 Soil 01-AUG-15 384857-05	
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	10.8	35.2	10.2	9.71	68.1
	pH (1:2 soil:water) (pH)	6.04	5.59	6.51	8.26	6.34
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)	4.0	6.0	3.0	9.0	132
	Oxidation-Reduction Potential (ORP) (mV)	300	337	329	310	251
Anions and Nutrients	Total Nitrogen by LECO (%)	0.164	0.201	0.062	0.292	1.15
Organic / Inorganic Carbon	Total Carbon by Combustion (%)	2.1	3.1	0.5	3.6	35.1
Plant Available Nutrients	Available Ammonium-N (mg/kg)	4.0	6.0	3.0	9.0	132 ^{DLM}
	Available Nitrate-N (mg/kg)	<1.0	38.7	<1.0	<1.0	<10 ^{DLM}
	Nitrate+Nitrite-N (mg/kg)	<2.0	<2.0	<2.0	<2.0	<10 ^{DLM}
	Nitrate-N (mg/kg)	<2.0	<2.0	<2.0	<2.0	<10 ^{DLM}
	Nitrite-N (mg/kg)	<0.50	<0.50	<0.50	<0.50	<2.0 ^{DLM}
	Available Phosphate-P (mg/kg)	<2.0	<2.0	<2.0	<4.0 ^{DLM}	8.2 ^{DLM}
	Available Potassium (mg/kg)	81	92	38	128 ^{DLM}	91 ^{DLM}
	Available Sulfate-S (mg/kg)	8.4	10.9	<3.0	6.3	44 ^{DLM}
Metals	Antimony (Sb) (mg/kg)	0.27	0.36	0.32		
	Arsenic (As) (mg/kg)	7.54	9.78	8.95		
	Barium (Ba) (mg/kg)	120	176	95.7		
	Beryllium (Be) (mg/kg)	0.57	0.80	0.38		
	Cadmium (Cd) (mg/kg)	0.198	0.658	0.092		
	Chromium (Cr) (mg/kg)	41.8	54.7	35.7		
	Cobalt (Co) (mg/kg)	10.0	13.5	12.0		
	Copper (Cu) (mg/kg)	48.0	63.5	24.1		
	Lead (Pb) (mg/kg)	7.89	11.7	6.87		
	Mercury (Hg) (mg/kg)	<0.050	0.055	<0.050		
	Molybdenum (Mo) (mg/kg)	0.67	0.99	0.55		
	Nickel (Ni) (mg/kg)	27.8	39.6	21.5		
	Selenium (Se) (mg/kg)	<0.20	0.22	0.22		
	Silver (Ag) (mg/kg)	0.19	0.45	<0.10		
	Thallium (Tl) (mg/kg)	0.086	0.135	0.072		
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0		
	Uranium (U) (mg/kg)	0.727	1.10	0.620		
	Vanadium (V) (mg/kg)	82.2	96.7	70.1		
	Zinc (Zn) (mg/kg)	70.2	97.0	40.8		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1654527-62 Soil 01-AUG-15 384857-06	L1654527-63 Soil 01-AUG-15 384857-07	L1654527-64 Soil 01-AUG-15 384857-08	L1654527-65 Soil 01-AUG-15 384857-09	L1654527-66 Soil 01-AUG-15 384857-10
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	52.4	21.3		61.2	56.7
	pH (1:2 soil:water) (pH)	6.27	7.43	8.29	6.48	6.37
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)	65.5	9.5		29.9	28.2
	Oxidation-Reduction Potential (ORP) (mV)	291	287		276	266
Anions and Nutrients	Total Nitrogen by LECO (%)	0.479	0.068		1.01	0.470
Organic / Inorganic Carbon	Total Carbon by Combustion (%)	10.5	0.7		23.5	10.6
Plant Available Nutrients	Available Ammonium-N (mg/kg)	65.5 ^{DLM}	9.5		29.9 ^{DLM}	15.4 ^{DLM}
	Available Nitrate-N (mg/kg)	<4.0 ^{DLM}	<1.0		19 ^{DLM}	11.7 ^{DLM}
	Nitrate+Nitrite-N (mg/kg)	<4.0 ^{DLM}	<2.0		<8.0 ^{DLM}	12.9 ^{DLM}
	Nitrate-N (mg/kg)	<4.0 ^{DLM}	<2.0		<8.0 ^{DLM}	12.9 ^{DLM}
	Nitrite-N (mg/kg)	<0.80 ^{DLM}	<0.50		<1.6 ^{DLM}	<1.2 ^{DLM}
	Available Phosphate-P (mg/kg)	<2.0	<2.0		15.9 ^{DLM}	17.8 ^{DLM}
	Available Potassium (mg/kg)	95	<20		136 ^{DLM}	84 ^{DLM}
	Available Sulfate-S (mg/kg)	27.6 ^{DLM}	11.6		77 ^{DLM}	59.8 ^{DLM}
Metals	Antimony (Sb) (mg/kg)	0.42		0.43		0.36
	Arsenic (As) (mg/kg)	7.85		9.34		3.83
	Barium (Ba) (mg/kg)	244		94.2		254
	Beryllium (Be) (mg/kg)	0.79		0.42		0.22
	Cadmium (Cd) (mg/kg)	0.678		0.126		0.909
	Chromium (Cr) (mg/kg)	44.4		24.4		16.6
	Cobalt (Co) (mg/kg)	15.0		13.8		11.9
	Copper (Cu) (mg/kg)	102		616		52.6
	Lead (Pb) (mg/kg)	9.49		4.74		14.5
	Mercury (Hg) (mg/kg)	0.151		0.077		0.191
	Molybdenum (Mo) (mg/kg)	1.58		3.86		2.31
	Nickel (Ni) (mg/kg)	38.4		12.8		10.7
	Selenium (Se) (mg/kg)	1.31		0.95		0.55
	Silver (Ag) (mg/kg)	0.67		0.26		0.44
	Thallium (Tl) (mg/kg)	0.168		<0.050		0.182
	Tin (Sn) (mg/kg)	<2.0		<2.0		<2.0
	Uranium (U) (mg/kg)	2.71		0.669		0.595
	Vanadium (V) (mg/kg)	75.5		222		44.5
	Zinc (Zn) (mg/kg)	53.5		49.9		62.3

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1654527-67 Soil 01-AUG-15 384857-11	L1654527-68 Soil 01-AUG-15 384857-12	L1654527-70 Grab 01-AUG-15 389820-02	L1654527-71 Grab 01-AUG-15 389820-03	L1654527-72 Grab 01-AUG-15 389820-04
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)		35.4			
	pH (1:2 soil:water) (pH)	6.73	5.00	8.44	8.41	8.40
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)		23.5			
	Oxidation-Reduction Potential (ORP) (mV)		346			
Anions and Nutrients	Total Nitrogen by LECO (%)		0.659			
Organic / Inorganic Carbon	Total Carbon by Combustion (%)		16.7			
Plant Available Nutrients	Available Ammonium-N (mg/kg)		23.5 ^{DLM}			
	Available Nitrate-N (mg/kg)		<8.0 ^{DLM}			
	Nitrate+Nitrite-N (mg/kg)		<8.0 ^{DLM}			
	Nitrate-N (mg/kg)		<8.0 ^{DLM}			
	Nitrite-N (mg/kg)		<1.6 ^{DLM}			
	Available Phosphate-P (mg/kg)		53.0 ^{DLM}			
	Available Potassium (mg/kg)		316 ^{DLM}			
	Available Sulfate-S (mg/kg)		22 ^{DLM}			
Metals	Antimony (Sb) (mg/kg)	0.24		0.43	0.45	0.29
	Arsenic (As) (mg/kg)	5.68		11.9	11.7	9.20
	Barium (Ba) (mg/kg)	116		166	90.0	89.7
	Beryllium (Be) (mg/kg)	0.37		0.60	0.42	0.30
	Cadmium (Cd) (mg/kg)	0.134		0.165	0.132	0.158
	Chromium (Cr) (mg/kg)	29.5		11.8	26.4	31.3
	Cobalt (Co) (mg/kg)	8.85		15.6	11.6	9.13
	Copper (Cu) (mg/kg)	111		804	321	29.1
	Lead (Pb) (mg/kg)	4.82		5.01	4.51	4.92
	Mercury (Hg) (mg/kg)	0.057		0.075	0.058	<0.050
	Molybdenum (Mo) (mg/kg)	1.17		6.73	1.38	0.63
	Nickel (Ni) (mg/kg)	17.9		8.97	15.7	20.0
	Selenium (Se) (mg/kg)	0.37		1.02	0.47	0.31
	Silver (Ag) (mg/kg)	0.17		0.37	0.18	<0.10
	Thallium (Tl) (mg/kg)	0.070		<0.050	<0.050	0.063
	Tin (Sn) (mg/kg)	<2.0		<2.0	<2.0	<2.0
	Uranium (U) (mg/kg)	0.855		1.05	0.662	0.649
	Vanadium (V) (mg/kg)	84.4		192	148	63.0
	Zinc (Zn) (mg/kg)	42.1		57.2	48.6	44.1

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1654527-73 Grab 01-AUG-15 389820-05	L1654527-74 Grab 01-AUG-15 389820-06	L1654527-75 Grab 01-AUG-15 389820-07	L1654527-76 Grab 01-AUG-15 389820-08	L1654527-77 Grab 01-AUG-15 389820-09
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%) pH (1:2 soil:water) (pH)	6.83	8.25	6.94	8.02	8.63
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg) Oxidation-Reduction Potential (ORP) (mV)					
Anions and Nutrients	Total Nitrogen by LECO (%)					
Organic / Inorganic Carbon	Total Carbon by Combustion (%)					
Plant Available Nutrients	Available Ammonium-N (mg/kg) Available Nitrate-N (mg/kg) Nitrate+Nitrite-N (mg/kg) Nitrate-N (mg/kg) Nitrite-N (mg/kg) Available Phosphate-P (mg/kg) Available Potassium (mg/kg) Available Sulfate-S (mg/kg)					
Metals	Antimony (Sb) (mg/kg) Arsenic (As) (mg/kg) Barium (Ba) (mg/kg) Beryllium (Be) (mg/kg) Cadmium (Cd) (mg/kg) Chromium (Cr) (mg/kg) Cobalt (Co) (mg/kg) Copper (Cu) (mg/kg) Lead (Pb) (mg/kg) Mercury (Hg) (mg/kg) Molybdenum (Mo) (mg/kg) Nickel (Ni) (mg/kg) Selenium (Se) (mg/kg) Silver (Ag) (mg/kg) Thallium (Tl) (mg/kg) Tin (Sn) (mg/kg) Uranium (U) (mg/kg) Vanadium (V) (mg/kg) Zinc (Zn) (mg/kg)	0.37 8.60 119 0.42 0.133 15.0 11.3 566 4.04 0.070 3.15 10.1 0.74 0.24 <0.050 <2.0 0.628 146 40.6	0.70 1.55 49.7 0.13 0.859 121 2.73 53.8 1.86 0.210 0.76 12.4 8.89 0.36 0.053 <2.0 2.86 14.1 22.1	0.31 7.38 70.5 0.31 0.074 43.0 11.0 18.9 6.55 <0.050 0.39 23.1 <0.20 <0.10 0.071 <2.0 0.515 61.0 42.3	0.36 11.2 161 0.60 0.144 11.0 15.6 858 4.99 0.068 4.78 8.53 1.03 0.36 <0.050 <2.0 0.958 194 55.3	0.37 9.84 120 0.49 0.117 14.3 13.2 717 4.29 0.062 3.76 8.59 0.88 0.32 <0.050 <2.0 0.798 205 45.7

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1654527-79 Grab 01-AUG-15 389820-11	L1654527-80 Soil Grab 01-AUG-15 384858-01	L1654527-81 Soil Grab 01-AUG-15 384858-02	L1654527-83 Soil Grab 01-AUG-15 384858-04	L1654527-84 Soil Grab 01-AUG-15 384858-05	
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)		26.0	13.5	55.7	34.9
	pH (1:2 soil:water) (pH)	5.80	4.82	5.11	5.88	6.04
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)		9.0	5.0	42.2	18.3
	Oxidation-Reduction Potential (ORP) (mV)		312	317	290	303
Anions and Nutrients	Total Nitrogen by LECO (%)		0.401	0.159	0.838	0.231
Organic / Inorganic Carbon	Total Carbon by Combustion (%)		9.9	3.2	16.8	3.6
Plant Available Nutrients	Available Ammonium-N (mg/kg)		9.0 ^{DLM}	5.0 ^{DLM}	42.2 ^{DLM}	18.3 ^{DLM}
	Available Nitrate-N (mg/kg)		<6.0 ^{DLM}	<4.0 ^{DLM}	<8.0 ^{DLM}	<4.0 ^{DLM}
	Nitrate+Nitrite-N (mg/kg)		<4.0 ^{DLM}	<4.0 ^{DLM}	<6.0 ^{DLM}	<4.0 ^{DLM}
	Nitrate-N (mg/kg)		<4.0 ^{DLM}	<4.0 ^{DLM}	<6.0 ^{DLM}	<4.0 ^{DLM}
	Nitrite-N (mg/kg)		<0.80 ^{DLM}	<0.80 ^{DLM}	<1.2 ^{DLM}	<0.80 ^{DLM}
	Available Phosphate-P (mg/kg)		30.0 ^{DLM}	12.8	14.0 ^{DLM}	<2.0
	Available Potassium (mg/kg)		208 ^{DLM}	75	145 ^{DLM}	80
	Available Sulfate-S (mg/kg)		17.3 ^{DLM}	6.6 ^{DLM}	257 ^{DLM}	41.4 ^{DLM}
Metals	Antimony (Sb) (mg/kg)	0.31	0.25			
	Arsenic (As) (mg/kg)	7.77	2.96			
	Barium (Ba) (mg/kg)	80.5	133			
	Beryllium (Be) (mg/kg)	0.28	<0.10			
	Cadmium (Cd) (mg/kg)	0.176	0.341			
	Chromium (Cr) (mg/kg)	37.2	12.2			
	Cobalt (Co) (mg/kg)	10.1	3.52			
	Copper (Cu) (mg/kg)	21.7	18.0			
	Lead (Pb) (mg/kg)	6.30	9.31			
	Mercury (Hg) (mg/kg)	<0.050	0.086			
	Molybdenum (Mo) (mg/kg)	0.58	1.10			
	Nickel (Ni) (mg/kg)	24.5	5.49			
	Selenium (Se) (mg/kg)	<0.20	<0.20			
	Silver (Ag) (mg/kg)	<0.10	0.20			
	Thallium (Tl) (mg/kg)	0.078	0.065			
	Tin (Sn) (mg/kg)	<2.0	<2.0			
	Uranium (U) (mg/kg)	0.453	0.259			
	Vanadium (V) (mg/kg)	66.3	30.8			
	Zinc (Zn) (mg/kg)	50.6	35.7			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1654527-85 Soil Grab 01-AUG-15 384858-06	L1654527-86 Soil Grab 02-AUG-15 384858-07	L1654527-87 Soil Grab 02-AUG-15 384858-08	L1654527-88 Soil Grab 02-AUG-15 384858-09	L1654527-89 Soil Grab 02-AUG-15 384858-10
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	17.4	31.3	20.1	18.9	11.8
	pH (1:2 soil:water) (pH)	6.56	5.98	5.83	5.80	5.87
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)	2.2	16.0	2.9	<4.3	2.7
	Oxidation-Reduction Potential (ORP) (mV)	285	255	301	317	326
Anions and Nutrients	Total Nitrogen by LECO (%)	0.083	0.876	0.197	0.240	0.096
Organic / Inorganic Carbon	Total Carbon by Combustion (%)	0.7	15.7	3.5	4.3	1.4
Plant Available Nutrients	Available Ammonium-N (mg/kg)	2.2	16.0 ^{DLM}	2.9	2.8 ^{DLM}	2.7
	Available Nitrate-N (mg/kg)	<4.0 ^{DLM}	<8.0 ^{DLM}	<1.0	<1.0 ^{DLM}	<1.0
	Nitrate+Nitrite-N (mg/kg)	<2.0	<6.0 ^{DLM}	<2.0	<4.0 ^{DLM}	<2.0
	Nitrate-N (mg/kg)	<2.0	<6.0 ^{DLM}	<2.0	<4.0 ^{DLM}	<2.0
	Nitrite-N (mg/kg)	<0.50	<1.2 ^{DLM}	<0.50	<0.80 ^{DLM}	<0.50
	Available Phosphate-P (mg/kg)	<2.0	46.5 ^{DLM}	2.7	3.3	<2.0
	Available Potassium (mg/kg)	40	220 ^{DLM}	29	33	42
	Available Sulfate-S (mg/kg)	11.0 ^{DLM}	16 ^{DLM}	3.6	4.6	<3.0
Metals	Antimony (Sb) (mg/kg)			0.15	0.14	
	Arsenic (As) (mg/kg)			1.99	1.82	
	Barium (Ba) (mg/kg)			42.5	46.3	
	Beryllium (Be) (mg/kg)			0.14	0.10	
	Cadmium (Cd) (mg/kg)			1.27	1.06	
	Chromium (Cr) (mg/kg)			18.6	18.7	
	Cobalt (Co) (mg/kg)			7.50	7.17	
	Copper (Cu) (mg/kg)			15.0	12.9	
	Lead (Pb) (mg/kg)			6.97	6.86	
	Mercury (Hg) (mg/kg)			<0.050	<0.050	
	Molybdenum (Mo) (mg/kg)			0.72	0.77	
	Nickel (Ni) (mg/kg)			8.02	8.48	
	Selenium (Se) (mg/kg)			<0.20	<0.20	
	Silver (Ag) (mg/kg)			0.14	0.14	
	Thallium (Tl) (mg/kg)			<0.050	<0.050	
	Tin (Sn) (mg/kg)			<2.0	<2.0	
	Uranium (U) (mg/kg)			0.547	0.459	
	Vanadium (V) (mg/kg)			38.8	39.0	
	Zinc (Zn) (mg/kg)			41.9	44.6	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

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Sample ID Description Sampled Date Sampled Time Client ID	L1654527-90 Soil Grab 02-AUG-15 384858-11	L1654527-91 Soil Grab 02-AUG-15 384858-12	L1654527-92 Soil Grab 02-AUG-15 384859-01	L1654527-93 Soil Grab 02-AUG-15 384859-02	L1654527-94 Soil Grab 02-AUG-15 384859-03	
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	41.9	11.6	10.5	24.4	74.0
	pH (1:2 soil:water) (pH)	5.84	5.79	6.29	8.40	6.14
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)	24	4.6	<4.3	3.2	76
	Oxidation-Reduction Potential (ORP) (mV)	330	316	312	265	284
Anions and Nutrients	Total Nitrogen by LECO (%)	1.68	0.280	0.090	0.046	1.61
Organic / Inorganic Carbon	Total Carbon by Combustion (%)	40.3	4.4	1.0	0.5	37.2
Plant Available Nutrients	Available Ammonium-N (mg/kg)	24.3 ^{DLM}	4.6 ^{DLM}	1.6 ^{DLM}	3.2	75.9 ^{DLM}
	Available Nitrate-N (mg/kg)	<12 ^{DLM}	<4.0 ^{DLM}	<1.0 ^{DLM}	<1.0	<12 ^{DLM}
	Nitrate+Nitrite-N (mg/kg)	<12 ^{DLM}	<4.0 ^{DLM}	<4.0 ^{DLM}	<2.0	<12 ^{DLM}
	Nitrate-N (mg/kg)	<12 ^{DLM}	<4.0 ^{DLM}	<4.0 ^{DLM}	<2.0	<12 ^{DLM}
	Nitrite-N (mg/kg)	<2.4 ^{DLM}	<0.80 ^{DLM}	<0.80 ^{DLM}	<0.50	<2.4 ^{DLM}
	Available Phosphate-P (mg/kg)	57.7 ^{DLM}	8.1	2.3	<2.0	45.8 ^{DLM}
	Available Potassium (mg/kg)	607 ^{DLM}	44	27	71	58 ^{DLM}
	Available Sulfate-S (mg/kg)	45 ^{DLM}	10.9 ^{DLM}	4.3	11.0	153 ^{DLM}
Metals	Antimony (Sb) (mg/kg)	0.18	<0.10	0.12	0.36	
	Arsenic (As) (mg/kg)	1.83	0.94	2.75	9.96	
	Barium (Ba) (mg/kg)	200	50.0	50.3	113	
	Beryllium (Be) (mg/kg)	0.15	<0.10	0.18	0.48	
	Cadmium (Cd) (mg/kg)	3.87	0.327	0.139	0.155	
	Chromium (Cr) (mg/kg)	12.0	13.9	26.6	14.1	
	Cobalt (Co) (mg/kg)	11.3	2.31	6.91	13.0	
	Copper (Cu) (mg/kg)	22.1	11.4	7.39	626	
	Lead (Pb) (mg/kg)	7.43	5.21	5.73	4.18	
	Mercury (Hg) (mg/kg)	0.183	<0.050	<0.050	0.069	
	Molybdenum (Mo) (mg/kg)	1.05	0.35	0.62	3.29	
	Nickel (Ni) (mg/kg)	13.6	5.31	13.9	9.03	
	Selenium (Se) (mg/kg)	0.52	<0.20	<0.20	0.84	
	Silver (Ag) (mg/kg)	0.59	0.15	0.13	0.28	
	Thallium (Tl) (mg/kg)	0.098	<0.050	0.055	<0.050	
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	
	Uranium (U) (mg/kg)	0.224	0.390	0.616	0.825	
	Vanadium (V) (mg/kg)	15.9	17.8	43.7	210	
	Zinc (Zn) (mg/kg)	89.8	16.4	40.0	46.7	

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Sample ID Description Sampled Date Sampled Time Client ID	L1654527-95 Soil Grab 02-AUG-15 384859-04	L1654527-96 Soil Grab 02-AUG-15 384859-05	L1654527-97 Soil Grab 02-AUG-15 384859-06	L1654527-98 Soil Grab 02-AUG-15 384859-07	L1654527-99 Soil Grab 02-AUG-15 384859-08
Grouping					
Analyte					
SOIL					
Physical Tests					
Moisture (%)	58.7			47.4	51.9
pH (1:2 soil:water) (pH)	6.22	8.68	8.20	6.52	7.11
Leachable Anions & Nutrients					
Total Available Nitrogen (mg/kg)	28.4			61.5	62.1
Oxidation-Reduction Potential (ORP) (mV)	298			277	277
Anions and Nutrients					
Total Nitrogen by LECO (%)	0.947			1.01	0.811
Organic / Inorganic Carbon					
Total Carbon by Combustion (%)	17.6			20.2	16.3
Plant Available Nutrients					
Available Ammonium-N (mg/kg)	28.4 ^{DLM}			14.2 ^{DLM}	11.5 ^{DLM}
Available Nitrate-N (mg/kg)	<6.0 ^{DLM}			37.9 ^{DLM}	46.2 ^{DLM}
Nitrate+Nitrite-N (mg/kg)	<6.0 ^{DLM}			47.3 ^{DLM}	50.6 ^{DLM}
Nitrate-N (mg/kg)	<6.0 ^{DLM}			47.3 ^{DLM}	50.6 ^{DLM}
Nitrite-N (mg/kg)	<1.2 ^{DLM}			<1.2 ^{DLM}	<1.2 ^{DLM}
Available Phosphate-P (mg/kg)	3.2			82.2 ^{DLM}	83.6 ^{DLM}
Available Potassium (mg/kg)	64			170 ^{DLM}	134 ^{DLM}
Available Sulfate-S (mg/kg)	208 ^{DLM}			178 ^{DLM}	172 ^{DLM}
Metals					
Antimony (Sb) (mg/kg)		0.41	0.40	0.18	0.25
Arsenic (As) (mg/kg)		11.4	9.11	2.16	2.58
Barium (Ba) (mg/kg)		166	128	173	199
Beryllium (Be) (mg/kg)		0.63	0.45	0.11	0.18
Cadmium (Cd) (mg/kg)		0.179	0.120	0.982	1.20
Chromium (Cr) (mg/kg)		10.6	14.3	12.2	17.6
Cobalt (Co) (mg/kg)		16.1	11.8	5.02	7.36
Copper (Cu) (mg/kg)		811	504	23.1	28.0
Lead (Pb) (mg/kg)		4.49	3.97	11.3	11.9
Mercury (Hg) (mg/kg)		0.080	0.061	0.161	0.161
Molybdenum (Mo) (mg/kg)		4.85	3.15	1.62	1.44
Nickel (Ni) (mg/kg)		8.86	9.61	6.50	13.2
Selenium (Se) (mg/kg)		1.11	0.68	<0.20	0.21
Silver (Ag) (mg/kg)		0.36	0.23	0.20	0.26
Thallium (Tl) (mg/kg)		<0.050	<0.050	0.076	0.080
Tin (Sn) (mg/kg)		<2.0	<2.0	<2.0	<2.0
Uranium (U) (mg/kg)		1.07	0.739	0.315	0.348
Vanadium (V) (mg/kg)		184	162	23.4	31.7
Zinc (Zn) (mg/kg)		55.7	41.4	118	118

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

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Sample ID Description Sampled Date Sampled Time Client ID	L1654527-100 Soil Grab 02-AUG-15 384859-09	L1654527-101 Soil Grab 02-AUG-15 384859-10	L1654527-102 Soil Grab 02-AUG-15 384859-11	L1654527-103 Soil Grab 02-AUG-15 384859-12	L1654527-104 Soil Grab 02-AUG-15 471688-01	
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	24.5	20.2	22.2	13.7	41.7
	pH (1:2 soil:water) (pH)	6.70	6.92	6.24	8.38	6.86
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)	9.6	8.5	7.2	2.5	20.8
	Oxidation-Reduction Potential (ORP) (mV)	291	293	239	351	150
Anions and Nutrients	Total Nitrogen by LECO (%)	0.095	0.117	0.090	0.043	0.657
Organic / Inorganic Carbon	Total Carbon by Combustion (%)	1.0	1.2	1.0	0.4	14.3
Plant Available Nutrients	Available Ammonium-N (mg/kg)	1.7	1.5	4.9	2.5	20.8 ^{DLM}
	Available Nitrate-N (mg/kg)	7.4 ^{DLM}	6.5	2.2	<1.0	<6.0 ^{DLM}
	Nitrate+Nitrite-N (mg/kg)	7.9	7.0	2.4	<2.0	<4.0 ^{DLM}
	Nitrate-N (mg/kg)	7.9	7.0	2.4	<2.0	<4.0 ^{DLM}
	Nitrite-N (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.80 ^{DLM}
	Available Phosphate-P (mg/kg)	17.6	17.5	6.7	<2.0	50.3 ^{DLM}
	Available Potassium (mg/kg)	35	47	26	116	259 ^{DLM}
	Available Sulfate-S (mg/kg)	49.1 ^{DLM}	51.9	29.5	29.5	355 ^{DLM}
Metals	Antimony (Sb) (mg/kg)	0.14	0.11		0.41	
	Arsenic (As) (mg/kg)	2.04	1.80		12.6	
	Barium (Ba) (mg/kg)	64.8	56.7		171	
	Beryllium (Be) (mg/kg)	<0.10	<0.10		0.62	
	Cadmium (Cd) (mg/kg)	0.179	0.142		0.152	
	Chromium (Cr) (mg/kg)	15.2	14.3		11.8	
	Cobalt (Co) (mg/kg)	2.72	2.55		16.3	
	Copper (Cu) (mg/kg)	7.19	4.35		854	
	Lead (Pb) (mg/kg)	5.52	6.02		4.95	
	Mercury (Hg) (mg/kg)	<0.050	<0.050		0.080	
	Molybdenum (Mo) (mg/kg)	0.46	0.31		4.20	
	Nickel (Ni) (mg/kg)	4.88	4.22		9.57	
	Selenium (Se) (mg/kg)	<0.20	<0.20		1.02	
	Silver (Ag) (mg/kg)	<0.10	<0.10		0.37	
	Thallium (Tl) (mg/kg)	<0.050	<0.050		<0.050	
	Tin (Sn) (mg/kg)	<2.0	<2.0		<2.0	
	Uranium (U) (mg/kg)	0.298	0.315		0.972	
	Vanadium (V) (mg/kg)	31.1	31.2		196	
	Zinc (Zn) (mg/kg)	36.1	31.7		57.7	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

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	Sample ID Description Sampled Date Sampled Time Client ID	L1654527-105 Soil Grab 02-AUG-15 471688-02	L1654527-106 Soil Grab 03-AUG-15 471688-03	L1654527-107 Soil Grab 03-AUG-15 471688-04	L1654527-108 Soil Grab 03-AUG-15 471688-05	L1654527-109 Soil Grab 03-AUG-15 471688-06
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	13.4	4.37	59.6	39.3	33.5
	pH (1:2 soil:water) (pH)	6.46	8.06	5.83	5.93	5.78
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)	5.8	2.7	151	90.7	67.4
	Oxidation-Reduction Potential (ORP) (mV)	288	291	316	323	345
Anions and Nutrients	Total Nitrogen by LECO (%)	0.118	0.043	0.939	0.724	0.543
Organic / Inorganic Carbon	Total Carbon by Combustion (%)	1.7	0.3	14.3	9.5	6.7
Plant Available Nutrients	Available Ammonium-N (mg/kg)	5.8	2.7	33.5 ^{DLM}	27.3 ^{DLM}	22.6 ^{DLM}
	Available Nitrate-N (mg/kg)	<1.0	<1.0	120 ^{DLM}	60.0 ^{DLM}	41.8 ^{DLM}
	Nitrate+Nitrite-N (mg/kg)	<2.0	<2.0	117 ^{DLM}	63.3 ^{DLM}	44.8 ^{DLM}
	Nitrate-N (mg/kg)	<2.0	<2.0	117 ^{DLM}	63.3 ^{DLM}	44.8 ^{DLM}
	Nitrite-N (mg/kg)	<0.50	<0.50	<1.2 ^{DLM}	<0.80 ^{DLM}	<0.80 ^{DLM}
	Available Phosphate-P (mg/kg)	84.0	2.7	26.8 ^{DLM}	8.8	10.3 ^{DLM}
	Available Potassium (mg/kg)	98	57	138 ^{DLM}	97	84 ^{DLM}
	Available Sulfate-S (mg/kg)	308	79.7	494 ^{DLM}	271 ^{DLM}	164 ^{DLM}
Metals	Antimony (Sb) (mg/kg)	0.22				
	Arsenic (As) (mg/kg)	5.73				
	Barium (Ba) (mg/kg)	69.3				
	Beryllium (Be) (mg/kg)	0.24				
	Cadmium (Cd) (mg/kg)	0.299				
	Chromium (Cr) (mg/kg)	29.0				
	Cobalt (Co) (mg/kg)	7.38				
	Copper (Cu) (mg/kg)	12.8				
	Lead (Pb) (mg/kg)	5.81				
	Mercury (Hg) (mg/kg)	<0.050				
	Molybdenum (Mo) (mg/kg)	0.67				
	Nickel (Ni) (mg/kg)	16.8				
	Selenium (Se) (mg/kg)	<0.20				
	Silver (Ag) (mg/kg)	0.12				
	Thallium (Tl) (mg/kg)	0.061				
	Tin (Sn) (mg/kg)	<2.0				
	Uranium (U) (mg/kg)	0.429				
	Vanadium (V) (mg/kg)	56.5				
	Zinc (Zn) (mg/kg)	73.7				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

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Sample ID Description Sampled Date Sampled Time Client ID		L1654527-110 Soil Grab 03-AUG-15 471688-07	L1654527-111 Soil Grab 03-AUG-15 471688-08	L1654527-112 Soil Grab 03-AUG-15 471688-09	L1654527-113 Soil Grab 03-AUG-15 471688-10	L1654527-114 Soil Grab 03-AUG-15 471688-11
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)				66.1	55.8
	pH (1:2 soil:water) (pH)	8.39	8.18	8.06	6.44	6.04
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)				449	46.9
	Oxidation-Reduction Potential (ORP) (mV)				168	239
Anions and Nutrients	Total Nitrogen by LECO (%)				1.54	1.08
Organic / Inorganic Carbon	Total Carbon by Combustion (%)				24.4	15.7
Plant Available Nutrients	Available Ammonium-N (mg/kg)				449 ^{DLM}	46.9 ^{DLM}
	Available Nitrate-N (mg/kg)				<10 ^{DLM}	<6.0 ^{DLM}
	Nitrate+Nitrite-N (mg/kg)				<6.0 ^{DLM}	<6.0 ^{DLM}
	Nitrate-N (mg/kg)				<6.0 ^{DLM}	<6.0 ^{DLM}
	Nitrite-N (mg/kg)				<1.2 ^{DLM}	<1.2 ^{DLM}
	Available Phosphate-P (mg/kg)				33.7 ^{DLM}	19.3 ^{DLM}
	Available Potassium (mg/kg)				210 ^{DLM}	235 ^{DLM}
	Available Sulfate-S (mg/kg)				208 ^{DLM}	403 ^{DLM}
Metals	Antimony (Sb) (mg/kg)	0.34	0.30	0.37		0.70
	Arsenic (As) (mg/kg)	8.73	8.66	8.94		16.4
	Barium (Ba) (mg/kg)	124	136	132		336
	Beryllium (Be) (mg/kg)	0.45	0.45	0.49		0.94
	Cadmium (Cd) (mg/kg)	0.113	0.412	0.148		3.37
	Chromium (Cr) (mg/kg)	15.3	15.1	14.9		64.7
	Cobalt (Co) (mg/kg)	12.3	12.6	11.9		17.7
	Copper (Cu) (mg/kg)	469	480	612		151
	Lead (Pb) (mg/kg)	4.08	4.22	4.67		12.7
	Mercury (Hg) (mg/kg)	0.055	0.069	0.066		0.158
	Molybdenum (Mo) (mg/kg)	3.17	2.89	4.08		2.48
	Nickel (Ni) (mg/kg)	10.1	10.6	11.0		71.0
	Selenium (Se) (mg/kg)	0.70	0.71	0.82		2.33
	Silver (Ag) (mg/kg)	0.23	0.21	0.29		1.52
	Thallium (Tl) (mg/kg)	<0.050	<0.050	<0.050		0.168
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0		<2.0
	Uranium (U) (mg/kg)	0.739	0.692	0.821		1.93
	Vanadium (V) (mg/kg)	198	189	143		78.8
	Zinc (Zn) (mg/kg)	42.2	42.9	44.6		209

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

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	Sample ID Description Sampled Date Sampled Time Client ID	L1654527-115 Soil Grab 03-AUG-15 471688-12	L1654527-116 Soil 03-AUG-15 389821-01	L1654527-117 Soil 03-AUG-15 389821-02	L1654527-118 Soil 03-AUG-15 389821-03	L1654527-119 Soil 03-AUG-15 389821-04
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)			69.4	41.0	
	pH (1:2 soil:water) (pH)	7.27	7.26	6.69	6.97	8.00
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)	9.9	8.1	29.3	7.5	
	Oxidation-Reduction Potential (ORP) (mV)			175	260	
Anions and Nutrients	Total Nitrogen by LECO (%)	0.225	0.237	1.93	0.581	
Organic / Inorganic Carbon	Total Carbon by Combustion (%)	2.8	2.3	38.0	8.0	
Plant Available Nutrients	Available Ammonium-N (mg/kg)	9.9	8.1 ^{DLM}	29.3 ^{DLM}	7.5 ^{DLM}	
	Available Nitrate-N (mg/kg)	<1.0	<1.0 ^{DLM}	<10 ^{DLM}	<8.0 ^{DLM}	
	Nitrate+Nitrite-N (mg/kg)	<2.0	<4.0 ^{DLM}	<8.0 ^{DLM}	<6.0 ^{DLM}	
	Nitrate-N (mg/kg)	<2.0	<4.0 ^{DLM}	<8.0 ^{DLM}	<6.0 ^{DLM}	
	Nitrite-N (mg/kg)	<0.50	<0.80 ^{DLM}	<1.6 ^{DLM}	<1.2 ^{DLM}	
	Available Phosphate-P (mg/kg)	4.4	4.3	23.3 ^{DLM}	<2.0	
	Available Potassium (mg/kg)	99	83	176 ^{DLM}	145 ^{DLM}	
	Available Sulfate-S (mg/kg)	18.4	16.4	33 ^{DLM}	15 ^{DLM}	
Metals	Antimony (Sb) (mg/kg)	0.36	0.41			0.40
	Arsenic (As) (mg/kg)	15.1	17.3			9.91
	Barium (Ba) (mg/kg)	137	172			172
	Beryllium (Be) (mg/kg)	0.49	0.56			0.54
	Cadmium (Cd) (mg/kg)	0.657	0.671			0.159
	Chromium (Cr) (mg/kg)	47.1	51.4			18.1
	Cobalt (Co) (mg/kg)	16.0	17.4			13.9
	Copper (Cu) (mg/kg)	61.9	64.2			472
	Lead (Pb) (mg/kg)	8.55	9.81			5.84
	Mercury (Hg) (mg/kg)	<0.050	<0.050			0.072
	Molybdenum (Mo) (mg/kg)	1.41	1.54			2.86
	Nickel (Ni) (mg/kg)	36.9	39.7			14.1
	Selenium (Se) (mg/kg)	0.32	0.40			0.80
	Silver (Ag) (mg/kg)	0.39	0.45			0.26
	Thallium (Tl) (mg/kg)	0.104	0.133			<0.050
	Tin (Sn) (mg/kg)	<2.0	<2.0			<2.0
	Uranium (U) (mg/kg)	1.45	1.55			0.953
	Vanadium (V) (mg/kg)	62.8	69.9			140
	Zinc (Zn) (mg/kg)	97.6	113			53.3

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1654527-120 Soil 03-AUG-15 389821-05	L1654527-121 Soil 03-AUG-15 389821-06	L1654527-122 Soil 03-AUG-15 389821-07	L1654527-124 Soil 03-AUG-15 389821-09	L1654527-125 Soil 04-AUG-15 389821-10
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)			77.7	59.4	15.4
	pH (1:2 soil:water) (pH)	7.93	8.09	7.01	7.12	7.92
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)			52.8	26.5	<2.2
	Oxidation-Reduction Potential (ORP) (mV)			204	128	286
Anions and Nutrients	Total Nitrogen by LECO (%)			2.30	1.78	0.061
Organic / Inorganic Carbon	Total Carbon by Combustion (%)			37.6	38.1	0.9
Plant Available Nutrients	Available Ammonium-N (mg/kg)			17.6 ^{DLM}	26.5 ^{DLM}	<1.0
	Available Nitrate-N (mg/kg)			30 ^{DLM}	<10 ^{DLM}	<1.0
	Nitrate+Nitrite-N (mg/kg)			35.2 ^{DLM}	<8.0 ^{DLM}	<2.0
	Nitrate-N (mg/kg)			35.2 ^{DLM}	<8.0 ^{DLM}	<2.0
	Nitrite-N (mg/kg)			<1.6 ^{DLM}	<1.6 ^{DLM}	<0.50
	Available Phosphate-P (mg/kg)			6.5 ^{DLM}	12.3 ^{DLM}	4.0
	Available Potassium (mg/kg)			91 ^{DLM}	280 ^{DLM}	88
	Available Sulfate-S (mg/kg)			75 ^{DLM}	64 ^{DLM}	40.1
Metals	Antimony (Sb) (mg/kg)	0.40	0.35			0.37
	Arsenic (As) (mg/kg)	9.84	9.24			9.77
	Barium (Ba) (mg/kg)	167	128			143
	Beryllium (Be) (mg/kg)	0.51	0.45			0.48
	Cadmium (Cd) (mg/kg)	0.153	0.134			0.135
	Chromium (Cr) (mg/kg)	17.9	16.2			14.1
	Cobalt (Co) (mg/kg)	13.9	11.6			14.0
	Copper (Cu) (mg/kg)	452	525			558
	Lead (Pb) (mg/kg)	5.31	4.27			4.22
	Mercury (Hg) (mg/kg)	0.064	0.064			0.063
	Molybdenum (Mo) (mg/kg)	2.85	3.93			3.19
	Nickel (Ni) (mg/kg)	13.7	10.8			9.11
	Selenium (Se) (mg/kg)	0.75	0.71			0.86
	Silver (Ag) (mg/kg)	0.22	0.22			0.26
	Thallium (Tl) (mg/kg)	<0.050	<0.050			<0.050
	Tin (Sn) (mg/kg)	<2.0	<2.0			<2.0
	Uranium (U) (mg/kg)	0.934	0.727			0.903
	Vanadium (V) (mg/kg)	152	143			221
	Zinc (Zn) (mg/kg)	51.5	44.1			43.6

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1654527-126 Soil 04-AUG-15 389821-11	L1654527-127 Soil 04-AUG-15 389821-12	L1654527-128 Soil 04-AUG-15 429590-01	L1654527-129 Soil 04-AUG-15 429590-02	L1654527-130 Soil 04-AUG-15 429590-03	
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	19.0	36.9	34.7	17.9	6.59
	pH (1:2 soil:water) (pH)	7.94	7.11	5.98	6.16	6.66
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)	<2.2	7.6	11.1	12.2	3.5
	Oxidation-Reduction Potential (ORP) (mV)	304	239	254	338	306
Anions and Nutrients	Total Nitrogen by LECO (%)	0.094	0.422	0.847	0.914	0.164
Organic / Inorganic Carbon	Total Carbon by Combustion (%)	1.3	6.5	12.5	12.3	2.5
Plant Available Nutrients	Available Ammonium-N (mg/kg)	<1.0	7.6 ^{DLM}	11.1 ^{DLM}	12.2 ^{DLM}	3.5
	Available Nitrate-N (mg/kg)	<1.0	<4.0 ^{DLM}	<10 ^{DLM}	<4.0 ^{DLM}	<1.0
	Nitrate+Nitrite-N (mg/kg)	<2.0	<4.0 ^{DLM}	<6.0 ^{DLM}	<6.0 ^{DLM}	<2.0
	Nitrate-N (mg/kg)	<2.0	<4.0 ^{DLM}	<6.0 ^{DLM}	<6.0 ^{DLM}	<2.0
	Nitrite-N (mg/kg)	<0.50	<0.80 ^{DLM}	<1.2 ^{DLM}	<1.2 ^{DLM}	<0.50
	Available Phosphate-P (mg/kg)	4.8	12.0 ^{DLM}	57.4 ^{DLM}	12.1	13.0
	Available Potassium (mg/kg)	97	366 ^{DLM}	351 ^{DLM}	212	85
	Available Sulfate-S (mg/kg)	22.9	39.4 ^{DLM}	142 ^{DLM}	21.1 ^{DLM}	6.5
Metals	Antimony (Sb) (mg/kg)	0.31				
	Arsenic (As) (mg/kg)	9.65				
	Barium (Ba) (mg/kg)	148				
	Beryllium (Be) (mg/kg)	0.46				
	Cadmium (Cd) (mg/kg)	0.136				
	Chromium (Cr) (mg/kg)	13.5				
	Cobalt (Co) (mg/kg)	13.8				
	Copper (Cu) (mg/kg)	573				
	Lead (Pb) (mg/kg)	4.16				
	Mercury (Hg) (mg/kg)	0.077				
	Molybdenum (Mo) (mg/kg)	3.61				
	Nickel (Ni) (mg/kg)	8.90				
	Selenium (Se) (mg/kg)	0.80				
	Silver (Ag) (mg/kg)	0.38				
	Thallium (Tl) (mg/kg)	<0.050				
	Tin (Sn) (mg/kg)	<2.0				
	Uranium (U) (mg/kg)	0.808				
	Vanadium (V) (mg/kg)	223				
	Zinc (Zn) (mg/kg)	44.7				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1654527-131 Soil 04-AUG-15 429590-04	L1654527-132 Soil 04-AUG-15 429590-05	L1654527-133 Soil 04-AUG-15 429590-06	L1654527-134 Soil 04-AUG-15 429590-07	L1654527-135 Soil 04-AUG-15 429590-08
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)					
	pH (1:2 soil:water) (pH)	7.65	7.51	6.07	8.63	8.53
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)					
	Oxidation-Reduction Potential (ORP) (mV)					
Anions and Nutrients	Total Nitrogen by LECO (%)					
Organic / Inorganic Carbon	Total Carbon by Combustion (%)					
Plant Available Nutrients	Available Ammonium-N (mg/kg)					
	Available Nitrate-N (mg/kg)					
	Nitrate+Nitrite-N (mg/kg)					
	Nitrate-N (mg/kg)					
	Nitrite-N (mg/kg)					
	Available Phosphate-P (mg/kg)					
	Available Potassium (mg/kg)					
	Available Sulfate-S (mg/kg)					
Metals	Antimony (Sb) (mg/kg)	0.45	0.30	0.43	0.32	0.33
	Arsenic (As) (mg/kg)	10.1	7.16	7.78	10.8	9.11
	Barium (Ba) (mg/kg)	106	148	192	158	120
	Beryllium (Be) (mg/kg)	0.38	0.42	0.69	0.58	0.48
	Cadmium (Cd) (mg/kg)	0.217	0.205	0.560	0.133	0.119
	Chromium (Cr) (mg/kg)	27.3	15.6	50.1	9.82	10.6
	Cobalt (Co) (mg/kg)	10.6	11.8	33.1	15.8	12.6
	Copper (Cu) (mg/kg)	54.4	488	52.4	872	794
	Lead (Pb) (mg/kg)	5.53	4.16	10.5	7.27	4.28
	Mercury (Hg) (mg/kg)	0.052	0.083	<0.050	0.066	0.065
	Molybdenum (Mo) (mg/kg)	0.79	3.11	1.01	4.49	4.27
	Nickel (Ni) (mg/kg)	19.0	11.2	37.5	7.87	7.27
	Selenium (Se) (mg/kg)	0.30	0.81	<0.20	1.06	0.94
	Silver (Ag) (mg/kg)	0.10	0.27	0.25	0.38	0.32
	Thallium (Tl) (mg/kg)	0.063	<0.050	0.124	<0.050	<0.050
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Uranium (U) (mg/kg)	0.699	0.918	0.847	0.914	0.714
	Vanadium (V) (mg/kg)	79.2	164	90.2	196	186
	Zinc (Zn) (mg/kg)	67.1	42.4	102	54.6	44.0

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1654527-136			
		Soil	04-AUG-15		
		429590-09			
Grouping	Analyte				
SOIL					
Physical Tests	Moisture (%)				
	pH (1:2 soil:water) (pH)	7.88			
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)				
	Oxidation-Reduction Potential (ORP) (mV)				
Anions and Nutrients	Total Nitrogen by LECO (%)				
Organic / Inorganic Carbon	Total Carbon by Combustion (%)				
Plant Available Nutrients	Available Ammonium-N (mg/kg)				
	Available Nitrate-N (mg/kg)				
	Nitrate+Nitrite-N (mg/kg)				
	Nitrate-N (mg/kg)				
	Nitrite-N (mg/kg)				
	Available Phosphate-P (mg/kg)				
	Available Potassium (mg/kg)				
	Available Sulfate-S (mg/kg)				
Metals	Antimony (Sb) (mg/kg)	0.33			
	Arsenic (As) (mg/kg)	10.1			
	Barium (Ba) (mg/kg)	89.7			
	Beryllium (Be) (mg/kg)	0.32			
	Cadmium (Cd) (mg/kg)	0.172			
	Chromium (Cr) (mg/kg)	30.8			
	Cobalt (Co) (mg/kg)	10.8			
	Copper (Cu) (mg/kg)	113			
	Lead (Pb) (mg/kg)	5.33			
	Mercury (Hg) (mg/kg)	0.058			
	Molybdenum (Mo) (mg/kg)	1.01			
	Nickel (Ni) (mg/kg)	21.1			
	Selenium (Se) (mg/kg)	0.44			
	Silver (Ag) (mg/kg)	0.11			
	Thallium (Tl) (mg/kg)	0.062			
	Tin (Sn) (mg/kg)	<2.0			
	Uranium (U) (mg/kg)	0.736			
	Vanadium (V) (mg/kg)	80.4			
	Zinc (Zn) (mg/kg)	48.1			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-LECO-SK	Soil	Total Carbon by combustion method	SSSA (1996) P. 973-974
		The sample is ignited in a combustion analyzer where carbon in the reduced CO ₂ gas is determined using a thermal conductivity detector.	
ETL-N-TOT-AVAIL-SK	Soil	Available Ammonium-N - Calculation	Soil Methods of Analysis (1993) CSSS
HG-200.2-CVAF-VA	Soil	Mercury in Soil by CVAFS	EPA 200.2/1631E (mod)
		Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.	
MET-200.2-CCMS-VA	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)
		Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CRC ICPMS.	
		Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. This method does not dissolve all silicate materials and may result in a partial extraction. depending on the sample matrix, for some metals, including, but not limited to Al, Ba, Be, Cr, Sr, Ti, Tl, and V.	
MOISTURE-VA	Soil	Moisture content	ASTM D2974-00 Method A
		This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.	
N-TOT-LECO-SK	Soil	Total Nitrogen by combustion method	SSSA (1996) P. 973-974
		The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.	
N2/N3-AVAIL-KCL-SK	Soil	Nitrate, Nitrite & Nitrate+Nitrite-N(KCL	CSSS (1993) p. 26-28
		Plant available nitrate and nitrite are extracted from the sample with 2N KCl. Nitrate and Nitrite in the filtered extract are determined colorimetrically by Technicon auto-analyzer or flow injection analyzer at 520 nm.	
NH4-AVAIL-SK	Soil	Available Ammonium-N	CSSS(1993) 4.2/COMM SOIL SCI 19(6)
		Ammonium (NH ₄ -N) is extracted from the soil using 2 N KCl. Ammonium in the extract is mixed with hypochlorite and salicylate to form indophenol blue, which is determined colorimetrically by auto analysis at 660 nm.	
NO3-AVAIL-SK	Soil	Available Nitrate-N	Method = Alberta Ag (1988)
		Available Nitrate and Nitrite are extracted from the soil using a dilute calcium chloride solution. Nitrate is quantitatively reduced to nitrite by passage of the sample through a copperized cadmium column. The nitrite (reduced nitrate plus original nitrite) is then determined by diazotizing with sulfanilamide followed by coupling with N-(1-naphthyl) ethylenediamine dihydrochloride. The resulting water soluble dye has a magenta color which is measured at colorimetrically at 520nm.	
		Reference: Recommended Methods of Soil Analysis for Canadian Prairie Agricultural Soils. Alberta Agriculture (1988) p. 19 and 28	
ORP-SHKFL96-VA	Soil	ORP by Electrode (96 hour SHAKEFLASK)	BC MIN. OF ENERGY AND MINES
		This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 96 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter. The sample is then analysed using procedures carried out in accordance "ASTM" method D1498-00 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM), May 2000. Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.	
PH-1:2-VA	Soil	pH in Soil (1:2 Soil:Water Extraction)	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL
		This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.	
PO4/K-AVAIL-SK	Soil	Plant Available Phosphorus and Potassium	Comm. Soil Sci. Plant Anal, 25 (5&6)
		Plant available phosphorus and potassium are extracted from the soil using Modified Kelowna solution. Phosphorous in the soil extract is determined colorimetrically at 880 nm, while potassium is determined by flame emission at 770 nm.	
SO4-AVAIL-SK	Soil	Available Sulfate-S	REC METH SOIL ANAL - AB. AG(1988)
		Plant available sulfate in the soil is extracted using a weak calcium chloride solution. Sulfate in the extract is determined by ICP-OES.	

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Reference Information

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

08-028545	10-384855	10-384856	10-384857	10-384858
10-384859	10-389818	10-389819	10-389820	10-389821
10-471688	14-429590			

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

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Client: GOLDER ASSOCIATES LTD.
 200-2920 Virtual Way
 Vancouver BC V5M 0C4

Contact: Evin Zapf-Gilje

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-LECO-SK		Soil						
Batch	R3251758							
WG2152225-1	DUP	L1654527-10						
Total Carbon by Combustion		7.9	7.6		%	4.4	20	21-AUG-15
WG2152225-10	DUP	L1654527-117						
Total Carbon by Combustion		38.0	36.7		%	3.5	20	21-AUG-15
WG2152225-4	DUP	L1654527-54						
Total Carbon by Combustion		5.8	5.7		%	1.2	20	21-AUG-15
WG2152225-7	DUP	L1654527-91						
Total Carbon by Combustion		4.4	4.4		%	0.5	20	21-AUG-15
WG2152225-11	IRM	08-109_SOIL						
Total Carbon by Combustion			107.8		%		80-120	21-AUG-15
WG2152225-2	IRM	08-109_SOIL						
Total Carbon by Combustion			102.5		%		80-120	21-AUG-15
WG2152225-5	IRM	08-109_SOIL						
Total Carbon by Combustion			99.5		%		80-120	21-AUG-15
WG2152225-8	IRM	08-109_SOIL						
Total Carbon by Combustion			99.2		%		80-120	21-AUG-15
WG2152225-12	MB							
Total Carbon by Combustion			<0.1		%		0.1	21-AUG-15
WG2152225-3	MB							
Total Carbon by Combustion			<0.1		%		0.1	21-AUG-15
WG2152225-6	MB							
Total Carbon by Combustion			<0.1		%		0.1	21-AUG-15
WG2152225-9	MB							
Total Carbon by Combustion			<0.1		%		0.1	21-AUG-15
HG-200.2-CVAF-VA		Soil						
Batch	R3248092							
WG2149965-4	CRM	VA-NRC-STSD1						
Mercury (Hg)			95.2		%		70-130	17-AUG-15
WG2149965-5	CRM	VA-NRC-PACS3						
Mercury (Hg)			99.5		%		70-130	17-AUG-15
WG2150078-4	CRM	VA-NRC-STSD1						
Mercury (Hg)			85.2		%		70-130	17-AUG-15
WG2150078-5	CRM	VA-NRC-PACS3						
Mercury (Hg)			90.4		%		70-130	17-AUG-15
WG2150078-2	DUP	L1654527-98						
Mercury (Hg)		0.161	0.136		mg/kg	17	40	17-AUG-15
WG2149965-3	LCS							
Mercury (Hg)			88.6		%		70-130	17-AUG-15
WG2150078-3	LCS							



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-200.2-CVAF-VA		Soil						
Batch	R3248092							
WG2150078-3	LCS							
Mercury (Hg)			76.1		%		70-130	17-AUG-15
WG2149965-1	MB							
Mercury (Hg)			<0.0050		mg/kg		0.005	17-AUG-15
WG2150078-1	MB							
Mercury (Hg)			<0.0050		mg/kg		0.005	17-AUG-15
Batch	R3248150							
WG2150050-4	CRM	VA-NRC-STSD1						
Mercury (Hg)			91.8		%		70-130	17-AUG-15
WG2150050-5	CRM	VA-NRC-PACS3						
Mercury (Hg)			109.2		%		70-130	17-AUG-15
WG2150071-4	CRM	VA-NRC-STSD1						
Mercury (Hg)			102.9		%		70-130	17-AUG-15
WG2150071-5	CRM	VA-NRC-PACS3						
Mercury (Hg)			117.2		%		70-130	17-AUG-15
WG2150050-2	DUP	L1654527-25						
Mercury (Hg)		0.108	0.110		mg/kg	2.0	40	17-AUG-15
WG2150071-2	DUP	L1654527-62						
Mercury (Hg)		0.151	0.160		mg/kg	5.7	40	17-AUG-15
WG2150050-3	LCS							
Mercury (Hg)			89.8		%		70-130	17-AUG-15
WG2150071-3	LCS							
Mercury (Hg)			102.9		%		70-130	17-AUG-15
WG2150050-1	MB							
Mercury (Hg)			<0.0050		mg/kg		0.005	17-AUG-15
WG2150071-1	MB							
Mercury (Hg)			<0.0050		mg/kg		0.005	17-AUG-15
Batch	R3249709							
WG2152092-4	CRM	VA-NRC-STSD1						
Mercury (Hg)			94.1		%		70-130	19-AUG-15
WG2152092-5	CRM	VA-NRC-PACS3						
Mercury (Hg)			90.8		%		70-130	19-AUG-15
WG2152092-2	DUP	L1654527-20						
Mercury (Hg)		0.081	0.081		mg/kg	0.4	40	19-AUG-15
WG2152092-3	LCS							
Mercury (Hg)			88.1		%		70-130	19-AUG-15
WG2152092-1	MB							
Mercury (Hg)			<0.0050		mg/kg		0.005	19-AUG-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-200.2-CVAF-VA		Soil						
Batch	R3249777							
WG2151822-4	CRM	VA-NRC-STSD1						
Mercury (Hg)			92.9		%		70-130	19-AUG-15
WG2151822-5	CRM	VA-NRC-PACS3						
Mercury (Hg)			93.0		%		70-130	19-AUG-15
WG2151874-4	CRM	VA-NRC-STSD1						
Mercury (Hg)			90.6		%		70-130	19-AUG-15
WG2151874-5	CRM	VA-NRC-PACS3						
Mercury (Hg)			98.2		%		70-130	19-AUG-15
WG2151822-2	DUP	L1654527-52						
Mercury (Hg)		0.070	0.075		mg/kg	6.2	40	19-AUG-15
WG2151874-2	DUP	L1654527-112						
Mercury (Hg)		0.066	0.072		mg/kg	8.4	40	19-AUG-15
WG2151822-3	LCS							
Mercury (Hg)			84.1		%		70-130	19-AUG-15
WG2151874-3	LCS							
Mercury (Hg)			81.9		%		70-130	19-AUG-15
WG2151822-1	MB							
Mercury (Hg)			<0.0050		mg/kg		0.005	19-AUG-15
WG2151874-1	MB							
Mercury (Hg)			<0.0050		mg/kg		0.005	19-AUG-15
Batch	R3250284							
WG2152237-4	CRM	VA-NRC-STSD1						
Mercury (Hg)			86.5		%		70-130	20-AUG-15
WG2152237-5	CRM	VA-NRC-PACS3						
Mercury (Hg)			97.0		%		70-130	20-AUG-15
WG2152237-2	DUP	L1654527-49						
Mercury (Hg)		0.080	0.077		mg/kg	3.9	40	20-AUG-15
WG2152237-3	LCS							
Mercury (Hg)			92.4		%		70-130	20-AUG-15
WG2152237-1	MB							
Mercury (Hg)			<0.0050		mg/kg		0.005	20-AUG-15
Batch	R3272034							
WG2174574-4	CRM	VA-NRC-STSD1						
Mercury (Hg)			102.2		%		70-130	21-SEP-15
WG2174574-5	CRM	VA-NRC-PACS3						
Mercury (Hg)			106.7		%		70-130	21-SEP-15
WG2174574-2	DUP	L1654527-136						
Mercury (Hg)		0.058	0.056		mg/kg	4.7	40	21-SEP-15
WG2174574-3	LCS							



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HG-200.2-CVAF-VA		Soil						
Batch	R3272034							
WG2174574-3	LCS							
Mercury (Hg)			107.5		%		70-130	21-SEP-15
WG2174574-1	MB							
Mercury (Hg)			<0.0050		mg/kg		0.005	21-SEP-15
Batch	R3296311							
WG2199073-4	CRM	VA-NRC-STSD1						
Mercury (Hg)			99.3		%		70-130	25-OCT-15
WG2199073-5	CRM	VA-NRC-PACS3						
Mercury (Hg)			104.8		%		70-130	25-OCT-15
WG2199073-3	LCS							
Mercury (Hg)			94.5		%		70-130	25-OCT-15
WG2199073-1	MB							
Mercury (Hg)			<0.0050		mg/kg		0.005	25-OCT-15
MET-200.2-CCMS-VA		Soil						
Batch	R3247743							
WG2150050-4	CRM	VA-NRC-STSD1						
Antimony (Sb)			106.8		%		70-130	16-AUG-15
Arsenic (As)			103.9		%		70-130	16-AUG-15
Barium (Ba)			97.3		%		70-130	16-AUG-15
Beryllium (Be)			113.0		%		70-130	16-AUG-15
Cadmium (Cd)			98.9		%		70-130	16-AUG-15
Chromium (Cr)			104.4		%		70-130	16-AUG-15
Cobalt (Co)			104.2		%		70-130	16-AUG-15
Copper (Cu)			102.0		%		70-130	16-AUG-15
Lead (Pb)			101.5		%		70-130	16-AUG-15
Molybdenum (Mo)			104.8		%		70-130	16-AUG-15
Nickel (Ni)			103.5		%		70-130	16-AUG-15
Selenium (Se)			93.4		%		70-130	16-AUG-15
Silver (Ag)			103.2		%		70-130	16-AUG-15
Thallium (Tl)			101.9		%		70-130	16-AUG-15
Tin (Sn)			105.5		%		70-130	16-AUG-15
Vanadium (V)			111.1		%		70-130	16-AUG-15
Zinc (Zn)			100.3		%		70-130	16-AUG-15
WG2150050-5	CRM	VA-NRC-PACS3						
Antimony (Sb)			100.2		%		70-130	16-AUG-15
Arsenic (As)			94.5		%		70-130	16-AUG-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA								
	Soil							
Batch	R3247743							
WG2150050-5	CRM	VA-NRC-PACS3						
Barium (Ba)			99.7		%		70-130	16-AUG-15
Beryllium (Be)			106.6		%		70-130	16-AUG-15
Cadmium (Cd)			95.3		%		70-130	16-AUG-15
Chromium (Cr)			97.6		%		70-130	16-AUG-15
Cobalt (Co)			99.2		%		70-130	16-AUG-15
Copper (Cu)			101.8		%		70-130	16-AUG-15
Lead (Pb)			100.2		%		70-130	16-AUG-15
Molybdenum (Mo)			94.2		%		70-130	16-AUG-15
Nickel (Ni)			100.3		%		70-130	16-AUG-15
Selenium (Se)			98.2		%		70-130	16-AUG-15
Silver (Ag)			103.7		%		70-130	16-AUG-15
Thallium (Tl)			101.1		%		70-130	16-AUG-15
Tin (Sn)			91.2		%		70-130	16-AUG-15
Uranium (U)			105.5		%		70-130	16-AUG-15
Vanadium (V)			102.2		%		70-130	16-AUG-15
Zinc (Zn)			100.5		%		70-130	16-AUG-15
WG2150050-2	DUP	L1654527-25						
Antimony (Sb)		0.35	0.34		mg/kg	1.4	30	16-AUG-15
Arsenic (As)		5.70	5.34		mg/kg	6.6	30	16-AUG-15
Barium (Ba)		194	184		mg/kg	5.6	40	16-AUG-15
Beryllium (Be)		0.87	0.85		mg/kg	2.4	30	16-AUG-15
Cadmium (Cd)		0.417	0.472		mg/kg	12	30	16-AUG-15
Chromium (Cr)		48.6	41.5		mg/kg	16	30	16-AUG-15
Cobalt (Co)		24.0	25.8		mg/kg	7.1	30	16-AUG-15
Copper (Cu)		46.8	44.0		mg/kg	6.3	30	16-AUG-15
Lead (Pb)		13.4	13.7		mg/kg	2.1	40	16-AUG-15
Molybdenum (Mo)		1.34	1.33		mg/kg	0.3	40	16-AUG-15
Nickel (Ni)		28.1	25.5		mg/kg	10	30	16-AUG-15
Selenium (Se)		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	16-AUG-15
Silver (Ag)		1.00	0.97		mg/kg	2.9	40	16-AUG-15
Thallium (Tl)		0.140	0.142		mg/kg	1.1	30	16-AUG-15
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	16-AUG-15
Uranium (U)		0.975	0.899		mg/kg	8.2	30	16-AUG-15
Vanadium (V)		84.0	76.3		mg/kg	9.7	30	16-AUG-15



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MET-200.2-CCMS-VA								
Batch	R3247743							
WG2150050-2	DUP	L1654527-25						
Zinc (Zn)		91.3	84.0		mg/kg	8.3	30	16-AUG-15
Batch								
R3248332								
WG2149965-4	CRM	VA-NRC-STSD1						
Antimony (Sb)			107.5		%		70-130	17-AUG-15
Arsenic (As)			103.2		%		70-130	17-AUG-15
Barium (Ba)			99.2		%		70-130	17-AUG-15
Beryllium (Be)			99.4		%		70-130	17-AUG-15
Cadmium (Cd)			97.8		%		70-130	17-AUG-15
Chromium (Cr)			102.3		%		70-130	17-AUG-15
Cobalt (Co)			101.4		%		70-130	17-AUG-15
Copper (Cu)			99.2		%		70-130	17-AUG-15
Lead (Pb)			104.1		%		70-130	17-AUG-15
Molybdenum (Mo)			104.8		%		70-130	17-AUG-15
Nickel (Ni)			97.8		%		70-130	17-AUG-15
Selenium (Se)			97.7		%		70-130	17-AUG-15
Silver (Ag)			101.7		%		70-130	17-AUG-15
Thallium (Tl)			108.1		%		70-130	17-AUG-15
Tin (Sn)			102.4		%		70-130	17-AUG-15
Vanadium (V)			104.0		%		70-130	17-AUG-15
Zinc (Zn)			101.2		%		70-130	17-AUG-15
WG2149965-5	CRM	VA-NRC-PACS3						
Antimony (Sb)			96.7		%		70-130	17-AUG-15
Arsenic (As)			92.1		%		70-130	17-AUG-15
Barium (Ba)			103.5		%		70-130	17-AUG-15
Beryllium (Be)			100.1		%		70-130	17-AUG-15
Cadmium (Cd)			94.8		%		70-130	17-AUG-15
Chromium (Cr)			97.0		%		70-130	17-AUG-15
Cobalt (Co)			97.0		%		70-130	17-AUG-15
Copper (Cu)			100.5		%		70-130	17-AUG-15
Lead (Pb)			104.2		%		70-130	17-AUG-15
Molybdenum (Mo)			98.0		%		70-130	17-AUG-15
Nickel (Ni)			96.7		%		70-130	17-AUG-15
Selenium (Se)			103.3		%		70-130	17-AUG-15
Silver (Ag)			102.9		%		70-130	17-AUG-15



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MET-200.2-CCMS-VA								
	Soil							
Batch	R3248332							
WG2149965-5	CRM	VA-NRC-PACS3						
Thallium (Tl)			105.9		%		70-130	17-AUG-15
Tin (Sn)			91.9		%		70-130	17-AUG-15
Uranium (U)			103.9		%		70-130	17-AUG-15
Vanadium (V)			97.5		%		70-130	17-AUG-15
Zinc (Zn)			103.8		%		70-130	17-AUG-15
WG2149965-3	LCS							
Antimony (Sb)			102.2		%		70-130	17-AUG-15
Arsenic (As)			97.8		%		70-130	17-AUG-15
Barium (Ba)			100.2		%		70-130	17-AUG-15
Beryllium (Be)			99.7		%		70-130	17-AUG-15
Cadmium (Cd)			97.6		%		70-130	17-AUG-15
Chromium (Cr)			96.0		%		70-130	17-AUG-15
Cobalt (Co)			95.7		%		70-130	17-AUG-15
Copper (Cu)			92.2		%		70-130	17-AUG-15
Lead (Pb)			102.1		%		70-130	17-AUG-15
Molybdenum (Mo)			103.9		%		70-130	17-AUG-15
Nickel (Ni)			93.4		%		70-130	17-AUG-15
Selenium (Se)			96.6		%		70-130	17-AUG-15
Silver (Ag)			98.6		%		70-130	17-AUG-15
Thallium (Tl)			100.9		%		70-130	17-AUG-15
Tin (Sn)			100.1		%		70-130	17-AUG-15
Uranium (U)			101.7		%		70-130	17-AUG-15
Vanadium (V)			97.5		%		70-130	17-AUG-15
Zinc (Zn)			94.2		%		70-130	17-AUG-15
WG2150050-3	LCS							
Antimony (Sb)			100.5		%		70-130	17-AUG-15
Arsenic (As)			96.7		%		70-130	17-AUG-15
Barium (Ba)			101.4		%		70-130	17-AUG-15
Beryllium (Be)			92.4		%		70-130	17-AUG-15
Cadmium (Cd)			97.1		%		70-130	17-AUG-15
Chromium (Cr)			93.3		%		70-130	17-AUG-15
Cobalt (Co)			94.3		%		70-130	17-AUG-15
Copper (Cu)			91.8		%		70-130	17-AUG-15
Lead (Pb)			97.8		%		70-130	17-AUG-15
Molybdenum (Mo)			100.3		%		70-130	17-AUG-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA		Soil						
Batch	R3248332							
WG2150050-3	LCS							
Nickel (Ni)			94.1		%		70-130	17-AUG-15
Selenium (Se)			94.5		%		70-130	17-AUG-15
Silver (Ag)			98.6		%		70-130	17-AUG-15
Thallium (Tl)			96.4		%		70-130	17-AUG-15
Tin (Sn)			100.6		%		70-130	17-AUG-15
Uranium (U)			95.4		%		70-130	17-AUG-15
Vanadium (V)			96.8		%		70-130	17-AUG-15
Zinc (Zn)			91.9		%		70-130	17-AUG-15
WG2149965-1	MB							
Antimony (Sb)			<0.10		mg/kg		0.1	17-AUG-15
Arsenic (As)			<0.10		mg/kg		0.1	17-AUG-15
Barium (Ba)			<0.50		mg/kg		0.5	17-AUG-15
Beryllium (Be)			<0.10		mg/kg		0.1	17-AUG-15
Cadmium (Cd)			<0.020		mg/kg		0.02	17-AUG-15
Chromium (Cr)			<0.50		mg/kg		0.5	17-AUG-15
Cobalt (Co)			<0.10		mg/kg		0.1	17-AUG-15
Copper (Cu)			<0.50		mg/kg		0.5	17-AUG-15
Lead (Pb)			<0.50		mg/kg		0.5	17-AUG-15
Molybdenum (Mo)			<0.10		mg/kg		0.1	17-AUG-15
Nickel (Ni)			<0.50		mg/kg		0.5	17-AUG-15
Selenium (Se)			<0.20		mg/kg		0.2	17-AUG-15
Silver (Ag)			<0.10		mg/kg		0.1	17-AUG-15
Thallium (Tl)			<0.050		mg/kg		0.05	17-AUG-15
Tin (Sn)			<2.0		mg/kg		2	17-AUG-15
Uranium (U)			<0.050		mg/kg		0.05	17-AUG-15
Vanadium (V)			<0.20		mg/kg		0.2	17-AUG-15
Zinc (Zn)			<2.0		mg/kg		2	17-AUG-15
WG2150050-1	MB							
Antimony (Sb)			<0.10		mg/kg		0.1	17-AUG-15
Arsenic (As)			<0.10		mg/kg		0.1	17-AUG-15
Barium (Ba)			<0.50		mg/kg		0.5	17-AUG-15
Beryllium (Be)			<0.10		mg/kg		0.1	17-AUG-15
Cadmium (Cd)			<0.020		mg/kg		0.02	17-AUG-15
Chromium (Cr)			<0.50		mg/kg		0.5	17-AUG-15
Cobalt (Co)			<0.10		mg/kg		0.1	17-AUG-15



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MET-200.2-CCMS-VA								
	Soil							
Batch	R3248332							
WG2150050-1	MB							
Copper (Cu)			<0.50		mg/kg		0.5	17-AUG-15
Lead (Pb)			<0.50		mg/kg		0.5	17-AUG-15
Molybdenum (Mo)			<0.10		mg/kg		0.1	17-AUG-15
Nickel (Ni)			<0.50		mg/kg		0.5	17-AUG-15
Selenium (Se)			<0.20		mg/kg		0.2	17-AUG-15
Silver (Ag)			<0.10		mg/kg		0.1	17-AUG-15
Thallium (Tl)			<0.050		mg/kg		0.05	17-AUG-15
Tin (Sn)			<2.0		mg/kg		2	17-AUG-15
Uranium (U)			<0.050		mg/kg		0.05	17-AUG-15
Vanadium (V)			<0.20		mg/kg		0.2	17-AUG-15
Zinc (Zn)			<2.0		mg/kg		2	17-AUG-15
Batch	R3248880							
WG2150071-4	CRM	VA-NRC-STSD1						
Antimony (Sb)			107.4		%		70-130	17-AUG-15
Arsenic (As)			99.9		%		70-130	17-AUG-15
Barium (Ba)			95.6		%		70-130	17-AUG-15
Beryllium (Be)			100.5		%		70-130	17-AUG-15
Cadmium (Cd)			97.8		%		70-130	17-AUG-15
Chromium (Cr)			99.3		%		70-130	17-AUG-15
Cobalt (Co)			98.0		%		70-130	17-AUG-15
Copper (Cu)			98.2		%		70-130	17-AUG-15
Lead (Pb)			100.7		%		70-130	17-AUG-15
Molybdenum (Mo)			107.1		%		70-130	17-AUG-15
Nickel (Ni)			99.3		%		70-130	17-AUG-15
Selenium (Se)			101.7		%		70-130	17-AUG-15
Silver (Ag)			102.3		%		70-130	17-AUG-15
Thallium (Tl)			103.9		%		70-130	17-AUG-15
Tin (Sn)			100.1		%		70-130	17-AUG-15
Vanadium (V)			105.3		%		70-130	17-AUG-15
Zinc (Zn)			99.8		%		70-130	17-AUG-15
WG2150071-5	CRM	VA-NRC-PACS3						
Antimony (Sb)			91.0		%		70-130	17-AUG-15
Arsenic (As)			88.6		%		70-130	17-AUG-15
Barium (Ba)			91.5		%		70-130	17-AUG-15
Beryllium (Be)			97.5		%		70-130	17-AUG-15



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MET-200.2-CCMS-VA		Soil						
Batch	R3248880							
WG2150071-5	CRM	VA-NRC-PACS3						
Cadmium (Cd)			92.2		%		70-130	17-AUG-15
Chromium (Cr)			92.4		%		70-130	17-AUG-15
Cobalt (Co)			95.0		%		70-130	17-AUG-15
Copper (Cu)			98.2		%		70-130	17-AUG-15
Lead (Pb)			100.0		%		70-130	17-AUG-15
Molybdenum (Mo)			87.4		%		70-130	17-AUG-15
Nickel (Ni)			93.8		%		70-130	17-AUG-15
Selenium (Se)			99.1		%		70-130	17-AUG-15
Silver (Ag)			98.7		%		70-130	17-AUG-15
Thallium (Tl)			98.8		%		70-130	17-AUG-15
Tin (Sn)			86.1		%		70-130	17-AUG-15
Uranium (U)			102.6		%		70-130	17-AUG-15
Vanadium (V)			96.6		%		70-130	17-AUG-15
Zinc (Zn)			98.3		%		70-130	17-AUG-15
WG2150078-4	CRM	VA-NRC-STSD1						
Antimony (Sb)			107.1		%		70-130	17-AUG-15
Arsenic (As)			100.1		%		70-130	17-AUG-15
Barium (Ba)			93.3		%		70-130	17-AUG-15
Beryllium (Be)			104.4		%		70-130	17-AUG-15
Cadmium (Cd)			98.8		%		70-130	17-AUG-15
Chromium (Cr)			97.6		%		70-130	17-AUG-15
Cobalt (Co)			98.2		%		70-130	17-AUG-15
Copper (Cu)			98.2		%		70-130	17-AUG-15
Lead (Pb)			101.7		%		70-130	17-AUG-15
Molybdenum (Mo)			99.5		%		70-130	17-AUG-15
Nickel (Ni)			98.1		%		70-130	17-AUG-15
Selenium (Se)			99.5		%		70-130	17-AUG-15
Silver (Ag)			101.2		%		70-130	17-AUG-15
Thallium (Tl)			101.4		%		70-130	17-AUG-15
Tin (Sn)			129.0		%		70-130	17-AUG-15
Vanadium (V)			104.4		%		70-130	17-AUG-15
Zinc (Zn)			98.7		%		70-130	17-AUG-15
WG2150078-5	CRM	VA-NRC-PACS3						
Antimony (Sb)			95.0		%		70-130	17-AUG-15
Arsenic (As)			91.7		%		70-130	17-AUG-15



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MET-200.2-CCMS-VA		Soil						
Batch	R3248880							
WG2150078-5	CRM	VA-NRC-PACS3						
Barium (Ba)			90.0		%		70-130	17-AUG-15
Beryllium (Be)			95.3		%		70-130	17-AUG-15
Cadmium (Cd)			94.2		%		70-130	17-AUG-15
Chromium (Cr)			92.6		%		70-130	17-AUG-15
Cobalt (Co)			95.9		%		70-130	17-AUG-15
Copper (Cu)			98.9		%		70-130	17-AUG-15
Lead (Pb)			100.3		%		70-130	17-AUG-15
Molybdenum (Mo)			91.6		%		70-130	17-AUG-15
Nickel (Ni)			95.4		%		70-130	17-AUG-15
Selenium (Se)			106.0		%		70-130	17-AUG-15
Silver (Ag)			99.7		%		70-130	17-AUG-15
Thallium (Tl)			99.7		%		70-130	17-AUG-15
Tin (Sn)			88.8		%		70-130	17-AUG-15
Uranium (U)			100.0		%		70-130	17-AUG-15
Vanadium (V)			97.0		%		70-130	17-AUG-15
Zinc (Zn)			100.0		%		70-130	17-AUG-15
WG2150071-2	DUP	L1654527-62						
Antimony (Sb)		0.42	0.42		mg/kg	1.1	30	17-AUG-15
Arsenic (As)		7.85	8.11		mg/kg	3.3	30	17-AUG-15
Barium (Ba)		244	245		mg/kg	0.2	40	17-AUG-15
Beryllium (Be)		0.79	0.82		mg/kg	3.1	30	17-AUG-15
Cadmium (Cd)		0.678	0.704		mg/kg	3.8	30	17-AUG-15
Chromium (Cr)		44.4	44.2		mg/kg	0.5	30	17-AUG-15
Cobalt (Co)		15.0	15.2		mg/kg	1.3	30	17-AUG-15
Copper (Cu)		102	116		mg/kg	13	30	17-AUG-15
Lead (Pb)		9.49	9.52		mg/kg	0.4	40	17-AUG-15
Molybdenum (Mo)		1.58	1.59		mg/kg	1.0	40	17-AUG-15
Nickel (Ni)		38.4	38.6		mg/kg	0.6	30	17-AUG-15
Selenium (Se)		1.31	1.47		mg/kg	12	30	17-AUG-15
Silver (Ag)		0.67	0.69		mg/kg	3.2	40	17-AUG-15
Thallium (Tl)		0.168	0.160		mg/kg	4.6	30	17-AUG-15
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	17-AUG-15
Uranium (U)		2.71	2.79		mg/kg	2.8	30	17-AUG-15
Vanadium (V)		75.5	77.5		mg/kg	2.6	30	17-AUG-15



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MET-200.2-CCMS-VA		Soil						
Batch	R3248880							
WG2150071-2	DUP	L1654527-62						
Zinc (Zn)		53.5	54.0		mg/kg	0.9	30	17-AUG-15
WG2150078-2	DUP	L1654527-98						
Antimony (Sb)		0.18	0.19		mg/kg	8.9	30	17-AUG-15
Arsenic (As)		2.16	2.18		mg/kg	0.8	30	17-AUG-15
Barium (Ba)		173	184		mg/kg	6.5	40	17-AUG-15
Beryllium (Be)		0.11	0.12		mg/kg	7.2	30	17-AUG-15
Cadmium (Cd)		0.982	1.05		mg/kg	6.4	30	17-AUG-15
Chromium (Cr)		12.2	12.5		mg/kg	2.5	30	17-AUG-15
Cobalt (Co)		5.02	5.10		mg/kg	1.7	30	17-AUG-15
Copper (Cu)		23.1	23.7		mg/kg	2.6	30	17-AUG-15
Lead (Pb)		11.3	12.8		mg/kg	12	40	17-AUG-15
Molybdenum (Mo)		1.62	1.55		mg/kg	4.7	40	17-AUG-15
Nickel (Ni)		6.50	7.20		mg/kg	10	30	17-AUG-15
Selenium (Se)		<0.20	0.22	RPD-NA	mg/kg	N/A	30	17-AUG-15
Silver (Ag)		0.20	0.22		mg/kg	12	40	17-AUG-15
Thallium (Tl)		0.076	0.075		mg/kg	1.3	30	17-AUG-15
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	17-AUG-15
Uranium (U)		0.315	0.293		mg/kg	7.3	30	17-AUG-15
Vanadium (V)		23.4	23.0		mg/kg	1.7	30	17-AUG-15
Zinc (Zn)		118	134		mg/kg	13	30	17-AUG-15
WG2150071-3	LCS							
Antimony (Sb)			100.0		%		70-130	17-AUG-15
Arsenic (As)			98.6		%		70-130	17-AUG-15
Barium (Ba)			98.2		%		70-130	17-AUG-15
Beryllium (Be)			97.4		%		70-130	17-AUG-15
Cadmium (Cd)			98.2		%		70-130	17-AUG-15
Chromium (Cr)			93.6		%		70-130	17-AUG-15
Cobalt (Co)			96.6		%		70-130	17-AUG-15
Copper (Cu)			94.2		%		70-130	17-AUG-15
Lead (Pb)			100.3		%		70-130	17-AUG-15
Molybdenum (Mo)			97.2		%		70-130	17-AUG-15
Nickel (Ni)			95.6		%		70-130	17-AUG-15
Selenium (Se)			99.7		%		70-130	17-AUG-15
Silver (Ag)			95.6		%		70-130	17-AUG-15
Thallium (Tl)			98.0		%		70-130	17-AUG-15



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MET-200.2-CCMS-VA		Soil						
Batch	R3248880							
WG2150071-3	LCS							
Tin (Sn)			99.1		%		70-130	17-AUG-15
Uranium (U)			99.5		%		70-130	17-AUG-15
Vanadium (V)			98.5		%		70-130	17-AUG-15
Zinc (Zn)			93.1		%		70-130	17-AUG-15
WG2150078-3	LCS							
Antimony (Sb)			101.0		%		70-130	17-AUG-15
Arsenic (As)			97.2		%		70-130	17-AUG-15
Barium (Ba)			97.2		%		70-130	17-AUG-15
Beryllium (Be)			98.1		%		70-130	17-AUG-15
Cadmium (Cd)			98.0		%		70-130	17-AUG-15
Chromium (Cr)			93.0		%		70-130	17-AUG-15
Cobalt (Co)			94.3		%		70-130	17-AUG-15
Copper (Cu)			92.5		%		70-130	17-AUG-15
Lead (Pb)			101.1		%		70-130	17-AUG-15
Molybdenum (Mo)			99.3		%		70-130	17-AUG-15
Nickel (Ni)			94.2		%		70-130	17-AUG-15
Selenium (Se)			101.3		%		70-130	17-AUG-15
Silver (Ag)			97.0		%		70-130	17-AUG-15
Thallium (Tl)			99.0		%		70-130	17-AUG-15
Tin (Sn)			99.2		%		70-130	17-AUG-15
Uranium (U)			101.7		%		70-130	17-AUG-15
Vanadium (V)			98.7		%		70-130	17-AUG-15
Zinc (Zn)			93.0		%		70-130	17-AUG-15
WG2150071-1	MB							
Antimony (Sb)			<0.10		mg/kg		0.1	17-AUG-15
Arsenic (As)			<0.10		mg/kg		0.1	17-AUG-15
Barium (Ba)			<0.50		mg/kg		0.5	17-AUG-15
Beryllium (Be)			<0.10		mg/kg		0.1	17-AUG-15
Cadmium (Cd)			<0.020		mg/kg		0.02	17-AUG-15
Chromium (Cr)			<0.50		mg/kg		0.5	17-AUG-15
Cobalt (Co)			<0.10		mg/kg		0.1	17-AUG-15
Copper (Cu)			<0.50		mg/kg		0.5	17-AUG-15
Lead (Pb)			<0.50		mg/kg		0.5	17-AUG-15
Molybdenum (Mo)			<0.10		mg/kg		0.1	17-AUG-15
Nickel (Ni)			<0.50		mg/kg		0.5	17-AUG-15



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MET-200.2-CCMS-VA								
	Soil							
Batch	R3248880							
WG2150071-1	MB							
Selenium (Se)			<0.20		mg/kg		0.2	17-AUG-15
Silver (Ag)			<0.10		mg/kg		0.1	17-AUG-15
Thallium (Tl)			<0.050		mg/kg		0.05	17-AUG-15
Tin (Sn)			<2.0		mg/kg		2	17-AUG-15
Uranium (U)			<0.050		mg/kg		0.05	17-AUG-15
Vanadium (V)			<0.20		mg/kg		0.2	17-AUG-15
Zinc (Zn)			<2.0		mg/kg		2	17-AUG-15
WG2150078-1	MB							
Antimony (Sb)			<0.10		mg/kg		0.1	17-AUG-15
Arsenic (As)			<0.10		mg/kg		0.1	17-AUG-15
Barium (Ba)			<0.50		mg/kg		0.5	17-AUG-15
Beryllium (Be)			<0.10		mg/kg		0.1	17-AUG-15
Cadmium (Cd)			<0.020		mg/kg		0.02	17-AUG-15
Chromium (Cr)			<0.50		mg/kg		0.5	17-AUG-15
Cobalt (Co)			<0.10		mg/kg		0.1	17-AUG-15
Copper (Cu)			<0.50		mg/kg		0.5	17-AUG-15
Lead (Pb)			<0.50		mg/kg		0.5	17-AUG-15
Molybdenum (Mo)			<0.10		mg/kg		0.1	17-AUG-15
Nickel (Ni)			<0.50		mg/kg		0.5	17-AUG-15
Selenium (Se)			<0.20		mg/kg		0.2	17-AUG-15
Silver (Ag)			<0.10		mg/kg		0.1	17-AUG-15
Thallium (Tl)			<0.050		mg/kg		0.05	17-AUG-15
Tin (Sn)			<2.0		mg/kg		2	17-AUG-15
Uranium (U)			<0.050		mg/kg		0.05	17-AUG-15
Vanadium (V)			<0.20		mg/kg		0.2	17-AUG-15
Zinc (Zn)			<2.0		mg/kg		2	17-AUG-15
Batch	R3250173							
WG2151822-4	CRM	VA-NRC-STSD1						
Antimony (Sb)			99.1		%		70-130	19-AUG-15
Arsenic (As)			99.4		%		70-130	19-AUG-15
Barium (Ba)			96.1		%		70-130	19-AUG-15
Beryllium (Be)			100.1		%		70-130	19-AUG-15
Cadmium (Cd)			95.2		%		70-130	19-AUG-15
Chromium (Cr)			103.3		%		70-130	19-AUG-15
Cobalt (Co)			99.5		%		70-130	19-AUG-15



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MET-200.2-CCMS-VA								
	Soil							
Batch	R3250173							
WG2151822-4	CRM	VA-NRC-STSD1						
Copper (Cu)			99.1		%		70-130	19-AUG-15
Lead (Pb)			95.4		%		70-130	19-AUG-15
Molybdenum (Mo)			111.5		%		70-130	19-AUG-15
Nickel (Ni)			100.3		%		70-130	19-AUG-15
Selenium (Se)			96.2		%		70-130	19-AUG-15
Silver (Ag)			95.2		%		70-130	19-AUG-15
Thallium (Tl)			93.3		%		70-130	19-AUG-15
Tin (Sn)			106.2		%		70-130	19-AUG-15
Vanadium (V)			104.9		%		70-130	19-AUG-15
Zinc (Zn)			99.5		%		70-130	19-AUG-15
WG2151822-5	CRM	VA-NRC-PACS3						
Antimony (Sb)			86.0		%		70-130	19-AUG-15
Arsenic (As)			82.4		%		70-130	19-AUG-15
Barium (Ba)			97.9		%		70-130	19-AUG-15
Beryllium (Be)			89.8		%		70-130	19-AUG-15
Cadmium (Cd)			85.6		%		70-130	19-AUG-15
Chromium (Cr)			90.3		%		70-130	19-AUG-15
Cobalt (Co)			88.5		%		70-130	19-AUG-15
Copper (Cu)			88.9		%		70-130	19-AUG-15
Lead (Pb)			91.2		%		70-130	19-AUG-15
Molybdenum (Mo)			82.4		%		70-130	19-AUG-15
Nickel (Ni)			90.2		%		70-130	19-AUG-15
Selenium (Se)			88.9		%		70-130	19-AUG-15
Silver (Ag)			85.5		%		70-130	19-AUG-15
Thallium (Tl)			89.2		%		70-130	19-AUG-15
Tin (Sn)			75.9		%		70-130	19-AUG-15
Uranium (U)			91.4		%		70-130	19-AUG-15
Vanadium (V)			91.3		%		70-130	19-AUG-15
Zinc (Zn)			90.7		%		70-130	19-AUG-15
WG2151874-4	CRM	VA-NRC-STSD1						
Antimony (Sb)			100.2		%		70-130	19-AUG-15
Arsenic (As)			94.2		%		70-130	19-AUG-15
Barium (Ba)			92.1		%		70-130	19-AUG-15
Beryllium (Be)			93.7		%		70-130	19-AUG-15
Cadmium (Cd)			89.7		%		70-130	19-AUG-15



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MET-200.2-CCMS-VA								
	Soil							
Batch	R3250173							
WG2151874-4	CRM	VA-NRC-STSD1						
Chromium (Cr)			96.3		%		70-130	19-AUG-15
Cobalt (Co)			93.8		%		70-130	19-AUG-15
Copper (Cu)			94.2		%		70-130	19-AUG-15
Lead (Pb)			93.9		%		70-130	19-AUG-15
Molybdenum (Mo)			95.2		%		70-130	19-AUG-15
Nickel (Ni)			94.9		%		70-130	19-AUG-15
Selenium (Se)			78.7		%		70-130	19-AUG-15
Silver (Ag)			96.4		%		70-130	19-AUG-15
Thallium (Tl)			91.2		%		70-130	19-AUG-15
Tin (Sn)			93.2		%		70-130	19-AUG-15
Vanadium (V)			101.2		%		70-130	19-AUG-15
Zinc (Zn)			93.4		%		70-130	19-AUG-15
WG2151874-5	CRM	VA-NRC-PACS3						
Antimony (Sb)			94.7		%		70-130	19-AUG-15
Arsenic (As)			90.9		%		70-130	19-AUG-15
Barium (Ba)			102.1		%		70-130	19-AUG-15
Beryllium (Be)			93.1		%		70-130	19-AUG-15
Cadmium (Cd)			94.9		%		70-130	19-AUG-15
Chromium (Cr)			99.0		%		70-130	19-AUG-15
Cobalt (Co)			95.3		%		70-130	19-AUG-15
Copper (Cu)			94.9		%		70-130	19-AUG-15
Lead (Pb)			97.4		%		70-130	19-AUG-15
Molybdenum (Mo)			88.1		%		70-130	19-AUG-15
Nickel (Ni)			97.9		%		70-130	19-AUG-15
Selenium (Se)			96.8		%		70-130	19-AUG-15
Silver (Ag)			96.0		%		70-130	19-AUG-15
Thallium (Tl)			93.5		%		70-130	19-AUG-15
Tin (Sn)			83.6		%		70-130	19-AUG-15
Uranium (U)			102.8		%		70-130	19-AUG-15
Vanadium (V)			98.5		%		70-130	19-AUG-15
Zinc (Zn)			99.5		%		70-130	19-AUG-15
WG2152092-4	CRM	VA-NRC-STSD1						
Antimony (Sb)			103.2		%		70-130	19-AUG-15
Arsenic (As)			101.9		%		70-130	19-AUG-15
Barium (Ba)			102.4		%		70-130	19-AUG-15



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MET-200.2-CCMS-VA								
	Soil							
Batch	R3250173							
WG2152092-4	CRM	VA-NRC-STSD1						
Beryllium (Be)			98.4		%		70-130	19-AUG-15
Cadmium (Cd)			98.6		%		70-130	19-AUG-15
Chromium (Cr)			102.0		%		70-130	19-AUG-15
Cobalt (Co)			100.4		%		70-130	19-AUG-15
Copper (Cu)			100.5		%		70-130	19-AUG-15
Lead (Pb)			102.2		%		70-130	19-AUG-15
Molybdenum (Mo)			96.4		%		70-130	19-AUG-15
Nickel (Ni)			102.9		%		70-130	19-AUG-15
Selenium (Se)			101.0		%		70-130	19-AUG-15
Silver (Ag)			99.9		%		70-130	19-AUG-15
Thallium (Tl)			101.1		%		70-130	19-AUG-15
Tin (Sn)			102.9		%		70-130	19-AUG-15
Vanadium (V)			106.6		%		70-130	19-AUG-15
Zinc (Zn)			102.9		%		70-130	19-AUG-15
WG2152092-5	CRM	VA-NRC-PACS3						
Antimony (Sb)			99.0		%		70-130	19-AUG-15
Arsenic (As)			97.0		%		70-130	19-AUG-15
Barium (Ba)			102.0		%		70-130	19-AUG-15
Beryllium (Be)			98.7		%		70-130	19-AUG-15
Cadmium (Cd)			97.8		%		70-130	19-AUG-15
Chromium (Cr)			103.5		%		70-130	19-AUG-15
Cobalt (Co)			100.9		%		70-130	19-AUG-15
Copper (Cu)			102.7		%		70-130	19-AUG-15
Lead (Pb)			101.6		%		70-130	19-AUG-15
Molybdenum (Mo)			94.9		%		70-130	19-AUG-15
Nickel (Ni)			103.3		%		70-130	19-AUG-15
Selenium (Se)			101.8		%		70-130	19-AUG-15
Silver (Ag)			103.2		%		70-130	19-AUG-15
Thallium (Tl)			100.5		%		70-130	19-AUG-15
Tin (Sn)			89.3		%		70-130	19-AUG-15
Uranium (U)			101.9		%		70-130	19-AUG-15
Vanadium (V)			104.7		%		70-130	19-AUG-15
Zinc (Zn)			107.6		%		70-130	19-AUG-15
WG2151874-2	DUP	L1654527-112						
Antimony (Sb)		0.37	0.34		mg/kg	7.8	30	19-AUG-15



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MET-200.2-CCMS-VA		Soil						
Batch	R3250173							
WG2151874-2	DUP	L1654527-112						
Arsenic (As)		8.94	8.84		mg/kg	1.1	30	19-AUG-15
Barium (Ba)		132	125		mg/kg	5.6	40	19-AUG-15
Beryllium (Be)		0.49	0.46		mg/kg	7.5	30	19-AUG-15
Cadmium (Cd)		0.148	0.149		mg/kg	0.2	30	19-AUG-15
Chromium (Cr)		14.9	14.1		mg/kg	6.1	30	19-AUG-15
Cobalt (Co)		11.9	11.9		mg/kg	0.7	30	19-AUG-15
Copper (Cu)		612	594		mg/kg	3.0	30	19-AUG-15
Lead (Pb)		4.67	4.30		mg/kg	8.2	40	19-AUG-15
Molybdenum (Mo)		4.08	3.39		mg/kg	19	40	19-AUG-15
Nickel (Ni)		11.0	10.5		mg/kg	4.7	30	19-AUG-15
Selenium (Se)		0.82	0.76		mg/kg	7.3	30	19-AUG-15
Silver (Ag)		0.29	0.24		mg/kg	19	40	19-AUG-15
Thallium (Tl)		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	19-AUG-15
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	19-AUG-15
Uranium (U)		0.821	0.724		mg/kg	13	30	19-AUG-15
Vanadium (V)		143	140		mg/kg	1.7	30	19-AUG-15
Zinc (Zn)		44.6	43.8		mg/kg	1.8	30	19-AUG-15
WG2152092-2	DUP	L1654527-20						
Antimony (Sb)		0.41	0.39		mg/kg	3.9	30	19-AUG-15
Arsenic (As)		12.1	11.8		mg/kg	2.0	30	19-AUG-15
Barium (Ba)		165	168		mg/kg	1.8	40	19-AUG-15
Beryllium (Be)		0.62	0.63		mg/kg	2.3	30	19-AUG-15
Cadmium (Cd)		0.251	0.153	J	mg/kg	0.098	0.1	19-AUG-15
Chromium (Cr)		11.1	10.5		mg/kg	5.3	30	19-AUG-15
Cobalt (Co)		16.7	16.4		mg/kg	1.9	30	19-AUG-15
Copper (Cu)		860	866		mg/kg	0.7	30	19-AUG-15
Lead (Pb)		5.01	4.97		mg/kg	0.8	40	19-AUG-15
Molybdenum (Mo)		4.00	4.88		mg/kg	20	40	19-AUG-15
Nickel (Ni)		8.68	8.55		mg/kg	1.6	30	19-AUG-15
Selenium (Se)		1.05	1.09		mg/kg	3.6	30	19-AUG-15
Silver (Ag)		0.36	0.40		mg/kg	11	40	19-AUG-15
Thallium (Tl)		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	19-AUG-15
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	19-AUG-15
Uranium (U)		1.03	1.10		mg/kg	6.6	30	19-AUG-15



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MET-200.2-CCMS-VA								
	Soil							
Batch	R3250173							
WG2152092-2	DUP	L1654527-20						
Vanadium (V)		201	198		mg/kg	1.1	30	19-AUG-15
Zinc (Zn)		60.1	56.3		mg/kg	6.6	30	19-AUG-15
WG2151822-3	LCS							
Antimony (Sb)			99.1		%		70-130	19-AUG-15
Arsenic (As)			98.8		%		70-130	19-AUG-15
Barium (Ba)			96.9		%		70-130	19-AUG-15
Beryllium (Be)			91.7		%		70-130	19-AUG-15
Cadmium (Cd)			95.3		%		70-130	19-AUG-15
Chromium (Cr)			97.3		%		70-130	19-AUG-15
Cobalt (Co)			95.0		%		70-130	19-AUG-15
Copper (Cu)			94.3		%		70-130	19-AUG-15
Lead (Pb)			95.2		%		70-130	19-AUG-15
Molybdenum (Mo)			95.5		%		70-130	19-AUG-15
Nickel (Ni)			95.6		%		70-130	19-AUG-15
Selenium (Se)			99.8		%		70-130	19-AUG-15
Silver (Ag)			91.9		%		70-130	19-AUG-15
Thallium (Tl)			87.8		%		70-130	19-AUG-15
Tin (Sn)			96.0		%		70-130	19-AUG-15
Uranium (U)			92.5		%		70-130	19-AUG-15
Vanadium (V)			99.97		%		70-130	19-AUG-15
Zinc (Zn)			92.6		%		70-130	19-AUG-15
WG2151874-3	LCS							
Antimony (Sb)			99.7		%		70-130	19-AUG-15
Arsenic (As)			95.1		%		70-130	19-AUG-15
Barium (Ba)			99.6		%		70-130	19-AUG-15
Beryllium (Be)			93.8		%		70-130	19-AUG-15
Cadmium (Cd)			92.6		%		70-130	19-AUG-15
Chromium (Cr)			95.8		%		70-130	19-AUG-15
Cobalt (Co)			94.6		%		70-130	19-AUG-15
Copper (Cu)			92.3		%		70-130	19-AUG-15
Lead (Pb)			92.7		%		70-130	19-AUG-15
Molybdenum (Mo)			98.2		%		70-130	19-AUG-15
Nickel (Ni)			95.1		%		70-130	19-AUG-15
Selenium (Se)			86.7		%		70-130	19-AUG-15
Silver (Ag)			94.6		%		70-130	19-AUG-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA		Soil						
Batch	R3250173							
WG2151874-3	LCS							
Thallium (Tl)			87.4		%		70-130	19-AUG-15
Tin (Sn)			95.2		%		70-130	19-AUG-15
Uranium (U)			93.6		%		70-130	19-AUG-15
Vanadium (V)			98.0		%		70-130	19-AUG-15
Zinc (Zn)			88.1		%		70-130	19-AUG-15
WG2152092-3	LCS							
Antimony (Sb)			98.9		%		70-130	19-AUG-15
Arsenic (As)			97.3		%		70-130	19-AUG-15
Barium (Ba)			96.3		%		70-130	19-AUG-15
Beryllium (Be)			96.6		%		70-130	19-AUG-15
Cadmium (Cd)			96.3		%		70-130	19-AUG-15
Chromium (Cr)			96.2		%		70-130	19-AUG-15
Cobalt (Co)			93.6		%		70-130	19-AUG-15
Copper (Cu)			93.1		%		70-130	19-AUG-15
Lead (Pb)			97.7		%		70-130	19-AUG-15
Molybdenum (Mo)			98.6		%		70-130	19-AUG-15
Nickel (Ni)			95.6		%		70-130	19-AUG-15
Selenium (Se)			101.2		%		70-130	19-AUG-15
Silver (Ag)			92.4		%		70-130	19-AUG-15
Thallium (Tl)			95.0		%		70-130	19-AUG-15
Tin (Sn)			92.8		%		70-130	19-AUG-15
Uranium (U)			99.7		%		70-130	19-AUG-15
Vanadium (V)			99.3		%		70-130	19-AUG-15
Zinc (Zn)			92.0		%		70-130	19-AUG-15
WG2151822-1	MB							
Antimony (Sb)			<0.10		mg/kg		0.1	19-AUG-15
Arsenic (As)			<0.10		mg/kg		0.1	19-AUG-15
Barium (Ba)			<0.50		mg/kg		0.5	19-AUG-15
Beryllium (Be)			<0.10		mg/kg		0.1	19-AUG-15
Cadmium (Cd)			<0.020		mg/kg		0.02	19-AUG-15
Chromium (Cr)			<0.50		mg/kg		0.5	19-AUG-15
Cobalt (Co)			<0.10		mg/kg		0.1	19-AUG-15
Copper (Cu)			<0.50		mg/kg		0.5	19-AUG-15
Lead (Pb)			<0.50		mg/kg		0.5	19-AUG-15
Molybdenum (Mo)			<0.10		mg/kg		0.1	19-AUG-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA		Soil						
Batch	R3250173							
WG2151822-1	MB							
Nickel (Ni)			<0.50		mg/kg		0.5	19-AUG-15
Selenium (Se)			<0.20		mg/kg		0.2	19-AUG-15
Silver (Ag)			<0.10		mg/kg		0.1	19-AUG-15
Thallium (Tl)			<0.050		mg/kg		0.05	19-AUG-15
Tin (Sn)			<2.0		mg/kg		2	19-AUG-15
Uranium (U)			<0.050		mg/kg		0.05	19-AUG-15
Vanadium (V)			<0.20		mg/kg		0.2	19-AUG-15
Zinc (Zn)			<2.0		mg/kg		2	19-AUG-15
WG2151874-1	MB							
Antimony (Sb)			<0.10		mg/kg		0.1	19-AUG-15
Arsenic (As)			<0.10		mg/kg		0.1	19-AUG-15
Barium (Ba)			<0.50		mg/kg		0.5	19-AUG-15
Beryllium (Be)			<0.10		mg/kg		0.1	19-AUG-15
Cadmium (Cd)			<0.020		mg/kg		0.02	19-AUG-15
Chromium (Cr)			<0.50		mg/kg		0.5	19-AUG-15
Cobalt (Co)			<0.10		mg/kg		0.1	19-AUG-15
Copper (Cu)			<0.50		mg/kg		0.5	19-AUG-15
Lead (Pb)			<0.50		mg/kg		0.5	19-AUG-15
Molybdenum (Mo)			<0.10		mg/kg		0.1	19-AUG-15
Nickel (Ni)			<0.50		mg/kg		0.5	19-AUG-15
Selenium (Se)			<0.20		mg/kg		0.2	19-AUG-15
Silver (Ag)			<0.10		mg/kg		0.1	19-AUG-15
Thallium (Tl)			<0.050		mg/kg		0.05	19-AUG-15
Tin (Sn)			<2.0		mg/kg		2	19-AUG-15
Uranium (U)			<0.050		mg/kg		0.05	19-AUG-15
Vanadium (V)			<0.20		mg/kg		0.2	19-AUG-15
Zinc (Zn)			<2.0		mg/kg		2	19-AUG-15
WG2152092-1	MB							
Antimony (Sb)			<0.10		mg/kg		0.1	19-AUG-15
Arsenic (As)			<0.10		mg/kg		0.1	19-AUG-15
Barium (Ba)			<0.50		mg/kg		0.5	19-AUG-15
Beryllium (Be)			<0.10		mg/kg		0.1	19-AUG-15
Cadmium (Cd)			<0.020		mg/kg		0.02	19-AUG-15
Chromium (Cr)			<0.50		mg/kg		0.5	19-AUG-15
Cobalt (Co)			<0.10		mg/kg		0.1	19-AUG-15



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MET-200.2-CCMS-VA								
	Soil							
Batch	R3250173							
WG2152092-1	MB							
Copper (Cu)			<0.50		mg/kg		0.5	19-AUG-15
Lead (Pb)			<0.50		mg/kg		0.5	19-AUG-15
Molybdenum (Mo)			<0.10		mg/kg		0.1	19-AUG-15
Nickel (Ni)			<0.50		mg/kg		0.5	19-AUG-15
Selenium (Se)			<0.20		mg/kg		0.2	19-AUG-15
Silver (Ag)			<0.10		mg/kg		0.1	19-AUG-15
Thallium (Tl)			<0.050		mg/kg		0.05	19-AUG-15
Tin (Sn)			<2.0		mg/kg		2	19-AUG-15
Uranium (U)			<0.050		mg/kg		0.05	19-AUG-15
Vanadium (V)			<0.20		mg/kg		0.2	19-AUG-15
Zinc (Zn)			<2.0		mg/kg		2	19-AUG-15
Batch	R3250463							
WG2152237-4	CRM	VA-NRC-STSD1						
Antimony (Sb)			92.9		%		70-130	19-AUG-15
Arsenic (As)			98.3		%		70-130	19-AUG-15
Barium (Ba)			97.4		%		70-130	19-AUG-15
Beryllium (Be)			97.2		%		70-130	19-AUG-15
Cadmium (Cd)			96.2		%		70-130	19-AUG-15
Chromium (Cr)			99.7		%		70-130	19-AUG-15
Cobalt (Co)			96.9		%		70-130	19-AUG-15
Copper (Cu)			96.2		%		70-130	19-AUG-15
Lead (Pb)			98.7		%		70-130	19-AUG-15
Molybdenum (Mo)			100.0		%		70-130	19-AUG-15
Nickel (Ni)			98.0		%		70-130	19-AUG-15
Selenium (Se)			94.2		%		70-130	19-AUG-15
Silver (Ag)			93.3		%		70-130	19-AUG-15
Thallium (Tl)			97.2		%		70-130	19-AUG-15
Tin (Sn)			96.9		%		70-130	19-AUG-15
Vanadium (V)			102.5		%		70-130	19-AUG-15
Zinc (Zn)			94.6		%		70-130	19-AUG-15
WG2152237-5	CRM	VA-NRC-PACS3						
Antimony (Sb)			88.4		%		70-130	19-AUG-15
Arsenic (As)			87.9		%		70-130	19-AUG-15
Barium (Ba)			97.6		%		70-130	19-AUG-15
Beryllium (Be)			92.6		%		70-130	19-AUG-15



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MET-200.2-CCMS-VA		Soil						
Batch	R3250463							
WG2152237-5	CRM	VA-NRC-PACS3						
Cadmium (Cd)			88.5		%		70-130	19-AUG-15
Chromium (Cr)			92.4		%		70-130	19-AUG-15
Cobalt (Co)			91.6		%		70-130	19-AUG-15
Copper (Cu)			95.8		%		70-130	19-AUG-15
Lead (Pb)			93.0		%		70-130	19-AUG-15
Molybdenum (Mo)			89.0		%		70-130	19-AUG-15
Nickel (Ni)			94.0		%		70-130	19-AUG-15
Selenium (Se)			92.0		%		70-130	19-AUG-15
Silver (Ag)			95.8		%		70-130	19-AUG-15
Thallium (Tl)			89.4		%		70-130	19-AUG-15
Tin (Sn)			80.5		%		70-130	19-AUG-15
Uranium (U)			92.9		%		70-130	19-AUG-15
Vanadium (V)			95.0		%		70-130	19-AUG-15
Zinc (Zn)			95.0		%		70-130	19-AUG-15
WG2152237-2	DUP	L1654527-49						
Antimony (Sb)		0.29	0.28		mg/kg	3.3	30	19-AUG-15
Arsenic (As)		8.81	8.80		mg/kg	0.1	30	19-AUG-15
Barium (Ba)		139	142		mg/kg	1.9	40	19-AUG-15
Beryllium (Be)		0.47	0.49		mg/kg	3.4	30	19-AUG-15
Cadmium (Cd)		0.135	0.128		mg/kg	5.1	30	19-AUG-15
Chromium (Cr)		11.2	11.1		mg/kg	1.4	30	19-AUG-15
Cobalt (Co)		12.8	13.2		mg/kg	2.6	30	19-AUG-15
Copper (Cu)		781	830		mg/kg	6.1	30	19-AUG-15
Lead (Pb)		3.75	3.86		mg/kg	2.9	40	19-AUG-15
Molybdenum (Mo)		4.35	4.96		mg/kg	13	40	19-AUG-15
Nickel (Ni)		7.34	7.77		mg/kg	5.8	30	19-AUG-15
Selenium (Se)		0.93	1.00		mg/kg	7.2	30	19-AUG-15
Silver (Ag)		0.33	0.32		mg/kg	3.3	40	19-AUG-15
Thallium (Tl)		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	19-AUG-15
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	19-AUG-15
Uranium (U)		0.651	0.611		mg/kg	6.4	30	19-AUG-15
Vanadium (V)		187	183		mg/kg	2.0	30	19-AUG-15
Zinc (Zn)		40.5	43.1		mg/kg	6.1	30	19-AUG-15
WG2152237-3	LCS							
Antimony (Sb)			93.0		%		70-130	19-AUG-15



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MET-200.2-CCMS-VA		Soil						
Batch	R3250463							
WG2152237-3	LCS							
Arsenic (As)			97.7		%		70-130	19-AUG-15
Barium (Ba)			98.7		%		70-130	19-AUG-15
Beryllium (Be)			95.0		%		70-130	19-AUG-15
Cadmium (Cd)			97.2		%		70-130	19-AUG-15
Chromium (Cr)			96.3		%		70-130	19-AUG-15
Cobalt (Co)			95.5		%		70-130	19-AUG-15
Copper (Cu)			92.6		%		70-130	19-AUG-15
Lead (Pb)			99.7		%		70-130	19-AUG-15
Molybdenum (Mo)			100.8		%		70-130	19-AUG-15
Nickel (Ni)			96.0		%		70-130	19-AUG-15
Selenium (Se)			97.5		%		70-130	19-AUG-15
Silver (Ag)			90.6		%		70-130	19-AUG-15
Thallium (Tl)			92.4		%		70-130	19-AUG-15
Tin (Sn)			93.0		%		70-130	19-AUG-15
Uranium (U)			95.9		%		70-130	19-AUG-15
Vanadium (V)			100.1		%		70-130	19-AUG-15
Zinc (Zn)			90.5		%		70-130	19-AUG-15
WG2152237-1	MB							
Antimony (Sb)			<0.10		mg/kg		0.1	19-AUG-15
Arsenic (As)			<0.10		mg/kg		0.1	19-AUG-15
Barium (Ba)			<0.50		mg/kg		0.5	19-AUG-15
Beryllium (Be)			<0.10		mg/kg		0.1	19-AUG-15
Cadmium (Cd)			<0.020		mg/kg		0.02	19-AUG-15
Chromium (Cr)			<0.50		mg/kg		0.5	19-AUG-15
Cobalt (Co)			<0.10		mg/kg		0.1	19-AUG-15
Copper (Cu)			<0.50		mg/kg		0.5	19-AUG-15
Lead (Pb)			<0.50		mg/kg		0.5	19-AUG-15
Molybdenum (Mo)			<0.10		mg/kg		0.1	19-AUG-15
Nickel (Ni)			<0.50		mg/kg		0.5	19-AUG-15
Selenium (Se)			<0.20		mg/kg		0.2	19-AUG-15
Silver (Ag)			<0.10		mg/kg		0.1	19-AUG-15
Thallium (Tl)			<0.050		mg/kg		0.05	19-AUG-15
Tin (Sn)			<2.0		mg/kg		2	19-AUG-15
Uranium (U)			<0.050		mg/kg		0.05	19-AUG-15



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MET-200.2-CCMS-VA		Soil						
Batch R3250463								
WG2152237-1 MB								
Vanadium (V)			<0.20		mg/kg		0.2	19-AUG-15
Zinc (Zn)			<2.0		mg/kg		2	19-AUG-15
Batch R3251201								
WG2151822-2 DUP		L1654527-52						
Antimony (Sb)		0.33	0.34		mg/kg	2.3	30	20-AUG-15
Arsenic (As)		10.1	9.74		mg/kg	3.3	30	20-AUG-15
Barium (Ba)		126	127		mg/kg	1.5	40	20-AUG-15
Beryllium (Be)		0.55	0.55		mg/kg	0.0	30	20-AUG-15
Cadmium (Cd)		0.148	0.131		mg/kg	13	30	20-AUG-15
Chromium (Cr)		9.52	8.97		mg/kg	6.0	30	20-AUG-15
Cobalt (Co)		13.0	12.5		mg/kg	3.4	30	20-AUG-15
Copper (Cu)		990	998		mg/kg	0.8	30	20-AUG-15
Lead (Pb)		4.45	4.36		mg/kg	2.1	40	20-AUG-15
Molybdenum (Mo)		5.70	4.56		mg/kg	22	40	20-AUG-15
Nickel (Ni)		6.50	6.09		mg/kg	6.6	30	20-AUG-15
Selenium (Se)		1.10	1.03		mg/kg	7.0	30	20-AUG-15
Silver (Ag)		0.40	0.38		mg/kg	6.3	40	20-AUG-15
Thallium (Tl)		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	20-AUG-15
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	20-AUG-15
Uranium (U)		0.832	0.776		mg/kg	7.0	30	20-AUG-15
Vanadium (V)		184	165		mg/kg	11	30	20-AUG-15
Zinc (Zn)		43.0	43.9		mg/kg	2.2	30	20-AUG-15
Batch R3251962								
WG2153909-4 CRM		VA-NRC-STSD1						
Antimony (Sb)			97.2		%		70-130	21-AUG-15
Arsenic (As)			100.4		%		70-130	21-AUG-15
Barium (Ba)			97.0		%		70-130	21-AUG-15
Beryllium (Be)			105.2		%		70-130	21-AUG-15
Cadmium (Cd)			100.6		%		70-130	21-AUG-15
Chromium (Cr)			103.5		%		70-130	21-AUG-15
Cobalt (Co)			100.3		%		70-130	21-AUG-15
Copper (Cu)			99.4		%		70-130	21-AUG-15
Lead (Pb)			102.6		%		70-130	21-AUG-15
Molybdenum (Mo)			107.2		%		70-130	21-AUG-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA		Soil						
Batch	R3251962							
WG2153909-4	CRM	VA-NRC-STSD1						
Nickel (Ni)			102.4		%		70-130	21-AUG-15
Selenium (Se)			95.4		%		70-130	21-AUG-15
Silver (Ag)			94.3		%		70-130	21-AUG-15
Thallium (Tl)			103.1		%		70-130	21-AUG-15
Tin (Sn)			106.1		%		70-130	21-AUG-15
Vanadium (V)			106.8		%		70-130	21-AUG-15
Zinc (Zn)			99.7		%		70-130	21-AUG-15
WG2153909-5	CRM	VA-NRC-PACS3						
Antimony (Sb)			90.1		%		70-130	21-AUG-15
Arsenic (As)			89.9		%		70-130	21-AUG-15
Barium (Ba)			101.0		%		70-130	21-AUG-15
Beryllium (Be)			101.0		%		70-130	21-AUG-15
Cadmium (Cd)			95.4		%		70-130	21-AUG-15
Chromium (Cr)			97.7		%		70-130	21-AUG-15
Cobalt (Co)			95.8		%		70-130	21-AUG-15
Copper (Cu)			99.0		%		70-130	21-AUG-15
Lead (Pb)			97.0		%		70-130	21-AUG-15
Molybdenum (Mo)			91.8		%		70-130	21-AUG-15
Nickel (Ni)			99.9		%		70-130	21-AUG-15
Selenium (Se)			102.9		%		70-130	21-AUG-15
Silver (Ag)			92.7		%		70-130	21-AUG-15
Thallium (Tl)			96.4		%		70-130	21-AUG-15
Tin (Sn)			87.3		%		70-130	21-AUG-15
Uranium (U)			96.8		%		70-130	21-AUG-15
Vanadium (V)			98.6		%		70-130	21-AUG-15
Zinc (Zn)			99.6		%		70-130	21-AUG-15
WG2153909-2	DUP	L1654527-47						
Antimony (Sb)		0.41	0.33		mg/kg	23	30	21-AUG-15
Arsenic (As)		12.0	11.9		mg/kg	1.1	30	21-AUG-15
Barium (Ba)		76.3	79.1		mg/kg	3.7	40	21-AUG-15
Beryllium (Be)		0.48	0.42		mg/kg	13	30	21-AUG-15
Cadmium (Cd)		0.232	0.180		mg/kg	25	30	21-AUG-15
Chromium (Cr)		16.8	15.9		mg/kg	5.4	30	21-AUG-15
Cobalt (Co)		15.4	15.8		mg/kg	3.1	30	21-AUG-15
Copper (Cu)		1150	1090		mg/kg	5.1	30	21-AUG-15



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MET-200.2-CCMS-VA								
	Soil							
Batch	R3251962							
WG2153909-2	DUP	L1654527-47						
Lead (Pb)		4.77	5.01		mg/kg	4.9	40	21-AUG-15
Molybdenum (Mo)		3.42	3.69		mg/kg	7.7	40	21-AUG-15
Nickel (Ni)		8.76	8.95		mg/kg	2.1	30	21-AUG-15
Selenium (Se)		1.20	1.22		mg/kg	1.1	30	21-AUG-15
Silver (Ag)		0.53	0.52		mg/kg	1.1	40	21-AUG-15
Thallium (Tl)		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	21-AUG-15
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	21-AUG-15
Uranium (U)		0.713	0.595		mg/kg	18	30	21-AUG-15
Vanadium (V)		287	299		mg/kg	3.9	30	21-AUG-15
Zinc (Zn)		61.1	60.8		mg/kg	0.6	30	21-AUG-15
WG2153909-3	LCS							
Antimony (Sb)			95.6		%		70-130	21-AUG-15
Arsenic (As)			99.99		%		70-130	21-AUG-15
Barium (Ba)			96.7		%		70-130	21-AUG-15
Beryllium (Be)			96.6		%		70-130	21-AUG-15
Cadmium (Cd)			96.2		%		70-130	21-AUG-15
Chromium (Cr)			99.5		%		70-130	21-AUG-15
Cobalt (Co)			98.6		%		70-130	21-AUG-15
Copper (Cu)			97.0		%		70-130	21-AUG-15
Lead (Pb)			100.6		%		70-130	21-AUG-15
Molybdenum (Mo)			98.5		%		70-130	21-AUG-15
Nickel (Ni)			99.3		%		70-130	21-AUG-15
Selenium (Se)			99.4		%		70-130	21-AUG-15
Silver (Ag)			90.8		%		70-130	21-AUG-15
Thallium (Tl)			99.5		%		70-130	21-AUG-15
Tin (Sn)			98.0		%		70-130	21-AUG-15
Uranium (U)			98.1		%		70-130	21-AUG-15
Vanadium (V)			101.7		%		70-130	21-AUG-15
Zinc (Zn)			92.7		%		70-130	21-AUG-15
WG2153909-1	MB							
Antimony (Sb)			<0.10		mg/kg		0.1	21-AUG-15
Arsenic (As)			<0.10		mg/kg		0.1	21-AUG-15
Barium (Ba)			<0.50		mg/kg		0.5	21-AUG-15
Beryllium (Be)			<0.10		mg/kg		0.1	21-AUG-15
Cadmium (Cd)			<0.020		mg/kg		0.02	21-AUG-15



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MET-200.2-CCMS-VA								
	Soil							
Batch	R3251962							
WG2153909-1	MB							
Chromium (Cr)			<0.50		mg/kg		0.5	21-AUG-15
Cobalt (Co)			<0.10		mg/kg		0.1	21-AUG-15
Copper (Cu)			<0.50		mg/kg		0.5	21-AUG-15
Lead (Pb)			<0.50		mg/kg		0.5	21-AUG-15
Molybdenum (Mo)			<0.10		mg/kg		0.1	21-AUG-15
Nickel (Ni)			<0.50		mg/kg		0.5	21-AUG-15
Selenium (Se)			<0.20		mg/kg		0.2	21-AUG-15
Silver (Ag)			<0.10		mg/kg		0.1	21-AUG-15
Thallium (Tl)			<0.050		mg/kg		0.05	21-AUG-15
Tin (Sn)			<2.0		mg/kg		2	21-AUG-15
Uranium (U)			<0.050		mg/kg		0.05	21-AUG-15
Vanadium (V)			<0.20		mg/kg		0.2	21-AUG-15
Zinc (Zn)			<2.0		mg/kg		2	21-AUG-15
Batch	R3271432							
WG2174574-4	CRM	VA-NRC-STSD1						
Antimony (Sb)			106.4		%		70-130	20-SEP-15
Arsenic (As)			101.2		%		70-130	20-SEP-15
Barium (Ba)			91.3		%		70-130	20-SEP-15
Beryllium (Be)			101.6		%		70-130	20-SEP-15
Cadmium (Cd)			97.9		%		70-130	20-SEP-15
Chromium (Cr)			97.0		%		70-130	20-SEP-15
Cobalt (Co)			98.2		%		70-130	20-SEP-15
Copper (Cu)			99.8		%		70-130	20-SEP-15
Lead (Pb)			103.7		%		70-130	20-SEP-15
Molybdenum (Mo)			106.3		%		70-130	20-SEP-15
Nickel (Ni)			98.6		%		70-130	20-SEP-15
Selenium (Se)			93.3		%		70-130	20-SEP-15
Silver (Ag)			103.2		%		70-130	20-SEP-15
Thallium (Tl)			107.6		%		70-130	20-SEP-15
Tin (Sn)			100.0		%		70-130	20-SEP-15
Vanadium (V)			99.8		%		70-130	20-SEP-15
Zinc (Zn)			99.0		%		70-130	20-SEP-15
WG2174574-5	CRM	VA-NRC-PACS3						
Antimony (Sb)			96.5		%		70-130	20-SEP-15
Arsenic (As)			92.7		%		70-130	20-SEP-15



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MET-200.2-CCMS-VA								
	Soil							
Batch	R3271432							
WG2174574-5	CRM	VA-NRC-PACS3						
Barium (Ba)			94.5		%		70-130	20-SEP-15
Beryllium (Be)			92.4		%		70-130	20-SEP-15
Cadmium (Cd)			92.2		%		70-130	20-SEP-15
Chromium (Cr)			95.7		%		70-130	20-SEP-15
Cobalt (Co)			98.8		%		70-130	20-SEP-15
Copper (Cu)			101.7		%		70-130	20-SEP-15
Lead (Pb)			104.6		%		70-130	20-SEP-15
Molybdenum (Mo)			94.6		%		70-130	20-SEP-15
Nickel (Ni)			99.3		%		70-130	20-SEP-15
Selenium (Se)			98.9		%		70-130	20-SEP-15
Silver (Ag)			114.3		%		70-130	20-SEP-15
Thallium (Tl)			104.3		%		70-130	20-SEP-15
Tin (Sn)			86.7		%		70-130	20-SEP-15
Uranium (U)			106.5		%		70-130	20-SEP-15
Vanadium (V)			97.2		%		70-130	20-SEP-15
Zinc (Zn)			102.9		%		70-130	20-SEP-15
WG2174574-3	LCS							
Antimony (Sb)			97.1		%		70-130	20-SEP-15
Arsenic (As)			98.4		%		70-130	20-SEP-15
Barium (Ba)			95.3		%		70-130	20-SEP-15
Beryllium (Be)			94.3		%		70-130	20-SEP-15
Cadmium (Cd)			96.8		%		70-130	20-SEP-15
Chromium (Cr)			95.6		%		70-130	20-SEP-15
Cobalt (Co)			95.6		%		70-130	20-SEP-15
Copper (Cu)			94.9		%		70-130	20-SEP-15
Lead (Pb)			97.2		%		70-130	20-SEP-15
Molybdenum (Mo)			100.7		%		70-130	20-SEP-15
Nickel (Ni)			96.7		%		70-130	20-SEP-15
Selenium (Se)			98.3		%		70-130	20-SEP-15
Silver (Ag)			93.7		%		70-130	20-SEP-15
Thallium (Tl)			95.8		%		70-130	20-SEP-15
Tin (Sn)			93.3		%		70-130	20-SEP-15
Uranium (U)			97.3		%		70-130	20-SEP-15
Vanadium (V)			97.6		%		70-130	20-SEP-15



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MET-200.2-CCMS-VA								
	Soil							
Batch	R3271432							
WG2174574-3	LCS							
Zinc (Zn)			95.2		%		70-130	20-SEP-15
WG2174574-1	MB							
Antimony (Sb)			<0.10		mg/kg		0.1	20-SEP-15
Arsenic (As)			<0.10		mg/kg		0.1	20-SEP-15
Barium (Ba)			<0.50		mg/kg		0.5	20-SEP-15
Beryllium (Be)			<0.10		mg/kg		0.1	20-SEP-15
Cadmium (Cd)			<0.020		mg/kg		0.02	20-SEP-15
Chromium (Cr)			<0.50		mg/kg		0.5	20-SEP-15
Cobalt (Co)			<0.10		mg/kg		0.1	20-SEP-15
Copper (Cu)			<0.50		mg/kg		0.5	20-SEP-15
Lead (Pb)			<0.50		mg/kg		0.5	20-SEP-15
Molybdenum (Mo)			<0.10		mg/kg		0.1	20-SEP-15
Nickel (Ni)			<0.50		mg/kg		0.5	20-SEP-15
Selenium (Se)			<0.20		mg/kg		0.2	20-SEP-15
Silver (Ag)			<0.10		mg/kg		0.1	20-SEP-15
Thallium (Tl)			<0.050		mg/kg		0.05	20-SEP-15
Tin (Sn)			<2.0		mg/kg		2	20-SEP-15
Uranium (U)			<0.050		mg/kg		0.05	20-SEP-15
Vanadium (V)			<0.20		mg/kg		0.2	20-SEP-15
Zinc (Zn)			<2.0		mg/kg		2	20-SEP-15
Batch	R3273140							
WG2174574-2	DUP	L1654527-136						
Antimony (Sb)		0.33	0.35		mg/kg	5.8	30	21-SEP-15
Arsenic (As)		10.1	10.3		mg/kg	1.9	30	21-SEP-15
Barium (Ba)		89.7	90.0		mg/kg	0.4	40	21-SEP-15
Beryllium (Be)		0.32	0.34		mg/kg	3.2	30	21-SEP-15
Cadmium (Cd)		0.172	0.179		mg/kg	3.7	30	21-SEP-15
Chromium (Cr)		30.8	29.9		mg/kg	2.7	30	21-SEP-15
Cobalt (Co)		10.8	10.5		mg/kg	3.0	30	21-SEP-15
Copper (Cu)		113	107		mg/kg	5.8	30	21-SEP-15
Lead (Pb)		5.33	5.42		mg/kg	1.7	40	21-SEP-15
Molybdenum (Mo)		1.01	1.24		mg/kg	20	40	21-SEP-15
Nickel (Ni)		21.1	21.2		mg/kg	0.5	30	21-SEP-15
Selenium (Se)		0.44	0.40		mg/kg	11	30	21-SEP-15
Silver (Ag)		0.11	0.10		mg/kg	9.9	40	21-SEP-15



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MET-200.2-CCMS-VA		Soil						
Batch	R3273140							
WG2174574-2	DUP	L1654527-136						
Thallium (Tl)		0.062	0.060		mg/kg	3.9	30	21-SEP-15
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	21-SEP-15
Uranium (U)		0.736	0.798		mg/kg	8.1	30	21-SEP-15
Vanadium (V)		80.4	79.3		mg/kg	1.4	30	21-SEP-15
Zinc (Zn)		48.1	47.5		mg/kg	1.3	30	21-SEP-15
Batch	R3296742							
WG2199073-4	CRM	VA-NRC-STSD1						
Antimony (Sb)			104.5		%		70-130	24-OCT-15
Arsenic (As)			107.0		%		70-130	24-OCT-15
Barium (Ba)			101.1		%		70-130	24-OCT-15
Beryllium (Be)			110.7		%		70-130	24-OCT-15
Cadmium (Cd)			97.5		%		70-130	24-OCT-15
Chromium (Cr)			105.1		%		70-130	24-OCT-15
Cobalt (Co)			104.4		%		70-130	24-OCT-15
Copper (Cu)			103.0		%		70-130	24-OCT-15
Lead (Pb)			97.8		%		70-130	24-OCT-15
Molybdenum (Mo)			105.0		%		70-130	24-OCT-15
Nickel (Ni)			102.3		%		70-130	24-OCT-15
Selenium (Se)			101.6		%		70-130	24-OCT-15
Silver (Ag)			105.1		%		70-130	24-OCT-15
Thallium (Tl)			101.3		%		70-130	24-OCT-15
Tin (Sn)			98.2		%		70-130	24-OCT-15
Vanadium (V)			107.9		%		70-130	24-OCT-15
Zinc (Zn)			102.5		%		70-130	24-OCT-15
WG2199073-5	CRM	VA-NRC-PACS3						
Antimony (Sb)			103.0		%		70-130	24-OCT-15
Arsenic (As)			95.8		%		70-130	24-OCT-15
Barium (Ba)			103.6		%		70-130	24-OCT-15
Beryllium (Be)			99.9		%		70-130	24-OCT-15
Cadmium (Cd)			95.2		%		70-130	24-OCT-15
Chromium (Cr)			102.8		%		70-130	24-OCT-15
Cobalt (Co)			101.5		%		70-130	24-OCT-15
Copper (Cu)			105.1		%		70-130	24-OCT-15
Lead (Pb)			98.6		%		70-130	24-OCT-15
Molybdenum (Mo)			95.3		%		70-130	24-OCT-15



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MET-200.2-CCMS-VA		Soil						
Batch	R3296742							
WG2199073-5	CRM	VA-NRC-PACS3						
Nickel (Ni)			101.2		%		70-130	24-OCT-15
Selenium (Se)			99.3		%		70-130	24-OCT-15
Silver (Ag)			110.3		%		70-130	24-OCT-15
Thallium (Tl)			100.7		%		70-130	24-OCT-15
Tin (Sn)			88.9		%		70-130	24-OCT-15
Uranium (U)			100.5		%		70-130	24-OCT-15
Vanadium (V)			102.5		%		70-130	24-OCT-15
Zinc (Zn)			104.6		%		70-130	24-OCT-15
WG2199073-3	LCS							
Antimony (Sb)			103.7		%		70-130	24-OCT-15
Arsenic (As)			103.7		%		70-130	24-OCT-15
Barium (Ba)			103.3		%		70-130	24-OCT-15
Beryllium (Be)			98.7		%		70-130	24-OCT-15
Cadmium (Cd)			98.2		%		70-130	24-OCT-15
Chromium (Cr)			102.4		%		70-130	24-OCT-15
Cobalt (Co)			101.4		%		70-130	24-OCT-15
Copper (Cu)			99.2		%		70-130	24-OCT-15
Lead (Pb)			96.0		%		70-130	24-OCT-15
Molybdenum (Mo)			101.5		%		70-130	24-OCT-15
Nickel (Ni)			99.4		%		70-130	24-OCT-15
Selenium (Se)			100.0		%		70-130	24-OCT-15
Silver (Ag)			101.2		%		70-130	24-OCT-15
Thallium (Tl)			98.9		%		70-130	24-OCT-15
Tin (Sn)			98.7		%		70-130	24-OCT-15
Uranium (U)			96.9		%		70-130	24-OCT-15
Vanadium (V)			104.0		%		70-130	24-OCT-15
Zinc (Zn)			94.5		%		70-130	24-OCT-15
WG2199073-1	MB							
Antimony (Sb)			<0.10		mg/kg		0.1	24-OCT-15
Arsenic (As)			<0.10		mg/kg		0.1	24-OCT-15
Barium (Ba)			<0.50		mg/kg		0.5	24-OCT-15
Beryllium (Be)			<0.10		mg/kg		0.1	24-OCT-15
Cadmium (Cd)			<0.020		mg/kg		0.02	24-OCT-15
Chromium (Cr)			<0.50		mg/kg		0.5	24-OCT-15
Cobalt (Co)			<0.10		mg/kg		0.1	24-OCT-15



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MET-200.2-CCMS-VA								
	Soil							
Batch	R3296742							
WG2199073-1	MB							
Copper (Cu)			<0.50		mg/kg		0.5	24-OCT-15
Lead (Pb)			<0.50		mg/kg		0.5	24-OCT-15
Molybdenum (Mo)			<0.10		mg/kg		0.1	24-OCT-15
Nickel (Ni)			<0.50		mg/kg		0.5	24-OCT-15
Selenium (Se)			<0.20		mg/kg		0.2	24-OCT-15
Silver (Ag)			<0.10		mg/kg		0.1	24-OCT-15
Thallium (Tl)			<0.050		mg/kg		0.05	24-OCT-15
Tin (Sn)			<2.0		mg/kg		2	24-OCT-15
Uranium (U)			<0.050		mg/kg		0.05	24-OCT-15
Vanadium (V)			<0.20		mg/kg		0.2	24-OCT-15
Zinc (Zn)			<2.0		mg/kg		2	24-OCT-15
MOISTURE-VA								
	Soil							
Batch	R3246962							
WG2149983-4	DUP	L1654527-58						
Moisture		35.2	32.2		%	8.9	20	14-AUG-15
WG2149983-2	LCS							
Moisture			100.3		%		90-110	14-AUG-15
WG2149983-1	MB							
Moisture			<0.25		%		0.25	14-AUG-15
Batch	R3247003							
WG2150080-3	DUP	L1654527-59						
Moisture		10.2	10.1		%	1.9	20	15-AUG-15
WG2150080-4	DUP	L1654527-107						
Moisture		59.6	61.5		%	3.2	20	15-AUG-15
WG2150080-2	LCS							
Moisture			100.4		%		90-110	15-AUG-15
WG2150080-1	MB							
Moisture			<0.25		%		0.25	15-AUG-15
Batch	R3247008							
WG2150124-2	LCS							
Moisture			99.7		%		90-110	15-AUG-15
WG2150124-1	MB							
Moisture			<0.25		%		0.25	15-AUG-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-VA		Soil						
Batch	R3248201							
WG2151377-2	LCS							
Moisture			100.4		%		90-110	18-AUG-15
WG2151377-1	MB							
Moisture			<0.25		%		0.25	18-AUG-15
N-TOT-LECO-SK		Soil						
Batch	R3251758							
WG2152225-1	DUP	L1654527-10						
Total Nitrogen by LECO		0.456	0.464		%	1.6	20	21-AUG-15
WG2152225-10	DUP	L1654527-117						
Total Nitrogen by LECO		1.93	1.86		%	4.0	20	21-AUG-15
WG2152225-4	DUP	L1654527-54						
Total Nitrogen by LECO		0.434	0.424		%	2.3	20	21-AUG-15
WG2152225-7	DUP	L1654527-91						
Total Nitrogen by LECO		0.280	0.285		%	1.5	20	21-AUG-15
WG2152225-11	IRM	08-109_SOIL						
Total Nitrogen by LECO			0.126		%		0.085-0.135	21-AUG-15
WG2152225-2	IRM	08-109_SOIL						
Total Nitrogen by LECO			0.125		%		0.085-0.135	21-AUG-15
WG2152225-5	IRM	08-109_SOIL						
Total Nitrogen by LECO			0.125		%		0.085-0.135	21-AUG-15
WG2152225-8	IRM	08-109_SOIL						
Total Nitrogen by LECO			0.125		%		0.085-0.135	21-AUG-15
WG2152225-12	MB							
Total Nitrogen by LECO			<0.020		%		0.02	21-AUG-15
WG2152225-3	MB							
Total Nitrogen by LECO			<0.020		%		0.02	21-AUG-15
WG2152225-6	MB							
Total Nitrogen by LECO			<0.020		%		0.02	21-AUG-15
WG2152225-9	MB							
Total Nitrogen by LECO			<0.020		%		0.02	21-AUG-15
N2/N3-AVAIL-KCL-SK		Soil						
Batch	R3250555							
WG2152172-3	IRM	SAL814						
Nitrate+Nitrite-N			96.7		%		70-130	20-AUG-15
WG2152172-2	MB							
Nitrite-N			<0.50		mg/kg		0.5	20-AUG-15
Nitrate+Nitrite-N			<2.0		mg/kg		2	20-AUG-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
N2/N3-AVAIL-KCL-SK								
Soil								
Batch	R3251115							
WG2152174-3	IRM	SAL814						
Nitrate+Nitrite-N			99.5		%		70-130	20-AUG-15
WG2152174-2	MB							
Nitrite-N			<0.50		mg/kg		0.5	20-AUG-15
Nitrate+Nitrite-N			<2.0		mg/kg		2	20-AUG-15
Batch	R3251116							
WG2152175-3	IRM	SAL814						
Nitrate+Nitrite-N			100.9		%		70-130	20-AUG-15
WG2152175-2	MB							
Nitrite-N			<0.50		mg/kg		0.5	20-AUG-15
Nitrate+Nitrite-N			<2.0		mg/kg		2	20-AUG-15
Batch	R3251117							
WG2152177-3	IRM	SAL814						
Nitrate+Nitrite-N			101.8		%		70-130	20-AUG-15
WG2152177-2	MB							
Nitrite-N			<0.50		mg/kg		0.5	20-AUG-15
Nitrate+Nitrite-N			<2.0		mg/kg		2	20-AUG-15
Batch	R3251238							
WG2152173-3	IRM	SAL814						
Nitrate+Nitrite-N			99.4		%		70-130	20-AUG-15
WG2152173-2	MB							
Nitrite-N			<0.50		mg/kg		0.5	20-AUG-15
Nitrate+Nitrite-N			<2.0		mg/kg		2	20-AUG-15
Batch	R3251405							
WG2154163-2	IRM	SAL814						
Nitrate+Nitrite-N			93.3		%		70-130	21-AUG-15
WG2154163-1	MB							
Nitrite-N			<0.50		mg/kg		0.5	21-AUG-15
Nitrate+Nitrite-N			<2.0		mg/kg		2	21-AUG-15
NH4-AVAIL-SK								
Soil								
Batch	R3250558							
WG2152180-3	IRM	SAL814						
Available Ammonium-N			108.8		%		70-130	20-AUG-15
WG2152180-2	MB							
Available Ammonium-N			<1.0		mg/kg		1	20-AUG-15



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NH4-AVAIL-SK								
Soil								
Batch	R3250559							
WG2152184-3	IRM	SAL814						
Available Ammonium-N			111.4		%		70-130	20-AUG-15
WG2152184-2	MB							
Available Ammonium-N			<1.0		mg/kg		1	20-AUG-15
Batch	R3250898							
WG2152186-3	IRM	SAL814						
Available Ammonium-N			100.4		%		70-130	20-AUG-15
WG2152186-2	MB							
Available Ammonium-N			<1.0		mg/kg		1	20-AUG-15
Batch	R3250899							
WG2152187-3	IRM	SAL814						
Available Ammonium-N			111.2		%		70-130	20-AUG-15
WG2152187-2	MB							
Available Ammonium-N			<1.0		mg/kg		1	20-AUG-15
Batch	R3250900							
WG2152192-3	IRM	SAL814						
Available Ammonium-N			107.6		%		70-130	20-AUG-15
WG2152192-2	MB							
Available Ammonium-N			<1.0		mg/kg		1	20-AUG-15
Batch	R3251412							
WG2154491-2	IRM	SAL814						
Available Ammonium-N			105.6		%		70-130	21-AUG-15
WG2154491-1	MB							
Available Ammonium-N			<1.0		mg/kg		1	21-AUG-15
NO3-AVAIL-SK								
Soil								
Batch	R3250912							
WG2152156-3	IRM	SAL814						
Available Nitrate-N			98.3		%		70-130	20-AUG-15
WG2152156-2	MB							
Available Nitrate-N			<1.0		mg/kg		1	20-AUG-15
Batch	R3250913							
WG2152157-3	IRM	SAL814						
Available Nitrate-N			102.2		%		70-130	20-AUG-15
WG2152157-2	MB							
Available Nitrate-N			<1.0		mg/kg		1	20-AUG-15



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NO3-AVAIL-SK								
Soil								
Batch	R3250914							
WG2152154-3	IRM	SAL814						
Available Nitrate-N			98.6		%		70-130	20-AUG-15
WG2152154-2	MB							
Available Nitrate-N			<1.0		mg/kg		1	20-AUG-15
Batch	R3250915							
WG2152160-3	IRM	SAL814						
Available Nitrate-N			99.8		%		70-130	20-AUG-15
WG2152160-2	MB							
Available Nitrate-N			<1.0		mg/kg		1	20-AUG-15
Batch	R3251402							
WG2152158-3	IRM	SAL814						
Available Nitrate-N			104.1		%		70-130	21-AUG-15
WG2152158-2	MB							
Available Nitrate-N			<1.0		mg/kg		1	21-AUG-15
Batch	R3252572							
WG2154158-3	IRM	SAL814						
Available Nitrate-N			97.9		%		70-130	21-AUG-15
WG2154158-2	MB							
Available Nitrate-N			<1.0		mg/kg		1	21-AUG-15
ORP-SHKFL96-VA								
Soil								
Batch	R3252918							
WG2155866-1	CRM	VA-ORP						
Oxidation-Reduction Potential (ORP)			213		mV		190-250	25-AUG-15
WG2151199-5	DUP	L1654527-5						
Oxidation-Reduction Potential (ORP)		279	281		mV	0.7	30	25-AUG-15
Batch	R3253085							
WG2156810-1	CRM	VA-ORP						
Oxidation-Reduction Potential (ORP)			213		mV		190-250	25-AUG-15
WG2152395-3	DUP	L1654527-59						
Oxidation-Reduction Potential (ORP)		329	338		mV	2.8	30	25-AUG-15
Batch	R3256027							
WG2159793-1	CRM	VA-ORP						
Oxidation-Reduction Potential (ORP)			215		mV		190-250	28-AUG-15
WG2154102-5	DUP	L1654527-92						
Oxidation-Reduction Potential (ORP)		312	311		mV	0.2	30	28-AUG-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ORP-SHKFL96-VA								
Batch	R3256450							
WG2160426-1	CRM	VA-ORP						
Oxidation-Reduction Potential (ORP)			214		mV		190-250	29-AUG-15
WG2156088-3	DUP	L1654527-106						
Oxidation-Reduction Potential (ORP)		291	286		mV	1.6	30	29-AUG-15
PH-1:2-VA								
Batch	R3247892							
WG2150050-2	DUP	L1654527-25						
pH (1:2 soil:water)		4.81	4.83	J	pH	0.02	0.3	17-AUG-15
Batch	R3248721							
WG2150071-2	DUP	L1654527-62						
pH (1:2 soil:water)		6.27	6.26	J	pH	0.01	0.3	18-AUG-15
WG2150078-2	DUP	L1654527-98						
pH (1:2 soil:water)		6.52	6.51	J	pH	0.01	0.3	18-AUG-15
Batch	R3249648							
WG2151822-2	DUP	L1654527-52						
pH (1:2 soil:water)		8.50	8.48	J	pH	0.02	0.3	19-AUG-15
WG2151874-2	DUP	L1654527-112						
pH (1:2 soil:water)		8.06	8.05	J	pH	0.01	0.3	19-AUG-15
WG2152092-2	DUP	L1654527-20						
pH (1:2 soil:water)		8.84	8.87	J	pH	0.03	0.3	19-AUG-15
WG2152237-2	DUP	L1654527-49						
pH (1:2 soil:water)		8.37	8.38	J	pH	0.01	0.3	19-AUG-15
Batch	R3249686							
WG2152453-1	DUP	L1654527-122						
pH (1:2 soil:water)		7.01	7.10	J	pH	0.09	0.3	19-AUG-15
Batch	R3270546							
WG2174574-2	DUP	L1654527-136						
pH (1:2 soil:water)		7.88	7.87	J	pH	0.01	0.3	20-SEP-15
PO4/K-AVAIL-SK								
Batch	R3250552							
WG2152204-1	DUP	L1654527-129						
Available Phosphate-P		12.1	12.0		mg/kg	0.8	30	20-AUG-15
Available Potassium		212	202		mg/kg	4.9	30	20-AUG-15
WG2152204-3	IRM	FARM2005						
Available Phosphate-P			87.6		%		70-130	20-AUG-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PO4/K-AVAIL-SK								
Soil								
Batch	R3250552							
WG2152204-3	IRM	FARM2005						
Available Potassium			88.3		%		70-130	20-AUG-15
WG2152204-2	MB							
Available Phosphate-P			<2.0		mg/kg		2	20-AUG-15
Available Potassium			<20		mg/kg		20	20-AUG-15
Batch	R3251126							
WG2152193-1	DUP	L1654527-9						
Available Phosphate-P		4.1	4.0		mg/kg	2.1	30	20-AUG-15
Available Potassium		107	103		mg/kg	3.8	30	20-AUG-15
WG2152193-3	IRM	FARM2005						
Available Phosphate-P			89.2		%		70-130	20-AUG-15
Available Potassium			91.0		%		70-130	20-AUG-15
WG2152193-2	MB							
Available Phosphate-P			<2.0		mg/kg		2	20-AUG-15
Available Potassium			<20		mg/kg		20	20-AUG-15
Batch	R3251248							
WG2152201-1	DUP	L1654527-108						
Available Phosphate-P		8.8	7.8		mg/kg	13	30	20-AUG-15
Available Potassium		97	89		mg/kg	8.2	30	20-AUG-15
WG2152201-3	IRM	FARM2005						
Available Phosphate-P			89.2		%		70-130	20-AUG-15
Available Potassium			88.0		%		70-130	20-AUG-15
WG2152201-2	MB							
Available Phosphate-P			<2.0		mg/kg		2	20-AUG-15
Available Potassium			<20		mg/kg		20	20-AUG-15
Batch	R3251406							
WG2152197-1	DUP	L1654527-53						
Available Phosphate-P		4.1	4.0		mg/kg	3.0	30	20-AUG-15
Available Potassium		87	85		mg/kg	2.2	30	20-AUG-15
WG2152197-3	IRM	FARM2005						
Available Phosphate-P			89.9		%		70-130	20-AUG-15
Available Potassium			90.9		%		70-130	20-AUG-15
WG2152197-2	MB							
Available Phosphate-P			<2.0		mg/kg		2	20-AUG-15
Available Potassium			<20		mg/kg		20	20-AUG-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PO4/K-AVAIL-SK								
Soil								
Batch	R3251407							
WG2152200-1	DUP	L1654527-85						
Available Phosphate-P		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	21-AUG-15
Available Potassium		40	37		mg/kg	7.4	30	21-AUG-15
WG2152200-3	IRM	FARM2005						
Available Phosphate-P			85.9		%		70-130	21-AUG-15
Available Potassium			87.6		%		70-130	21-AUG-15
WG2152200-2	MB							
Available Phosphate-P			<2.0		mg/kg		2	21-AUG-15
Available Potassium			<20		mg/kg		20	21-AUG-15
Batch	R3252624							
WG2154161-3	IRM	FARM2005						
Available Phosphate-P			87.0		%		70-130	21-AUG-15
Available Potassium			91.8		%		70-130	21-AUG-15
WG2154161-2	MB							
Available Phosphate-P			<2.0		mg/kg		2	21-AUG-15
Available Potassium			<20		mg/kg		20	21-AUG-15
SO4-AVAIL-SK								
Soil								
Batch	R3250413							
WG2152162-3	IRM	SAL814						
Available Sulfate-S			91.0		%		70-130	20-AUG-15
WG2152162-2	MB							
Available Sulfate-S			<3.0		mg/kg		3	20-AUG-15
Batch	R3250414							
WG2152169-3	IRM	SAL814						
Available Sulfate-S			92.1		%		70-130	20-AUG-15
WG2152169-2	MB							
Available Sulfate-S			<3.0		mg/kg		3	20-AUG-15
Batch	R3250448							
WG2152164-3	IRM	SAL814						
Available Sulfate-S			90.3		%		70-130	20-AUG-15
WG2152164-2	MB							
Available Sulfate-S			<3.0		mg/kg		3	20-AUG-15
Batch	R3250449							
WG2152165-3	IRM	SAL814						
Available Sulfate-S			92.2		%		70-130	20-AUG-15
WG2152165-2	MB							
Available Sulfate-S			<3.0		mg/kg		3	20-AUG-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-AVAIL-SK	Soil							
Batch R3251096								
WG2152167-3 IRM		SAL814						
Available Sulfate-S			96.1		%		70-130	21-AUG-15
WG2152167-2 MB								
Available Sulfate-S			<3.0		mg/kg		3	21-AUG-15
Batch R3251098								
WG2154159-3 IRM		SAL814						
Available Sulfate-S			96.3		%		70-130	21-AUG-15
WG2154159-2 MB								
Available Sulfate-S			<3.0		mg/kg		3	21-AUG-15

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Moisture content							
	1	29-JUL-15	14-AUG-15 23:47	14	16	days	EHT
	2	29-JUL-15	14-AUG-15 23:47	14	16	days	EHT
	3	29-JUL-15	14-AUG-15 23:47	14	16	days	EHT
	4	29-JUL-15	14-AUG-15 23:47	14	16	days	EHT
	5	29-JUL-15	14-AUG-15 23:47	14	16	days	EHT
	6	29-JUL-15	14-AUG-15 23:47	14	16	days	EHT
	7	29-JUL-15	14-AUG-15 23:47	14	16	days	EHT
	8	29-JUL-15	14-AUG-15 23:47	14	16	days	EHT
	9	29-JUL-15	14-AUG-15 23:47	14	16	days	EHT
	10	29-JUL-15	14-AUG-15 23:47	14	16	days	EHT
	11	29-JUL-15	14-AUG-15 23:47	14	16	days	EHT
	19	29-JUL-15 16:00	14-AUG-15 23:47	14	16	days	EHT
	21	28-JUL-15	14-AUG-15 23:47	14	17	days	EHT
	22	28-JUL-15	14-AUG-15 23:47	14	17	days	EHT
	25	30-JUL-15	14-AUG-15 23:47	14	15	days	EHT
	26	30-JUL-15	14-AUG-15 23:47	14	15	days	EHT
	33	30-JUL-15	14-AUG-15 23:47	14	15	days	EHT
	34	30-JUL-15	14-AUG-15 23:47	14	15	days	EHT
	35	30-JUL-15	14-AUG-15 23:47	14	15	days	EHT
	44	30-JUL-15	14-AUG-15 23:47	14	15	days	EHT
	45	30-JUL-15	14-AUG-15 23:47	14	15	days	EHT
	46	30-JUL-15	14-AUG-15 23:47	14	15	days	EHT
	59	31-JUL-15	15-AUG-15 06:35	14	15	days	EHT
	108	03-AUG-15	18-AUG-15 03:08	14	15	days	EHT
	109	03-AUG-15	18-AUG-15 03:08	14	15	days	EHT
	113	03-AUG-15	18-AUG-15 03:08	14	15	days	EHT
	114	03-AUG-15	18-AUG-15 03:08	14	15	days	EHT
	117	03-AUG-15	18-AUG-15 03:08	14	15	days	EHT
	118	03-AUG-15	18-AUG-15 03:08	14	15	days	EHT
	122	03-AUG-15	18-AUG-15 03:08	14	15	days	EHT
	124	03-AUG-15	18-AUG-15 03:08	14	15	days	EHT
pH in Soil (1:2 Soil:Water Extraction)							
	136	04-AUG-15	19-SEP-15 15:26	30	46	days	EHT
Metals							
Mercury in Soil by CVAFS							
	90	02-AUG-15	22-OCT-15 16:23	28	81	days	EHT
	103	02-AUG-15	22-OCT-15 16:23	28	81	days	EHT
	136	04-AUG-15	19-SEP-15 15:26	28	46	days	EHT

Legend & Qualifier Definitions:

- EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
- EHTR: Exceeded ALS recommended hold time prior to sample receipt.
- EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
- EHT: Exceeded ALS recommended hold time prior to analysis.
- Rec. HT: ALS recommended hold time (see units).

Notes*:
 Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
 Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1654527 were received on 07-AUG-15 10:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

Quality Control Report

Workorder: L1654527

Report Date: 26-OCT-15

Page 44 of 44

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Report To	Report Format / Distribution	Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
Company: <u>Golder</u>	Standard: <input checked="" type="checkbox"/> Other (specify):	<input checked="" type="checkbox"/> Regular (Standard Turnaround Times - Business Days)
Contact:	Select: PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax	Priority: 2-4 Business Days - 50% surcharge - Contact ALS to confirm TAT
Address: <u>Vancouver</u>	Email 1: <u>EZap@Golder.com</u>	Emergency (1-2 Business Days) - 100% Surcharge - Contact ALS to confirm TAT
	Email 2: <u>carol.kinison@Golder.com</u>	Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	<u>kinison@mountcollege.com</u>	

Invoice To	Client / Project Information	Analysis Request (Indicate Filtered or Preserved, F/P)											
Same as Report? (circle) Yes or No (if No, provide details)	Job #: <u>1411739/11000</u>												
Copy of Invoice with Report? (circle) Yes or No	PO / AFE:												
Company:	LSD:												
Contact:	Quote #:												
Address:													
Phone:													

Lab Work Order # (lab use only)	ALS Contact: <u>A. Springer</u>	Sampler: <u>EZG</u>
--	--	----------------------------

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Number of Containers
	<u>384859-01</u>	<u>AUG 2 / 15</u>		<u>Soil GRAB</u>	<u>4</u>
	<u>-02</u>				<u>2</u>
	<u>-03</u>				<u>4</u>
	<u>-04</u>				<u>4</u>
	<u>-05</u>				<u>2</u>
	<u>-06</u>				<u>2</u>
	<u>-07</u>				<u>4</u>
	<u>-08</u>				<u>4</u>
	<u>-09</u>				<u>4</u>
	<u>-10</u>				<u>4</u>
	<u>-11</u>				<u>2</u>
	<u>384859-12</u>	<u>AUG 2 / 15</u>			<u>2</u>

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)				
Released by: <u>A. Atz</u>	Date: <u>Aug 4/15</u>	Time:	Received by: <u>Ivan</u>	Date: <u>10 Am</u>	Time: <u>Ave of 11 AM</u>	Temperature: <u>2 = 6.3 C</u>	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF



L1654527-COFC

Report To		Report Format / USET/Speciation			All Below (Rush Turnaround Time (TAT) is not available for all tests)														
Company: <u>Golder</u>		Select Report Format: <input type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input checked="" type="checkbox"/> EDD (DIGITAL)			R <input checked="" type="checkbox"/> Regular (Standard TAT if received by 3pm)														
Contact:		Quality Control (QC) Report with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			P <input type="checkbox"/> Priority (2-4 business days if received by 3pm)														
Address: <u>Vancouver</u>		<input type="checkbox"/> Criteria on Report - provide details below if box checked			E <input type="checkbox"/> Emergency (1-2 business days if received by 3pm)														
Phone:		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			E2 <input type="checkbox"/> Same day or weekend emergency if received by 10am - contact ALS for surcharge.														
Invoice To Same as Report To <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Email 1 or Fax: <u>Ezga@live.ca (E-mail), (Fax)</u>			Specify Date Required for E2, E or P:														
Copy of Invoice with Report <input type="checkbox"/> Yes <input type="checkbox"/> No		Email 2: <u>kat.hansen@atkins.com</u>			Analysis Request														
Company:		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below														
Contact:		Email 1 or Fax: <u>matkinson@golder.com</u>			Number of Containers														
Project Information		Email 2:																	
ALS Quote #:		Oil and Gas Required Fields (client use)																	
Job #: <u>1411734 / 11000</u>		Approver ID:																	
PO / AFE:		GL Account:																	
LSD:		Activity Code:																	
ALS Lab Work Order # (lab use only)		ALS Contact: <u>A Springer</u>			Sampler: <u>AMA / EZG</u>														
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type															
	<u>471688 - 01</u>	<u>Aug 2 / 15</u>		<u>Soil 68th</u>	<u>4</u>														
	<u>-02</u>	<u>Aug 3 / 15</u>			<u>4</u>														
	<u>-03</u>	<u>Aug 3 / 15</u>			<u>4</u>														
	<u>-04</u>				<u>4</u>														
	<u>-05</u>				<u>4</u>														
	<u>-06</u>				<u>2</u>														
	<u>-07</u>				<u>2</u>														
	<u>-08</u>				<u>2</u>														
	<u>-09</u>				<u>2</u>														
	<u>-10</u>				<u>4</u>														
	<u>-11</u>				<u>4</u>														
	<u>-12</u>				<u>2</u>														
Drinking Water (DW) Samples (client use)		Special Instructions / Specify Criteria to add on report (client Use)			SAMPLE CONDITION AS RECEIVED (lab use only)														
Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input type="checkbox"/> No					Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>														
Are samples for human drinking water use? <input type="checkbox"/> Yes <input type="checkbox"/> No					Ice packs Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>														
					Cooling Initiated <input type="checkbox"/>														
					INITIAL COOLER TEMPERATURES °C														
					FINAL COOLER TEMPERATURES °C														
					<u>Ave of 11 = 6.3</u>														
SHIPMENT RELEASE (client use)				INITIAL SHIPMENT RECEPTION (lab use only)				FINAL SHIPMENT RECEPTION (lab use only)											
Released by: <u>[Signature]</u>		Date: <u>Aug 4 / 15</u>		Received by: <u>Sean</u>		Date: <u>7 Aug</u>		Received by: <u>Sean</u>		Date: <u>7 Aug</u>		Time: <u>10 Am</u>							

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

SOIL



10-389821



Chain of Custody / Analytic
Canada Toll Free: 1 800 387 2238
www.alsglobal.com

L1654527-COFC

Page 11 of 12

Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)	
Company: Golder		Standard: <input checked="" type="checkbox"/> Other (specify):		<input checked="" type="checkbox"/> Regular (Standard Turnaround Times - Business Days)	
Contact:		Select: PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax <input type="checkbox"/>		Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT	
Address: Vancouver		Email 1: atkinson@golder.com		Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT	
Phone:		Email 2: ezepf@jje@golder.com		Same Day or Weekend Emergency - Contact ALS to confirm TAT	
Fax:		Krcmahen@wvnetkey.com		Analysis Request	
Invoice To: Same as Report? (circle) Yes or No (if No, provide details)		Client / Project Information		(Indicate Filtered or Preserved, F/P)	
Copy of Invoice with Report? (circle) Yes or No		Job #: 1111734 / 11000			
Company:		PO / AFE:			
Contact:		LSD:			
Address:		Quote #:			
Phone:		ALS Contact: AS			
Fax:		Sampler: AMA			
Lab Work Order # (lab use only)					

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	Number of Containers
	389821-01	Aug 3/15		SOIL	2
	-02				4
	-03				2
	-04				2
	-05				2
	-06				2
	-07				4
	-08				4
	-09				4
	-10	Aug 4/15			4
	-11				4
	-12				4

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)				
Released by: A. Act	Date: Aug 4/15	Time:	Received by: Jean	Date: 7 Aug	Time: 10 AM	Temperature: Ave of 11 cool 6-35 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF



Report To	Report Format / Distribution	Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
Company: <i>Goldex</i>	Standard: <input checked="" type="checkbox"/> Other (specify):	<input checked="" type="checkbox"/> Regular (Standard Turnaround Times - Business Days)
Contact:	Select: PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax	Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address: <i>Vancouver</i>	Email 1: <i>aatkinson@golder.com</i>	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
Phone:	Email 2: <i>ezappalje@golder.com</i> <i>Kmenzhen@ndcountpolicy.com</i>	Same Day or Weekend Emergency - Contact ALS to confirm TAT

Invoice To: Same as Report? (circle Yes or No (if No, provide details))	Client / Project Information	Analysis Request (Indicate Filtered or Preserved, F/P)																	
Copy of Invoice with Report? (circle Yes or No)	Job #: <i>1411734 / 11000</i>																		
Company:	PO / AFE:																		
Contact:	LSD:																		
Address:	Quote #:																		
Phone:	ALS Contact: <i>A. Springer</i>																		
Fax:	Sampler: <i>EZG</i>																		
Lab Work Order # (lab use only)	<i>L1654527</i>																		

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Hold													Number of Containers		
	<i>384855-01</i>	<i>July 29/15</i>		<i>Soil</i>	<i>X</i>															<i>4</i>
	<i>-02</i>																			<i>4</i>
	<i>-03</i>																			<i>4</i>
	<i>-04</i>																			<i>2</i>
	<i>-05</i>																			<i>2</i>
	<i>-06</i>																			<i>2</i>
	<i>-07</i>																			<i>4</i>
	<i>-08</i>																			<i>4</i>
	<i>-09</i>																			<i>4</i>
	<i>-10</i>																			<i>4</i>
	<i>-11</i>																			<i>4</i>
	<i>-12</i>																			<i>2</i>



Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)				
Released by: <i>A. Ostr</i>	Date: <i>Aug 4/15</i>	Time:	Received by: <i>Jean</i>	Date: <i>7 Aug</i>	Time: <i>10 AM</i>	Temperature: <i>Ave of 11 cool 6.3 °C</i>	Verified by:	Date:	Time:	Observations: Yes / No? If Yes add SIF



Environmental Division

actkinis@golder.com

Report to: Company: <u>Golder Associates LTD.</u> Contact: <u>Evin Zapf-Gilje</u> Address: <u>Vancouver office</u> Phone: <u>604 379 6223</u> Fax: _____	Report Format / Distribution Standard: <input checked="" type="checkbox"/> <u>Excel</u> Other: _____ Select: PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital Email 1: <u>Evin Zapf-Gilje@golder.com</u> Email 2: <u>Katie McMahon@Mountpolley.com</u> <u>to Mc Mahen @ Mount polley, com</u>	Service Requested: (rush - subject to availability) <input checked="" type="checkbox"/> Regular (Default) Priority (2-3 Business Days) - 50% Surcharge Emergency (1 Business Day) - 100% Surcharge For Emergency < 1 Day, ASAP or Weekend - Contact ALS
---	--	--

Invoice To: Same as Report? <input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No ? Company: _____ Contact: _____ Address: _____ Phone: _____	Client / Project Information: Job #: _____ PO / AFE: <u>1411734-11000</u> Legal Site Description: <u>Mount Riley M.A.</u> Quote #: _____	Analysis Request (Indicate Filtered or Preserved, F/P)
--	---	--

ALS Contact: <u>A. Springer</u>	Sampler: <u>E2G</u>	CSR Metals	N-TOT-Aval-1-SK	N-TOT-LECO-SK	Nutrients Anal (ALP/PS)	pH	Moisture Content	ORP 96hr Storage	Copper	HOLD	Number of Containers
---------------------------------	---------------------	------------	-----------------	---------------	-------------------------	----	------------------	------------------	--------	------	----------------------

Sample #	Sample Identification (This description will appear on the report)	Date	Time	Sample Type	CSR Metals	N-TOT-Aval-1-SK	N-TOT-LECO-SK	Nutrients Anal (ALP/PS)	pH	Moisture Content	ORP 96hr Storage	Copper	HOLD	Number of Containers
08-028545-01	SSIS-07-01 OFF-ROADS 08-028545-01	24/JUL/15	1 Pm	Grab									X	2
08-028545-02	SSIS-07-01 OFF-ROADS -02													2
08-028545-03	SSIS-07-01 OFF-ROADS -03													2
08-028545-04	SSIS-07-01 OFF-ROADS -04		1 Pm											2
08-028545-05	SSIS-07-02 OFF-ROADS -05	30/AUG/15												
08-028545-06	SSIS-07-02 OFF-ROADS -06	30/AUG/15												
08-028545-07	SSIS-07-02 OFF-ROADS -07	30/AUG/15												
08-028545-08	SSIS-07-02 OFF-ROADS -08	30/AUG/15												
08-028545-09	SSIS-07-03 OFF-ROADS 08-028545-09	29/AUG/15	4 Pm										X	2
08-028545-10	SSIS-07-03 OFF-ROADS -10	29/AUG/15												2
08-028545-11	SSIS-07-03 OFF-ROADS -11	29/AUG/15												2
08-028545-12	SSIS-07-04 OFF-ROADS -12	30/AUG/15	4 Pm	GRAB										2

Special Instructions / Regulations / Hazardous Details

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)		
Released by: <u>A. Springer</u>	Date & Time: <u>Aug 4/15</u>	Received by: <u>Sean</u>	Date: <u>7 Aug</u>	Time: <u>10 AM</u>	Temperature: <u>Ave of all cooler 6.3 E</u>	Verified by: _____	Date & Time: _____	Observations: Yes / No ? If Yes attach SIF

Report To	Report Format / Distribution	Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
Company: <u>Golden</u>	Standard: <u>Other (specify):</u>	<input checked="" type="checkbox"/> Regular (Standard Turnaround Times - Business Days)
Contact:	Select: PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax <input type="checkbox"/>	Priority: (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address: <u>Vancouver</u>	Email 1: <u>oattkinson@golder.com</u>	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Email 2: <u>emaffalge@golder.com</u>	Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	<u>kmchristian@mattpoller.com</u>	

Phone: _____ Fax: _____	Client / Project Information	Analysis Request (Indicate Filtered or Preserved, F/P)																					
Invoice To: Same as Report? (circle) <u>Yes</u> or No (if No, provide details)	Job #: <u>1411734/11000</u>																						
Copy of Invoice with Report? (circle) Yes or No	PO / AFE:																						
Company:	LSD:																						
Contact:	Quote #:																						
Address:																							
Phone: _____ Fax: _____	ALS Contact: <u>A. Springer</u>	Sampler: <u>E26</u>																					

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type																			Number of Containers
	<u>384856-01</u>	<u>July 28 15</u>		<u>Soil</u>	<u>X</u>																		<u>2</u>
	<u>-02</u>	↓																					<u>2</u>
	<u>-03</u>																						<u>2</u>
	<u>-04</u>																						<u>2</u>
	<u>-05</u>	<u>July 30 15</u>																					<u>4</u>
	<u>-06</u>	↓																					<u>4</u>
	<u>-07</u>	<u>July 31 15</u>																					<u>2</u>
	<u>-08</u>																						<u>4</u>
	<u>-09</u>																						<u>4</u>
	<u>-10</u>																						<u>4</u>
	<u>-11</u>																						<u>4</u>
	<u>-12</u>																						<u>4</u>



Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)				
Released by: <u>A. Atz</u>	Date: <u>Aug 4 15</u>	Time: _____	Received by: <u>Sean</u>	Date: <u>7 Aug</u>	Time: <u>10 Am</u>	Temperature: <u>Ave of 11 cooler</u> <u>6.3 E OC</u>	Verified by: _____	Date: _____	Time: _____	Observations: Yes / No ? If Yes add SIF	



Report To	Report Format / Distribution	Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
Company: <u>Golder</u>	Standard: <input checked="" type="checkbox"/> Other (specify):	<input checked="" type="checkbox"/> Regular (Standard Turnaround Times - Business Days)
Contact:	Select: PDF <input type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax <input type="checkbox"/>	<input type="checkbox"/> Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address: <u>Vancouver</u>	Email 1: <u>Evin-Bopp-kyle@golder.com</u>	<input type="checkbox"/> Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Email 2: <u>atkinson@golder.com</u> <u>kmemmen@montvale.com</u>	<input type="checkbox"/> Same Day or Weekend Emergency - Contact ALS to confirm TAT

Phone: _____ Fax: _____	Analysis Request
Invoice To: Same as Report? (circle) Yes or No (if No, provide details)	(Indicate Filtered or Preserved, F/P)
Copy of Invoice with Report? (circle) Yes or No	
Company:	Client / Project Information
Contact:	Job #: <u>1411 734 / 11000</u>
Address:	PO / AFE:
Phone: _____ Fax: _____	LSD:
	Quote #:
Lab Work Order # (lab use only)	ALS Contact: <u>A. Springer</u> Sampler: <u>EZG</u>

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type		Number of Containers
384858-01	384858-01	Aug 1 / 15		Salt GRAB	X	4
	11 - 02	↓				2
	11 - 03	↓				2
	11 - 04	↓				2
	11 - 05	↓				2
	11 - 06	↓				2
384858-07	384858-07	Aug 2 / 15				4
	↓ - 08	↓				4
	↓ - 09	↓				4
	↓ - 10	↓				4
	↓ - 11	↓				4
	↓ - 12	↓				4



Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Det...

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: <u>A. Atkinson</u>	Date: <u>Aug 4 / 15</u>	Time: _____	Received by: <u>Jean</u>	Date: <u>1 Aug</u>	Time: <u>10 Am</u>	Temperature: <u>Avg of 11.0 C</u> <u>6-3</u>	Verified by: _____	Date: _____	Time: _____	Observations: Yes / No ? If Yes add SIF



MOUNT POLLEY MINING CORP.
ATTN: Katie McMahan
PO Box 12
Likely BC VOL 1N0

Date Received: 03-SEP-15
Report Date: 29-OCT-15 10:38 (MT)
Version: FINAL REV. 2

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1667543
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: 2, 3, 4, 5, B0024
Legal Site Desc:

Comments: 29-OCT-2015 This report replaces and supersedes previously sent report. This report includes pH results for ALS identified samples L1667543-1 to -52.

Can Dang
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

29-OCT-15 10:38 (MT)

Version: FINAL REV. 2

Sample ID Description Sampled Date Sampled Time Client ID		L1667543-1 Soil/Sediment 30-AUG-15 RYE GRASS SOIL- 1	L1667543-2 Soil/Sediment 30-AUG-15 RYE GRASS SOIL- 2	L1667543-3 Soil/Sediment 30-AUG-15 RYE GRASS SOIL- 3	L1667543-4 Soil/Sediment 30-AUG-15 RYE GRASS SOIL- 4	L1667543-5 Soil/Sediment 30-AUG-15 RYE GRASS SOIL- 4X
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	8.80	16.2	11.9	13.4	13.0
	pH (1:2 soil:water) (pH)	8.08	7.20	7.50	8.12	7.98
Metals	Aluminum (Al) (mg/kg)	16300	11600	15700	17700	16400
	Antimony (Sb) (mg/kg)	0.37	0.29	0.29	0.38	0.41
	Arsenic (As) (mg/kg)	11.2	7.54	6.72	12.1	11.5
	Barium (Ba) (mg/kg)	149	114	116	206	202
	Beryllium (Be) (mg/kg)	0.60	0.34	0.51	0.68	0.65
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	8.3	6.1	<5.0	7.5	6.6
	Cadmium (Cd) (mg/kg)	0.179	0.513	0.264	0.157	0.180
	Calcium (Ca) (mg/kg)	25200	9490	11400	23600	22000
	Chromium (Cr) (mg/kg)	15.4	30.2	28.1	12.8	13.2
	Cobalt (Co) (mg/kg)	16.0	11.0	13.3	18.1	17.3
	Copper (Cu) (mg/kg)	638	109	216	707	638
	Iron (Fe) (mg/kg)	44900	28000	33200	43700	40100
	Lead (Pb) (mg/kg)	5.34	6.33	6.55	5.32	5.51
	Lithium (Li) (mg/kg)	17.2	11.9	18.1	18.9	18.3
	Magnesium (Mg) (mg/kg)	9690	4910	6850	10900	10200
	Manganese (Mn) (mg/kg)	630	954	788	735	746
	Molybdenum (Mo) (mg/kg)	4.03	1.44	1.46	3.87	3.30
	Nickel (Ni) (mg/kg)	12.2	16.7	22.3	10.2	10.4
	Phosphorus (P) (mg/kg)	1240	1000	884	1320	1260
	Potassium (K) (mg/kg)	1630	1310	1440	1480	1390
	Selenium (Se) (mg/kg)	0.91	0.29	0.31	0.89	0.80
	Silver (Ag) (mg/kg)	0.27	0.25	0.19	0.38	0.33
	Sodium (Na) (mg/kg)	1530	197	323	840	769
	Strontium (Sr) (mg/kg)	159	80.7	77.1	163	153
	Thallium (Tl) (mg/kg)	<0.050	0.053	0.068	<0.050	<0.050
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	1520	794	908	1420	1190
Uranium (U) (mg/kg)	1.04	0.748	0.649	1.06	0.966	
Vanadium (V) (mg/kg)	166	80.8	97.1	163	150	
Zinc (Zn) (mg/kg)	58.5	90.0	64.0	66.9	65.6	
Zirconium (Zr) (mg/kg)	5.3	1.1	1.3	3.2	2.7	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

29-OCT-15 10:38 (MT)

Version: FINAL REV. 2

Sample ID Description Sampled Date Sampled Time Client ID		L1667543-6 Soil/Sediment 30-AUG-15 RYE GRASS SOIL- 5	L1667543-7 Soil/Sediment 30-AUG-15 RYE GRASS SOIL- 6	L1667543-8 Soil/Sediment 30-AUG-15 RYE GRASS SOIL- 7	L1667543-9 Soil/Sediment 30-AUG-15 RYE GRASS SOIL- 7X	L1667543-10 Soil/Sediment 30-AUG-15 RYE GRASS SOIL- 8
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	8.37	8.97	14.4	14.9	17.7
	pH (1:2 soil:water) (pH)	8.06	7.12	7.84	7.82	8.09
Metals	Aluminum (Al) (mg/kg)	17900	16500	15900	15700	26000
	Antimony (Sb) (mg/kg)	0.39	0.27	0.37	0.37	0.54
	Arsenic (As) (mg/kg)	12.0	5.64	11.6	11.7	10.0
	Barium (Ba) (mg/kg)	166	88.9	163	160	153
	Beryllium (Be) (mg/kg)	0.67	0.41	0.60	0.60	0.61
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	0.27
	Boron (B) (mg/kg)	8.1	<5.0	8.9	9.5	<5.0
	Cadmium (Cd) (mg/kg)	0.150	0.108	0.152	0.181	0.272
	Calcium (Ca) (mg/kg)	26200	4550	24400	23500	23300
	Chromium (Cr) (mg/kg)	10.6	39.1	11.8	13.4	58.0
	Cobalt (Co) (mg/kg)	18.0	12.4	16.4	16.0	21.1
	Copper (Cu) (mg/kg)	809	51.5	775	735	96.1
	Iron (Fe) (mg/kg)	49200	27800	49700	50400	47300
	Lead (Pb) (mg/kg)	4.67	7.44	5.06	5.17	13.6
	Lithium (Li) (mg/kg)	16.8	20.2	16.0	15.7	36.3
	Magnesium (Mg) (mg/kg)	10700	6490	9420	9390	13100
	Manganese (Mn) (mg/kg)	667	477	627	610	760
	Molybdenum (Mo) (mg/kg)	4.73	0.65	4.00	4.64	1.15
	Nickel (Ni) (mg/kg)	9.25	33.4	8.50	9.18	58.1
	Phosphorus (P) (mg/kg)	1410	555	1340	1300	788
	Potassium (K) (mg/kg)	1610	1440	1450	1380	2560
	Selenium (Se) (mg/kg)	1.07	<0.20	0.96	0.91	0.39
	Silver (Ag) (mg/kg)	0.38	0.11	0.34	0.32	0.15
	Sodium (Na) (mg/kg)	955	145	873	847	369
	Strontium (Sr) (mg/kg)	179	73.3	157	147	146
	Thallium (Tl) (mg/kg)	<0.050	0.097	<0.050	<0.050	0.179
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	1670	867	1650	1610	1060
Uranium (U) (mg/kg)	1.11	0.942	1.06	1.00	1.10	
Vanadium (V) (mg/kg)	185	61.5	195	194	72.9	
Zinc (Zn) (mg/kg)	62.7	50.4	55.4	55.8	104	
Zirconium (Zr) (mg/kg)	7.7	1.4	6.3	5.7	9.3	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1667543-11 Soil/Sediment 30-AUG-15 RYE GRASS SOIL-9	L1667543-12 Soil/Sediment 30-AUG-15 RYE GRASS SOIL-10	L1667543-13 Soil/Sediment 19-AUG-15 WILLOW SEEDLING SOIL-1	L1667543-14 Soil/Sediment 19-AUG-15 WILLOW WATTLE SOIL-1	L1667543-15 Soil/Sediment 19-AUG-15 WILLOW STAKE SOIL-1
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	7.93	7.79	2.78	2.58	5.22
	pH (1:2 soil:water) (pH)	7.91	7.92	8.45	8.37	8.41
Metals	Aluminum (Al) (mg/kg)	14500	17900	9800	10300	11000
	Antimony (Sb) (mg/kg)	0.56	0.49	0.44	0.40	0.45
	Arsenic (As) (mg/kg)	11.4	7.40	9.64	9.57	11.7
	Barium (Ba) (mg/kg)	145	123	79.5	139	97.5
	Beryllium (Be) (mg/kg)	0.58	0.54	0.31	0.31	0.35
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	5.9	<5.0	<5.0	<5.0	<5.0
	Cadmium (Cd) (mg/kg)	0.212	0.051	0.141	0.150	0.194
	Calcium (Ca) (mg/kg)	19000	8160	6120	6330	6100
	Chromium (Cr) (mg/kg)	17.3	45.8	30.1	28.6	32.3
	Cobalt (Co) (mg/kg)	14.7	14.3	9.81	9.89	11.1
	Copper (Cu) (mg/kg)	1020	183	71.0	66.8	51.6
	Iron (Fe) (mg/kg)	44100	41200	24800	24400	26600
	Lead (Pb) (mg/kg)	5.92	7.53	4.90	4.99	6.30
	Lithium (Li) (mg/kg)	15.6	14.8	9.9	9.7	11.2
	Magnesium (Mg) (mg/kg)	8310	7120	6150	5640	6200
	Manganese (Mn) (mg/kg)	645	407	483	473	555
	Molybdenum (Mo) (mg/kg)	3.86	1.95	0.66	0.59	0.69
	Nickel (Ni) (mg/kg)	13.1	26.7	23.8	22.5	25.0
	Phosphorus (P) (mg/kg)	1170	984	770	726	821
	Potassium (K) (mg/kg)	1110	1200	660	710	880
	Selenium (Se) (mg/kg)	0.99	0.31	<0.20	0.20	<0.20
	Silver (Ag) (mg/kg)	0.50	0.13	0.12	0.12	0.17
	Sodium (Na) (mg/kg)	699	284	201	191	226
	Strontium (Sr) (mg/kg)	121	85.0	47.7	75.7	75.6
	Thallium (Tl) (mg/kg)	<0.050	0.075	0.066	0.082	0.093
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	1130	827	743	778	806
Uranium (U) (mg/kg)	0.756	0.880	0.491	0.525	0.574	
Vanadium (V) (mg/kg)	160	114	71.6	73.6	74.3	
Zinc (Zn) (mg/kg)	59.1	54.1	47.1	44.9	49.6	
Zirconium (Zr) (mg/kg)	5.7	4.3	5.0	4.8	5.0	

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1667543-16 Soil/Sediment 19-AUG-15 WILLOW SEEDLING SOIL-2	L1667543-17 Soil/Sediment 19-AUG-15 WILLOW WATTLE SOIL-2	L1667543-18 Soil/Sediment 19-AUG-15 WILLOW STAKE SOIL-2	L1667543-19 Soil/Sediment 19-AUG-15 WILLOW SEEDLING SOIL-3	L1667543-20 Soil/Sediment 19-AUG-15 WILLOW WATTLE SOIL-3
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	14.5	10.4	14.9	6.25	4.36
	pH (1:2 soil:water) (pH)	8.46	8.48	8.40	8.08	8.66
Metals	Aluminum (Al) (mg/kg)	10300	14400	15300	11200	13800
	Antimony (Sb) (mg/kg)	0.41	0.56	0.39	0.60	0.43
	Arsenic (As) (mg/kg)	7.67	8.67	11.8	15.7	12.3
	Barium (Ba) (mg/kg)	80.2	94.4	148	112	133
	Beryllium (Be) (mg/kg)	0.31	0.40	0.59	0.49	0.47
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	<5.0	<5.0	6.6	<5.0	<5.0
	Cadmium (Cd) (mg/kg)	0.151	0.219	0.161	0.297	0.200
	Calcium (Ca) (mg/kg)	6420	20100	21400	9690	11100
	Chromium (Cr) (mg/kg)	30.8	33.9	16.2	37.1	23.4
	Cobalt (Co) (mg/kg)	9.50	12.8	15.5	14.1	13.2
	Copper (Cu) (mg/kg)	48.9	96.7	608	87.8	148
	Iron (Fe) (mg/kg)	23800	30900	42400	33200	33000
	Lead (Pb) (mg/kg)	4.87	6.21	5.76	8.20	6.17
	Lithium (Li) (mg/kg)	9.4	14.5	16.3	10.1	15.9
	Magnesium (Mg) (mg/kg)	6320	9000	9490	6840	9730
	Manganese (Mn) (mg/kg)	339	616	607	503	870
	Molybdenum (Mo) (mg/kg)	0.63	0.81	3.17	0.80	1.04
	Nickel (Ni) (mg/kg)	23.8	27.8	13.9	32.7	23.6
	Phosphorus (P) (mg/kg)	648	934	1150	919	1060
	Potassium (K) (mg/kg)	700	1090	1340	740	910
	Selenium (Se) (mg/kg)	0.80	0.55	0.83	0.74	0.30
	Silver (Ag) (mg/kg)	0.13	0.12	0.28	0.16	<0.20
	Sodium (Na) (mg/kg)	256	416	729	457	501
	Strontium (Sr) (mg/kg)	55.7	106	136	72.8	88.7
	Thallium (Tl) (mg/kg)	0.065	0.072	<0.050	0.094	0.077
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	835	1000	1270	620	857
Uranium (U) (mg/kg)	0.482	0.650	0.928	0.745	0.482	
Vanadium (V) (mg/kg)	69.3	87.8	150	90.7	92.8	
Zinc (Zn) (mg/kg)	52.1	58.6	58.6	71.7	58.2	
Zirconium (Zr) (mg/kg)	5.8	7.3	6.4	5.7	5.3	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1667543-21 Soil/Sediment 19-AUG-15 WILLOW STAKE SOIL-3	L1667543-22 Soil/Sediment 25-AUG-15 WILLOW SEEDLING SOIL-4	L1667543-23 Soil/Sediment 25-AUG-15 WILLOW WATTLE SOIL-4	L1667543-24 Soil/Sediment 25-AUG-15 WILLOW STAKE SOIL-4	L1667543-25 Soil/Sediment 25-AUG-15 WILLOW STAKE SOIL-4X
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	14.2	7.96	1.42	4.95	5.67
	pH (1:2 soil:water) (pH)	8.47	8.30	8.77	8.12	8.09
Metals	Aluminum (Al) (mg/kg)	17600	15800	9260	12400	12600
	Antimony (Sb) (mg/kg)	0.53	0.61	0.45	0.44	0.40
	Arsenic (As) (mg/kg)	11.2	11.1	7.56	14.3	12.6
	Barium (Ba) (mg/kg)	253	107	48.3	109	103
	Beryllium (Be) (mg/kg)	0.59	0.46	0.28	0.45	0.47
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	6.6	<5.0	<5.0	<5.0	<5.0
	Cadmium (Cd) (mg/kg)	0.157	0.218	0.209	0.213	0.198
	Calcium (Ca) (mg/kg)	25600	13500	20200	8120	8220
	Chromium (Cr) (mg/kg)	35.9	39.4	22.7	39.3	33.5
	Cobalt (Co) (mg/kg)	16.5	14.6	9.37	12.4	11.5
	Copper (Cu) (mg/kg)	359	85.6	38.4	96.2	101
	Iron (Fe) (mg/kg)	41100	33100	22200	32900	31500
	Lead (Pb) (mg/kg)	5.64	7.88	4.68	5.76	5.36
	Lithium (Li) (mg/kg)	17.3	17.6	10.4	12.6	12.7
	Magnesium (Mg) (mg/kg)	13200	8140	5880	7190	6590
	Manganese (Mn) (mg/kg)	704	601	486	594	572
	Molybdenum (Mo) (mg/kg)	1.87	0.87	0.72	1.24	1.23
	Nickel (Ni) (mg/kg)	35.7	32.5	19.9	27.6	22.8
	Phosphorus (P) (mg/kg)	1250	822	683	882	891
	Potassium (K) (mg/kg)	1140	1300	570	870	880
	Selenium (Se) (mg/kg)	0.55	0.37	0.20	0.37	0.32
	Silver (Ag) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Sodium (Na) (mg/kg)	601	204	259	333	609
	Strontium (Sr) (mg/kg)	138	74.8	93.2	84.7	78.3
	Thallium (Tl) (mg/kg)	0.053	0.134	0.107	0.084	0.075
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	1370	881	621	875	906
Uranium (U) (mg/kg)	0.761	0.628	0.438	0.941	0.896	
Vanadium (V) (mg/kg)	132	73.9	57.4	93.3	91.2	
Zinc (Zn) (mg/kg)	57.1	67.9	43.5	59.9	56.3	
Zirconium (Zr) (mg/kg)	8.2	5.8	5.1	2.9	2.8	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1667543-26 Soil/Sediment 25-AUG-15 WILLOW WATTLE SOIL-4X	L1667543-27 Soil/Sediment 25-AUG-15 WILLOW STAKE SOIL-5	L1667543-28 Soil/Sediment 25-AUG-15 WILLOW SEEDLING SOIL-5	L1667543-29 Soil/Sediment 25-AUG-15 WILLOW WATTLE SOIL-5	L1667543-30 Soil/Sediment 25-AUG-15 WILLOW STAKE SOIL-6
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	1.30	15.8	7.58	2.96	14.5
	pH (1:2 soil:water) (pH)	8.75	8.42	8.03	8.48	8.51
Metals	Aluminum (Al) (mg/kg)	10500	18000	11600	12000	16500
	Antimony (Sb) (mg/kg)	0.46	0.49	0.45	0.36	0.51
	Arsenic (As) (mg/kg)	12.6	14.4	10.7	10.9	9.01
	Barium (Ba) (mg/kg)	50.1	174	122	125	139
	Beryllium (Be) (mg/kg)	0.30	0.66	0.39	0.45	0.49
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	<5.0	8.5	<5.0	8.5	6.1
	Cadmium (Cd) (mg/kg)	0.226	0.194	0.178	0.139	0.218
	Calcium (Ca) (mg/kg)	16700	24600	14800	14000	22400
	Chromium (Cr) (mg/kg)	25.3	21.8	29.7	19.5	28.9
	Cobalt (Co) (mg/kg)	9.72	16.9	10.9	10.6	14.6
	Copper (Cu) (mg/kg)	39.0	608	115	259	315
	Iron (Fe) (mg/kg)	23200	42700	30200	30600	36600
	Lead (Pb) (mg/kg)	4.83	5.79	5.65	4.44	5.98
	Lithium (Li) (mg/kg)	10.1	18.7	11.5	11.1	15.7
	Magnesium (Mg) (mg/kg)	6710	11100	6430	7460	10300
	Manganese (Mn) (mg/kg)	449	745	574	532	687
	Molybdenum (Mo) (mg/kg)	0.61	2.92	0.99	1.61	1.74
	Nickel (Ni) (mg/kg)	21.1	15.2	20.5	16.6	24.1
	Phosphorus (P) (mg/kg)	790	1250	849	985	994
	Potassium (K) (mg/kg)	750	1470	960	900	1360
	Selenium (Se) (mg/kg)	0.26	0.83	0.61	0.36	0.75
	Silver (Ag) (mg/kg)	<0.20	<0.30	<0.20	<0.20	<0.20
	Sodium (Na) (mg/kg)	371	803	306	570	656
	Strontium (Sr) (mg/kg)	95.1	153	90.9	110	133
	Thallium (Tl) (mg/kg)	0.091	<0.050	0.073	<0.050	0.062
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	678	1600	924	938	1190
Uranium (U) (mg/kg)	0.595	0.997	1.32	0.651	0.813	
Vanadium (V) (mg/kg)	61.7	156	90.0	96.2	111	
Zinc (Zn) (mg/kg)	44.7	67.8	50.5	48.6	60.8	
Zirconium (Zr) (mg/kg)	5.2	9.4	5.2	6.0	8.9	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1667543-31 Soil/Sediment 25-AUG-15 WILLOW WATTLE SOIL-6	L1667543-32 Soil/Sediment 25-AUG-15 WILLOW SEEDLING SOIL-6	L1667543-33 Soil/Sediment 25-AUG-15 WILLOW SOIL-1	L1667543-34 Soil/Sediment 25-AUG-15 WILLOW SOIL-2	L1667543-35 Soil/Sediment 25-AUG-15 WILLOW SOIL-3	
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	9.39	4.41	10.6	10.4	15.3
	pH (1:2 soil:water) (pH)	8.08	8.30	5.95	7.18	6.36
Metals	Aluminum (Al) (mg/kg)	13000	13800	19400	18000	20200
	Antimony (Sb) (mg/kg)	0.37	0.51	0.20	0.33	0.52
	Arsenic (As) (mg/kg)	10.2	13.6	4.45	5.53	11.0
	Barium (Ba) (mg/kg)	118	118	82.7	89.9	127
	Beryllium (Be) (mg/kg)	0.40	0.42	0.40	0.36	0.52
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Cadmium (Cd) (mg/kg)	0.182	0.208	0.150	0.121	0.348
	Calcium (Ca) (mg/kg)	9720	9730	5530	7980	6420
	Chromium (Cr) (mg/kg)	30.9	36.2	35.1	37.4	47.7
	Cobalt (Co) (mg/kg)	12.3	13.7	10.8	11.3	16.3
	Copper (Cu) (mg/kg)	192	115	19.0	27.2	51.2
	Iron (Fe) (mg/kg)	32000	34200	30000	30800	37800
	Lead (Pb) (mg/kg)	5.65	6.06	6.92	7.61	9.53
	Lithium (Li) (mg/kg)	13.4	13.9	27.8	19.7	28.2
	Magnesium (Mg) (mg/kg)	7050	8490	7280	8030	8630
	Manganese (Mn) (mg/kg)	615	562	416	441	654
	Molybdenum (Mo) (mg/kg)	1.34	0.96	0.72	0.51	0.76
	Nickel (Ni) (mg/kg)	22.8	30.1	27.7	28.0	39.8
	Phosphorus (P) (mg/kg)	869	893	392	751	792
	Potassium (K) (mg/kg)	910	1130	880	960	1940
	Selenium (Se) (mg/kg)	0.43	0.34	0.23	0.21	0.39
	Silver (Ag) (mg/kg)	<0.20	<0.20	<0.10	<0.10	<0.20
	Sodium (Na) (mg/kg)	450	285	125	293	233
	Strontium (Sr) (mg/kg)	77.9	74.4	56.2	61.7	62.3
	Thallium (Tl) (mg/kg)	0.064	0.097	0.091	0.097	0.183
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	747	994	768	995	768
	Uranium (U) (mg/kg)	0.739	0.749	0.982	0.710	0.755
	Vanadium (V) (mg/kg)	86.3	90.3	60.2	72.1	67.3
	Zinc (Zn) (mg/kg)	52.2	60.3	57.5	57.6	92.7
	Zirconium (Zr) (mg/kg)	2.2	4.6	2.0	3.2	1.5

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID Description Sampled Date Sampled Time Client ID	L1667543-36 Soil/Sediment 25-AUG-15 WILLOW SOIL-3X	L1667543-37 Soil/Sediment 25-AUG-15 WILLOW SOIL-4	L1667543-38 Soil/Sediment 25-AUG-15 WILLOW SOIL-5	L1667543-39 Soil/Sediment 25-AUG-15 WILLOW SOIL-6	L1667543-40 Soil/Sediment 25-AUG-15 WILLOW SOIL-6X
Grouping	Analyte						
SOIL							
Physical Tests	Moisture (%)	13.8	10.8	4.79	3.78	3.84	
	pH (1:2 soil:water) (pH)	6.20	6.27	6.67	6.39	6.23	
Metals	Aluminum (Al) (mg/kg)	15800	13700	14300	13100	12900	
	Antimony (Sb) (mg/kg)	0.43	0.36	0.49	0.26	0.29	
	Arsenic (As) (mg/kg)	10.0	12.1	9.73	6.08	6.90	
	Barium (Ba) (mg/kg)	96.7	232	115	52.4	53.0	
	Beryllium (Be) (mg/kg)	0.40	0.47	0.39	0.29	0.28	
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Boron (B) (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0	
	Cadmium (Cd) (mg/kg)	0.229	0.742	0.224	0.078	0.086	
	Calcium (Ca) (mg/kg)	5630	4970	5210	3470	3570	
	Chromium (Cr) (mg/kg)	40.7	34.2	34.8	38.1	36.4	
	Cobalt (Co) (mg/kg)	12.6	11.1	11.2	9.30	9.13	
	Copper (Cu) (mg/kg)	34.3	23.3	48.5	28.4	27.9	
	Iron (Fe) (mg/kg)	32200	28500	29300	27800	27600	
	Lead (Pb) (mg/kg)	8.11	6.91	6.50	4.59	4.57	
	Lithium (Li) (mg/kg)	20.0	25.2	13.4	14.9	14.8	
	Magnesium (Mg) (mg/kg)	6760	4700	6030	5330	5340	
	Manganese (Mn) (mg/kg)	529	1130	540	244	244	
	Molybdenum (Mo) (mg/kg)	0.64	1.04	0.62	0.53	0.55	
	Nickel (Ni) (mg/kg)	30.2	24.6	25.1	24.9	23.4	
	Phosphorus (P) (mg/kg)	751	595	803	546	550	
	Potassium (K) (mg/kg)	1410	1050	1020	810	830	
	Selenium (Se) (mg/kg)	0.35	0.36	<0.20	<0.20	<0.20	
	Silver (Ag) (mg/kg)	<0.10	<0.30	<0.10	<0.10	<0.10	
	Sodium (Na) (mg/kg)	225	96	107	112	102	
	Strontium (Sr) (mg/kg)	53.3	49.5	45.7	30.0	29.3	
	Thallium (Tl) (mg/kg)	0.142	0.251	0.091	0.065	0.064	
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0	
	Titanium (Ti) (mg/kg)	695	524	827	814	808	
Uranium (U) (mg/kg)	0.844	1.47	0.517	0.533	0.513		
Vanadium (V) (mg/kg)	61.2	63.4	77.5	64.1	64.1		
Zinc (Zn) (mg/kg)	69.6	130	67.3	38.6	38.5		
Zirconium (Zr) (mg/kg)	1.1	<1.0	1.9	2.1	1.9		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID Description Sampled Date Sampled Time Client ID	L1667543-41 Soil/Sediment 25-AUG-15 WILLOW SOIL-7	L1667543-42 Soil/Sediment 25-AUG-15 WILLOW SOIL-8	L1667543-43 Soil/Sediment 25-AUG-15 WILLOW SOIL-9	L1667543-44 Soil/Sediment 25-AUG-15 WILLOW SOIL-10	L1667543-45 Soil/Sediment 19-AUG-15 BERRIES SOIL-1
Grouping	Analyte						
SOIL							
Physical Tests	Moisture (%)	2.90	9.84	3.98	7.22	29.2	
	pH (1:2 soil:water) (pH)	7.22	7.02	8.07	7.70	5.08	
Metals	Aluminum (Al) (mg/kg)	8830	16400	14700	18200	25700	
	Antimony (Sb) (mg/kg)	0.32	0.39	0.23	0.24	0.36	
	Arsenic (As) (mg/kg)	5.95	8.41	5.19	6.82	6.06	
	Barium (Ba) (mg/kg)	49.4	91.3	43.8	101	220	
	Beryllium (Be) (mg/kg)	0.24	0.42	0.29	0.38	1.19	
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Boron (B) (mg/kg)	<5.0	<5.0	<5.0	8.2	<5.0	
	Cadmium (Cd) (mg/kg)	0.145	0.239	0.169	0.160	0.927	
	Calcium (Ca) (mg/kg)	7210	5210	25200	18300	8100	
	Chromium (Cr) (mg/kg)	26.0	35.0	30.3	40.7	41.6	
	Cobalt (Co) (mg/kg)	8.49	12.7	11.7	14.0	16.7	
	Copper (Cu) (mg/kg)	28.5	43.0	32.0	72.4	88.7	
	Iron (Fe) (mg/kg)	22200	30400	29700	35700	33300	
	Lead (Pb) (mg/kg)	4.57	8.09	7.33	5.35	10.5	
	Lithium (Li) (mg/kg)	8.7	16.3	20.3	13.2	18.8	
	Magnesium (Mg) (mg/kg)	4930	6460	7040	9060	5760	
	Manganese (Mn) (mg/kg)	408	716	489	599	1250	
	Molybdenum (Mo) (mg/kg)	0.45	0.65	0.54	0.60	1.40	
	Nickel (Ni) (mg/kg)	18.4	28.8	26.8	27.1	35.1	
	Phosphorus (P) (mg/kg)	638	806	847	963	1140	
	Potassium (K) (mg/kg)	610	1310	1080	1660	1830	
	Selenium (Se) (mg/kg)	<0.20	0.22	<0.20	<0.20	0.36	
	Silver (Ag) (mg/kg)	<0.10	0.12	<0.10	0.10	0.75	
	Sodium (Na) (mg/kg)	153	136	264	576	241	
	Strontium (Sr) (mg/kg)	45.0	44.2	171	146	80.7	
	Thallium (Tl) (mg/kg)	0.077	0.115	0.100	<0.050	0.138	
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0	
	Titanium (Ti) (mg/kg)	670	811	792	1170	564	
Uranium (U) (mg/kg)	0.415	0.502	0.627	0.418	1.17		
Vanadium (V) (mg/kg)	57.1	72.2	53.3	119	68.0		
Zinc (Zn) (mg/kg)	37.6	67.4	54.3	45.6	87.6		
Zirconium (Zr) (mg/kg)	2.5	2.4	4.3	4.7	<1.0		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1667543-46 Soil/Sediment 19-AUG-15 BERRIES SOIL-2	L1667543-47 Soil/Sediment 19-AUG-15 BERRIES SOIL-3	L1667543-48 Soil/Sediment 19-AUG-15 BERRIES SOIL-4	L1667543-49 Soil/Sediment 19-AUG-15 BERRIES TAILINGS-1	L1667543-50 Soil/Sediment 19-AUG-15 BERRIES TAILINGS-2
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	25.6	16.6	68.3	4.16	9.67
	pH (1:2 soil:water) (pH)	5.87	6.30	5.99	7.59	7.55
Metals	Aluminum (Al) (mg/kg)	20400	8070	3720	13800	12300
	Antimony (Sb) (mg/kg)	0.36	0.23	<0.10	0.31	0.31
	Arsenic (As) (mg/kg)	4.86	3.08	1.12	8.61	9.02
	Barium (Ba) (mg/kg)	139	149	49.4	147	159
	Beryllium (Be) (mg/kg)	0.63	0.20	0.11	0.50	0.49
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	<5.0	<5.0	<5.0	6.8	7.3
	Cadmium (Cd) (mg/kg)	0.745	0.333	0.236	0.155	0.145
	Calcium (Ca) (mg/kg)	10700	8730	8790	19100	20000
	Chromium (Cr) (mg/kg)	36.2	16.2	5.88	13.5	13.5
	Cobalt (Co) (mg/kg)	11.3	6.52	4.16	13.2	13.2
	Copper (Cu) (mg/kg)	47.1	125	47.5	608	514
	Iron (Fe) (mg/kg)	26400	17600	6620	47400	52500
	Lead (Pb) (mg/kg)	8.46	7.29	1.80	4.11	3.95
	Lithium (Li) (mg/kg)	18.7	7.9	2.2	12.3	12.3
	Magnesium (Mg) (mg/kg)	6170	3350	1370	6760	6470
	Manganese (Mn) (mg/kg)	513	1110	661	494	476
	Molybdenum (Mo) (mg/kg)	0.90	1.64	0.76	4.05	3.23
	Nickel (Ni) (mg/kg)	31.9	8.47	4.15	10.1	9.98
	Phosphorus (P) (mg/kg)	824	607	322	1120	1320
	Potassium (K) (mg/kg)	1470	970	320	1140	1080
	Selenium (Se) (mg/kg)	<0.20	0.22	<0.20	0.78	0.75
	Silver (Ag) (mg/kg)	0.23	0.56	0.68	0.30	0.26
	Sodium (Na) (mg/kg)	189	252	167	803	747
	Strontium (Sr) (mg/kg)	83.2	70.0	61.6	148	148
	Thallium (Tl) (mg/kg)	0.087	0.054	<0.050	<0.050	<0.050
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti) (mg/kg)	484	699	128	1100	1030	
Uranium (U) (mg/kg)	1.07	0.439	0.281	0.849	0.785	
Vanadium (V) (mg/kg)	58.7	58.3	16.2	178	192	
Zinc (Zn) (mg/kg)	83.6	49.9	15.3	41.5	43.7	
Zirconium (Zr) (mg/kg)	<1.0	<1.0	<1.0	2.0	2.9	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1667543-51 Soil/Sediment 19-AUG-15 BERRIES TAILINGS-3	L1667543-52 Soil/Sediment 19-AUG-15 BERRIES TAILINGS-4		
Grouping	Analyte				
SOIL					
Physical Tests	Moisture (%)	1.90	21.7		
	pH (1:2 soil:water) (pH)	8.54	7.99		
Metals	Aluminum (Al) (mg/kg)	11000	12600		
	Antimony (Sb) (mg/kg)	0.28	0.30		
	Arsenic (As) (mg/kg)	9.26	10.1		
	Barium (Ba) (mg/kg)	124	125		
	Beryllium (Be) (mg/kg)	0.47	0.51		
	Bismuth (Bi) (mg/kg)	<0.20	<0.20		
	Boron (B) (mg/kg)	5.8	7.4		
	Cadmium (Cd) (mg/kg)	0.170	0.134		
	Calcium (Ca) (mg/kg)	19100	21400		
	Chromium (Cr) (mg/kg)	8.39	9.56		
	Cobalt (Co) (mg/kg)	12.8	13.4		
	Copper (Cu) (mg/kg)	1070	927		
	Iron (Fe) (mg/kg)	47500	50700		
	Lead (Pb) (mg/kg)	4.39	4.03		
	Lithium (Li) (mg/kg)	11.6	11.5		
	Magnesium (Mg) (mg/kg)	6820	6850		
	Manganese (Mn) (mg/kg)	443	476		
	Molybdenum (Mo) (mg/kg)	5.27	4.52		
	Nickel (Ni) (mg/kg)	5.78	6.51		
	Phosphorus (P) (mg/kg)	1040	1210		
	Potassium (K) (mg/kg)	910	990		
	Selenium (Se) (mg/kg)	1.15	0.98		
	Silver (Ag) (mg/kg)	0.38	0.32		
	Sodium (Na) (mg/kg)	881	916		
	Strontium (Sr) (mg/kg)	122	134		
	Thallium (Tl) (mg/kg)	<0.050	<0.050		
	Tin (Sn) (mg/kg)	<2.0	<2.0		
	Titanium (Ti) (mg/kg)	822	1170		
	Uranium (U) (mg/kg)	0.604	0.719		
	Vanadium (V) (mg/kg)	176	197		
Zinc (Zn) (mg/kg)	50.3	48.9			
Zirconium (Zr) (mg/kg)	4.7	5.7			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Certified Reference Material	Silver (Ag)	RM-H	L1667543-20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -30, -31, -32, -33, -34, -35, -36, -37, -38
Certified Reference Material	Silver (Ag)	RM-H	L1667543-20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -30, -31, -32, -33, -34, -35, -36, -37, -38

Qualifiers for Individual Parameters Listed:

Qualifier	Description
RM-H	Reference Material recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
MET-200.2-CCMS-VA	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)
Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CRC ICPMS.			
Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. This method does not dissolve all silicate materials and may result in a partial extraction, depending on the sample matrix, for some metals, including, but not limited to Al, Ba, Be, Cr, Sr, Ti, Tl, and V.			
MOISTURE-VA	Soil	Moisture content	ASTM D2974-00 Method A
This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.			
PH-1:2-VA	Soil	pH in Soil (1:2 Soil:Water Extraction)	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL
This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

2	3	4	5	B0024
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GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

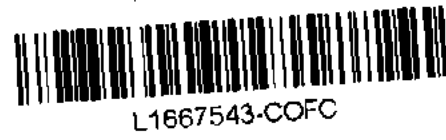
Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Report to:		Report Format / Distribution			Service Requested: (rush - subject to availability)																																												
Company: MOUNT POLLEY MINING CORP.		<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Default)																																												
Contact: Katie McMahan		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge																																												
Address: PO BOX 12, Likely, BC, V0L 1N0		Email 1: on file, Arainn Atkinson@golder.com			<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge																																												
		Email 2: Evin_Zapf-Gilje@golder.com			<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS																																												
Phone: 250-790-2215 Fax:					Analysis Request																																												
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No		Client / Project Information:			Please indicate below Filtered, Preserved or both (F, P, F/P)																																												
Company:		Job #:			<table border="1" style="width: 100%; height: 100%;"> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>																																												
Contact:		PO / AFE:																																															
Address:		Legal Site Description:																																															
Phone: Fax:		Quote #:																																															
Lab Work Order # (lab use only)		ALS Contact: Can Dang			Sampler: GH, SF																																												
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HOLD					Number of Containers																																							
	Berries Tailings - 1	19-Aug-15		Soil/Sediment	X					2																																							
	Berries Tailings - 2	19-Aug-15		Soil/Sediment	X					2																																							
	Berries Tailings - 3	19-Aug-15		Soil/Sediment	X					2																																							
	Berries Tailings - 4	19-Aug-15		Soil/Sediment	X					2																																							



Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)			
Released by: <i>[Signature]</i>	Date & Time: 02/09/15 15:30	Received by: MIKE	Date: 9/3	Time: 9:25	Temperature: 8.6	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF



Environmental Division

Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Katie McMahan	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file, Arainn Atkinson@golder.com	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
	Email 2: Evin Zapf-Gilje@golder.com	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Phone: 250-790-2215 Fax	Analysis Request	
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	Job #:	
Contact:	PO / AFE:	
Address:	Legal Site Description:	
Phone: Fax	Quote #:	

Lab Work Order # (lab use only)	L1667543	ALS Contact: Can Dang	Sampler: GH, SF
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Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HOLD															Number of Containers
	Rye grass soil - 1	30-Aug-15		Soil/Sediment	X															2
	Rye grass soil - 2	30-Aug-15		Soil/Sediment	X															2
	Rye grass soil - 3	30-Aug-15		Soil/Sediment	X															2
	Rye grass soil - 4	30-Aug-15		Soil/Sediment	X															2
	Rye grass soil - 4x	30-Aug-15		Soil/Sediment	X															2
	Rye grass soil - 5	30-Aug-15		Soil/Sediment	X															2
	Rye grass soil - 6	30-Aug-15		Soil/Sediment	X															2
	Rye grass soil - 7	30-Aug-15		Soil/Sediment	X															2
	Rye grass soil - 7x	30-Aug-15		Soil/Sediment	X															2
	Rye grass soil - 8	30-Aug-15		Soil/Sediment	X															2
	Rye grass soil - 9	30-Aug-15		Soil/Sediment	X															2
	Rye grass soil - 10	30-Aug-15		Soil/Sediment	X															2



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SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)			Observations:
Released by: <i>KM</i>	Date & Time: 08/08/15 15:30	Received by: MIKE	Date: 9/3	Time: 9:25	Temperature: 8.6	Verified by:	Date & Time:	Yes / No ? If Yes attach SIF



Environmental Division

Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Katie McMahan	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file, Arainn_Atkinson@golder.com	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
	Email 2: Evin_Zapf-Gilte@golder.com	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Phone: 250-790-2215 Fax:		Analysis Request																	
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Please indicate below Filtered, Preserved or both (F, P, F/P)																	
Company:	Job #:																		
Contact:	PO / AFE:																		
Address:	Legal Site Description:																		
Phone: Fax:	Quote #:																		

Lab Work Order # (lab use only)	ALS Contact: Can Dang	Sampler: GH, SF
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Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HOLD																Number of Containers	
	Willow Seedling soil - 1	19-Aug-15		Soil/Sediment	X																	2
	Willow Wattle soil - 1	19-Aug-15		Soil/Sediment	X																	2
	Willow Stake soil - 1	19-Aug-15		Soil/Sediment	X																	2
	Willow Seedling soil - 2	19-Aug-15		Soil/Sediment	X																	2
	Willow Wattle soil - 2	19-Aug-15		Soil/Sediment	X																	2
	Willow Stake soil - 2	19-Aug-15		Soil/Sediment	X																	2
	Willow Seedling soil - 3	19-Aug-15		Soil/Sediment	X																	2
	Willow Wattle soil - 3	19-Aug-15		Soil/Sediment	X																	2
	Willow Stake soil - 3	19-Aug-15		Soil/Sediment	X																	2
	Willow Seedling soil - 4	25-Aug-15		Soil/Sediment	X																	2
	Willow Wattle soil - 4	25-Aug-15		Soil/Sediment	X																	2
	Willow Stake soil - 4	25-Aug-15		Soil/Sediment	X																	2



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SHIPMENT RELEASE (client use)				SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)				
Released by: <i>[Signature]</i>	Date & Time: 6/25/15 15:30	Received by: MIKE	Date: 9/3	Time: 9:25	Temperature: 8.6	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF				



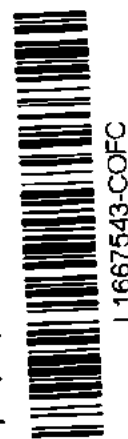
Environmental Division

Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Katie McMahan	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file, Arainn Atkinson@golder.com	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
	Email 2: Evin_Zapf-Gille@golder.com	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Phone: 250-790-2215 Fax:		Analysis Request														
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Please indicate below Filtered, Preserved or both (F, P, F/P)														
Company:	Job #:															
Contact:	PO / AFE:															
Address:	Legal Site Description:															
Phone: Fax:	Quote #:															

Lab Work Order # (lab use only)	ALS Contact: Can Dang	Sampler: GH, SF
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Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	HOLD														Number of Containers
	Willow Stake soil - 4x	25-Aug-15		Soil/Sediment	X														2
	Willow Wattle soil - 4x	25-Aug-15		Soil/Sediment	X														2
	Willow Stake soil - 5	25-Aug-15		Soil/Sediment	X														2
	Willow Seedling soil - 5	25-Aug-15		Soil/Sediment	X														2
	Willow Wattle soil - 5	25-Aug-15		Soil/Sediment	X														2
	Willow Stake soil - 6	25-Aug-15		Soil/Sediment	X														2
	Willow Wattle soil - 6	25-Aug-15		Soil/Sediment	X														2
	Willow Seedling soil - 6	25-Aug-15		Soil/Sediment	X														2
	Willow soil - 1	25-Aug-15		Soil/Sediment	X														2
	Willow soil - 2	25-Aug-15		Soil/Sediment	X														2
	Willow soil - 3	25-Aug-15		Soil/Sediment	X														2
	Willow soil - 3x	25-Aug-15		Soil/Sediment	X														2



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SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by: <i>[Signature]</i>	Date & Time: 02/08/15 15:30	Received by: MILK	Date: 9/13	Time: 9:25	Temperature: 8 L	Verified by:	Date & Time:	Observations: Yes / No? If Yes attach SIF



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 05-NOV-15
Report Date: 20-NOV-15 18:36 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1698939
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: G0044
Legal Site Desc:

Can Dang
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1698939-1	L1698939-2			
		Description	SOIL/SEDIMENT	SOIL/SEDIMENT			
		Sampled Date	04-NOV-15	04-NOV-15			
		Sampled Time	11:40	11:50			
		Client ID	TSA	TSI			
Grouping	Analyte						
SOIL							
Physical Tests	Moisture (%)		15.2	16.5			
	pH (1:2 soil:water) (pH)		8.46	8.51			
Particle Size	% Gravel (>2mm) (%)		<0.10	<0.10			
	% Sand (2.00mm - 1.00mm) (%)		<0.10	<0.10			
	% Sand (1.00mm - 0.50mm) (%)		0.94	0.15			
	% Sand (0.50mm - 0.25mm) (%)		17.8	3.65			
	% Sand (0.25mm - 0.125mm) (%)		48.5	18.8			
	% Sand (0.125mm - 0.063mm) (%)		17.6	23.9			
	% Silt (0.063mm - 0.0312mm) (%)		8.23	21.8			
	% Silt (0.0312mm - 0.004mm) (%)		5.38	24.9			
	% Clay (<4um) (%)		1.46	6.77			
	Texture		Sand	Sandy loam			
Leachable Anions & Nutrients	Total Available Nitrogen (mg/kg)		2.8	<2.2			
	Oxidation-Reduction Potential (ORP) (mV)		295	330			
Anions and Nutrients	Total Nitrogen by LECO (%)		<0.020	<0.020			
Organic / Inorganic Carbon	Total Carbon by Combustion (%)		0.6	0.4			
Plant Available Nutrients	Available Ammonium-N (mg/kg)		2.8	1.3			
	Available Nitrate-N (mg/kg)		<1.0	<1.0			
	Nitrate+Nitrite-N (mg/kg)		<2.0	<2.0			
	Nitrate-N (mg/kg)		<2.0	<2.0			
	Nitrite-N (mg/kg)		0.51	0.62			
	Available Phosphate-P (mg/kg)		<2.0	<2.0			
	Available Potassium (mg/kg)		52	127			
	Available Sulfate-S (mg/kg)		8.5	120			
Metals	Antimony (Sb) (mg/kg)		0.32	0.35			
	Arsenic (As) (mg/kg)		8.81	10.7			
	Barium (Ba) (mg/kg)		110	175			
	Beryllium (Be) (mg/kg)		0.51	0.61			
	Cadmium (Cd) (mg/kg)		0.153	0.120			
	Chromium (Cr) (mg/kg)		11.8	9.67			
	Cobalt (Co) (mg/kg)		13.3	15.5			
	Copper (Cu) (mg/kg)		1130	805			
	Lead (Pb) (mg/kg)		4.43	4.36			
	Mercury (Hg) (mg/kg)		0.087	0.082			
	Molybdenum (Mo) (mg/kg)		4.19	4.84			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1698939-1 SOIL/SEDIMENT 04-NOV-15 11:40 TSA	L1698939-2 SOIL/SEDIMENT 04-NOV-15 11:50 TSI		
Grouping	Analyte				
SOIL					
Metals	Nickel (Ni) (mg/kg)	7.07	6.57		
	Selenium (Se) (mg/kg)	1.18	1.03		
	Silver (Ag) (mg/kg)	0.39	0.35		
	Thallium (Tl) (mg/kg)	<0.050	<0.050		
	Tin (Sn) (mg/kg)	<2.0	<2.0		
	Uranium (U) (mg/kg)	0.641	0.919		
	Vanadium (V) (mg/kg)	187	202		
	Zinc (Zn) (mg/kg)	44.1	49.8		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Available Phosphate-P	DLHC	L1698939-1, -2
Duplicate	Available Potassium	DLHC	L1698939-1, -2
Duplicate	Selenium (Se)	DUP-H	L1698939-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-LECO-SK	Soil	Total Carbon by combustion method	SSSA (1996) P. 973-974
The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.			
ETL-N-TOT-AVAIL-SK	Soil	Available Ammonium-N - Calculation	Soil Methods of Analysis (1993) CSSS
HG-200.2-CVAF-VA	Soil	Mercury in Soil by CVAFS	EPA 200.2/1631E (mod)
Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.			
MET-200.2-CCMS-VA	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)
Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CRC ICPMS.			
Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. This method does not dissolve all silicate materials and may result in a partial extraction. depending on the sample matrix, for some metals, including, but not limited to Al, Ba, Be, Cr, Sr, Ti, Tl, and V.			
MOISTURE-VA	Soil	Moisture content	ASTM D2974-00 Method A
This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.			
N-TOT-LECO-SK	Soil	Total Nitrogen by combustion method	SSSA (1996) P. 973-974
The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.			
N2/N3-AVAIL-KCL-SK	Soil	Nitrate, Nitrite & Nitrate+Nitrite-N(KCL	CSSS (1993) p. 26-28
Plant available nitrate and nitrite are extracted from the sample with 2N KCl. Nitrate and Nitrite in the filtered extract are determined colorimetrically by Technicon auto-analyzer or flow injection analyzer at 520 nm.			
NH4-AVAIL-SK	Soil	Available Ammonium-N	CSSS(1993) 4.2/COMM SOIL SCI 19(6)
Ammonium (NH4-N) is extracted from the soil using 2 N KCl. Ammonium in the extract is mixed with hypochlorite and salicylate to form indophenol blue, which is determined colorimetrically by auto analysis at 660 nm.			
NO3-AVAIL-SK	Soil	Available Nitrate-N	Method = Alberta Ag (1988)
Available Nitrate and Nitrite are extracted from the soil using a dilute calcium chloride solution. Nitrate is quantitatively reduced to nitrite by passage of the sample through a copperized cadmium column. The nitrite (reduced nitrate plus original nitrite) is then determined by diazotizing with sulfanilamide followed by coupling with N-(1-naphthyl) ethylenediamine dihydrochloride. The resulting water soluble dye has a magenta color which is measured at colorimetrically at 520nm.			
Reference: Recommended Methods of Soil Analysis for Canadian Prairie Agricultural Soils. Alberta Agriculture (1988) p. 19 and 28			
ORP-SHKFL96-VA	Soil	ORP by Electrode (96 hour SHAKEFLASK)	BC MIN. OF ENERGY AND MINES
This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 96 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter. The sample is then analysed using procedures carried out in accordance "ASTM" method D1498-00 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM), May 2000. Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.			
PH-1:2-VA	Soil	pH in Soil (1:2 Soil:Water Extraction)	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL
This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.			

Reference Information

PO4/K-AVAIL-SK	Soil	Plant Available Phosphorus and Potassium	Comm. Soil Sci. Plant Anal, 25 (5&6)
Plant available phosphorus and potassium are extracted from the soil using Modified Kelowna solution. Phosphorus in the soil extract is determined colorimetrically at 880 nm, while potassium is determined by flame emission at 770 nm.			
PSA-PIPET-DETAIL-SK	Soil	Particle size - Sieve and Pipette	SSIR-51 METHOD 3.2.1
Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.			

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

SO4-AVAIL-SK	Soil	Available Sulfate-S	REC METH SOIL ANAL - AB. AG(1988)
Plant available sulfate in the soil is extracted using a weak calcium chloride solution. Sulfate in the extract is determined by ICP-OES.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

G0044

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Environmental Division

Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Colleen Hughes	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
	Email 2: arainn_atkinson@golder.com	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Phone: 250-790-2215 Fax:	Analysis Request	
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	Job #:	
Contact:	PO / AFE:	
Address:	Legal Site Description:	
Phone: Fax:	Quote #:	

Lab Work Order # (lab use only)	ALS Contact: Can Dang	Sampler: VH GH
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Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Plant Available Nutrients	Total Metals	pH	TOC	Moisture	Grain Size	Number of Containers
TSa		04-Nov-15	11:40	Soil/Sediment	X	X	X	X	X	X	5
TSi		04-Nov-15	11:50	Soil/Sediment	X	X	X	X	X	X	5



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****Please contact Arainn Atkinson prior to analysis****; Plant Available Nutrients (N, P, K, S)

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SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)			Observations: Yes / No ? If Yes attach SIF
Released by: Valerie Holweck	Date & Time: 04-11-15 15:30	Received by: <i>Lady</i>	Date: NOV 05 2015	Time: 9AM	Temperature: 0.2 °C	Verified by:	Date & Time:	



APPENDIX C

Groundwater Quality

Factual Data Report on Groundwater Quality, Hazeltine Creek Floodplain, August 2015

Prepared by:

Evin Zapf-Gilje, B.Sc., Trish Miller, M.Sc., CSAP and Reidar Zapf-Gilje, P.Eng., Ph.D., CSAP

Golder Associates Ltd.

DATE January 26, 2016**REFERENCE No.** 1411734-065-TM-Rev0-11000**TO** Colleen Hughes
Mount Polley Mining Corporation**CC** Trish Miller**FROM** Evin Zapf-Gilje, Trish Miller, Reidar Zapf-Gilje**EMAIL** ezapfgilje@golder.com
trish_miller@golder.com
rzapfgilje@golder.com**FACTUAL DATA REPORT ON GROUNDWATER QUALITY
HAZELTINE CREEK FLOODPLAIN, AUGUST 2015****1.0 INTRODUCTION**

Golder Associates Ltd. (Golder) is pleased to provide Mount Polley Mining Corporation (MPMC) with the following summary of groundwater quality data collected by Golder personnel along the Hazeltine Creek floodplain on August 3 and 4, 2015. A total of eight groundwater samples were collected:

- Four mini-piezometers installed in the tailings;
- One “shallow pit well” installed at a background location;
- Two grab samples from small groundwater springs; and
- One seep sample.

Two of the mini-piezometers were located at the bottom of the canyon along Transect 3 (Figure 1); one at the top of the canyon along Transect 6 (Figure 2); and one upstream of the Gavin lake bridge along Transect 14 (Figure 4).

The background mini-piezometer was located near Edney creek upstream of the Edney creek bridge (Figure 5). The two grab samples were located slightly downstream of Transect 10 (Figure 3). The seep sample was collected near GW15-06 (Figure 4). The mini-piezometers were installed more than 10 metres (m) upgradient of the nearest surface water body. Mini-piezometers were installed to depths of between 0.68 and 1.98 m depending on depth to water (0.11 to 0.75 m). All well screens were installed within the tailings layer to measure potential leaching of metals from the tailings into the groundwater.

This technical memorandum presents the groundwater data from the sampling conducted during August 2015 in the Hazeltine Creek floodplain. The memorandum provides factual information only. Interpretation of the data will be provided in the Detailed Site Investigation report. The factual information provided include:

- Sampling type and locations of samples collected;
- Sampling procedures and methods;
- Quality Assurance/Quality Control procedures; and
- Analytical results.



2.0 METHODS

2.1 Well Installation

A total of four groundwater mini-piezometers were hand installed. Holes were hand augured to depths ranging between 0.68 and 1.98 m depending on the depth to water. Before installation, the holes were purged for a minimum of 20 minutes until the turbidity significantly decreased. A PVC pipe with a slit screen was installed into the auger hole (Photograph 1). Screen length was generally 0.4 m, but in one case (GW15-02) the screen length was 0.75 m to prevent fines from clogging the screen. After PVC pipe installation, the hole was filled with Target 10/20 filter sand to 0.20 m above the top of screen in order to form a sand pack around the well screen. The remainder of the hole was filled with hydrated bentonite chips to seal the well. After installation the mini-piezometer was purged a minimum of three times to develop the well (Photograph 2).

Several attempts were made to hand auger a borehole for installation of a mini-piezometer. However, the attempts were unsuccessful because of difficult hand augering conditions and encountering refusal. Instead, a hole was dug to act as a temporary 'shallow pit well'. The hole was purged for 30 minutes until the groundwater ran clear and then pit was allowed to recharge.

2.2 Groundwater Sampling

The newly installed groundwater mini-piezometers were sampled on August 3 and 4, 2015 following standard low flow sampling procedures. Samples were obtained using dedicated 6-mm (1/4 inch) polyethylene tubing and a geotech peristaltic pump set to a purge rate of approximately 150 to 250 mL/min (Photograph 3). In three of the five mini-piezometers (GW15-01, GW15-02, and GW15-06) the recharge rate was not sufficient to permit continuous sampling. Groundwater was sampled until five centimetres of water remained in the well. The well was then allowed to recharge back to the initial water depth before sampling was continued. Field parameters were monitored and recorded during the groundwater well purging prior to sampling, including: temperature, pH, specific conductivity (SPC), oxidation-reduction potential (ORP), total dissolved solids (TDS) and dissolved oxygen (DO). Representative groundwater quality was determined when measurements of these parameters demonstrated stability between subsequent measurements, and at least two well volumes had been purged. Collected samples were field filtered and preserved where necessary.

In two locations, GW15-04 and GW15-05 (Figure 3), small groundwater springs were identified. The water in these springs was clear and welled up through the sandy tailing layer. Samples were collected at the point where the groundwater daylighted.

Seep water was identified near GW15-06 upstream of the Gavin lake bridge. The seep water ran underneath the tailings layer and daylighted at a diversion trench dug along the forest edge (Photograph 4). The seep water had iron oxide and organic staining, likely due to the nearby marshy area. This water was sampled from a small pool located approximately five metres from the seep.

The following parameters were analyzed in the Field and Laboratory:

Groundwater samples	Field Parameters	Lab Parameters
GW15-01, GW15-02, GW15-06	Temp, pH, ORP, DO, TDS, SPC	Hardness, TSS, pH, ORP, Anions, Nutrients, DOC, Nitrogen, Metals
GW15-03, GW15-04, GW15-05 , Seep15-01, GW-BKG15-01	Temp, pH, ORP, DO, TDS, SPC	Hardness, TSS, pH, ORP, Anions, Nutrients, Metals

Notes: ORP – Oxidation-reduction potential; DO = dissolved oxygen; TDS = total dissolved solids; TSS = total suspended solids; SPC = specific conductivity; DOC = dissolved organic carbon

2.3 Quality Assurance and Quality Control Procedures

To document that the sampling and analytical data were interpretable, meaningful and reproducible, conformance to the Golder quality assurance and quality control (QA/QC) program was followed. This involved using QA/QC measures in both the collection (field program) and analysis (laboratory) of environmental samples.

The following discussion includes a brief summary of the QA/QC measures implemented by Golder during the field program and during our review of the data, as well as the QA/QC measures implemented by the analytical laboratory.

Quality control measures use in the well development, sample collection, preservation and shipment included the following:

- Well development and sampling methods were consistent with established Golder protocols and provincial/federal requirements;
- Field notes were recorded during the investigation and have been stored in the project file;
- Sample locations were recorded and marked in the field; and
- Samples were filtered, preserved (where appropriate), put on ice and subsequently transported to the laboratory using Golder chain-of-custody procedures.

The quality assurance measures for the field program included:

- Submission of blind field duplicate samples. A blind field duplicate sample is a second sample of a certain media (e.g., soil; water) from the same location that is submitted to the analytical lab under a separate label such that the lab has no prior knowledge that it is a duplicate.
- For duplicate samples, either the relative percent difference (RPD) or difference factor (DF) was used to evaluate the sample result variability, depending on the magnitude of the concentrations. The RPD is a measure of the variability between two outcomes from the same procedure is calculated by:

$$absolute\left(\frac{(x_1 + x_2)}{average(x_1, x_2)}\right) \times 100$$

where x_1 is the original sample result and x_2 is the blind field duplicate result. In general, the RPD should not be more than 35% on average, or a maximum of 50%, depending on the parameter and the concentration. A RPD greater than 30% may reflect “in bottle” variability or variation in the test process. RPD is calculated when sample results are equal to or greater than five times the laboratory method detection limit. DF is the absolute difference between the two values divided by the method detection limit and is calculated when sample results are less than five times the method detection limit but not less than the method detection limit. In general, DF should be less than 2.

The following criteria were considered acceptable for laboratory QA/QC samples:

- For organic and inorganic analytes, analytical duplicates should exhibit less than 35% RPD on average, and no more than 50% for a specific analyte.
- Analytical results for reference materials or spiked standards should be within 10% of certified values for inorganic elements or 30% of certified values for organic compounds.
- Analytical blanks should be less than the detection limits used for the specific analysis.
- Certification by the Canadian Association for Laboratory Accreditation Inc. (CALA) for analytical methods used for this program.
- Reports from the laboratory were internally reviewed prior to submission to Golder. If internal QA/QC problems are encountered, the field samples and internal QA/QC samples are re-analysed.

3.0 GROUNDWATER QUALITY RESULTS

Groundwater quality results are presented in Table 2. Results were screened against CSR Schedule 6 Generic Numerical Water Standards for Protection of Freshwater Aquatic Life. No exceedances of these standards were found. Concentrations of copper and selenium in the groundwater samples were also below the BC Water Quality Guidelines for the Protection of Freshwater Aquatic Life. Summary statistics for all parameters are presented Tables 3, 4 and 5.

Table 1 shows the summary of copper and selenium concentrations in the groundwater and background samples as well as the geochemistry humidity cells and column tests conducted by SRK Consulting (Canada) Inc. Detailed geochemistry results can be found in Appendix B.

Table 1: Summary of Copper and Selenium Concentrations

Parameter	Sample size (n)	Minimum	Maximum	Average	CSR Standard (AW-F) ¹	CSR Standard (DW)
Tailings						
pH	7	7.0	8.1	7.6	-	-
Copper	7	0.001	0.029	0.0068	0.080 – 0.090	
Selenium	7	<0.001	<0.001	<0.001	0.010	0.010
Background						
pH	1	7.7	7.7	7.7	-	-
Copper	1	0.0024	0.0024	0.0024	0.080 – 0.090	
Selenium	1	<0.0010	<0.0010	<0.0010	0.010	0.010
Humidity Cells						
pH	7	~7.95	~8.2	~8.1	-	-
Copper	7	~0.006	~0.07	~0.008	0.080 – 0.090	
Selenium	7	~0.0006	~0.007	~0.005	0.010	0.010
Column Tests						
pH	3	~8.1	~8.1	~8.1	-	-
Copper	3	~0.004	~0.022	~0.012	0.080 – 0.090	
Selenium	3	~0.004	~0.013	~0.008	0.010	0.010

Notes:

All units are in mg/L unless otherwise noted

CSR Schedule 6 Generic Numerical Water Standards for Protection of Freshwater Aquatic Life

CSR Schedule 6 Generic Numerical Water Standards for Protection of Drinking Water

3.1 QA/QC Results

One field duplicate collected from GW15-03 was submitted for physical tests, and metal analysis for a total of 11.1% field duplicate analysis; meeting the data quality objective (DQO) of 10%. The results of the field duplicate analysis are presented in Table 6.

The RPDs calculated for physical tests, dissolved organic carbon, and metals indicated that, of the analytes with detectable concentrations, the sample had RPD values that ranged from 0.5% to 49%, with an average RPD of 6.7%. RPDs were generally less than 12% with the exception of total phosphorus and total suspended solids. The RPDs for total phosphorus and total suspended solids were 36% and 49%, respectively, which is still within the maximum QA/QC objective of 50% and is therefore considered acceptable.

Where the RPD calculation was not applicable, DFs were calculated. All calculated DF values were less than the QA/QC objective of 2, and ranged from 0 to 0.92 with an average of 0.20.

Hold times were met for all parameters. Due to the 15-minute hold time for ORP and pH, these parameters were measured in the field, and data reported in Table 2 represent field measurements.

The data is therefore considered reproducible and suitable for the assessment of groundwater quality.

4.0 STATEMENT OF LIMITATIONS

This report was prepared for the exclusive use of MPMC. The report is based on data and information collected during investigations conducted by Golder Associates Ltd. personnel. It is based solely on the conditions of the subject property at the time of the site investigation conducted in August, 2015, as described in this technical memorandum. The data presented in this memorandum represent groundwater conditions encountered at the sampling locations tested during this time period. Groundwater conditions may vary with location, depth, time, sampling methodology, analytical techniques and other factors. Golder Associates Ltd. makes no warranty, expressed or implied, and assumes no liability with respect to the use of the information contained in this report at the subject site, or any other site, for other than its intended purpose.

The findings and conclusions documented in this report have been prepared for the specific application to this project, and have been developed in a manner consistent with that level of care normally exercised by environmental professionals currently practising under similar conditions in the jurisdiction. Golder makes no other warranty, expressed or implied and assumes no liability with respect to the use of the information contained in this report at the subject site, or any other site, for other than its intended purpose.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Golder accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or action based on this report. All third parties relying on this report do so at their own risk. Electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore no party can rely upon the electronic media versions of Golder's report or other work product. Golder is not responsible for any unauthorized use or modifications of this report.

MPMC may rely on the information contained in this report subject to the above limitations.

Golder makes no other representation whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation. These interpretations and the regulations themselves may change over time, thus MPMC should review these issues.

If new information is discovered during future work Golder should be requested to re-evaluate the conclusions of this report and to provide amendments, as required, prior to any reliance upon the information presented herein. The validity of this report is affected by any change of site conditions, purpose, development plans or significant delay from the date of this report in initiating or completing the project.

5.0 CLOSURE

We trust that this technical memo provides sufficient information for your present needs. If you have any questions, please do not hesitate to contact the undersigned at 604 787-6707.

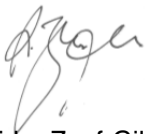
GOLDER ASSOCIATES LTD.



Evin Zapf-Gilje, B.Sc.
Environmental Scientist



Trish Miller, M.Sc., CSAP
Principal, Senior Environmental Scientist



Reidar Zapf-Gilje, P.Eng., Ph.D., CSAP
Consultant to Golder Associates

EZG/TAM/RZG/syd

- Attachment 1: Tables – Chemistry, Summary Statistics and QA/QC
- Attachment 2: Figures
- Attachment 3: Site Photographs
- Attachment 4: Analytical Report and Chain of Custody

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6.0 REFERENCES

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BC Ministry of Environment. 2015. *Water Quality Guidelines for the Protection of Freshwater Aquatic Life*. Available at: <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines/approved-water-quality-guidelines>

ATTACHMENT 1

Tables - Chemistry, Summary Statistics and QA/QC

**Table 2 - Results of Groundwater Analysis
MPMC - Detailed Site Investigation
Mount Polley Mine, BC**

Parameter	Units	BC CSR Schedule 6 Groundwater Standards ¹		471689-01	471689-02	471689-03	471689-04	471689-05	471689-06	471689-07	471689-08	471689-09
		Maximum	notes	GW15-01 3-Aug-15 L1652569-1	GW15-02 3-Aug-15 L1652569-2	GW15-03 FDA 3-Aug-15 L1652569-3	GW15-03 DUP 3-Aug-15 L1652569-4	GW15-05 3-Aug-15 L1652569-5	GW15-04 4-Aug-15 L1652569-6	GW15-06 4-Aug-15 L1652569-7	Seep15-01 4-Aug-15 L1652569-8	GW-BKG15-01 4-Aug-15 L1652569-9
Physical Parameters												
Conductivity (field)	µs/cm	-		1323	518	1135	1135	244	520	1236	1151	355
Acidity (as CaCO ₃)	mg/L	-		49.4	1.6	23.7	31.3	<1.0	1.2	12.0	4.8	1.4
Hardness (Dissolved)	mg/L	-		890	384	615	610	195	302	661	639	207
Dissolved Oxygen (Field)	mg/L	-		1.1	6.4	0.60	0.60	0.30	0.23	5.1	4.0	3.3
Total Suspended Solids (lab)	mg/L	-		399	226	1900	1150	95.5	142	137	105	364
Total Dissolved Solids (field)	mg/L	-		852	319	741	741	150	338	800	798	231
Water Temp (Field)	°C	-		19.3	17.6	14.1	14.1	6.4	9.8	17.0	28.6	10.3
ORP (field)	mV	-		-40.5	35.1	-20	-20	-4.8	116	-48.2	44.4	117
pH (field)	pH Unit	-		6.7	7.7	6.8	6.8	8.0	7.6	6.8	7.7	7.1
Nutrients												
Ammonia	mg/L (as N)	3.7-18.4	FW	0.056	0.046	<0.0050	<0.0050	<0.0050	<0.0050	0.0077	0.0223	<0.0050
Total Nitrogen	mg/L (as N)	400	FW	1.2	0.50	-	-	-	-	-	-	0.58
Nitrate (as N)	mg/L	400	FW	<0.025	0.053	0.040	0.063	0.04	<0.0050	0.20	0.73	0.12
Nitrite (as N)	mg/L	200 - 2000	FW, Cl	<0.0050	<0.0050	<0.0050	<0.0050	<0.0010	<0.0010	0.56	0.87	<0.0010
Dissolved Phosphorus	mg/L	-		<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Total Phosphorus	mg/L	-		0.38	0.29	2.45	1.70	0.13	0.255	0.15	0.194	0.0501
Orthophosphate (Dissolved)	mg/L	-		<0.0010	0.0021	<0.0010	<0.0010	0.0052	0.0024	<0.0010	<0.0010	0.0018
Dissolved Organic Carbon	mg/L	-		92.5	11.4	-	-	-	-	-	-	10
Anions												
Bromide	mg/L	-		<0.25	<0.25	<0.25	<0.25	<0.050	<0.050	<0.25	<0.25	<0.050
Chloride	mg/L	1500	FW	4.8	10.3	5.0	5.5	1.1	0.95	9.8	7.7	1.67
Fluoride	mg/L	3000 ^a	FW, H	0.10	0.36	0.14	0.15	0.16	0.152	<0.10	0.13	0.054
Sulfate	mg/L	-		3.2	222	64.3	71.2	50.2	63.9	91.1	54.1	18.7
Dissolved Metals												
Aluminum	mg/L	-		0.067	0.031	0.075	0.076	<0.010	<0.010	0.048	0.036	0.013
Antimony	mg/L	0.2	FW	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic	mg/L	0.05	FW	0.029	0.0037	0.0034	0.0030	0.0020	0.0012	0.0031	0.0016	<0.0010
Barium	mg/L	10	FW	0.20	0.078	0.10	0.097	0.029	0.043	0.17	0.068	0.028
Beryllium	mg/L	0.053	FW	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bismuth	mg/L	-		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron	mg/L	50	FW	<0.10	0.22	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium	mg/L	0.00060	FW,H	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Calcium	mg/L	-		282	114	184	183	48.6	90.5	201	183	72.2
Chromium	mg/L	0.010 (IV), 0.090 (III)	FW, V	0.0014	<0.00050	0.00059	0.00059	<0.00050	<0.00050	0.0017	0.0011	<0.00050
Cobalt	mg/L	0.04	FW	0.014	0.0045	0.0067	0.0065	<0.00050	<0.00050	0.0050	0.0034	<0.00050
Copper	mg/L	0.08-0.09	FW,H	0.0012	0.0036	0.0028	0.0029	<0.0010	0.0091	<0.0010	0.029	0.0024
Iron	mg/L	21.6		21.6	0.054	2.1	2.1	<0.030	<0.030	13.4	0.51	<0.030
Lead	mg/L	0.06-0.16	FW,H	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Lithium	mg/L	-		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Magnesium	mg/L	-		45.3	24.0	37.6	37.1	17.8	18.5	38.5	44	6.4
Manganese	mg/L	26.5		26.5	1.5	13.2	13.0	0.10	0.15	9.3	4.3	0.038
Mercury	mg/L	0.001	FW	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Molybdenum	mg/L	10	FW	0.0036	0.065	0.0082	0.0092	0.0072	0.0079	0.0022	0.0074	<0.0010
Nickel	mg/L	1.5	FW,H	0.013	0.011	0.0061	0.0063	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Potassium	mg/L	-		12.7	8.1	5.5	5.5	<2.0	<2.0	3.5	10	<2.0
Selenium	mg/L	0.01	FW	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silicon	mg/L	-		21.7	6.9	13.1	12.9	8.8	7.9	13.0	10	5.7
Silver	mg/L	0.015	FW,H	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Sodium	mg/L	-		18.8	68.5	26.9	27.8	19.4	14.5	44.9	58	6.4
Sulfur	mg/L	-		1.2	1.0	1.4	1.4	0.58	0.73	1.3	1.5	0.34
Tellurium	mg/L	-		3.1	75.5	19.5	21.0	16.7	21.3	25.6	18	5.1
Thallium	mg/L	0.003	FW	<0.000050	0.000013	<0.000020	<0.000020	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	-		<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Titanium	mg/L	1	FW	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Uranium	mg/L	3	FW	0.0019	0.0036	0.0042	0.0043	<0.00020	0.0035	0.0014	0.0017	0.00053
Vanadium	mg/L	<0.030		<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Zinc	mg/L	0.9-2.4	FW,H	0.019	0.016	0.015	0.016	<0.0050	<0.0050	0.025	<0.0050	<0.0050

Notes:

All concentrations in milligrams per litre (mg/L), unless otherwise noted.

MPMC = Mount Polley Mining Company FDA = field duplicate available; DUP = duplicate sample; < = below detection limit; "-" = not measured; H = hardness-dependent; pH = pH-dependent; Cl = Chloride-dependent ; V = valence dependent, VI refers to chromium VI and III refers to chromium III.

1. Standards from British Columbia Contaminated Sites Regulation (BC CSR; Updated to January 31, 2014), Schedule 6 Generic Numerical Water Standards. The most conservative standard has been applied for the protection of the following site-specific pathway: FW = groundwater flow to surface water used by freshwater aquatic life

a) Fluoride standard is hardness dependent. Since all samples had hardness >50 mg/L the applicable standard is 3000 mg/L for protection of freshwater aquatic life.

123 Indicates concentration exceeding the BC CSR Schedule 6 Groundwater Standards



ATTACHMENT 1
Tables - Chemistry, Summary Statistics and QA/QC

Table 3: Summary of Groundwater Results – Physical Parameters

Parameter	Units	Sample size (n)	Minimum	Maximum	Average
Conductivity (lab)	µs/cm	7	402	1300	944
Acidity (as CaCO ₃)	mg/L	7	1.0	49	13
Hardness (Dissolved)	mg/L	7	195	890	527
Dissolved Oxygen (Field)	mg/L	7	0.23	6.4	2.5
Total Suspended Solids (lab)	mg/L	7	96	1900	429
Total Dissolved Solids (field)	mg/L	7	150	852	571
Water Temp (Field)	°C	7	6.4	29	16
ORP (lab)	mV	7	263	351	303
pH (lab)	pH Unit	7	7.0	8.1	7.6

Table 4: Summary of Groundwater Results – Anions and Nutrients

Parameter	Sample size (n)	Minimum	Maximum	Average	CSR ² Standard (AW-F)	CSR ² Standard (DW)
Ammonia	7	0.005	0.056	0.021	3.7-18.4 ³	-
Total Nitrogen	2	0.5	1.2	0.85	400	-
Nitrate (as N)	7	0.005	0.73	0.16	400	10
Nitrite (as N)	7	0.0	0.87	0.21	0.2 – 2 ⁴	3.2
Dissolved Phosphorus	7	<0.3	<0.3	<0.3	-	-
Total Phosphorus	7	0.13	2.5	0.55	-	-
Orthophosphate (Dissolved)	7	0.001	0.0052	0.002	-	-
Dissolved Organic Carbon	2	11	93	52	-	-
Bromide	7	<0.050	<0.25	<0.2	-	-
Chloride	7	0.95	10	5.7	1500	250
Fluoride	7	0.1	0.36	0.16	3	1.5
Sulfate	7	3.2	222	78	1000	500

Table Notes:

1. Units shown are in mg/L unless otherwise noted.
2. Standards shown are from the Contaminated Sites Regulation.
3. Standard for ammonia is dependent on pH and temperature.
4. Standard for nitrite is chloride dependent.



ATTACHMENT 1
Tables - Chemistry, Summary Statistics and QA/QC

Table 5: Summary of Groundwater Results – Dissolved Metals

Parameter	Sample size (n)	Minimum	Maximum	Average	CSR ² Standard (AW-F)	CSR ² Standard (DW)
Aluminum	7	<0.010	0.075	0.04	-	9.5
Antimony	7	<0.00050	<0.00050	<0.00050	0.2	0.006
Arsenic	7	0.0012	0.029	0.0063	0.05	0.010
Barium	7	0.029	0.2	0.099	10	1
Beryllium	7	<0.0050	<0.0050	<0.0050	0.053	-
Bismuth	7	<0.20	<0.20	<0.20	-	-
Boron	7	0.1	0.22	0.12	50	5
Cadmium	7	<0.000050	<0.000050	<0.000050	0.00060	0.005
Calcium	7	49	282	158	-	-
Chromium	7	0.0005	0.0017	0.0009	0.010 (IV) ³ , 0.090 (III)	0.050
Cobalt	7	0.0005	0.014	0.0049	0.040	-
Copper	7	0.001	0.029	0.0068	0.080-0.090	1
Iron	7	0.03	22	5.4	-	6.500
Lead	7	<0.0010	<0.0010	<0.0010	0.06-0.16	0.010
Lithium	7	<0.050	<0.050	<0.050	-	-
Magnesium	7	18	45	32	-	100
Manganese	7	0.1	27	7.9	-	0.550
Mercury	7	<0.00020	<0.00020	<0.00020	0.001	0.001
Molybdenum	7	0.0022	0.065	0.014	10	0.250
Nickel	7	0.005	0.013	0.007	1.5	-
Potassium	7	2.0	13	6.3	-	-
Selenium	7	<0.0010	<0.0010	<0.0010	0.010	0.010
Silicon	7	6.9	22	12	-	-
Silver	7	0	0	0.00005	0.015	-
Sodium	7	15	69	36	-	-
Sulfur	7	0.58	1.5	1.1	-	-
Tellurium	7	3.1	76	26	-	-
Thallium	7	0.00001	0.00005	0.000018	0.003	-
Tin	7	<0.030	<0.030	<0.030	-	-
Titanium	7	<0.050	<0.050	<0.050	1	-
Uranium	7	0.0002	0.0042	0.0024	3	0.020
Vanadium	7	<0.030	<0.030	<0.030	-	-
Zinc	7	0.005	0.025	0.013	0.9-2.4	5

Table Notes:

1. Units shown are in mg/L unless otherwise noted.
2. Standards shown are from the BC Contaminated Sites Regulation.
3. Standards chromium are valence dependent (Chromium 6+ and Chromium 3+).

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**Table 6 - Results of Groundwater QA/QC Analysis
MPMC - Detailed Site Investigation
Mount Polley Mine, BC**

2015 August 3 Samples						
Sample ID	471689-03	471689-04	Method Detection Limit	Mean	Relative Percent Difference (RPD)	Difference Factor (DF)
Date Sampled	3-Aug-15	3-Aug-15				
ALS Sample ID	L1652569-3	L1652569-4				
Physical Tests						
Hardness (as CaCO3)	615	610	0.50	613	0.8%	NA
pH	7.13	7.05	0.10	7.09	1.1%	NA
Total Suspended Solids	1900	1150	11.0	1525	49%	NA
ORP	351	357	-1000	354	1.7%	NA
Nutrients						
Ammonia	<0.0050	<0.0050	0.0050	NC	NC	NC
Total Nitrogen	-	-	-	NC	NC	NC
Nitrate (as N)	0.04	0.063	0.025	0.052	NA	0.92
Nitrite (as N)	<0.0050	<0.0050	0.0050	NC	NC	NC
Dissolved Phosphorus	<0.30	<0.30	0.30	NC	NC	NC
Total Phosphorus	2.45	1.70	0.20	2.08	36%	NA
Orthophosphate (Dissolved)	<0.0010	<0.0010	0.0010	NC	NC	NC
Anions						
Bromide	<0.25	<0.25	0.25	NC	NC	NC
Chloride	5	5.5	2.50	5.3	NA	0.20
Fluoride	0.14	0.15	0.10	0.15	NA	0.10
Sulfate	64.3	71.2	1.50	67.8	10%	NA
Dissolved Metals						
Aluminum (Al)-Dissolved	0.08	0.08	0.010	0.08	1.3%	NA
Antimony (Sb)-Dissolved	<0.00050	<0.00050	0.00050	NC	NC	NC
Arsenic (As)-Dissolved	0.0034	0.003	0.0010	0.0032	NA	0.40
Barium (Ba)-Dissolved	0.1	0.097	0.020	0.099	NA	0.15
Beryllium (Be)-Dissolved	<0.0050	<0.0050	0.0050	NC	NC	NC
Bismuth (Bi)-Dissolved	<0.20	<0.20	0.20	NC	NC	NC
Boron (B)-Dissolved	<0.10	<0.10	0.10	NC	NC	NC
Cadmium (Cd)-Dissolved	<0.000050	<0.000050	0.000050	NC	NC	NC
Calcium (Ca)-Dissolved	184	183	0.10	184	0.5%	NA
Chromium (Cr)-Dissolved	0.00059	0.00059	0.00050	0.00059	NA	0.00
Cobalt (Co)-Dissolved	0.0067	0.0065	0.00050	0.0066	4.1%	NA
Copper (Cu)-Dissolved	0.0028	0.0029	0.0010	0.0029	NA	0.10
Iron (Fe)-Dissolved	2.12	2.08	0.030	2.10	1.9%	NA
Lead (Pb)-Dissolved	<0.0010	<0.0010	0.0010	NC	NC	NC
Lithium (Li)-Dissolved	<0.050	<0.050	0.050	NC	NC	NC
Magnesium (Mg)-Dissolved	37.6	37.1	0.10	37.4	1.3%	NA
Manganese (Mn)-Dissolved	13.2	13	0.010	13.1	1.5%	NA
Mercury (Hg)-Dissolved	<0.00020	<0.00020	0.00020	NC	NC	NC
Molybdenum (Mo)-Dissolved	0.0082	0.0092	0.0010	0.0087	11%	NA
Nickel (Ni)-Dissolved	0.0061	0.0063	0.0050	0.0062	NA	0.040
Potassium (K)-Dissolved	5.5	5.5	2.0	5.5	NA	0.00
Selenium (Se)-Dissolved	<0.0010	<0.0010	0.0010	NC	NC	NC
Silicon (Si)-Dissolved	13.1	12.9	0.050	13.0	1.5%	NA
Silver (Ag)-Dissolved	<0.000050	<0.000050	0.000050	NC	NC	NC
Sodium (Na)-Dissolved	26.9	27.8	2.0	27.4	3.3%	NA
Sulfur (S)-Dissolved	1.4	1.38	0.0050	1.39	1.4%	NA
Tellurium (Te)-Dissolved	19.5	21	0.50	20.3	7.4%	NA
Thallium (Tl)-Dissolved	<0.000020	<0.000020	0.000020	NC	NC	NC
Tin (Sn)-Dissolved	<0.030	<0.030	0.030	NC	NC	NC
Titanium (Ti)-Dissolved	<0.050	<0.050	0.050	NC	NC	NC
Uranium (U)-Dissolved	0.0042	0.0043	0.00020	0.0042	2.4%	NA
Vanadium (V)-Dissolved	<0.030	<0.030	0.030	NC	NC	NC
Zinc (Zn)-Dissolved	0.015	0.016	0.0050	0.015	NA	0.040

Notes:

All parameter units in milligrams per kilogram (mg/kg), unless otherwise noted.

FDA = Field Duplicate Available; FD = Field Duplicate; m bgs = metres below ground surface; QA/QC = Quality Assurance/Quality Control

NA = Not Applicable; NC = Not Calculated; Mean = average of two values

Relative percent difference (RPD) = the difference between two values divided by the mean of the two values.

Golders' acceptable RPD is less than or equal to 35%.

RPD is calculated when the concentration is greater than five times the detection limit.

Difference factor (DF) = absolute difference between two values divided by the method detection limit.

Golders' acceptable DF is less than or equal to 2.0.

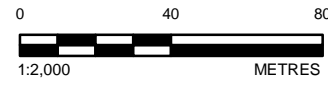
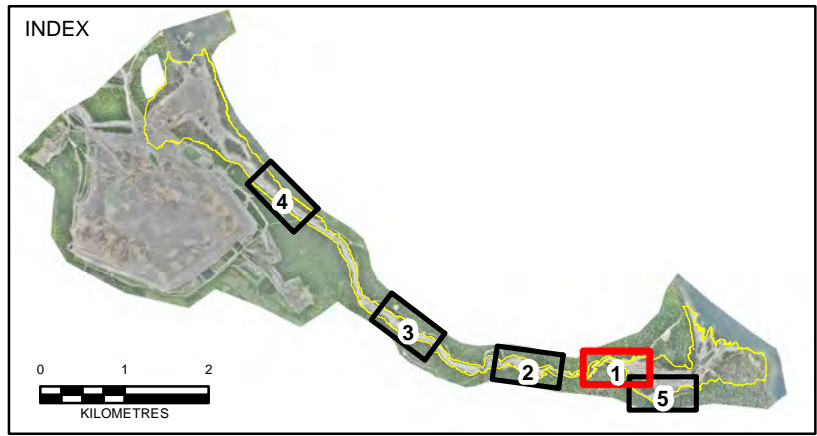
DF is calculated when the concentration is less than five times the detection limit.

ATTACHMENT 2
Figures



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- LEGEND**
- SAMPLE LOCATION
 - POST BREACH AFFECTED AREA EXTENT
 - NEW HAZELTINE CREEK CHANNEL (APPROXIMATE)
 - CONTOUR (1 m)
 - ROAD
 - WATERBODY



CLIENT
MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

CONSULTANT

YYYY-MM-DD	2015-09-01
DESIGNED	EZG
PREPARED	RH
REVIEWED	TM
APPROVED	TM



REFERENCES

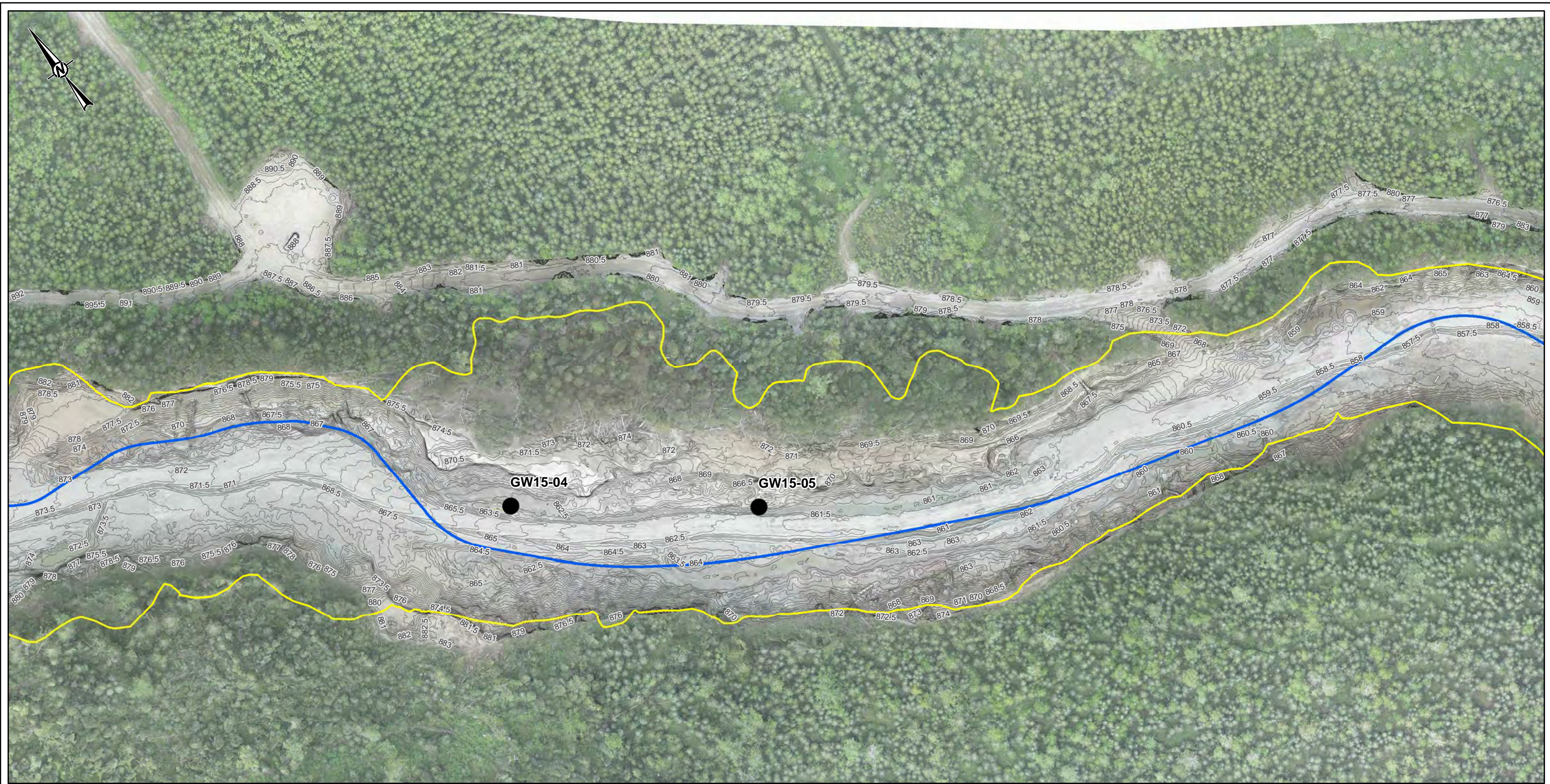
1. WATERBODY, WATERCOURSE AND ROAD DATA OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
2. POST BREACH AFFECTED AREA AND HAZELTINE CREEK CHANNEL OBTAINED FROM SNC LAVALIN LTD.
3. CONTOURS AND IMAGERY (MAY 2015) OBTAINED FROM MPMC.

PROJECT
TECHNICAL MEMO GROUNDWATER QUALITY

TITLE
SUMMARY OF GROUNDWATER QUALITY DATA COLLECTED IN THE HAZELTINE CREEK FLOODPLAIN IN AUGUST, 2015

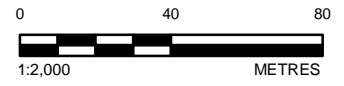
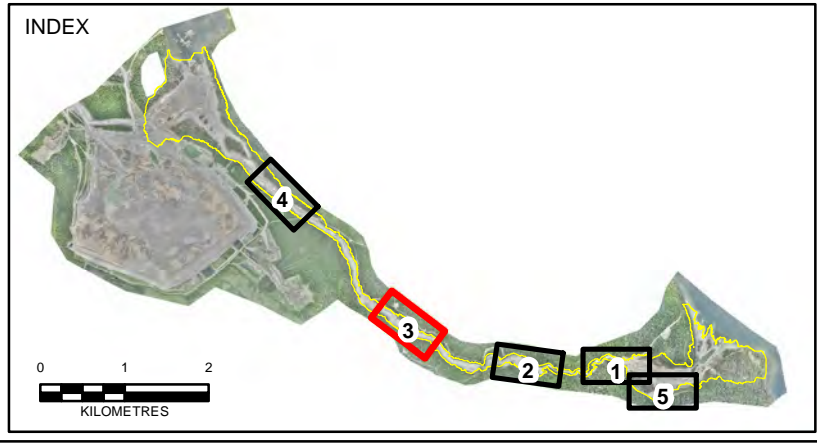
PROJECT NO. 1411734	CONTROL 11000 / 2000	REV. A	FIGURE 1
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25mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B



P:\TH\ygsd\p\gld\g\Bumby\CAD-GIS\Schematics\141749\FRODUCT\CON\1000_CSR_REMEDIATION\KOD\Report\PHASE_2007\Technical_Memo_GroundwaterQualityAug2015\14174_11000_Groundwater_Quality_Aug2015_DDP.mxd

- LEGEND**
- SAMPLE LOCATION
 - ▭ POST BREACH AFFECTED AREA EXTENT
 - NEW HAZELTINE CREEK CHANNEL (APPROXIMATE)
 - CONTOUR (1 m)
 - ROAD
 - WATERBODY



CLIENT MOUNT POLLEY MINING CORPORATION IMPERIAL METALS		
CONSULTANT		
YYYY-MM-DD	2015-09-01	
DESIGNED	EZG	
PREPARED	RH	
REVIEWED	TM	
APPROVED	TM	

- REFERENCES**
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 2. POST BREACH AFFECTED AREA AND HAZELTINE CREEK CHANNEL OBTAINED FROM SNC LAVALIN LTD.
 3. CONTOURS AND IMAGERY (MAY 2015) OBTAINED FROM MPMC.

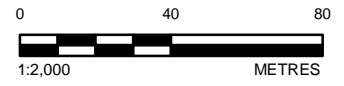
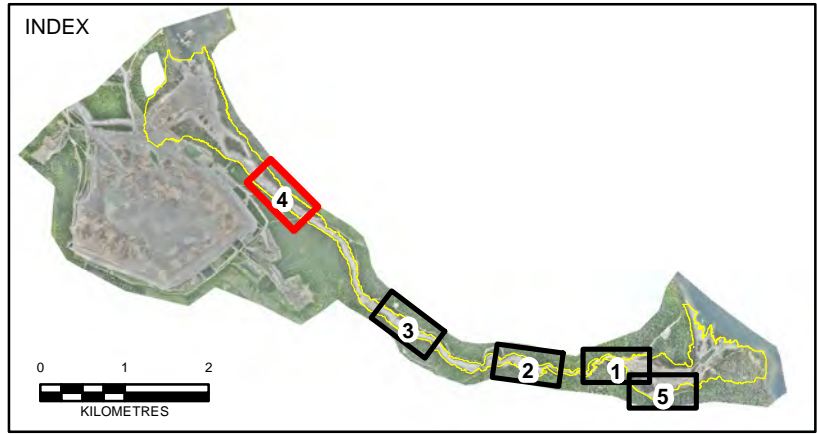
PROJECT TECHNICAL MEMO GROUNDWATER QUALITY		
TITLE SUMMARY OF GROUNDWATER QUALITY DATA COLLECTED IN THE HAZELTINE CREEK FLOODPLAIN IN AUGUST, 2015		
PROJECT NO. 1411734	CONTROL 11000 / 2000	REV. A
		FIGURE 3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B 26mm


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- LEGEND**
- SAMPLE LOCATION
 - ▭ POST BREACH AFFECTED AREA EXTENT
 - NEW HAZELTINE CREEK CHANNEL (APPROXIMATE)
 - CONTOUR (1 m)
 - ROAD
 - ▭ WATERBODY



CLIENT
**MOUNT POLLEY MINING CORPORATION
 IMPERIAL METALS**

CONSULTANT	YYYY-MM-DD	2015-09-01
	DESIGNED	EZG
	PREPARED	RH
	REVIEWED	TM
	APPROVED	TM

- REFERENCES**
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 3. CONTOURS AND IMAGERY (MAY 2015) OBTAINED FROM MPMC.

PROJECT
TECHNICAL MEMO GROUNDWATER QUALITY

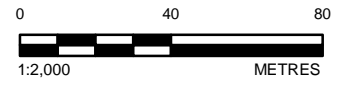
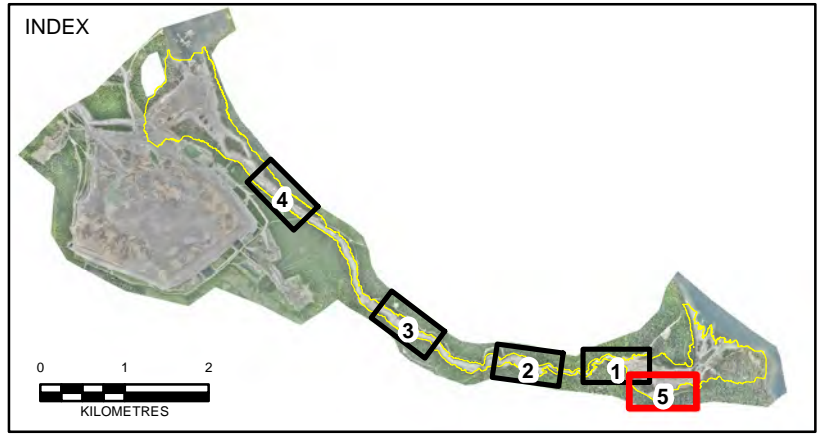
SUMMARY OF GROUNDWATER QUALITY DATA COLLECTED IN THE HAZELTINE CREEK FLOODPLAIN IN AUGUST, 2015

PROJECT NO. 1411734	CONTROL 11000 / 2000	REV. A	FIGURE 4
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B



- LEGEND**
- SAMPLE LOCATION
 - ▭ POST BREACH AFFECTED AREA EXTENT
 - NEW HAZELTINE CREEK CHANNEL (APPROXIMATE)
 - EDNEY CREEK
 - CONTOUR (1 m)
 - ROAD
 - ▭ WATERBODY



CLIENT
MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

CONSULTANT	YYYY-MM-DD	2015-09-01
	DESIGNED	EZG
	PREPARED	RH
	REVIEWED	TM
	APPROVED	TM



- REFERENCES**
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 2. POST BREACH AFFECTED AREA AND HAZELTINE CREEK CHANNEL OBTAINED FROM SNC LAVALIN LTD.
 3. CONTOURS AND IMAGERY (MAY 2015) OBTAINED FROM MPMC.

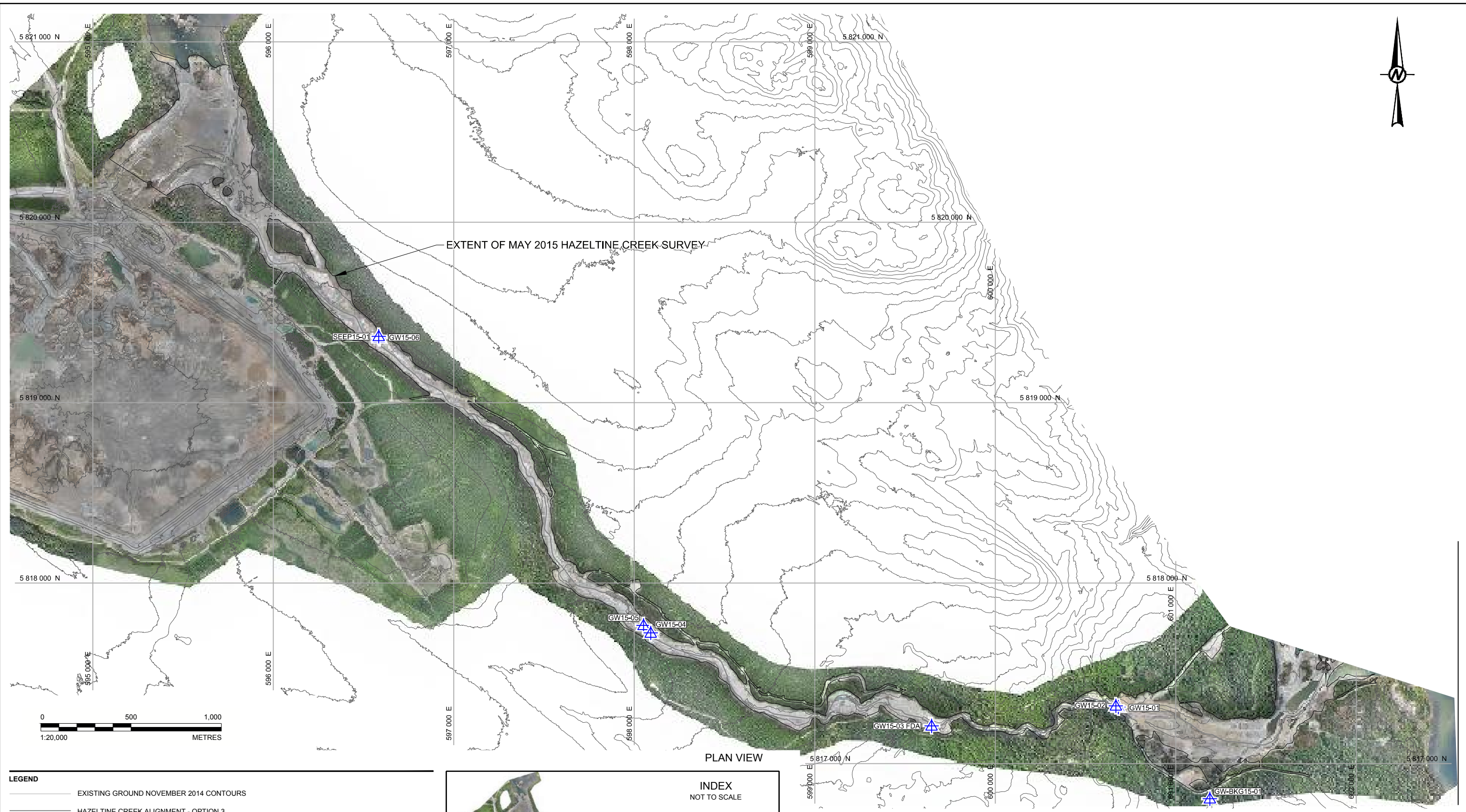
PROJECT
TECHNICAL MEMO GROUNDWATER QUALITY

TITLE
SUMMARY OF GROUNDWATER QUALITY DATA COLLECTED IN THE HAZELTINE CREEK FLOODPLAIN IN AUGUST, 2015

PROJECT NO. 1411734	CONTROL 11000 / 2000	REV. A	FIGURE 5
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25mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANS I



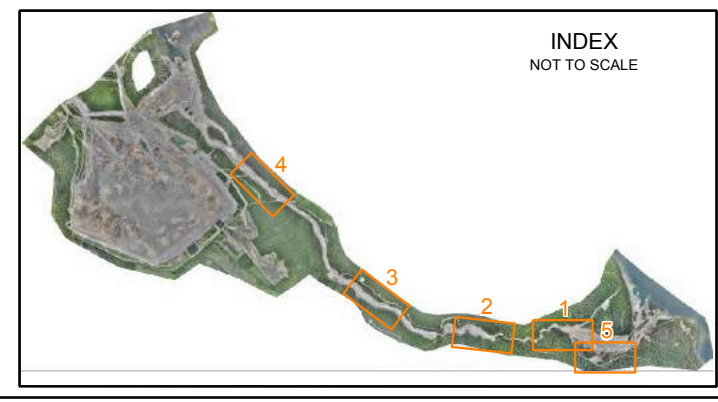
PLAN VIEW

LEGEND

- EXISTING GROUND NOVEMBER 2014 CONTOURS
- HAZELTINE CREEK ALIGNMENT - OPTION 3
- MONITORING WELL

NOTE(S)
 1. ALL UNITS ARE IN METRES UNLESS OTHERWISE NOTED.

REFERENCE(S)
 GROUNDWATER LOCATIONS PROVIDED BY SNC LAVALIN (AUGUST, 2015).
 BASE ORTHOPHOTO OBTAINED FROM SNC LAVALIN (2014).
 SURFACE CONTOURS OBTAINED FROM MPMC DRONE SURVEY (MAY 27, 2015).



CLIENT	MOUNT POLLEY MINING CORPORATION IMPERIAL METALS	
CONSULTANT		
YYYY-MM-DD	2015-11-02	
DESIGNED	E. ZAPF-GILJE	
PREPARED	R. WIGGINS	
REVIEWED	A. BRUEMMER	
APPROVED	T. MILLER	

PROJECT	DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT		
TITLE	SUMMARY OF GROUNDWATER QUALITY DATA COLLECTED IN THE HAZELTINE CREEK FLOODPLAIN IN AUGUST, 2015		
PROJECT NO.	PHASE/TASK	REV.	FIGURE
1411734	11000/2000	A	6

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28 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANS B

ATTACHMENT 3
Site Photographs



ATTACHMENT 3
Site Photographs



Photograph 1: Well Installation



ATTACHMENT 3

Site Photographs



Photograph 2: Purging



ATTACHMENT 3

Site Photographs



Photograph 3: Sampling



ATTACHMENT 3

Site Photographs



Photograph 4: Seep

o:\final\2014\1421\1411734\1411734-065-tm-rev0-11000\att 3 photos\site photographs.docx

ATTACHMENT 4
Analytical Report and Chain of Custody



GOLDER ASSOCIATES LTD.
ATTN: Karen McMillan
200-2920 Virtual Way
Vancouver BC V5M 0C4

Date Received: 05-AUG-15
Report Date: 24-SEP-15 15:58 (MT)
Version: FINAL REV. 2

Client Phone: 604-298-6623

Certificate of Analysis

Lab Work Order #: L1652569
Project P.O. #: NOT SUBMITTED
Job Reference: 1411734/11000
C of C Numbers: 14-471689
Legal Site Desc:

Comments:

24-SEP-2015 Additional data is included for all samples.

Amber Springer, B.Sc
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1652569-1	L1652569-2	L1652569-3	L1652569-4	L1652569-5
		Description	GW	GW	GW	GW	GW
		Sampled Date	03-AUG-15	03-AUG-15	03-AUG-15	03-AUG-15	03-AUG-15
		Sampled Time					
		Client ID	471689-01	471689-02	471689-03	471689-04	471689-05
Grouping	Analyte						
WATER							
Physical Tests	Conductivity (uS/cm)		1300	880	1150	1150	402
	Hardness (as CaCO3) (mg/L)		890	384	615	610	195
	pH (pH)		6.98	7.70	7.13	7.05	8.12
	ORP (mV)		279	284	351	357	302
	Total Suspended Solids (mg/L)		399	226	1900	1150	95.5
Anions and Nutrients	Acidity (as CaCO3) (mg/L)		49.4	1.6	23.7	31.3	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)		749	265	672	673	179
	Ammonia, Total (as N) (mg/L)		0.0557 ^{SRU}	0.0456 ^{SRU}	<0.0050 ^{PEHT}	<0.0050 ^{PEHT}	<0.0050 ^{PEHT}
	Bromide (Br) (mg/L)		<0.25 ^{DLM}	<0.25 ^{DLM}	<0.25 ^{DLM}	<0.25 ^{DLM}	<0.050
	Chloride (Cl) (mg/L)		4.8	10.3	5.0	5.5	1.12
	Fluoride (F) (mg/L)		0.10	0.36	0.14	0.15	0.161
	Nitrate (as N) (mg/L)		<0.025 ^{DLM}	0.053	0.040	0.063	0.0351
	Nitrite (as N) (mg/L)		<0.0050 ^{DLM}	<0.0050 ^{DLM}	<0.0050 ^{DLM}	<0.0050 ^{DLM}	<0.0010
	Total Nitrogen (mg/L)		1.20 ^{SP}	0.499 ^{SP}			
	Orthophosphate-Dissolved (as P) (mg/L)		<0.0010	0.0021	<0.0010	<0.0010	0.0052
	Phosphorus (P)-Total (mg/L)		0.380	0.294	2.45	1.70	0.133
	Sulfate (SO4) (mg/L)		3.2	222	64.3	71.2	50.2
	Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)		92.5	11.4		
Dissolved Metals	Dissolved Mercury Filtration Location		FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location		FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)		0.067	0.031	0.075	0.076	<0.010
	Antimony (Sb)-Dissolved (mg/L)		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Arsenic (As)-Dissolved (mg/L)		0.0294	0.0037	0.0034	0.0030	0.0020
	Barium (Ba)-Dissolved (mg/L)		0.203	0.078	0.100	0.097	0.029
	Beryllium (Be)-Dissolved (mg/L)		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Bismuth (Bi)-Dissolved (mg/L)		<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B)-Dissolved (mg/L)		<0.10	0.22	<0.10	<0.10	<0.10
	Cadmium (Cd)-Dissolved (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Calcium (Ca)-Dissolved (mg/L)		282	114	184	183	48.6
	Chromium (Cr)-Dissolved (mg/L)		0.00136	<0.00050	0.00059	0.00059	<0.00050
	Cobalt (Co)-Dissolved (mg/L)		0.0135	0.00446	0.00672	0.00645	<0.00050
	Copper (Cu)-Dissolved (mg/L)		0.0012	0.0036	0.0028	0.0029	<0.0010
	Iron (Fe)-Dissolved (mg/L)		21.6	0.054	2.12	2.08	<0.030
	Lead (Pb)-Dissolved (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Lithium (Li)-Dissolved (mg/L)		<0.050	<0.050	<0.050	<0.050	<0.050
Magnesium (Mg)-Dissolved (mg/L)		45.3	24.0	37.6	37.1	17.8	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1652569-6 GW 04-AUG-15 471689-06	L1652569-7 GW 04-AUG-15 471689-07	L1652569-8 GW 04-AUG-15 471689-08	L1652569-9 GW 04-AUG-15 471689-09		
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	543	1190	1140	371	
	Hardness (as CaCO3) (mg/L)	302	661	639	207	
	pH (pH)	8.05	7.07	8.07	7.73	
	ORP (mV)	317	324	263	318	
	Total Suspended Solids (mg/L)	142	137	105	364	
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	1.2	12.0	4.8	1.4	
	Alkalinity, Total (as CaCO3) (mg/L)	253	665	612	190	
	Ammonia, Total (as N) (mg/L)	<0.0050 ^{PEHT}	0.0077	0.0223	<0.0050 ^{SRU}	
	Bromide (Br) (mg/L)	<0.050	<0.25 ^{DLM}	<0.25 ^{DLM}	<0.050	
	Chloride (Cl) (mg/L)	0.95	9.8	7.7	1.67	
	Fluoride (F) (mg/L)	0.152	<0.10 ^{DLM}	0.13	0.054	
	Nitrate (as N) (mg/L)	<0.0050	0.202	0.731	0.118	
	Nitrite (as N) (mg/L)	<0.0010	0.560	0.870	<0.0010	
	Total Nitrogen (mg/L)				0.581 ^{SP}	
	Orthophosphate-Dissolved (as P) (mg/L)	0.0024	<0.0010	<0.0010	0.0018	
	Phosphorus (P)-Total (mg/L)	0.255	0.150	0.194	0.0501	
	Sulfate (SO4) (mg/L)	63.9	91.1	54.1	18.7	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)				10.0	
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Aluminum (Al)-Dissolved (mg/L)	<0.010	0.048	0.036	0.013	
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Arsenic (As)-Dissolved (mg/L)	0.0012	0.0031	0.0016	<0.0010	
	Barium (Ba)-Dissolved (mg/L)	0.043	0.172	0.068	0.028	
	Beryllium (Be)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20	<0.20	<0.20	
	Boron (B)-Dissolved (mg/L)	<0.10	<0.10	<0.10	<0.10	
	Cadmium (Cd)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Calcium (Ca)-Dissolved (mg/L)	90.5	201	183	72.2	
	Chromium (Cr)-Dissolved (mg/L)	<0.00050	0.00168	0.00109	<0.00050	
	Cobalt (Co)-Dissolved (mg/L)	<0.00050	0.00503	0.00341	<0.00050	
	Copper (Cu)-Dissolved (mg/L)	0.0091	<0.0010	0.0291	0.0024	
	Iron (Fe)-Dissolved (mg/L)	<0.030	13.4	0.512	<0.030	
	Lead (Pb)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Lithium (Li)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Magnesium (Mg)-Dissolved (mg/L)	18.5	38.5	44.3	6.44	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1652569-1	L1652569-2	L1652569-3	L1652569-4	L1652569-5
		Description	GW	GW	GW	GW	GW
		Sampled Date	03-AUG-15	03-AUG-15	03-AUG-15	03-AUG-15	03-AUG-15
		Sampled Time					
		Client ID	471689-01	471689-02	471689-03	471689-04	471689-05
Grouping	Analyte						
WATER							
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)		26.5	1.48	13.2	13.0	0.101
	Mercury (Hg)-Dissolved (mg/L)		0.0000113	0.0000060	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)		0.0036	0.0648	0.0082	0.0092	0.0072
	Nickel (Ni)-Dissolved (mg/L)		0.0132	0.0110	0.0061	0.0063	<0.0050
	Phosphorus (P)-Dissolved (mg/L)		<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)		12.7	8.1	5.5	5.5	<2.0
	Selenium (Se)-Dissolved (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)-Dissolved (mg/L)		21.7	6.92	13.1	12.9	8.75
	Silver (Ag)-Dissolved (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Sodium (Na)-Dissolved (mg/L)		18.8	68.5	26.9	27.8	19.4
	Strontium (Sr)-Dissolved (mg/L)		1.21	1.02	1.40	1.38	0.579
	Sulfur (S)-Dissolved (mg/L)		3.07	75.5	19.5	21.0	16.7
	Thallium (Tl)-Dissolved (mg/L)		<0.000050 ^{DLA}	0.000013	<0.000020 ^{DLA}	<0.000020 ^{DLA}	<0.000010
	Tin (Sn)-Dissolved (mg/L)		<0.030	<0.030	<0.030	<0.030	<0.030
	Titanium (Ti)-Dissolved (mg/L)		<0.050	<0.050	<0.050	<0.050	<0.050
	Uranium (U)-Dissolved (mg/L)		0.00194	0.00356	0.00419	0.00429	<0.00020
	Vanadium (V)-Dissolved (mg/L)		<0.030	<0.030	<0.030	<0.030	<0.030
	Zinc (Zn)-Dissolved (mg/L)		0.0185	0.0160	0.0153	0.0155	<0.0050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1652569-6	L1652569-7	L1652569-8	L1652569-9
		Description	GW	GW	GW	GW
		Sampled Date	04-AUG-15	04-AUG-15	04-AUG-15	04-AUG-15
		Sampled Time				
		Client ID	471689-06	471689-07	471689-08	471689-09
Grouping	Analyte					
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)		0.149	9.34	4.33	0.038
	Mercury (Hg)-Dissolved (mg/L)		<0.0000050	<0.0000050	0.0000073	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)		0.0079	0.0022	0.0074	<0.0010
	Nickel (Ni)-Dissolved (mg/L)		<0.0050	<0.0050	<0.0050	<0.0050
	Phosphorus (P)-Dissolved (mg/L)		<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)		<2.0	3.5	10.1	<2.0
	Selenium (Se)-Dissolved (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)-Dissolved (mg/L)		7.91	13.0	10.4	5.66
	Silver (Ag)-Dissolved (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050
	Sodium (Na)-Dissolved (mg/L)		14.5	44.9	58.1	6.4
	Strontium (Sr)-Dissolved (mg/L)		0.730	1.34	1.52	0.335
	Sulfur (S)-Dissolved (mg/L)		21.3	25.6	17.9	5.10
	Thallium (Tl)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)		<0.030	<0.030	<0.030	<0.030
	Titanium (Ti)-Dissolved (mg/L)		<0.050	<0.050	<0.050	<0.050
	Uranium (U)-Dissolved (mg/L)		0.00349	0.00142	0.00170	0.00053
	Vanadium (V)-Dissolved (mg/L)		<0.030	<0.030	<0.030	<0.030
	Zinc (Zn)-Dissolved (mg/L)		<0.0050	0.0249	<0.0050	<0.0050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
WSMD	Water sample(s) for dissolved mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Cadmium (Cd)-Dissolved	DLA	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Chromium (Cr)-Dissolved	DLA	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Copper (Cu)-Dissolved	DLA	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nickel (Ni)-Dissolved	DLA	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Silver (Ag)-Dissolved	DLA	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Antimony (Sb)-Dissolved	DLA	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cadmium (Cd)-Dissolved	DLA	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Chromium (Cr)-Dissolved	DLA	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cobalt (Co)-Dissolved	DLA	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Copper (Cu)-Dissolved	DLA	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Lead (Pb)-Dissolved	DLA	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nickel (Ni)-Dissolved	DLA	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Selenium (Se)-Dissolved	DLA	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Silver (Ag)-Dissolved	DLA	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Thallium (Tl)-Dissolved	DLA	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Chromium (Cr)-Dissolved	DLA	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cobalt (Co)-Dissolved	DLA	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nickel (Ni)-Dissolved	DLA	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Total Nitrogen	DLM	L1652569-1, -2, -9
Duplicate	Bromide (Br)	DLM	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Chloride (Cl)	DLM	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Fluoride (F)	DLM	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Fluoride (F)	DLM	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrite (as N)	DLM	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Bromide (Br)	DLM	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrite (as N)	DLM	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Aluminum (Al)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Antimony (Sb)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Antimony (Sb)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9

Reference Information

	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Aluminum (Al)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1652569-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Phosphorus (P)-Total	MS-B	L1652569-3, -4, -5, -6, -7, -8
Matrix Spike	Phosphorus (P)-Total	MS-B	L1652569-3, -4, -5, -6, -7, -8

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHT	Parameter Exceeded Recommended Holding Time Prior to Analysis
SP	Sample was Preserved at the laboratory
SRU	Sample Received Unpreserved. Results may be biased low for indicated parameter(s)

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
<p>This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.</p> <p>Samples of industrial wastes, acid mine drainage, or other solutions that contain appreciable amounts of hydrolyzable metal ions such as aluminum, iron, and manganese may require hot peroxide treatment to ensure oxidation and hydrolysis of reduced forms of polyvalent cations. Acidity results may be highly variable if this procedure is not followed. Results in this report for 'Acidity (as CaCO3)' have not been peroxide treated.</p>			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
<p>This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.</p> <p>Samples of industrial wastes, acid mine drainage, or other solutions that contain appreciable amounts of hydrolyzable metal ions such as aluminum, iron, and manganese may require hot peroxide treatment to ensure oxidation and hydrolysis of reduced forms of polyvalent cations. Acidity results may be highly variable if this procedure is not followed. Results in this report for 'Acidity (as CaCO3)' have not been peroxide treated.</p>			
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	EPA 310.2
<p>This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.</p>			
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity
<p>This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.</p>			
BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)
<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>			
CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)
<p>This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.</p>			
CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)
<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
<p>This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.</p>			
F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)
<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>			
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
<p>Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.</p>			

Reference Information

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)
Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.			
HG-DIS-CVAFS-VA	Water	Dissolved Hg in Water by CVAFS LOR=50ppt	APHA 3030B/EPA 1631E (mod)
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).			
MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
MET-DIS-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
N-T-COL-VA	Water	Total Nitrogen in water by Colour	APHA Method 4500-P (J) / NEMI 5735
This analysis is carried out using procedures adapted from APHA Method 4500-P (J) "Persulphate Method for Simultaneous Determination of Total Nitrogen and Total Phosphorus" and National Environmental Methods Index - Nemi method 5735.			
NH3-F-VA	Water	Ammonia in Water by Fluorescence	APHA 4500 NH3-NITROGEN (AMMONIA)
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.			
NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.			
NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
ORP-VA	Water	Oxidation reduction potential by Elect.	ASTM D1498-00
This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498-00 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM), May 2000. Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.			
It is recommended that this analysis be conducted in the field.			
P-T-PRES-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorus
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"
This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode			
It is recommended that this analysis be conducted in the field.			
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value
This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode			
It is recommended that this analysis be conducted in the field.			
PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorus
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
S-DIS-ICP-VA	Water	Dissolved Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

Reference Information

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

SO4-IC-N-VA Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TSS-VA Water Total Suspended Solids by Gravimetric APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

14-471689

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1652569

Report Date: 24-SEP-15

Page 1 of 17

Client: GOLDER ASSOCIATES LTD.
 200-2920 Virtual Way
 Vancouver BC V5M 0C4

Contact: Karen McMillan

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-PCT-VA		Water						
Batch	R3268189							
WG2171191-10 CRM		VA-ACY-CONTROL						
Acidity (as CaCO3)			99.2		%		85-115	16-SEP-15
WG2171191-11 CRM		VA-ACY-CONTROL						
Acidity (as CaCO3)			98.9		%		85-115	16-SEP-15
WG2171191-12 CRM		VA-ACY-CONTROL						
Acidity (as CaCO3)			98.5		%		85-115	16-SEP-15
WG2171191-13 CRM		VA-ACY-CONTROL						
Acidity (as CaCO3)			100.3		%		85-115	16-SEP-15
WG2171191-14 CRM		VA-ACY-CONTROL						
Acidity (as CaCO3)			100.0		%		85-115	16-SEP-15
WG2171191-9 CRM		VA-ACY-CONTROL						
Acidity (as CaCO3)			97.4		%		85-115	16-SEP-15
ALK-COL-VA		Water						
Batch	R3267512							
WG2171472-2 CRM		VA-ALKL-CONTROL						
Alkalinity, Total (as CaCO3)			101.0		%		85-115	15-SEP-15
WG2171472-5 CRM		VA-ALKM-CONTROL						
Alkalinity, Total (as CaCO3)			108.8		%		85-115	15-SEP-15
WG2171472-8 CRM		VA-ALKH-CONTROL						
Alkalinity, Total (as CaCO3)			104.4		%		85-115	15-SEP-15
WG2171472-6 DUP		L1652569-5						
Alkalinity, Total (as CaCO3)		179	179		mg/L	0.1	20	15-SEP-15
WG2171472-1 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	15-SEP-15
WG2171472-11 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	15-SEP-15
WG2171472-13 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	15-SEP-15
WG2171472-4 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	15-SEP-15
WG2171472-7 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	15-SEP-15
ALK-TITR-VA		Water						
Batch	R3267330							
WG2171242-10 CRM		VA-ALK-TITR-CONTROL						
Alkalinity, Total (as CaCO3)			105.2		%		85-115	16-SEP-15
WG2171242-11 CRM		VA-ALK-TITR-CONTROL						
Alkalinity, Total (as CaCO3)			105.2		%		85-115	16-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BR-L-IC-N-VA								
Water								
Batch	R3269035							
WG2171722-16	MB							
Bromide (Br)			<0.050		mg/L		0.05	16-SEP-15
WG2171722-4	MB							
Bromide (Br)			<0.050		mg/L		0.05	16-SEP-15
WG2171722-7	MB							
Bromide (Br)			<0.050		mg/L		0.05	16-SEP-15
WG2171722-11	MS	L1652569-5						
Bromide (Br)			107.8		%		75-125	16-SEP-15
CARBONS-DOC-VA								
Water								
Batch	R3242775							
WG2144434-12	LCS							
Dissolved Organic Carbon			101.8		%		80-120	07-AUG-15
WG2144434-16	LCS							
Dissolved Organic Carbon			105.0		%		80-120	07-AUG-15
WG2144434-20	LCS							
Dissolved Organic Carbon			97.5		%		80-120	07-AUG-15
WG2144434-24	LCS							
Dissolved Organic Carbon			105.3		%		80-120	07-AUG-15
WG2144434-4	LCS							
Dissolved Organic Carbon			101.1		%		80-120	07-AUG-15
WG2144434-8	LCS							
Dissolved Organic Carbon			106.9		%		80-120	07-AUG-15
WG2144434-11	MB							
Dissolved Organic Carbon			<0.50		mg/L		0.5	07-AUG-15
WG2144434-15	MB							
Dissolved Organic Carbon			<0.50		mg/L		0.5	07-AUG-15
WG2144434-19	MB							
Dissolved Organic Carbon			<0.50		mg/L		0.5	07-AUG-15
WG2144434-23	MB							
Dissolved Organic Carbon			<0.50		mg/L		0.5	07-AUG-15
WG2144434-3	MB							
Dissolved Organic Carbon			<0.50		mg/L		0.5	07-AUG-15
WG2144434-7	MB							
Dissolved Organic Carbon			<0.50		mg/L		0.5	07-AUG-15
Batch	R3243786							
WG2145968-4	LCS							
Dissolved Organic Carbon			102.4		%		80-120	10-AUG-15
WG2145968-8	LCS							



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CARBONS-DOC-VA								
	Water							
Batch	R3243786							
WG2145968-8	LCS							
Dissolved Organic Carbon			108.7		%		80-120	10-AUG-15
WG2145968-3	MB							
Dissolved Organic Carbon			<0.50		mg/L		0.5	10-AUG-15
WG2145968-7	MB							
Dissolved Organic Carbon			<0.50		mg/L		0.5	10-AUG-15
CL-IC-N-VA								
	Water							
Batch	R3269035							
WG2171722-6	DUP	L1652569-3						
Chloride (Cl)		5.0	5.0		mg/L	0.4	20	16-SEP-15
WG2171722-18	LCS							
Chloride (Cl)			101.5		%		90-110	16-SEP-15
WG2171722-2	LCS							
Chloride (Cl)			101.2		%		90-110	16-SEP-15
WG2171722-1	MB							
Chloride (Cl)			<0.50		mg/L		0.5	16-SEP-15
WG2171722-10	MB							
Chloride (Cl)			<0.50		mg/L		0.5	16-SEP-15
WG2171722-13	MB							
Chloride (Cl)			<0.50		mg/L		0.5	16-SEP-15
WG2171722-16	MB							
Chloride (Cl)			<0.50		mg/L		0.5	16-SEP-15
WG2171722-4	MB							
Chloride (Cl)			<0.50		mg/L		0.5	16-SEP-15
WG2171722-7	MB							
Chloride (Cl)			<0.50		mg/L		0.5	16-SEP-15
WG2171722-11	MS	L1652569-5						
Chloride (Cl)			102.1		%		75-125	16-SEP-15
EC-PCT-VA								
	Water							
Batch	R3243008							
WG2144329-17	CRM	VA-EC-PCT-CONTROL						
Conductivity			100.9		%		90-110	08-AUG-15
WG2144329-18	CRM	VA-EC-PCT-CONTROL						
Conductivity			100.1		%		90-110	08-AUG-15
WG2144329-19	CRM	VA-EC-PCT-CONTROL						
Conductivity			101.4		%		90-110	08-AUG-15
WG2144329-20	CRM	VA-EC-PCT-CONTROL						
Conductivity			100.3		%		90-110	08-AUG-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-PCT-VA		Water						
Batch	R3243008							
WG2144329-22	CRM	VA-EC-PCT-CONTROL						
Conductivity			102.2		%		90-110	08-AUG-15
WG2144329-1	MB							
Conductivity			<2.0		uS/cm		2	08-AUG-15
WG2144329-2	MB							
Conductivity			<2.0		uS/cm		2	08-AUG-15
WG2144329-3	MB							
Conductivity			<2.0		uS/cm		2	08-AUG-15
WG2144329-4	MB							
Conductivity			<2.0		uS/cm		2	08-AUG-15
WG2144329-6	MB							
Conductivity			<2.0		uS/cm		2	08-AUG-15
F-IC-N-VA		Water						
Batch	R3269035							
WG2171722-6	DUP	L1652569-3						
Fluoride (F)		0.14	0.14		mg/L	0.5	20	16-SEP-15
WG2171722-18	LCS							
Fluoride (F)			99.5		%		90-110	16-SEP-15
WG2171722-2	LCS							
Fluoride (F)			99.8		%		90-110	16-SEP-15
WG2171722-1	MB							
Fluoride (F)			<0.020		mg/L		0.02	16-SEP-15
WG2171722-10	MB							
Fluoride (F)			<0.020		mg/L		0.02	16-SEP-15
WG2171722-13	MB							
Fluoride (F)			<0.020		mg/L		0.02	16-SEP-15
WG2171722-16	MB							
Fluoride (F)			<0.020		mg/L		0.02	16-SEP-15
WG2171722-4	MB							
Fluoride (F)			<0.020		mg/L		0.02	16-SEP-15
WG2171722-7	MB							
Fluoride (F)			<0.020		mg/L		0.02	16-SEP-15
WG2171722-11	MS	L1652569-5						
Fluoride (F)			99.0		%		75-125	16-SEP-15
HG-D-CVAA-VA		Water						



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HG-D-CVAA-VA								
	Water							
Batch	R3242231							
WG2143533-1	MB	NP						
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	07-AUG-15
MET-D-CCMS-VA								
	Water							
Batch	R3241440							
WG2143533-2	LCS							
Aluminum (Al)-Dissolved			98.4		%		80-120	06-AUG-15
Antimony (Sb)-Dissolved			102.2		%		80-120	06-AUG-15
Arsenic (As)-Dissolved			100.3		%		80-120	06-AUG-15
Cadmium (Cd)-Dissolved			97.9		%		80-120	06-AUG-15
Chromium (Cr)-Dissolved			99.96		%		80-120	06-AUG-15
Cobalt (Co)-Dissolved			100.7		%		80-120	06-AUG-15
Copper (Cu)-Dissolved			98.9		%		80-120	06-AUG-15
Lead (Pb)-Dissolved			101.8		%		80-120	06-AUG-15
Molybdenum (Mo)-Dissolved			101.9		%		80-120	06-AUG-15
Nickel (Ni)-Dissolved			100.1		%		80-120	06-AUG-15
Selenium (Se)-Dissolved			97.8		%		80-120	06-AUG-15
Silver (Ag)-Dissolved			102.4		%		80-120	06-AUG-15
Thallium (Tl)-Dissolved			100.8		%		80-120	06-AUG-15
Uranium (U)-Dissolved			102.3		%		80-120	06-AUG-15
WG2143533-1	MB	NP						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	06-AUG-15
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	06-AUG-15
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	06-AUG-15
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	06-AUG-15
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	06-AUG-15
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	06-AUG-15
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	06-AUG-15
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	06-AUG-15
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	06-AUG-15
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	06-AUG-15
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	06-AUG-15
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	06-AUG-15
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	06-AUG-15
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	06-AUG-15
MET-DIS-ICP-VA	Water							



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA								
	Water							
Batch	R3241432							
WG2143533-2	LCS							
Barium (Ba)-Dissolved			97.7		%		80-120	06-AUG-15
Beryllium (Be)-Dissolved			98.4		%		80-120	06-AUG-15
Bismuth (Bi)-Dissolved			97.2		%		80-120	06-AUG-15
Boron (B)-Dissolved			96.7		%		80-120	06-AUG-15
Calcium (Ca)-Dissolved			103.7		%		80-120	06-AUG-15
Iron (Fe)-Dissolved			97.1		%		80-120	06-AUG-15
Lithium (Li)-Dissolved			98.8		%		80-120	06-AUG-15
Magnesium (Mg)-Dissolved			102.8		%		80-120	06-AUG-15
Manganese (Mn)-Dissolved			98.3		%		80-120	06-AUG-15
Phosphorus (P)-Dissolved			100.2		%		80-120	06-AUG-15
Potassium (K)-Dissolved			99.0		%		80-120	06-AUG-15
Silicon (Si)-Dissolved			105.4		%		80-120	06-AUG-15
Sodium (Na)-Dissolved			100.1		%		80-120	06-AUG-15
Strontium (Sr)-Dissolved			101.3		%		80-120	06-AUG-15
Tin (Sn)-Dissolved			98.3		%		80-120	06-AUG-15
Titanium (Ti)-Dissolved			99.0		%		80-120	06-AUG-15
Vanadium (V)-Dissolved			98.4		%		80-120	06-AUG-15
Zinc (Zn)-Dissolved			97.1		%		80-120	06-AUG-15
WG2143533-1	MB	NP						
Barium (Ba)-Dissolved			<0.010		mg/L		0.01	06-AUG-15
Beryllium (Be)-Dissolved			<0.0050		mg/L		0.005	06-AUG-15
Bismuth (Bi)-Dissolved			<0.20		mg/L		0.2	06-AUG-15
Boron (B)-Dissolved			<0.10		mg/L		0.1	06-AUG-15
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	06-AUG-15
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	06-AUG-15
Lithium (Li)-Dissolved			<0.010		mg/L		0.01	06-AUG-15
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	06-AUG-15
Manganese (Mn)-Dissolved			<0.0050		mg/L		0.005	06-AUG-15
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	06-AUG-15
Potassium (K)-Dissolved			<2.0		mg/L		2	06-AUG-15
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	06-AUG-15
Sodium (Na)-Dissolved			<2.0		mg/L		2	06-AUG-15
Strontium (Sr)-Dissolved			<0.0050		mg/L		0.005	06-AUG-15
Tin (Sn)-Dissolved			<0.030		mg/L		0.03	06-AUG-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA								
	Water							
Batch	R3241432							
WG2143533-1	MB	NP						
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	06-AUG-15
Vanadium (V)-Dissolved			<0.030		mg/L		0.03	06-AUG-15
Zinc (Zn)-Dissolved			<0.0050		mg/L		0.005	06-AUG-15
N-T-COL-VA								
	Water							
Batch	R3245195							
WG2147104-10	LCS							
Total Nitrogen			98.1		%		75-125	12-AUG-15
WG2147104-12	LCS							
Total Nitrogen			98.3		%		75-125	12-AUG-15
WG2147104-14	LCS							
Total Nitrogen			102.8		%		75-125	12-AUG-15
WG2147104-16	LCS							
Total Nitrogen			102.6		%		75-125	12-AUG-15
WG2147104-2	LCS							
Total Nitrogen			92.7		%		75-125	12-AUG-15
WG2147104-6	LCS							
Total Nitrogen			98.0		%		75-125	12-AUG-15
WG2147104-8	LCS							
Total Nitrogen			95.2		%		75-125	12-AUG-15
WG2147104-1	MB							
Total Nitrogen			<0.030		mg/L		0.03	12-AUG-15
WG2147104-11	MB							
Total Nitrogen			<0.030		mg/L		0.03	12-AUG-15
WG2147104-13	MB							
Total Nitrogen			<0.030		mg/L		0.03	12-AUG-15
WG2147104-15	MB							
Total Nitrogen			<0.030		mg/L		0.03	12-AUG-15
WG2147104-5	MB							
Total Nitrogen			<0.030		mg/L		0.03	12-AUG-15
WG2147104-7	MB							
Total Nitrogen			<0.030		mg/L		0.03	12-AUG-15
WG2147104-9	MB							
Total Nitrogen			<0.030		mg/L		0.03	12-AUG-15
NH3-F-VA	Water							



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NH3-F-VA								
Water								
Batch	R3244185							
WG2146492-10	CRM	VA-NH3-F						
Ammonia, Total (as N)			96.7		%		85-115	11-AUG-15
WG2146492-2	CRM	VA-NH3-F						
Ammonia, Total (as N)			97.2		%		85-115	11-AUG-15
WG2146492-4	CRM	VA-NH3-F						
Ammonia, Total (as N)			98.0		%		85-115	11-AUG-15
WG2146492-6	CRM	VA-NH3-F						
Ammonia, Total (as N)			97.8		%		85-115	11-AUG-15
WG2146492-8	CRM	VA-NH3-F						
Ammonia, Total (as N)			98.6		%		85-115	11-AUG-15
WG2146492-1	MB							
Ammonia, Total (as N)			<0.0050		mg/L		0.005	11-AUG-15
WG2146492-3	MB							
Ammonia, Total (as N)			<0.0050		mg/L		0.005	11-AUG-15
WG2146492-5	MB							
Ammonia, Total (as N)			<0.0050		mg/L		0.005	11-AUG-15
WG2146492-7	MB							
Ammonia, Total (as N)			<0.0050		mg/L		0.005	11-AUG-15
WG2146492-9	MB							
Ammonia, Total (as N)			<0.0050		mg/L		0.005	11-AUG-15
Batch	R3274386							
WG2176625-10	CRM	VA-NH3-F						
Ammonia, Total (as N)			100.0		%		85-115	23-SEP-15
WG2176625-2	CRM	VA-NH3-F						
Ammonia, Total (as N)			105.3		%		85-115	23-SEP-15
WG2176625-4	CRM	VA-NH3-F						
Ammonia, Total (as N)			99.6		%		85-115	23-SEP-15
WG2176625-6	CRM	VA-NH3-F						
Ammonia, Total (as N)			101.8		%		85-115	23-SEP-15
WG2176625-1	MB							
Ammonia, Total (as N)			<0.0050		mg/L		0.005	23-SEP-15
WG2176625-3	MB							
Ammonia, Total (as N)			<0.0050		mg/L		0.005	23-SEP-15
WG2176625-5	MB							
Ammonia, Total (as N)			<0.0050		mg/L		0.005	23-SEP-15
WG2176625-9	MB							
Ammonia, Total (as N)			<0.0050		mg/L		0.005	23-SEP-15
NO2-L-IC-N-VA	Water							



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NO2-L-IC-N-VA								
Water								
Batch	R3269035							
WG2171722-6	DUP	L1652569-3						
Nitrite (as N)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	16-SEP-15
WG2171722-18	LCS							
Nitrite (as N)			99.4		%		90-110	16-SEP-15
WG2171722-2	LCS							
Nitrite (as N)			100.0		%		90-110	16-SEP-15
WG2171722-1	MB							
Nitrite (as N)			<0.0010		mg/L		0.001	16-SEP-15
WG2171722-10	MB							
Nitrite (as N)			<0.0010		mg/L		0.001	16-SEP-15
WG2171722-13	MB							
Nitrite (as N)			<0.0010		mg/L		0.001	16-SEP-15
WG2171722-16	MB							
Nitrite (as N)			<0.0010		mg/L		0.001	16-SEP-15
WG2171722-4	MB							
Nitrite (as N)			<0.0010		mg/L		0.001	16-SEP-15
WG2171722-7	MB							
Nitrite (as N)			<0.0010		mg/L		0.001	16-SEP-15
WG2171722-11	MS	L1652569-5						
Nitrite (as N)			98.1		%		75-125	16-SEP-15
NO3-L-IC-N-VA								
Water								
Batch	R3269035							
WG2171722-6	DUP	L1652569-3						
Nitrate (as N)		0.040	0.042		mg/L	4.1	20	16-SEP-15
WG2171722-18	LCS							
Nitrate (as N)			101.4		%		90-110	16-SEP-15
WG2171722-2	LCS							
Nitrate (as N)			101.1		%		90-110	16-SEP-15
WG2171722-1	MB							
Nitrate (as N)			<0.0050		mg/L		0.005	16-SEP-15
WG2171722-10	MB							
Nitrate (as N)			<0.0050		mg/L		0.005	16-SEP-15
WG2171722-13	MB							
Nitrate (as N)			<0.0050		mg/L		0.005	16-SEP-15
WG2171722-16	MB							
Nitrate (as N)			<0.0050		mg/L		0.005	16-SEP-15
WG2171722-4	MB							
Nitrate (as N)			<0.0050		mg/L		0.005	16-SEP-15
WG2171722-7	MB							



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NO3-L-IC-N-VA	Water							
Batch	R3269035							
WG2171722-7 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	16-SEP-15
WG2171722-11 MS		L1652569-5						
Nitrate (as N)			102.1		%		75-125	16-SEP-15
ORP-VA	Water							
Batch	R3242678							
WG2145576-1 CRM		VA-ORP						
ORP			214		mV		210-230	09-AUG-15
Batch	R3243572							
WG2146587-1 CRM		VA-ORP						
ORP			213		mV		210-230	11-AUG-15
WG2146587-3 CRM		VA-ORP						
ORP			213		mV		210-230	11-AUG-15
WG2146587-5 CRM		VA-ORP						
ORP			213		mV		210-230	11-AUG-15
P-T-PRES-COL-VA	Water							
Batch	R3243919							
WG2146502-2 CRM		VA-ERA-PO4						
Phosphorus (P)-Total			102.5		%		80-120	11-AUG-15
WG2146502-3 DUP		L1652569-1						
Phosphorus (P)-Total		0.380	0.356		mg/L	6.6	20	11-AUG-15
WG2146502-1 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	11-AUG-15
Batch	R3244944							
WG2147411-2 CRM		VA-ERA-PO4						
Phosphorus (P)-Total			106.2		%		80-120	12-AUG-15
WG2147411-1 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	12-AUG-15
Batch	R3274857							
WG2177878-2 CRM		VA-ERA-PO4						
Phosphorus (P)-Total			105.5		%		80-120	24-SEP-15
WG2177878-1 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	24-SEP-15
PH-PCT-VA	Water							



Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-PCT-VA		Water						
Batch	R3243008							
WG2144329-25	CRM	VA-PH7-BUF						
pH			7.01		pH		6.9-7.1	08-AUG-15
WG2144329-26	CRM	VA-PH7-BUF						
pH			7.03		pH		6.9-7.1	08-AUG-15
WG2144329-27	CRM	VA-PH7-BUF						
pH			7.02		pH		6.9-7.1	08-AUG-15
WG2144329-28	CRM	VA-PH7-BUF						
pH			7.02		pH		6.9-7.1	08-AUG-15
WG2144329-29	CRM	VA-PH7-BUF						
pH			7.02		pH		6.9-7.1	08-AUG-15
WG2144329-30	CRM	VA-PH7-BUF						
pH			7.02		pH		6.9-7.1	08-AUG-15
PO4-DO-COL-VA		Water						
Batch	R3266744							
WG2171481-10	CRM	VA-OPO4-CONTROL						
Orthophosphate-Dissolved (as P)			91.7		%		80-120	15-SEP-15
WG2171481-15	CRM	VA-OPO4-CONTROL						
Orthophosphate-Dissolved (as P)			101.0		%		80-120	15-SEP-15
WG2171481-2	CRM	VA-OPO4-CONTROL						
Orthophosphate-Dissolved (as P)			98.0		%		80-120	15-SEP-15
WG2171481-5	CRM	VA-OPO4-CONTROL						
Orthophosphate-Dissolved (as P)			98.1		%		80-120	15-SEP-15
WG2171481-13	DUP	L1652569-9						
Orthophosphate-Dissolved (as P)		0.0018	0.0012	J	mg/L	0.0006	0.002	15-SEP-15
WG2171481-1	MB							
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	15-SEP-15
WG2171481-14	MB							
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	15-SEP-15
WG2171481-4	MB							
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	15-SEP-15
WG2171481-9	MB							
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	15-SEP-15
S-DIS-ICP-VA		Water						
Batch	R3241432							
WG2143533-2	LCS							
Sulfur (S)-Dissolved			98.5		%		80-120	06-AUG-15
WG2143533-1	MB	NP						
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	06-AUG-15



Quality Control Report

Workorder: L1652569

Report Date: 24-SEP-15

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-VA								
	Water							
Batch	R3269035							
WG2171722-6	DUP	L1652569-3						
Sulfate (SO4)		64.3	64.4		mg/L	0.1	20	16-SEP-15
WG2171722-18	LCS							
Sulfate (SO4)			101.9		%		90-110	16-SEP-15
WG2171722-2	LCS							
Sulfate (SO4)			102.0		%		90-110	16-SEP-15
WG2171722-1	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	16-SEP-15
WG2171722-10	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	16-SEP-15
WG2171722-13	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	16-SEP-15
WG2171722-16	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	16-SEP-15
WG2171722-4	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	16-SEP-15
WG2171722-7	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	16-SEP-15
WG2171722-11	MS	L1652569-5						
Sulfate (SO4)			95.9		%		75-125	16-SEP-15
TSS-VA								
	Water							
Batch	R3242430							
WG2144413-2	LCS							
Total Suspended Solids			95.2		%		85-115	06-AUG-15
WG2144413-5	LCS							
Total Suspended Solids			109.4		%		85-115	06-AUG-15
WG2144413-8	LCS							
Total Suspended Solids			94.5		%		85-115	06-AUG-15
WG2144413-1	MB							
Total Suspended Solids			<3.0		mg/L		3	06-AUG-15
WG2144413-4	MB							
Total Suspended Solids			<3.0		mg/L		3	06-AUG-15
WG2144413-7	MB							
Total Suspended Solids			<3.0		mg/L		3	06-AUG-15

Quality Control Report

Workorder: L1652569

Report Date: 24-SEP-15

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1652569

Report Date: 24-SEP-15

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation reduction potential by Elect.							
	1	03-AUG-15	09-AUG-15 08:37	0.25	141	hours	EHTR-FM
	2	03-AUG-15	09-AUG-15 08:37	0.25	141	hours	EHTR-FM
	3	03-AUG-15	11-AUG-15 06:30	0.25	186	hours	EHTR-FM
	4	03-AUG-15	11-AUG-15 06:30	0.25	186	hours	EHTR-FM
	5	03-AUG-15	11-AUG-15 06:30	0.25	186	hours	EHTR-FM
	6	04-AUG-15	11-AUG-15 06:30	0.25	162	hours	EHTR-FM
	7	04-AUG-15	11-AUG-15 06:30	0.25	162	hours	EHTR-FM
	8	04-AUG-15	11-AUG-15 06:30	0.25	162	hours	EHTR-FM
	9	04-AUG-15	11-AUG-15 06:30	0.25	162	hours	EHTR-FM
pH by Meter (Automated)							
	1	03-AUG-15	08-AUG-15 09:29	0.25	118	hours	EHTR-FM
	2	03-AUG-15	08-AUG-15 09:29	0.25	118	hours	EHTR-FM
	3	03-AUG-15	08-AUG-15 09:29	0.25	118	hours	EHTR-FM
	4	03-AUG-15	08-AUG-15 09:29	0.25	118	hours	EHTR-FM
	5	03-AUG-15	08-AUG-15 09:29	0.25	118	hours	EHTR-FM
	6	04-AUG-15	08-AUG-15 09:29	0.25	94	hours	EHTR-FM
	7	04-AUG-15	08-AUG-15 09:29	0.25	94	hours	EHTR-FM
	8	04-AUG-15	08-AUG-15 09:29	0.25	94	hours	EHTR-FM
	9	04-AUG-15	08-AUG-15 09:29	0.25	94	hours	EHTR-FM
Anions and Nutrients							
Acidity by Automatic Titration							
	1	03-AUG-15	16-SEP-15 09:24	14	44	days	EHT
	2	03-AUG-15	16-SEP-15 09:24	14	44	days	EHT
	3	03-AUG-15	16-SEP-15 09:24	14	44	days	EHT
	4	03-AUG-15	16-SEP-15 09:24	14	44	days	EHT
	5	03-AUG-15	16-SEP-15 09:24	14	44	days	EHT
	6	04-AUG-15	16-SEP-15 09:24	14	43	days	EHT
	7	04-AUG-15	16-SEP-15 09:24	14	43	days	EHT
	8	04-AUG-15	16-SEP-15 09:24	14	43	days	EHT
	9	04-AUG-15	16-SEP-15 09:24	14	43	days	EHT
Alkalinity Species by Titration							
	8	04-AUG-15	16-SEP-15 08:33	14	43	days	EHT
Alkalinity by Colourimetric (Automated)							
	1	03-AUG-15	15-SEP-15 21:08	14	43	days	EHT
	2	03-AUG-15	15-SEP-15 19:51	14	43	days	EHT
	3	03-AUG-15	15-SEP-15 21:08	14	43	days	EHT
	4	03-AUG-15	15-SEP-15 21:08	14	43	days	EHT
	5	03-AUG-15	15-SEP-15 19:51	14	43	days	EHT
	6	04-AUG-15	15-SEP-15 19:51	14	42	days	EHT
	7	04-AUG-15	15-SEP-15 21:08	14	42	days	EHT
	9	04-AUG-15	15-SEP-15 19:54	14	42	days	EHT
Ammonia in Water by Fluorescence							
	3	03-AUG-15	23-SEP-15 10:30	28	51	days	EHT
	4	03-AUG-15	23-SEP-15 10:30	28	51	days	EHT
	5	03-AUG-15	23-SEP-15 10:30	28	51	days	EHT
	6	04-AUG-15	23-SEP-15 10:30	28	50	days	EHT
	7	04-AUG-15	23-SEP-15 10:30	28	50	days	EHT
	8	04-AUG-15	23-SEP-15 10:30	28	50	days	EHT
Bromide in Water by IC (Low Level)							
	1	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	2	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	3	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	4	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	5	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	6	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT

Quality Control Report

Workorder: L1652569

Report Date: 24-SEP-15

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Anions and Nutrients							
Bromide in Water by IC (Low Level)							
	7	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	8	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	9	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
Chloride in Water by IC							
	1	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	2	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	3	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	4	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	5	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	6	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	7	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	8	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	9	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
Diss. Orthophosphate in Water by Colour							
	1	03-AUG-15	15-SEP-15 20:28	3	43	days	EHT
	2	03-AUG-15	15-SEP-15 20:30	3	43	days	EHT
	3	03-AUG-15	15-SEP-15 20:30	3	43	days	EHT
	4	03-AUG-15	15-SEP-15 20:30	3	43	days	EHT
	5	03-AUG-15	15-SEP-15 20:32	3	43	days	EHT
	6	04-AUG-15	15-SEP-15 20:32	3	42	days	EHT
	7	04-AUG-15	15-SEP-15 20:32	3	42	days	EHT
	8	04-AUG-15	15-SEP-15 20:34	3	42	days	EHT
	9	04-AUG-15	15-SEP-15 20:34	3	42	days	EHT
Fluoride in Water by IC							
	1	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	2	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	3	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	4	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	5	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	6	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	7	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	8	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	9	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
Nitrate in Water by IC (Low Level)							
	1	03-AUG-15	16-SEP-15 09:08	3	44	days	EHT
	2	03-AUG-15	16-SEP-15 09:08	3	44	days	EHT
	3	03-AUG-15	16-SEP-15 09:08	3	44	days	EHT
	4	03-AUG-15	16-SEP-15 09:08	3	44	days	EHT
	5	03-AUG-15	16-SEP-15 09:08	3	44	days	EHT
	6	04-AUG-15	16-SEP-15 09:08	3	43	days	EHT
	7	04-AUG-15	16-SEP-15 09:08	3	43	days	EHT
	8	04-AUG-15	16-SEP-15 09:08	3	43	days	EHT
	9	04-AUG-15	16-SEP-15 09:08	3	43	days	EHT
Nitrite in Water by IC (Low Level)							
	1	03-AUG-15	16-SEP-15 09:08	3	44	days	EHT
	2	03-AUG-15	16-SEP-15 09:08	3	44	days	EHT
	3	03-AUG-15	16-SEP-15 09:08	3	44	days	EHT
	4	03-AUG-15	16-SEP-15 09:08	3	44	days	EHT
	5	03-AUG-15	16-SEP-15 09:08	3	44	days	EHT
	6	04-AUG-15	16-SEP-15 09:08	3	43	days	EHT
	7	04-AUG-15	16-SEP-15 09:08	3	43	days	EHT
	8	04-AUG-15	16-SEP-15 09:08	3	43	days	EHT
	9	04-AUG-15	16-SEP-15 09:08	3	43	days	EHT
Sulfate in Water by IC							
	1	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT

Quality Control Report

Workorder: L1652569

Report Date: 24-SEP-15

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Anions and Nutrients							
Sulfate in Water by IC							
	2	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	3	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	4	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	5	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	6	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	7	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	8	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	9	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
Total P in Water by Colour							
	3	03-AUG-15	23-SEP-15 21:32	28	51	days	EHT
	4	03-AUG-15	23-SEP-15 21:32	28	51	days	EHT
	5	03-AUG-15	23-SEP-15 21:32	28	51	days	EHT
	6	04-AUG-15	23-SEP-15 21:32	28	50	days	EHT
	7	04-AUG-15	23-SEP-15 21:32	28	50	days	EHT
	8	04-AUG-15	23-SEP-15 21:32	28	50	days	EHT

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1652569 were received on 05-AUG-15 08:30.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Report To Karen McMillan, GOLDER ASSOCIATES LTD.
200-2920 Virtual Way

Vancouver, BC V5M 0C4

Client Phone 604-298-6623

Date Received
Report Date
Report Revision
Version

5-Aug-2015 08:30
24-Sep-2015 15:58
2
FINAL

Certificate of Analysis

Lab Work Order #	L1652569
Project P.O. #	
Job Reference	1411734/11000
Legal Site Description	
C of C Numbers	14-471689

Case Narrative/Comments

24-SEP-2015 Additional data is included for all samples.

Work Order Qualifiers:

Water sample(s) for dissolved mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.

Qualifier
WSMD

A handwritten signature in black ink that reads "Amber Springer".

Amber Springer, B.Sc
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

Sample Summary L1652569

Job Reference 1411734/11000
Report To Karen McMillan, GOLDER ASSOCIATES LTD.
Date Received 5-Aug-2015 8:30
Report Date 24-Sep-2015 15:58
Report Revision 2

Sample Details

ALS Sample ID	Client Sample ID	Matrix	Date Sampled	Time Sampled	Qualifier
L1652569-1	471689-01	GW	3-Aug-15	00:00	
L1652569-2	471689-02	GW	3-Aug-15	00:00	
L1652569-3	471689-03	GW	3-Aug-15	00:00	
L1652569-4	471689-04	GW	3-Aug-15	00:00	
L1652569-5	471689-05	GW	3-Aug-15	00:00	
L1652569-6	471689-06	GW	4-Aug-15	00:00	
L1652569-7	471689-07	GW	4-Aug-15	00:00	
L1652569-8	471689-08	GW	4-Aug-15	00:00	
L1652569-9	471689-09	GW	4-Aug-15	00:00	

Results Summary L1652569

Job Reference 1411734/11000
Report To Karen McMillan, GOLDER ASSOCIATES LTD.
Date Received 5-Aug-2015 8:30
Report Date 24-Sep-2015 15:58
Report Revision 2

Client Sample ID	471689-01	471689-02	471689-03	471689-04	471689-05	471689-06	471689-07	471689-08	471689-09
Date Sampled	3-Aug-2015	3-Aug-2015	3-Aug-2015	3-Aug-2015	3-Aug-2015	4-Aug-2015	4-Aug-2015	4-Aug-2015	4-Aug-2015
Time Sampled	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00
ALS Sample ID	L1652569-1	L1652569-2	L1652569-3	L1652569-4	L1652569-5	L1652569-6	L1652569-7	L1652569-8	L1652569-9

Parameter	Lowest Detection Limit	Units	Water		Water		Water		Water		Water	
			Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Physical Tests (Water)												
Conductivity	2.0	uS/cm	1300	880	1150	1150	402	543	1190	1140	371	
Hardness (as CaCO3)	0.50	mg/L	890	384	615	610	195	302	661	639	207	
pH	0.10	pH	6.98	7.70	7.13	7.05	8.12	8.05	7.07	8.07	7.73	
ORP	-1000	mV	279	284	351	357	302	317	324	263	318	
Total Suspended Solids	3.0	mg/L	399	226	1900	1150	95.5	142	137	105	364	

Anions and Nutrients (Water)												
Acidity (as CaCO3)	1.0	mg/L	49.4	1.6	23.7	31.3	<1.0	1.2	12.0	4.8	1.4	
Alkalinity, Total (as CaCO3)	1.0	mg/L	749	265	672	673	179	253	665		190	
Alkalinity, Total (as CaCO3)	1.0	mg/L								612		
Ammonia, Total (as N)	0.0050	mg/L	0.0557	0.0456	<0.0050	<0.0050	<0.0050	<0.0050	0.0077	0.0223	<0.0050	
Bromide (Br)	0.050	mg/L	<0.25	<0.25	<0.25	<0.25	<0.050	<0.050	<0.25	<0.25	<0.050	
Chloride (Cl)	0.50	mg/L	4.8	10.3	5.0	5.5	1.12	0.95	9.8	7.7	1.67	
Fluoride (F)	0.020	mg/L	0.10	0.36	0.14	0.15	0.161	0.152	<0.10	0.13	0.054	
Nitrate (as N)	0.0050	mg/L	<0.025	0.053	0.040	0.063	0.0351	<0.0050	0.202	0.731	0.118	
Nitrite (as N)	0.0010	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0010	<0.0010	0.560	0.870	<0.0010	
Total Nitrogen	0.060	mg/L	1.20	0.499							0.581	
Orthophosphate-Dissolved (as P)	0.0010	mg/L	<0.0010	0.0021	<0.0010	<0.0010	0.0052	0.0024	<0.0010	<0.0010	0.018	
Phosphorus (P)-Total	0.0020	mg/L	0.380	0.294	2.45	1.70	0.133	0.255	0.150	0.194	0.0501	
Sulfate (SO4)	0.30	mg/L	3.2	222	64.3	71.2	50.2	63.9	91.1	54.1	18.7	

Organic / Inorganic Carbon (Water)												
Dissolved Organic Carbon	0.50	mg/L	92.5	11.4							10.0	

Dissolved Metals (Water)												
Dissolved Mercury Filtration Location	-	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD
Dissolved Mercury Filtration Location	-	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD
Dissolved Metals Filtration Location	-	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD
Dissolved Metals Filtration Location	-	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD
Dissolved Metals Filtration Location	-	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved	0.010	mg/L	0.067	0.031	0.075	0.076	<0.010	<0.010	0.048	0.036	0.013	
Antimony (Sb)-Dissolved	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Arsenic (As)-Dissolved	0.0010	mg/L	0.0294	0.0037	0.0034	0.0030	0.0020	0.0012	0.0031	0.0016	<0.0010	
Barium (Ba)-Dissolved	0.020	mg/L	0.203	0.078	0.100	0.097	0.029	0.043	0.172	0.068	0.028	
Beryllium (Be)-Dissolved	0.0050	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Bismuth (Bi)-Dissolved	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	
Boron (B)-Dissolved	0.10	mg/L	<0.10	0.22	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
Cadmium (Cd)-Dissolved	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
Calcium (Ca)-Dissolved	0.10	mg/L	282	114	184	183	48.6	90.5	201	183	72.2	
Chromium (Cr)-Dissolved	0.00050	mg/L	0.00136	<0.00050	0.00059	0.00059	<0.00050	<0.00050	0.00168	0.00109	<0.00050	
Cobalt (Co)-Dissolved	0.00050	mg/L	0.0135	0.00446	0.00672	0.00645	<0.00050	<0.00050	0.00503	0.00341	<0.00050	
Copper (Cu)-Dissolved	0.0010	mg/L	0.0012	0.0036	0.0028	0.0029	<0.0010	0.0091	<0.0010	0.0291	0.0024	
Iron (Fe)-Dissolved	0.030	mg/L	21.6	0.054	2.12	2.08	<0.030	<0.030	13.4	0.512	<0.030	
Lead (Pb)-Dissolved	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Lithium (Li)-Dissolved	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	
Magnesium (Mg)-Dissolved	0.10	mg/L	45.3	24.0	37.6	37.1	17.8	18.5	38.5	44.3	6.44	
Manganese (Mn)-Dissolved	0.010	mg/L	26.5	1.48	13.2	13.0	0.101	0.149	9.34	4.33	0.038	
Mercury (Hg)-Dissolved	0.000050	mg/L	0.0000113	0.0000060	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.0000073	<0.000050	
Molybdenum (Mo)-Dissolved	0.0010	mg/L	0.0036	0.0648	0.0082	0.0092	0.0072	0.0079	0.0022	0.0074	<0.0010	
Nickel (Ni)-Dissolved	0.0050	mg/L	0.0132	0.0110	0.0061	0.0063	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Phosphorus (P)-Dissolved	0.30	mg/L	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	
Potassium (K)-Dissolved	2.0	mg/L	12.7	8.1	5.5	5.5	<2.0	<2.0	3.5	10.1	<2.0	
Selenium (Se)-Dissolved	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Silicon (Si)-Dissolved	0.050	mg/L	21.7	6.32	13.1	12.9	8.75	7.91	13.0	10.4	5.66	
Silver (Ag)-Dissolved	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
Sodium (Na)-Dissolved	2.0	mg/L	18.8	88.5	26.9	27.8	19.4	14.5	44.9	58.1	6.4	
Strontium (Sr)-Dissolved	0.0050	mg/L	1.21	1.02	1.40	1.38	0.579	0.730	1.34	1.52	0.335	
Sulfur (S)-Dissolved	0.50	mg/L	3.07	75.5	19.5	21.0	16.7	21.3	25.6	17.9	5.10	
Thallium (Tl)-Dissolved	0.000010	mg/L	<0.000050	0.000013	<0.000020	<0.000020	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
Tin (Sn)-Dissolved	0.030	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	
Titanium (Ti)-Dissolved	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	
Uranium (U)-Dissolved	0.00020	mg/L	0.00194	0.00356	0.00419	0.00429	<0.00020	0.00349	0.00142	0.00170	0.00053	
Vanadium (V)-Dissolved	0.030	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	
Zinc (Zn)-Dissolved	0.0050	mg/L	0.0185	0.0160	0.0153	0.0155	<0.0050	<0.0050	0.0249	<0.0050	<0.0050	

Qualifier Legend
SRU Sample Received Unpreserved. Results may be biased low for indicated parameter(s)
DLM Detection Limit Adjusted due to sample matrix effects.
SP Sample was Preserved at the laboratory
DLA Detection Limit adjusted for required dilution
PEHT Parameter Exceeded Recommended Holding Time Prior to Analysis

Results of Analysis L1652569

Job Reference 141 1734/11000
Report To Kamin McMillan, GOLDR ASSOCIATES LTD.
Date Received 5-Aug-2015 8:30
Report Date 24-Sep-2015 15:58
Report Revision 2

Main data table with columns: Parameter, ALS ID, Client Sample ID, ALS Test Code, Results, Detection Limit, Units, Qual, Date Sampled, Time Sampled, Prep Date, Analysis Date, QC Lot, QC Eval, Hold Time, Matrix, Class. It lists various chemical and physical tests for metals, nutrients, and organics.

Qualifier Legend
DLA Detection Limit adjusted for required dilution
DLM Detection Limit Adjusted due to sample matrix effects.
PEHT Parameter Exceeded Recommended Holding Time Prior to Analysis
SP Sample was Preserved at the laboratory.
SRU Sample Received Unpreserved. Results may be biased low for indicated parameter(s)


Evaluation Legend
QC Lot met ALS Data Quality Objectives
QC Lot did not meet ALS Data Quality Objectives

Duplicates L1652569

Job Reference 1411734/11000
Report To Karen McMillan, GOLDER ASSOCIATES LTD.
Date Received 5-Aug-2015 8:30
Report Date 24-Sep-2015 15:58
Report Revision 2

ALS ID	Reference	Client Sample ID	QC Type	QC Lot #	Analyte	Sample Result	Duplicate Result	Detection Limit	Units	RPD	RPD Limit	Diff	Diff Limit	Qual	Eval	Matrix	Class
Anions and Nutrients (Water)																	
WG2171472-6	L1652569-5	471689-05	DUP	372999	Alkalinity, Total (as CaCO3)	179	179	2.0	mg/L	0.1	20	-	-	✓	Water	Anions and Nutrients	
WG2171722-6	L1652569-3	471689-03	DUP	374188	Bromide (Br)	<0.25	<0.25	0.25	mg/L	N/A	20	-	-	✓	Water	Anions and Nutrients	
WG2171722-6	L1652569-3	471689-03	DUP	374188	Chloride (Cl)	5.0	5.0	2.5	mg/L	0.4	20	-	-	✓	Water	Anions and Nutrients	
WG2171722-6	L1652569-3	471689-03	DUP	374188	Fluoride (F)	0.14	0.14	0.10	mg/L	0.5	20	-	-	✓	Water	Anions and Nutrients	
WG2171722-6	L1652569-3	471689-03	DUP	374188	Nitrate (as N)	0.040	0.042	0.025	mg/L	4.1	20	-	-	✓	Water	Anions and Nutrients	
WG2171722-6	L1652569-3	471689-03	DUP	374188	Nitrite (as N)	<0.0050	<0.0050	0.0050	mg/L	N/A	20	-	-	✓	Water	Anions and Nutrients	
WG2171481-13	L1652569-9	471689-09	DUP	372907	Orthophosphate-Dissolved (as P)	0.0018	0.0012	0.0010	mg/L	-	0.0006	0.002	-	✓	Water	Anions and Nutrients	
WG2146502-3	L1652569-1	471689-01	DUP	353555	Phosphorus (P)-Total	0.380	0.356	0.020	mg/L	6.6	20	-	-	✓	Water	Anions and Nutrients	
WG2171722-6	L1652569-3	471689-03	DUP	374188	Sulfate (SO4)	64.3	64.4	1.5	mg/L	0.1	20	-	-	✓	Water	Anions and Nutrients	

Evaluation Legend

 Met ALS Data Quality Objectives

Methodology L1652569

Job Reference 1411734/11000
Report To Karen McMillan, GOLDER ASSOCIATES LTD.
Date Received 5-Aug-2015 8:30
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Report Revision 2

ALS Test Code	ALS Test Description	Lab Location	Matrix	Method Reference	Methodology Description
Physical Tests (Water)					
EC-PCT-VA	Conductivity (Automated)	Vancouver	Water	APHA 2510 Auto. Conduc.	This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.
HARDNESS-CALC-VA	Hardness	Vancouver	Water	APHA 2340B	Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.
ORP-VA	Oxidation reduction potential by Elect.	Vancouver	Water	ASTM D1498-00	This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498-00 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM), May 2000. Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.
PH-PCT-VA	pH by Meter (Automated)	Vancouver	Water	APHA 4500-H pH Value	It is recommended that this analysis be conducted in the field. This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode
TSS-VA	Total Suspended Solids by Gravimetric	Vancouver	Water	APHA 2540 D - GRAVIMETRIC	It is recommended that this analysis be conducted in the field. This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter. TSS is determined by drying the filter at 104 degrees celsius.
Anions and Nutrients (Water)					
ACY-PCT-VA	Acidity by Automatic Titration	Vancouver	Water	APHA 2310 Acidity	This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint. Samples of industrial wastes, acid mine drainage, or other solutions that contain appreciable amounts of hydrolyzable metal ions such as aluminum, iron, and manganese may require hot peroxide treatment to ensure oxidation and hydrolysis of reduced forms of polyvalent cations. Acidity results may be highly variable if this procedure is not followed. Results in this report for 'Acidity (as CaCO ₃)' have not been peroxide treated.
ALK-COL-VA	Alkalinity by Colourimetric (Automated)	Vancouver	Water	EPA 310.2	This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.
ALK-TITR-VA	Alkalinity Species by Titration	Vancouver	Water	APHA 2320 Alkalinity	This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
BR-L-IC-N-VA	Bromide in Water by IC (Low Level)	Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
CL-IC-N-VA	Chloride in Water by IC	Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
F-IC-N-VA	Fluoride in Water by IC	Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
N-T-COL-VA	Total Nitrogen in water by Colour	Vancouver	Water	APHA Method 4500-P (J) / NEMI 5735	This analysis is carried out using procedures adapted from APHA Method 4500-P (J) "Persulphate Method for Simultaneous Determination of Total Nitrogen and Total Phosphorus" and National Environmental Methods Index - Nemi method 5735.
NH3-F-VA	Ammonia in Water by Fluorescence	Vancouver	Water	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC	This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry; "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.
NO2-L-IC-N-VA	Nitrite in Water by IC (Low Level)	Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
NO3-L-IC-N-VA	Nitrate in Water by IC (Low Level)	Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
P-T-PRES-COL-VA	Total P in Water by Colour	Vancouver	Water	APHA 4500-P Phosphorus	This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.
PO4-DO-COL-VA	Diss. Orthophosphate in Water by Colour	Vancouver	Water	APHA 4500-P Phosphorus	This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.
SO4-IC-N-VA	Sulfate in Water by IC	Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Organic / Inorganic Carbon (Water)					
CARBONS-DOC-VA	Dissolved organic carbon by combustion	Vancouver	Water	APHA 5310B TOTAL ORGANIC CARBON (TOC)	This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.
Dissolved Metals (Water)					
HG-D-CVAA-VA	Diss. Mercury in Water by CVAAS or CVAFS	Vancouver	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.
HG-DIS-CVAFS-VA	Dissolved Hg in Water by CVAFS LOR=50ppt	Vancouver	Water	APHA 3030B/EPA 1631E (mod)	This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).
MET-D-CCMS-VA	Dissolved Metals in Water by CRC ICMS	Vancouver	Water	APHA 3030B/6020A (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
MET-DIS-ICP-VA	Dissolved Metals in Water by ICPOES	Vancouver	Water	EPA SW-846 3005A/6010B	This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Methodology L1652569

Job Reference 1411734/11000
Report To Karen McMillan, GOLDER ASSOCIATES LTD.
Date Received 5-Aug-2015 8:30
Report Date 24-Sep-2015 15:58
Report Revision 2

ALS Test Code	ALS Test Description	Lab Location	Matrix	Method Reference
S-DIS-ICP-VA	Dissolved Sulfur in Water by ICPOES	Vancouver	Water	EPA SW-846 3005A/6010B

Methodology Description

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

Hold Time Details L1652569

Job Reference 1411734/11000
Report To Karen McMillan, GOLDER ASSOCIATES LTD.
Date Received 5-Aug-2015 8:30
Report Date 24-Sep-2015 15:58
Report Revision 2

ALS Product Description	Sample ID	Sampling Date	Date Processed	Recommended Hold Time	Actual Hold Time	Units	Qualifier
Physical Tests (Water)							
Oxidation reduction potential by Elect.	1	03-AUG-15	09-AUG-15 08:37	0.25	141	hours	EHTR-FM
	2	03-AUG-15	09-AUG-15 08:37	0.25	141	hours	EHTR-FM
	3	03-AUG-15	11-AUG-15 06:30	0.25	186	hours	EHTR-FM
	4	03-AUG-15	11-AUG-15 06:30	0.25	186	hours	EHTR-FM
	5	03-AUG-15	11-AUG-15 06:30	0.25	186	hours	EHTR-FM
	6	04-AUG-15	11-AUG-15 06:30	0.25	162	hours	EHTR-FM
	7	04-AUG-15	11-AUG-15 06:30	0.25	162	hours	EHTR-FM
	8	04-AUG-15	11-AUG-15 06:30	0.25	162	hours	EHTR-FM
	9	04-AUG-15	11-AUG-15 06:30	0.25	162	hours	EHTR-FM
pH by Meter (Automated)	1	03-AUG-15	08-AUG-15 09:29	0.25	118	hours	EHTR-FM
	2	03-AUG-15	08-AUG-15 09:29	0.25	118	hours	EHTR-FM
	3	03-AUG-15	08-AUG-15 09:29	0.25	118	hours	EHTR-FM
	4	03-AUG-15	08-AUG-15 09:29	0.25	118	hours	EHTR-FM
	5	03-AUG-15	08-AUG-15 09:29	0.25	118	hours	EHTR-FM
	6	04-AUG-15	08-AUG-15 09:29	0.25	94	hours	EHTR-FM
	7	04-AUG-15	08-AUG-15 09:29	0.25	94	hours	EHTR-FM
	8	04-AUG-15	08-AUG-15 09:29	0.25	94	hours	EHTR-FM
	9	04-AUG-15	08-AUG-15 09:29	0.25	94	hours	EHTR-FM
Anions and Nutrients (Water)							
Acidity by Automatic Titration	1	03-AUG-15	16-SEP-15 09:24	14	44	days	EHT
	2	03-AUG-15	16-SEP-15 09:24	14	44	days	EHT
	3	03-AUG-15	16-SEP-15 09:24	14	44	days	EHT
	4	03-AUG-15	16-SEP-15 09:24	14	44	days	EHT
	5	03-AUG-15	16-SEP-15 09:24	14	44	days	EHT
	6	04-AUG-15	16-SEP-15 09:24	14	43	days	EHT
	7	04-AUG-15	16-SEP-15 09:24	14	43	days	EHT
	8	04-AUG-15	16-SEP-15 09:24	14	43	days	EHT
	9	04-AUG-15	16-SEP-15 09:24	14	43	days	EHT
Alkalinity Species by Titration Alkalinity by Colourimetric (Automated)	8	04-AUG-15	16-SEP-15 08:33	14	43	days	EHT
	1	03-AUG-15	15-SEP-15 21:08	14	43	days	EHT
	2	03-AUG-15	15-SEP-15 19:51	14	43	days	EHT
	3	03-AUG-15	15-SEP-15 21:08	14	43	days	EHT
	4	03-AUG-15	15-SEP-15 21:08	14	43	days	EHT
	5	03-AUG-15	15-SEP-15 19:51	14	43	days	EHT
	6	04-AUG-15	15-SEP-15 19:51	14	42	days	EHT
	7	04-AUG-15	15-SEP-15 21:08	14	42	days	EHT
	9	04-AUG-15	15-SEP-15 19:54	14	42	days	EHT
Ammonia in Water by Fluorescence	3	03-AUG-15	23-SEP-15 10:30	28	51	days	EHT
	4	03-AUG-15	23-SEP-15 10:30	28	51	days	EHT
	5	03-AUG-15	23-SEP-15 10:30	28	51	days	EHT
	6	04-AUG-15	23-SEP-15 10:30	28	50	days	EHT
	7	04-AUG-15	23-SEP-15 10:30	28	50	days	EHT
	8	04-AUG-15	23-SEP-15 10:30	28	50	days	EHT
	8	04-AUG-15	23-SEP-15 10:30	28	50	days	EHT
	9	04-AUG-15	23-SEP-15 10:30	28	50	days	EHT
Bromide in Water by IC (Low Level)	1	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	2	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	3	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	4	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	5	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	6	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	7	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	8	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	9	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
Chloride in Water by IC	1	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT

Hold Time Details L1652569

Job Reference 1411734/11000
Report To Karen McMillan, GOLDER ASSOCIATES LTD.
Date Received 5-Aug-2015 8:30
Report Date 24-Sep-2015 15:58
Report Revision 2

ALS Product Description	Sample ID	Sampling Date	Date Processed	Recommended Hold Time	Actual Hold Time	Units	Qualifier
	2	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	3	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	4	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	5	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	6	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	7	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	8	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	9	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
Diss. Orthophosphate in Water by Colour	1	03-AUG-15	15-SEP-15 20:28	3	43	days	EHT
	2	03-AUG-15	15-SEP-15 20:30	3	43	days	EHT
	3	03-AUG-15	15-SEP-15 20:30	3	43	days	EHT
	4	03-AUG-15	15-SEP-15 20:30	3	43	days	EHT
	5	03-AUG-15	15-SEP-15 20:32	3	43	days	EHT
	6	04-AUG-15	15-SEP-15 20:32	3	42	days	EHT
	7	04-AUG-15	15-SEP-15 20:32	3	42	days	EHT
	8	04-AUG-15	15-SEP-15 20:34	3	42	days	EHT
	9	04-AUG-15	15-SEP-15 20:34	3	42	days	EHT
Fluoride in Water by IC	1	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	2	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	3	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	4	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	5	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	6	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	7	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	8	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	9	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
Nitrate in Water by IC (Low Level)	1	03-AUG-15	16-SEP-15 09:08	3	44	days	EHT
	2	03-AUG-15	16-SEP-15 09:08	3	44	days	EHT
	3	03-AUG-15	16-SEP-15 09:08	3	44	days	EHT
	4	03-AUG-15	16-SEP-15 09:08	3	44	days	EHT
	5	03-AUG-15	16-SEP-15 09:08	3	44	days	EHT
	6	04-AUG-15	16-SEP-15 09:08	3	43	days	EHT
	7	04-AUG-15	16-SEP-15 09:08	3	43	days	EHT
	8	04-AUG-15	16-SEP-15 09:08	3	43	days	EHT
	9	04-AUG-15	16-SEP-15 09:08	3	43	days	EHT
Nitrite in Water by IC (Low Level)	1	03-AUG-15	16-SEP-15 09:08	3	44	days	EHT
	2	03-AUG-15	16-SEP-15 09:08	3	44	days	EHT
	3	03-AUG-15	16-SEP-15 09:08	3	44	days	EHT
	4	03-AUG-15	16-SEP-15 09:08	3	44	days	EHT
	5	03-AUG-15	16-SEP-15 09:08	3	44	days	EHT
	6	04-AUG-15	16-SEP-15 09:08	3	43	days	EHT
	7	04-AUG-15	16-SEP-15 09:08	3	43	days	EHT
	8	04-AUG-15	16-SEP-15 09:08	3	43	days	EHT
	9	04-AUG-15	16-SEP-15 09:08	3	43	days	EHT
Sulfate in Water by IC	1	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	2	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	3	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	4	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	5	03-AUG-15	16-SEP-15 09:08	28	44	days	EHT
	6	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	7	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	8	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
	9	04-AUG-15	16-SEP-15 09:08	28	43	days	EHT
Total P in Water by Colour	3	03-AUG-15	23-SEP-15 21:32	28	51	days	EHT
	4	03-AUG-15	23-SEP-15 21:32	28	51	days	EHT
	5	03-AUG-15	23-SEP-15 21:32	28	51	days	EHT

Hold Time Details L1652569

Job Reference 1411734/11000
Report To Karen McMillan, GOLDER ASSOCIATES LTD.
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ALS Product Description	Sample ID	Sampling Date	Date Processed	Recommended Hold Time	Actual Hold Time	Units	Qualifier
	6	04-AUG-15	23-SEP-15 21:32	28	50	days	EHT
	7	04-AUG-15	23-SEP-15 21:32	28	50	days	EHT
	8	04-AUG-15	23-SEP-15 21:32	28	50	days	EHT

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of specific requirements, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or CCME (where applicable).



APPENDIX D

Surface Water Quality

Mount Polley Surface Water Quality Impact Assessment Update, March to August 2015

Prepared by:

Jordana Van Geest, Ph.D., R.P.Bio, Elaine Irving, Ph.D., R.P.Bio. and Jerry Vandenberg, M.Sc, P.Chem.

Golder Associates Ltd.

Addendum to Mount Polley Surface Water Quality Impact Assessment Update.

Prepared by:

Jordana Van Geest, Ph.D., R.P.Bio, Amy Wiebe, M.Sc., Elaine Irving, Ph.D., R.P.Bio. and Jerry Vandenberg, M.Sc, P.Chem.

Golder Associates Ltd.

Results of Diffusive Gradients in Thin Films Device Deployment – August to October 2015.

Prepared by: Pierre Stecko, M.Sc., EP, R.P.Bio.

Minnow Environmental Inc.

DATE January 26, 2016**REFERENCE No.** 1411734-106-TM-Rev1-10000**TO** Colleen Hughes
Mount Polley Mining Corporation**CC** Trish Miller**FROM** Jordana Van Geest, Elaine Irving, Jerry Vandenberg**EMAIL** jvangeest@golder.com;
eirving@golder.com;
jvandenberg@golder.com**MOUNT POLLEY SURFACE WATER QUALITY IMPACT ASSESSMENT UPDATE,
MARCH TO AUGUST 2015**

Golder Associates Ltd. (Golder) is pleased to provide Mount Polley Mining Corporation (MPMC) with the following update to the Surface Water Quality Impact Assessment (WQIA) that was submitted as part of the Post-Event Environmental Impact Assessment Report (PEEIAR) in June 2015 (Golder 2015a). The 'event' refers to the tailings dam failure that occurred at the Mount Polley Mine on August 4, 2014, when the Tailings Storage Facility (TSF) Perimeter Embankment failed and there was a subsequent debris flow into the receiving environment. The time period considered in the WQIA was August 2014 to April 2015. This update to the WQIA focuses primarily on data generated by post-event water quality monitoring undertaken by MPMC over a six month period between March and August 2015. This period was selected as a cutoff for this update, however, MPMC water quality monitoring is ongoing. Note that there is some overlap in dates covered by the original WQIA and this document because the dataset was being generated during the preparation of the PEEIAR in March and April 2015. Monitoring of post-event receiving environment has also been carried out by the BC Ministry of Environment (BC MoE) for audit purposes; these results are reported elsewhere (<http://www.env.gov.bc.ca/epd/mount-polley/>).

1.0 INTRODUCTION

The interim findings of the WQIA concluded that there were measured changes in water quality in Polley Lake, Hazeltine Creek, Quesnel Lake, and Quesnel River as a result of the event, but that evidence available at the time of report preparation did not indicate that constituents of the TSF materials had resulted in toxicity in the water column. Post-event monitoring is being undertaken by MPMC to support the continued evaluation of water quality and the potential for toxicity in these waterbodies.

This technical memorandum is intended to provide an update to the interim findings of the PEEIAR WQIA and to characterize water quality conditions relevant to the Detailed Site Investigation (DSI) and Human Health and Ecological Risk Assessment (HHERA). The DSI and HHERA are being undertaken as a requirement of the Pollution Abatement Order issued by the BC MoE in response to the tailings dam failure to satisfy the requirements of the Provincial *Environmental Management Act* and the *Contaminated Sites Regulation* (CSR).



Following consultation with the BC MoE in July 2015¹, Hazeltine Creek is to be considered a receiving environment for the DSI and HHERA, and accordingly, it is considered a receiving environment for this WQIA update. In order of water flow, the receiving environments evaluated are Polley Lake, Hazeltine Creek, Quesnel Lake, and Quesnel River (Attachment 1).

Following initial screening of water quality data using relevant BC water quality guidelines (BC WQGs) and CSR standards, contaminants of potential concern (COPCs) were identified (see Section 3.1) for the receiving environments listed above. Post-event changes in receiving environment water quality, with respect to identified COPCs, were evaluated relative to applicable BC WQGs and CSR standards for the time period from March to August 2015 (Section 3.2). In Section 4, the results from this updated water quality assessment are discussed with reference to whether each COPC will be carried forward for further assessment as contaminants of concern (COCs) in the DSI. In Section 5, COCs are identified for consideration in the problem formulation components of the HHERA.

2.0 METHODS

2.1 Data Collection and Compilation

The assessment relied on water quality data collected by MPMC from March to August 2015 in accordance with the Post TSF-Breach 2015 Monitoring Plan (MPMC 2015), in addition to post-event data previously reported in the PEEIAR WQIA (Golder 2015a). In general, 2015 monitoring focused on routine stations, but some station locations were moved, replaced, added, or removed, consistent with the evolution of the post-event program and in consultation with regulatory agencies (MPMC 2015). A summary of monitoring stations and sampling frequencies for the time period between March and August is presented in Attachment 2.

The monitoring program evolved during the first year following the event in consideration of factors that included, but were not limited to: monitoring results, safety and logistical constraints, recommendations from the BC MoE, and seasonal conditions. A number of stations in Polley Lake, Hazeltine Creek, and Quesnel Lake were consistently monitored, typically either weekly or monthly; while other stations were monitored on a more intermittent basis or were briefly monitored for a specific purpose. A compilation of discrete water sample data collected at stations monitored by MPMC from August 2014 to August 2015, inclusive, are appended at the end of this technical memorandum in Attachment 8.

Between March and August 2015, depth profiles of field parameters were recorded throughout the water column and water samples were collected for chemical analysis at designated stations shown in Attachment 1. At the Polley Lake stations, discrete water samples were taken at 5 m depth intervals from the surface to close to the lake bottom, except when the water column was fully mixed at overturn, when samples were taken at 10 m depth intervals. The depth range sampled in Polley Lake was 0 to 20 m and approximately 2 m from the lake bottom. In Quesnel Lake the depth range sampled was station dependent consistent with previous reported post-event sampling in Golder (2015a) (depths sampled are provided in Attachment 2). Field methods were consistent with those described in Appendix B of the PEEIAR for water quality monitoring undertaken by MPMC between August 2014 and April 2015 (Golder 2015a). Continuous data loggers were installed to record field parameter measurements at station HAC-01b at the outflow of Hazeltine Creek and QUR-1 in the Quesnel River (i.e., conductivity, dissolved oxygen, pH, temperature, and turbidity) at 15 minute intervals.

¹ Verbal communication with the BC MoE Land Remediation Section following their review of the July 15, 2015, DSI and HHERA work plan.

Analytical and field monitoring data verified as reliable based on a quality assurance/quality control (QA/QC) assessment by MPMC, as well as station location information, were uploaded by MPMC to their water quality database. MPMC provided Golder with electronic data collected from March to August 2015 for this WQIA update. These data were used as received from MPMC with an additional check of transcription by Golder prior to use in COPC screening. The process of sample continuity and data quality verification by MPMC is documented in Appendix B of the PEEIAR for post-event data collected prior to March 2015 (Golder 2015a). These QA/QC procedures were followed through August 2015 and a summary of the findings of the MPMC QA/QC program for water quality data collected from March to August 2015 is provided in Attachment 3.

The majority of data collected between March and August 2015 met data quality objectives specified in Appendix B of Golder (2015a). Objectives that were not met mainly related to variability between duplicate samples, possibly due to environmental heterogeneity or interferences in the analytical method. The QA/QC results were considered acceptable because the overall number of data that did not meet objectives was low, and the observed variability did not influence the findings of this WQIA update.

2.2 COPC Identification

Discrete water quality data collected by MPMC at stations monitored between March and August 2015 (shown in Attachment 1) were compiled and screened to identify COPCs. The purpose of the COPC screening shown in Attachment 4 was to identify those parameters that remained elevated as of March 2015, in order to focus the WQIA update on those substances that might be of longer-term consequence regarding potential impacts on water quality. Data compiled for all stations sampled within a given area (i.e., Polley Lake, Hazeltine Creek, Quesnel Lake, and Quesnel River) were evaluated as one dataset for COPC screening. Subsequent data analysis of COPC temporal trends focused on a representative subset of monitoring stations for each area (as described in Section 2.3).

Substances were identified as COPCs if they were greater than pre-event concentrations and applicable guidelines based on the most sensitive receiving environment water use. Golder (2015a) identified the following known environmental uses on Quesnel Lake, particularly with respect to the West Basin, to determine the most sensitive water use for the downstream receiving environment.

- Commercial, recreational, and aboriginal fisheries;
- Recreational uses such as scenery and wildlife viewing, swimming, boating, kayaking, canoeing, waterskiing/tubing/wakeboarding, and in the winter snowmobiling and ice fishing when ice conditions allow; and
- Drinking and residential water use for domestic purposes.

For the WQIA update, maximum and 95th percentile parameter concentrations calculated for each receiving environment area were compared to the following regulatory criteria:

- BC WQGs for aquatic life (or most sensitive end use identified in Table 3-4 of Golder 2015a²);
- BC drinking water guidelines (BC MOE 2015a);
- CSR Schedule 6 standards for aquatic life (CSR 2014);
- CSR Schedule 6 drinking water standards (CSR 2014); and
- CSR Schedule 6 livestock water standards (as a surrogate for wildlife water) (CSR 2014).

Based on this screening, COPCs were conservatively identified for the four receiving environment areas for the purpose of evaluating potential water quality impacts to aquatic life, wildlife water, or drinking water. The screening was two-tiered: first, an initial screening stage identified parameters with maximum upper limit concentrations below BC WQGs. These water quality parameters were not carried further in the screening process. Second, for parameters with concentrations above BC WQGs, 95th percentile concentrations were calculated and screened against the regulatory criteria listed above. Water quality parameters were identified as COPCs if 95th percentile concentrations were above the lowest applicable criteria (Attachment 4, Tables 1-5) and were higher than the 95th percentile pre-event baseline concentration provided in Golder (2015a).

Maximum and 95th percentile concentrations represented upper limit concentrations in the post-event water quality dataset. Water quality parameters were not identified as COPCs if post-event upper limit concentrations were below the lowest applicable criteria. The lowest applicable criteria were typically BC WQGs; conservative environmental quality benchmarks with built-in safety factors that represent concentrations below which adverse impacts on water quality are not expected. Pre-event data were available for Polley Lake, Hazeltine Creek, and Quesnel River and these data are summarized in Golder (2015a). As described in Golder (2015a), pre-event data for Quesnel Lake data were limited to nutrient-related monitoring surveys primarily focused around Horsefly Bay just east of Cariboo Island.

Parameters without BC WQGs were not identified as COPCs in the PEEIAR WQIA based on an evaluation of post-event data up to February 2015. Concentrations of these parameters in the weeks and months following the event were not considered to be of environmental concern. Subsequently, the same parameters were not considered to be COPCs in the WQIA update.

² With the exception of molybdenum, total aluminum, and pH, the most sensitive receiving environment use was the protection of aquatic life. For molybdenum, the most conservative 30-d BC WQG value was adopted (i.e., irrigation assuming the copper: molybdenum ratio is less than 2:1 *in lieu* of a 30-d value for wildlife). For total aluminum, the most conservative maximum BC WQG was adopted (i.e., water for wildlife) because aquatic life guidelines are based only on dissolved aluminum.

2.3 COPC Evaluation

Changes in COPC concentrations were evaluated qualitatively (see Section 2.3.2) over time at representative stations previously assessed in the PEEIAR WQIA (Golder 2015a), although replacement stations were included as appropriate, consistent with the evolution of the post-event monitoring program.

2.3.1 Representative Station Selection

Ten representative stations in the downstream aquatic receiving environment for the WQIA update were monitored either weekly or monthly from August 2014 to August 2015. Datasets for some monitoring stations were combined to provide a continuous data record³. Rationale for the selection of each representative monitoring station is provided below.

- **Two stations on Polley Lake (P1 and P2).** Station P1 located at the north end of Polley Lake and Station P2 located to the south of the lake. These two stations represented the deepest areas of the lake and provided geographical coverage.
- **Three stations in Hazeltine Creek.** One station in upper Hazeltine Creek (HAC-05), one station in lower Hazeltine Creek (HAC-08) above the two sedimentation ponds, and one station at the outflow of Hazeltine Creek (HAC-01) below the sedimentation ponds. These ponds became operational in December 2014 and were designed to reduce loadings of suspended particulate matter in lower Hazeltine Creek and as a consequence inputs to Quesnel Lake. In upper Hazeltine Creek, Station HAC-05 has been the most frequently sampled since the event, and in lower Hazeltine Creek, Station HAC-01 has been the most frequently sampled (Attachment 2). Data from HAC-01 represent water quality at the outflow of Hazeltine Creek below the sedimentation ponds at the confluence with Quesnel Lake. Monitoring at Station HAC-08 began in late January 2015.
 - As described in Attachment 2 and Golder (2015a), the HAC-01 water quality monitoring station in lower Hazeltine Creek was moved slightly over time to adapt to changes in the creek channel due to rehabilitation activities and construction of sedimentation ponds (a change in location was indicated with a subsequent letter in the station code). Samples collected at HAC-01, HAC-01a, HAC-01b, HAC-01c in lower Hazeltine Creek have contiguous sampling periods and for the purposes of this assessment are considered to represent the same location (i.e., HAC-01/a/b/c).
- **Four stations in Quesnel Lake.** One near-field station, two mid-field stations located west of Cariboo Island, and one far-field station located east of Cariboo Island.
 - *Near-field:* Station QUL-66 is located close to the mouth of Hazeltine Creek, and was replaced by stations QUL-55 in March 2015 and QUL-55a in July 2015, when the creek mouth was re-routed. The Pollution Abatement Order 107461 amendment issued June 15, 2015, by the BC MoE (2015b), specified turbidity requirements for this station and surrounding profile data stations.

³ As described in Golder (2015a) some lake stations were not sampled during the winter months due to health and safety concerns and issues related to access. Hazeltine Creek was a managed system undergoing rehabilitation and so some stations had to be moved over time consistent with activities within the creek.

- *Mid-field:* Station QUL-18 represents one of the deepest points in the West Basin and is located north-west of the Hazeltine Creek mouth, towards the Quesnel River between QUL-66 and QUL-21. The Pollution Abatement Order 107461 amendment issued June 15, 2015, by the BC MoE (2015b) also specified turbidity requirements for this station. Station QUL-2/2a is a mid-field station located east of the Hazeltine Creek mouth west of Cariboo Island. Both stations QUL-2 and QUL-2a were monitored following the event until lake turnover in 2014, but monitoring only at QUL-2a was continued in 2015. Data from stations QUL-2 and QUL-2a were pooled to provide a combined post-event dataset that extended to August 2015.
- *Far-Field:* Station QUL-120/120a is located east of Cariboo Island towards the main body of the lake and was assessed with regards to turbidity measures of the plume. Data from stations QUL-120 and QUL-120a were pooled to provide a combined post-event dataset that extended to August 2015.
- **One Quesnel River station:** Station QUR-1 is located at the Quesnel River Research Centre near the community of Likely and reflects water quality at the outflow of Quesnel Lake. This station was routinely monitored by MPMC during the post-event period.

2.3.2 Changes in COPC Concentrations Over Time

Instantaneous measurements and rolling 30-day (d) average values for each COPC were assessed qualitatively and were compared against applicable provincial guidelines and standards to assess changes in water quality as a result of the event⁴.

- Instantaneous measurements were compared against the short-term maximum BC WQGs (where available) for the most sensitive water use to evaluate intermittent or transient impacts on aquatic life. These concentrations were also compared against CSR Schedule 6 standards for aquatic life, CSR Schedule 6 drinking water standards, and CSR Schedule 6 livestock water standards (as a surrogate for wildlife water). CSR standards were shown on relevant graphs where reported concentrations exceeded these standards; otherwise the CSR standards were not shown because they are often much higher than the y-axis maxima and therefore including them would compress the observed data downwards.
- Rolling 30-d average values were calculated and compared against long-term average BC WQGs that are intended to prevent sub-lethal and lethal effects on the most sensitive species and life stage for an indefinite time period. The 30-d mean guidelines are intended to be applied to mean concentrations of a minimum of five samples collected over a 30-d time period (BC MoE 2015a).

Temporal and spatial trends in the concentrations of each COPC were discussed (see Section 3.0) with a focus on those parameters that remained elevated from March to August 2015, under the assumption that these parameters could therefore be of longer-term potential consequence regarding impacts on water quality.

⁴ Substitutions were not made for values that were reported as less than the method detection limit (MDL) and these values were set equal to the MDL for purposes of plotting data, calculating 30-d averages.

2.3.3 Turbidity Requirements of Pollution Abatement Order 107461

A Pollution Abatement Order 107461 amendment was issued June 15, 2015, by the BC MoE (2015b) and specified that MPMC must meet the following requirements with respect to water quality.

- Turbidity at the monitoring sites QUL-54, QUL-55, QUL-56 (and subsequently replacement stations QUL-54a, QUL-55a, and QUL-56a) of no greater than 2 NTU rolling average above background (i.e., 1 NTU), at any monitored depth, over a period of 30 days using a minimum of five weekly samples.
- Turbidity at the monitoring site QUL-18 of no greater than 1 NTU above background at any monitored depth.

To assess compliance with amended Pollution Abatement Order 107461, depth profile measurements of turbidity were plotted for near-field stations QUL-54/54a, QUL-55/55a, QUL-56/56a and the western mid-field station QUL-18. The plots were then interpreted to identify time periods where non-compliance was observed.

3.0 RESULTS

3.1 COPC Identification

The screening process described in Section 2.2 for data collected between March and August 2015 identified the following COPCs that required further evaluation of post-event concentrations (bolded in Table 1):

- molybdenum in Polley Lake;
- turbidity in Quesnel Lake and Quesnel River;
- copper in Quesnel Lake; and
- turbidity, TSS, and a number of metals in Hazeltine Creek.

Table 1: Contaminants of Potential Concern Identified in the Receiving Environment Based on Water Quality Monitoring from March through August 2015¹

Waterbody	COPC: Physical ^{2,3}	COPC: Total Metals ²	COPC: Dissolved Metals ²	COPC: Non-Metal Substances
Polley Lake	<i>no substances</i>	molybdenum	molybdenum	<i>no substances</i>
Hazeltine Creek	turbidity, total suspended solids	aluminum, arsenic, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, molybdenum, titanium, zinc	copper, molybdenum	<i>no substances</i>
Quesnel Lake	turbidity	copper	<i>no substances</i>	<i>no substances</i>
Quesnel River	turbidity⁴	<i>no substances</i>	<i>no substances</i>	<i>no substances</i>

Notes:

- 1) Parameters were identified based on 95th percentile of measured values exceeding the BC WQG or CSR standard for the most sensitive end use and exceedance of the pre-event 95th percentile concentration.
- 2) Bolded COPCs were evaluated further in the WQIA update. Metals not bolded had 95th percentile concentrations that only exceeded CSR standards (i.e., total cadmium, total titanium), but did not exceed BC WQGs (dissolved cadmium concentrations did not exceed BC WQGs). These metals were not evaluated further and were conservatively retained for the HHERA.
- 3) Background turbidity concentrations are 1.5 NTU in Hazeltine Creek and 1 NTU in Quesnel Lake and Quesnel River.
- 4) Turbidity was identified as a COPC for Quesnel River based on in-situ data from a continuous logger.

With respect to Hazeltine Creek, suspended particulate matter, measured as TSS and turbidity, and the total forms of 14 metals were identified as COPCs for the period March to August 2015 (Table 1). Of those 14 metals, copper and molybdenum were also identified as COPCs in their dissolved forms. Subsequent evaluation of COPCs identified for Hazeltine Creek focused on those metals that exceeded BC WQGs, while metals that only exceeded CSR standards (i.e., total cadmium, total titanium) were conservatively retained as COPCs in Section 5 for further evaluation in the HHERA. Levels of suspended particulate matter in Hazeltine Creek initially decreased in December and January to those that represented 'clear-flow conditions' in the creek following the commissioning of the sedimentation ponds in December (Golder 2015a) and the onset of low flow freezing conditions. From February to May 2015, particulate matter levels increased in the creek as a result of construction activities along the creek channel that coincided with an early freshet (as illustrated in the photos provided in Attachment 6). These turbid flow episodes were associated with peak concentrations of metal COPCs above BC WQGs and pre-event concentrations in Hazeltine Creek.

In-situ pH values measured when discrete samples were taken from the four waterbodies were mostly within the BC WQG range of 6.5 to 9.0 for aquatic life⁵ and the BC WQG range of 6.5 to 8.5 for drinking water⁶. Based on these data, pH was not identified as a COPC consistent with the PEEIAR WQIA.

The PEEIAR WQIA identified dissolved oxygen (DO) as a COPC in Polley Lake, but DO was not of potential concern in Quesnel Lake, Hazeltine Creek, or Quesnel River. From May to June 2015, DO concentrations in Polley Lake were above the minimum BC WQG of 5 mg/L, but in July and August 2015 concentrations at depth were less than 5 mg/L, indicative of hypoxic conditions (as shown for Station P2 in Attachment 5). These late summer DO conditions were similar to those described for Polley Lake prior to the event by Minnow (2014): in late summer the lake underwent thermal stratification and hypoxic conditions were evident at depths greater than 20 m. Given that DO conditions in Polley Lake resemble pre-event conditions, DO was not identified as a COPC for this lake.

3.2 Changes in COPC Concentrations Over Time

The following section describes post-event changes in receiving environment water quality with respect to COPCs identified in Section 3.1. Changes in COPC concentrations over time from March to August 2015 are discussed below relative to relevant BC WQGs and CSR standards. Post-event concentrations from August 2014 to February 2015 previously reported in the PEEIAR WQIA (Golder 2015a) are provided in each figure for context and discussed where appropriate in the text to facilitate interpretation of data collected between March and August 2015. Results are presented according to each group of COPCs (i.e., suspended particulate matter, metals, nutrients), then within each COPC group. Changes in specific COPCs are discussed for each waterbody.

Data shown for Hazeltine Creek and Quesnel River represent discrete surface grab samples collected as described in the PEEIAR WQIA, except where a continuous data logger measured turbidity. Quesnel Lake and Polley Lake data are from discrete grab samples taken at various depths and were categorized as either surface (1-20 m) or deep (>20 m) for the purpose of evaluating changes over time.

⁵ With the exception of 4% of samples in Polley Lake and 2% of samples in Quesnel River that exceeded BC WQG upper limit of 9.0 (MPMC unpublished data)

⁶ With the exception of: 20% of samples in Polley Lake and 4% of samples in Quesnel Lake that exceeded BC WQG upper limit of 8.5 (MPMC unpublished data)

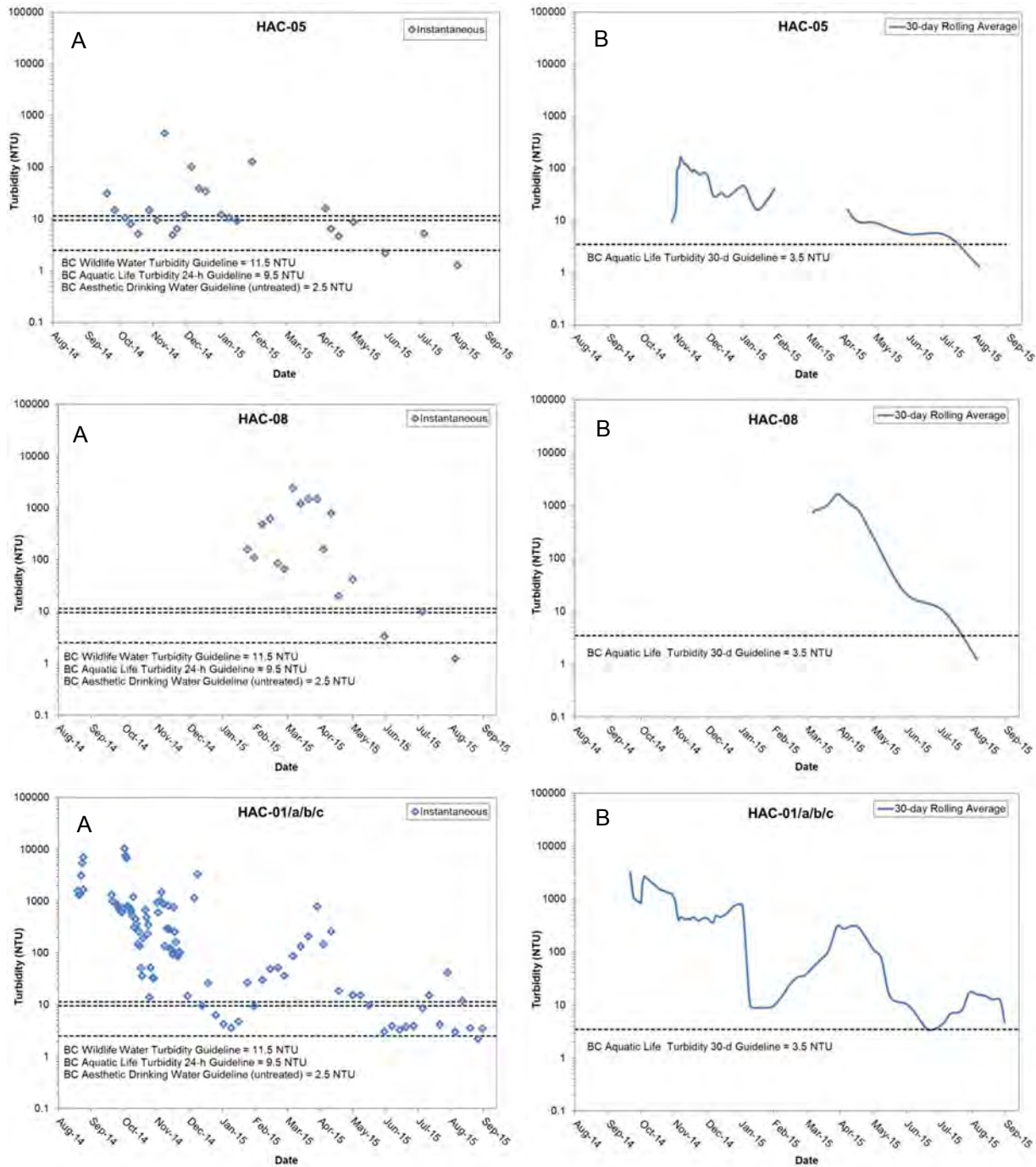
3.2.1 Suspended Particulate Matter (Turbidity/TSS)

Both TSS and turbidity, were identified as COPCs in Hazeltine Creek from March to August 2015, whereas downstream in Quesnel Lake and Quesnel River, only turbidity was identified as a COPC. Larger suspended solids captured in the TSS measurement tend to settle out more quickly than the finer particulates measured by turbidity that might travel further downstream.

3.2.1.1 Hazeltine Creek

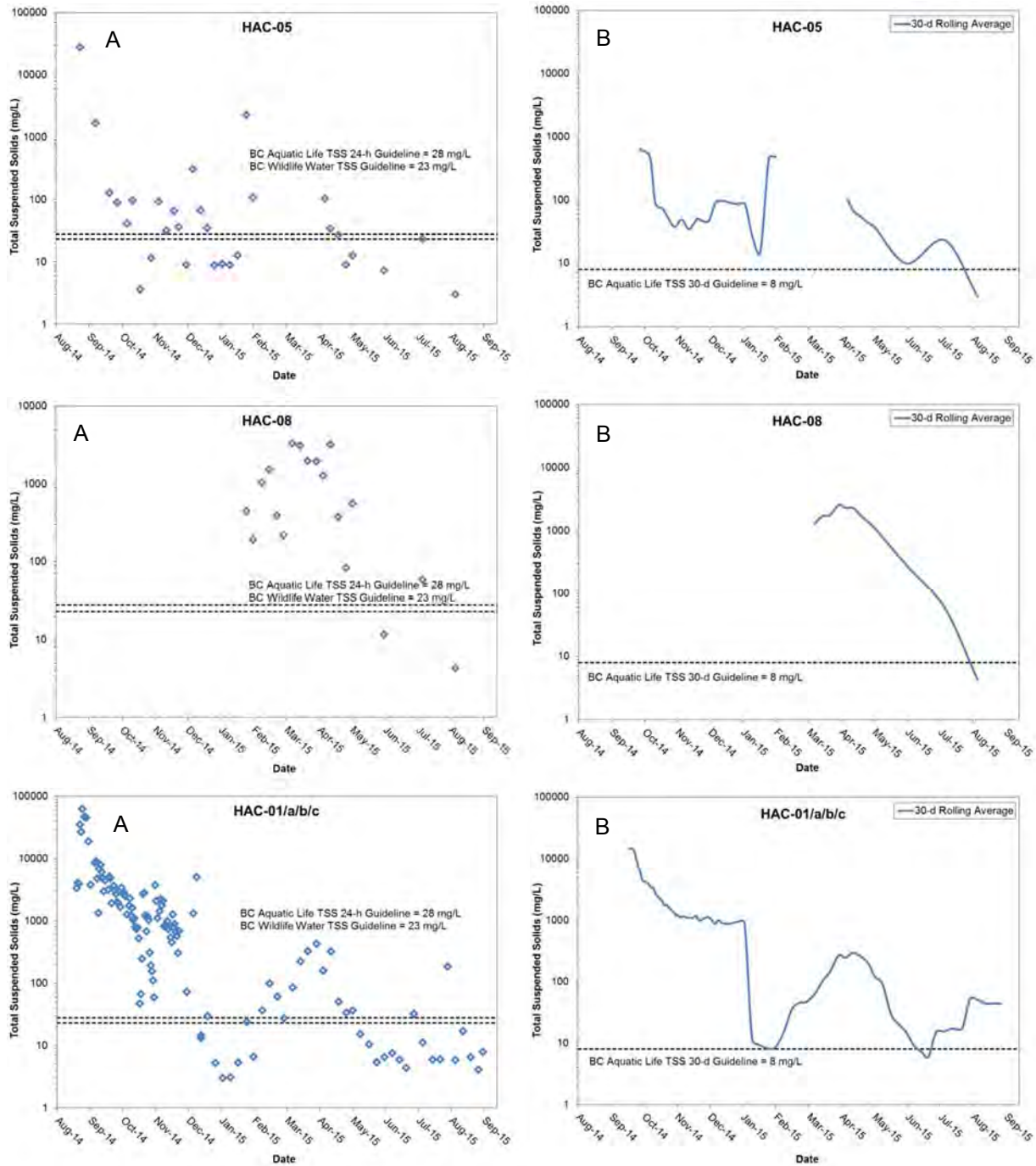
Turbidity and TSS in Hazeltine Creek were measured above BC WQGs following the event and exhibited a general decrease over time at stations HAC-05 and HAC-01/a/b/c from August 2014 through August 2015, and at HAC-08 from April to August 2015 (Figure 1 and Figure 2). Although two sedimentation ponds were commissioned in lower Hazeltine Creek in December 2014, and have been considered to be effective at reducing sediment loads most of the time, spikes in turbidity and TSS were observed downstream at HAC-01/a/b/c between late January and April 2015. This increase in turbidity was attributed to an early freshet and ongoing remediation works along the creek channel. Stabilization and rock armouring of the creek channel was completed on May 11, 2015, which corresponded with a reduction in turbidity. Peaks in turbidity at HAC-01/a/b/c again in late July and mid-August corresponded with construction activities related to a change in discharge location of the creek and maintenance of the sedimentation ponds at that time (pers. comm. S. Litke), rather than due to specific precipitation events (Attachment 6, Figure 5).

In upper Hazeltine Creek (HAC-05) and lower Hazeltine Creek above the sedimentation ponds (HAC-08), turbidity and TSS decreased below the 24-h BC WQG for aquatic life and BC WQG for wildlife water as of May 2015. The corresponding 30-d average concentrations decreased below the 30-d BC WQG for aquatic life in August 2015. As indicated in Figure 1, Station HAC-05 was not sampled between February and April due to active construction activity in the surrounding area. As of May 2015, the majority of measurements of both TSS and turbidity at the outflow of Hazeltine Creek (HAC-01/a/b/c) decreased below the 24-h BC WQGs for aquatic life and BC WQGs for wildlife water, but remained above the 30-d BC WQGs through August 2015. Turbidity at the outflow of Hazeltine Creek remained above the BC aesthetic drinking water guideline for untreated water through August.



Note: Baseline assumed equal to pre-event median turbidity of 1.5 NTU. Gaps represent >30 d between sampling.

Figure 1: Post-event Instantaneous (A) and Rolling 30-day Average (B) Turbidity Concentrations at Stations HAC-05, HAC-08, and HAC-01/a/b/c, Hazeltnie Creek.

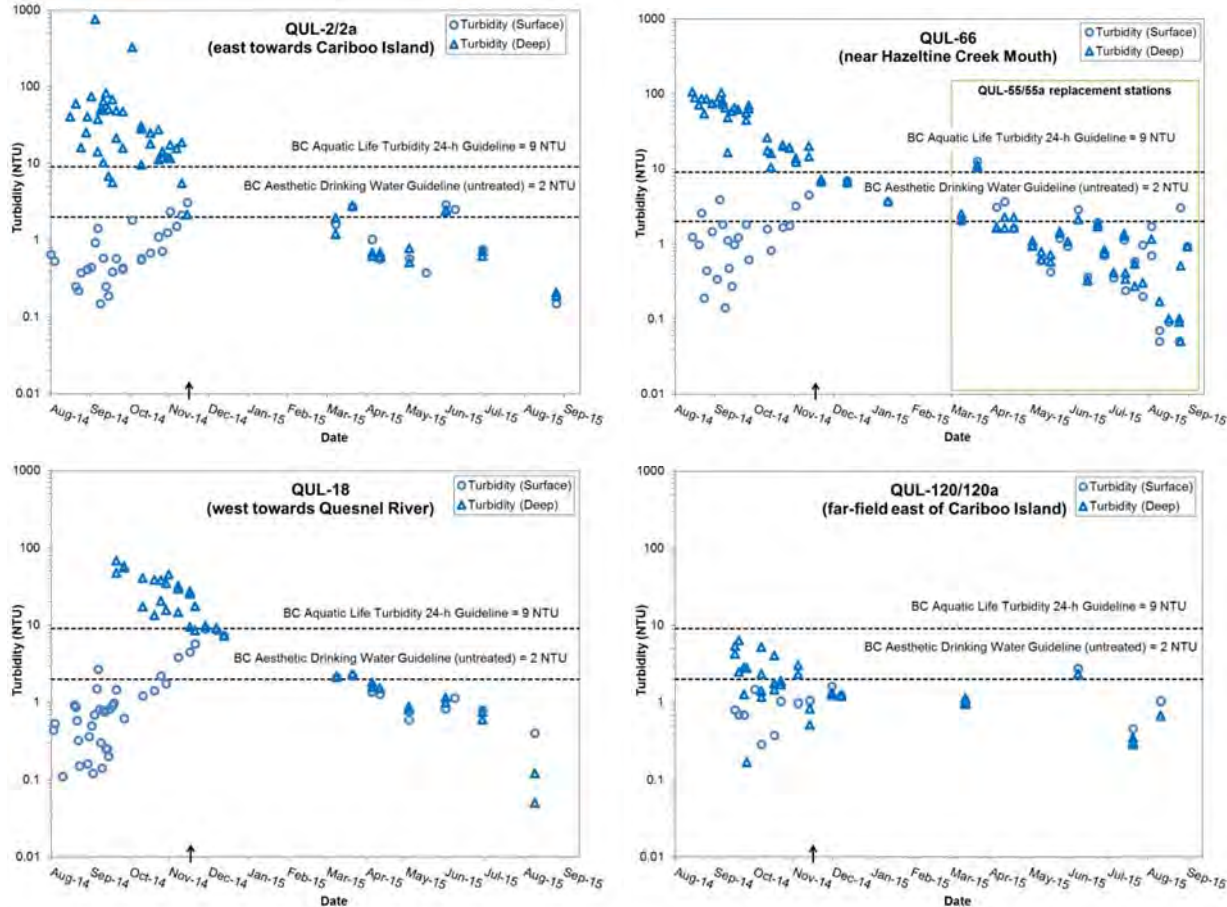


Note: Baseline assumed equal to the MDL of 3 mg/L. Gaps represent >30 d between sampling.

Figure 2: Post-event Instantaneous (A) and Rolling 30-day Average (B) TSS Concentrations at Stations HAC-05, HAC-08, and HAC-01/a/b/c, Hazeltime Creek.

3.2.1.2 Quesnel Lake

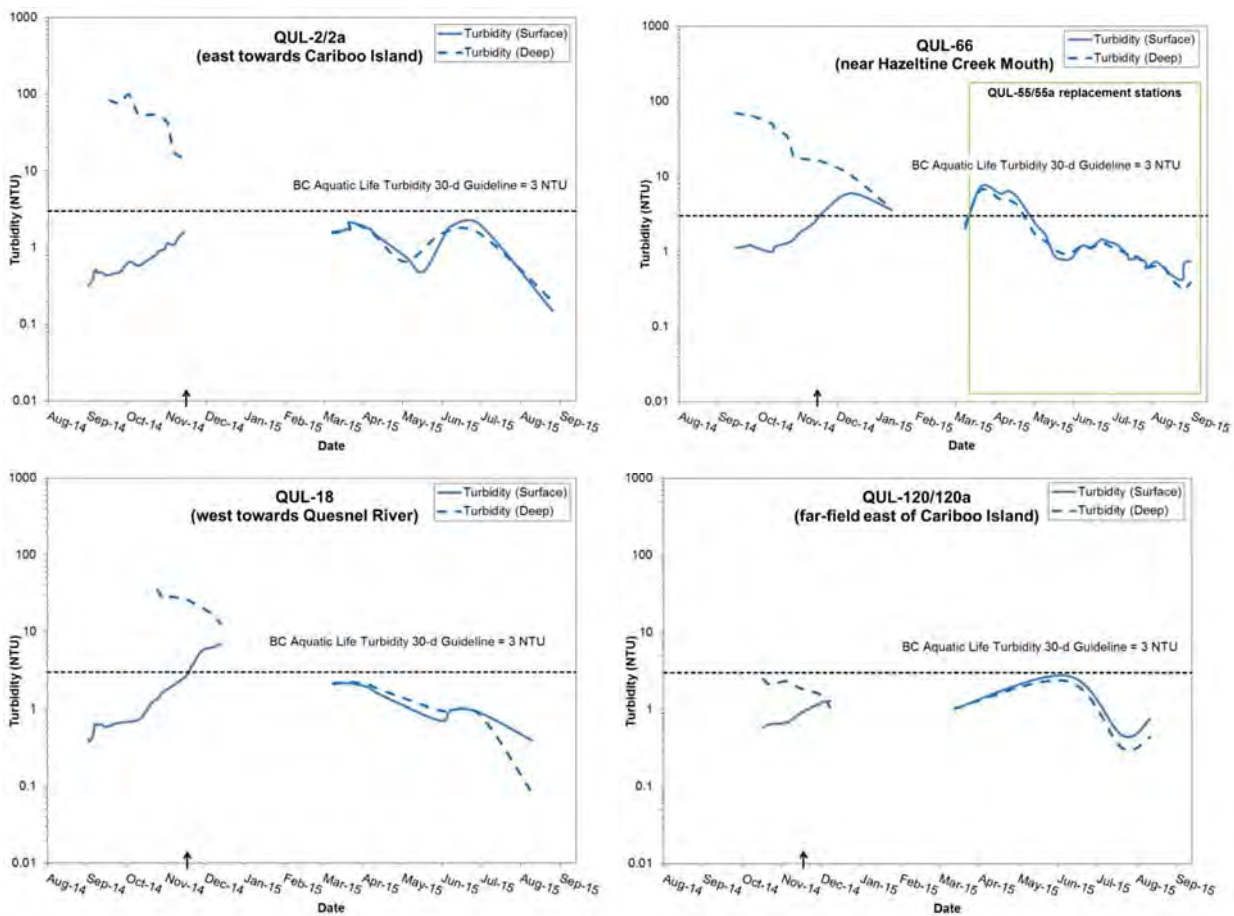
Following the event, turbidity was elevated at depth above 24-h BC WQGs in the West Basin of Quesnel Lake, but was not elevated at the far-field station (QUL-120/120a) east of Cariboo Island (Figure 3). Turbidity concentrations at depth decreased over time at stations QUL-2/2a, QUL-66/55/55a, and QUL-18 and were below or near BC WQGs by April 2015. Concentrations remained below BC WQGs through August 2015. At the surface, turbidity levels generally remained below guideline values with the exception of some exceedances of the aesthetic drinking water guideline for untreated water around the time of fall lake turnover in mid-November 2014 and occasionally into spring (Figure 3). Turbidity was measured above 2 NTU in June at both surface and depth at QUL-2/2a, QUL-66/55/55a, and QUL-120/120a. Given that the increase was observed at several stations including the far-field station, and turbidity in Hazeltine Creek was not abnormally high during that period, the temporary increase in turbidity was likely due to factors besides the mine, such as natural inputs from tributaries. Relative to the changes in turbidity that were observed during fall turnover in 2014, water quality did not appear to be influenced by spring turnover in 2015 as turbidity concentrations were similar at surface and depth during March and April, which is when turnover is expected to occur.



Note: Arrow represents the approximate timing of mid-November turnover in Quesnel Lake. Background assumed equal to 1 NTU.

Figure 3: Post-event Instantaneous Turbidity Concentrations at Stations QUL-2/2a, QUL-66/55/55a, QUL-18, and QUL-120/120a, Quesnel Lake.

Thirty-day average concentrations of turbidity at depth were above the 30-d BC WQG at stations in the West Basin following the event and decreased over time to below the guideline at all four stations by May 2015 (Figure 4). Concentrations at surface were generally below the guideline, except where fall turnover in mid-November 2014 resulted in vertical mixing and elevated turbidity at the surface. At QUL-66/55/55a, near the mouth of Hazeltine Creek, the 30-d average concentrations at surface and at depth were elevated throughout March and April 2015 due to inputs of turbid water from Hazeltine Creek during this period. Turbidity declined from May through August 2015 consistent with a similar general decline in Hazeltine Creek as described in Section 3.2.1.1. For the other stations located further away from the mouth of Hazeltine Creek, 30-d average concentrations remained below the respective guideline from March through August 2015 (Figure 4). Overall, 30-d average concentrations of turbidity at the four Quesnel Lake stations showed a decreasing trend over time to below BC WQGs, from August 2014 to August 2015.



Note: Arrow represents the approximate timing of mid-November turnover in Quesnel Lake. Background assumed equal to 1 NTU. Gaps represent >30 d between sampling.

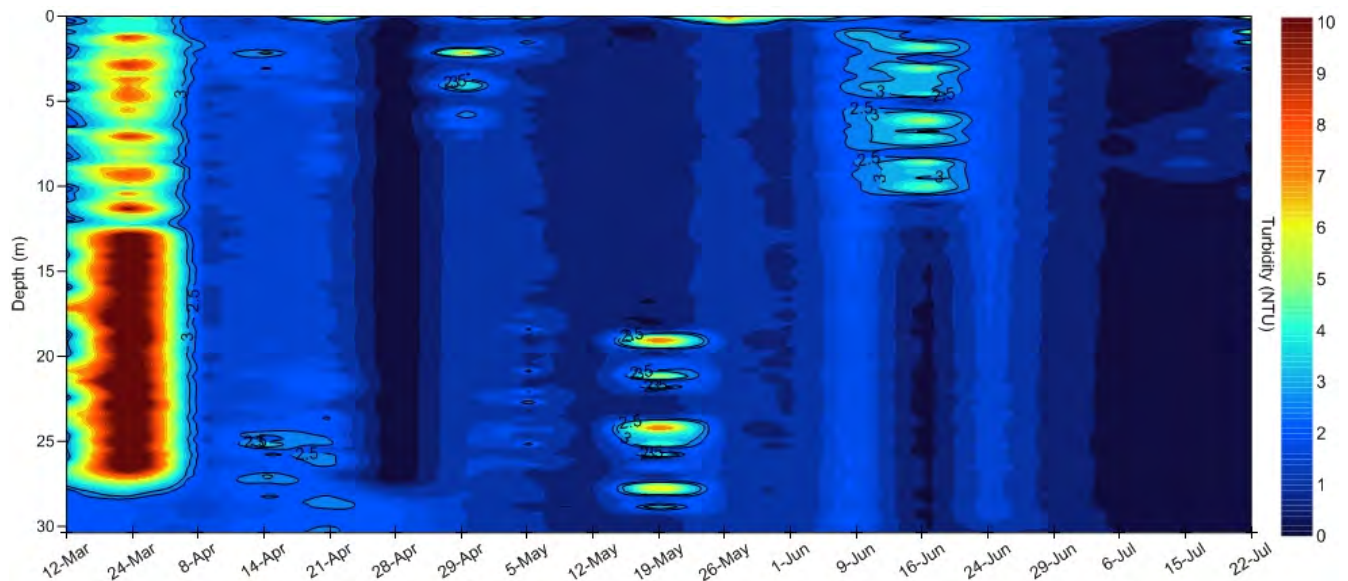
Figure 4: Post-event Rolling 30-day Average Turbidity Concentrations at Stations QUL-2/2a, QUL-66, QUL-18, and QUL-120/120a, Quesnel Lake.

Pollution Abatement Order Requirements: Turbidity

Near-Field Stations

Weekly depth profiles of field parameters were conducted at stations QUL-54, QUL-55, and QUL-56 near the mouth of Hazeltine Creek from March until late July 2015, when the outlet of Hazeltine Creek was redirected. Stations QUL-54a, QUL-55a, and QUL-56a were established near the new outlet to replace the previous stations and monitoring was continued at the same frequency.

- At QUL-55, turbidity was elevated up to 13 NTU throughout the water column on March 24, 2015, but thereafter rarely exceeded 3 NTU (i.e., criterion of 2 NTU above background of 1 NTU) between weekly sampling events (Figure 5). The same trends were observed for QUL-54 and QUL-56 during this period, but at these stations turbidity values in March were typically lower than those reported for QUL-55, remaining below 7 NTU (Attachment 6, Figures 6-7).
- From late July to August 2015 turbidity was less than 3 NTU at stations QUL-54a, QUL-55a, and QUL-56a except for an exceedance of up to 14 NTU around 7 m depth at QUL-56a in late July (Attachment 6, Figures 8-10). It is possible the observed temporary increase in turbidity close to the mouth of Hazeltine Creek was due to sediment mobilization as a result of construction of the new outlet to Quesnel Lake that occurred within this time period.

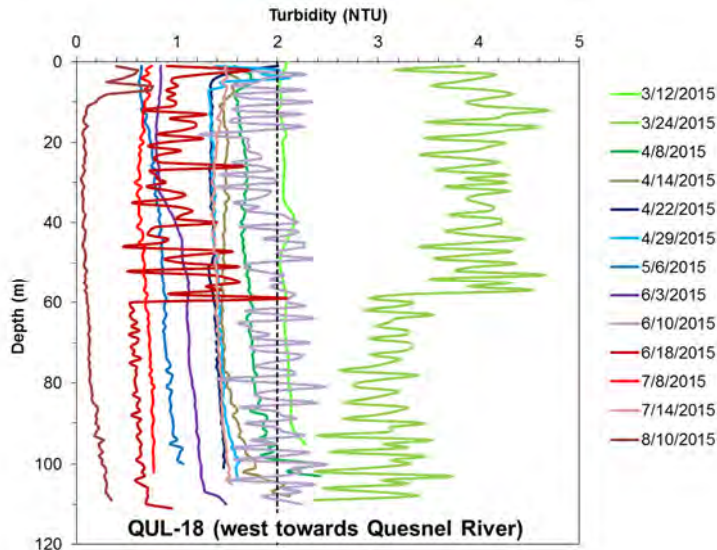


Note: The contour at 3 NTU represents the criterion of 2 NTU above background (1 NTU).

Figure 5: Contours of Turbidity Measured In-situ over Time at Station QUL-55 in Quesnel Lake (March to July 2015).

Western Mid-Field Station

At Station QUL-18, depth profiles of field parameters were recorded on 13 dates between March and August 2015, at a frequency of twice per month. On March 24, 2015, turbidity ranged from 2.5 to 4.5 NTU throughout the water column and exceeded the criterion of 1 NTU above background (Figure 6). This corresponded with observations of elevated turbidity at near-field Quesnel Lake stations on this date (i.e., QUL-55, see Figure 5). At other mid-field stations (QUL-2a east and QUL-21a west) turbidity was 2.8 NTU throughout the water column on this date (data not shown). Other than slight exceedance of this turbidity criterion at QUL-18 on March 12 and June 10, turbidity throughout the water column was below 2 NTU through to August.

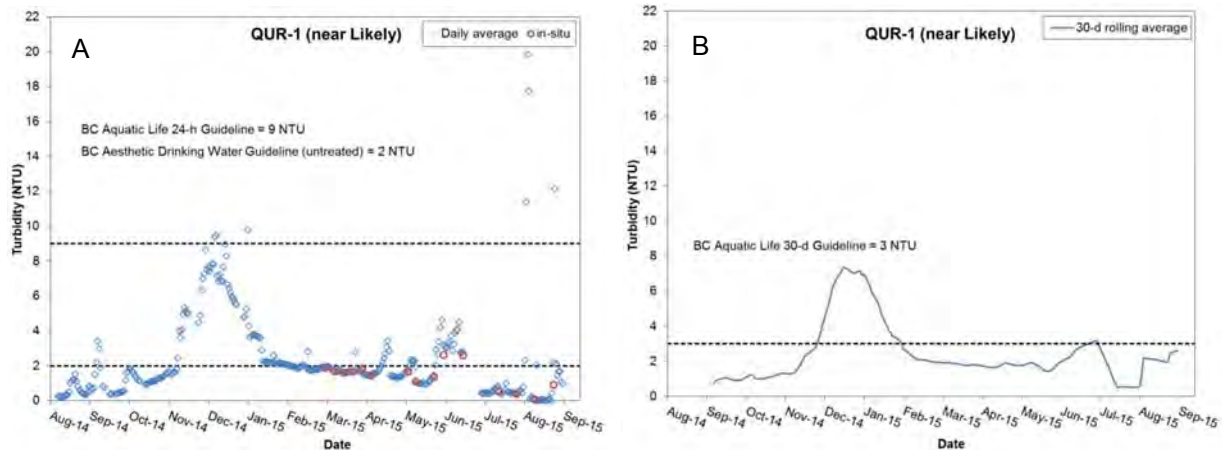


Note: Dotted line indicates criterion of 1 NTU above the background (1 NTU).

Figure 6: Depth Profiles of Turbidity at Station QUL-18 in Quesnel Lake (March to August 2015).

3.2.1.3 Quesnel River

Following the event, turbidity concentrations at Station QUR-1 were below the 24-h BC WQG for aquatic life, with the exception of a few exceedances in December 2014 and July and August 2015 (Figure 7). Turbidity spiked from late November 2014 to late January 2015, due to fall turnover of Quesnel Lake and mixing of deep turbid water, and the 30-d average concentration exceeded the 30-d BC WQG for aquatic life during this period. From mid-February through to the end of August 2015, turbidity concentrations in the river were below the 30-d BC WQG (Figure 7). Turbidity intermittently exceeded the BC aesthetic drinking water guideline for untreated water through to August 2015, but daily averages were typically below this guideline. The higher turbidity values recorded in June and August were not corroborated by in-situ measurements taken with a portable turbidity meter during collection of water samples on an alternating weekly basis (Figure 7). These higher turbidity readings are thought to be attributed to sensor fouling, in addition to the Sonde potentially being exposed from the water in August (pers. comm. S. Litke). The Sonde was moved and redeployed in early September 2015.



Note: Background assumed equal to 1 NTU.

Figure 7: Post-event Instantaneous (A) and Rolling 30-day Average (B) Turbidity Concentrations at Station QUR-1 near Likely, Quesnel River.

3.2.2 Metals

Screening of data collected between March and August 2015 identified molybdenum to be a COPC in Polley Lake and copper to be a COPC in Quesnel Lake. No metals were identified to be of potential concern in Quesnel River. A number of metals were identified to be COPCs in Hazeltine Creek, including copper and molybdenum (Table 1).

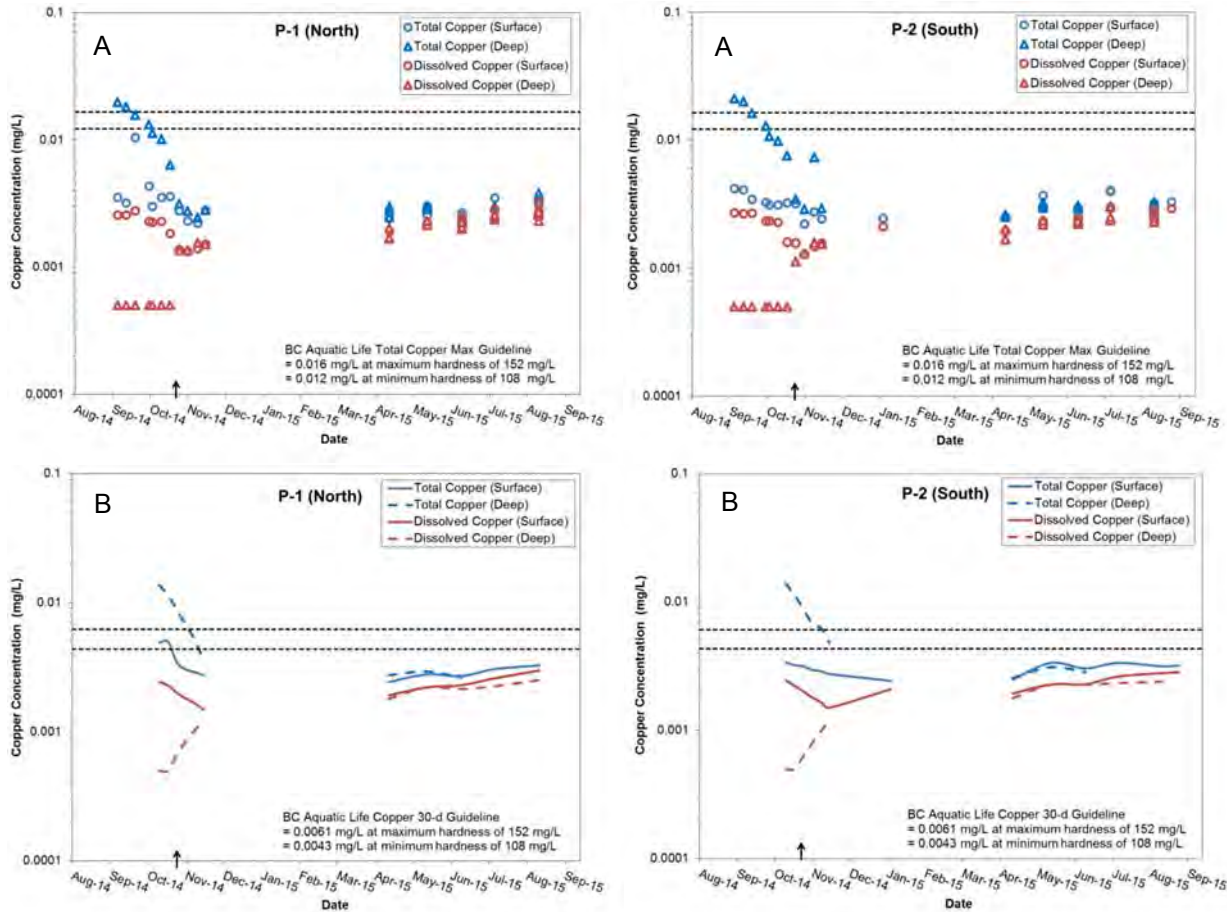
The PEEIAR WQIA identified copper as the COPC of primary interest because total and dissolved forms were reported to be above BC WQGs during the post-event period evaluated from August 2014 to February 2015 (Golder 2015a). It was therefore appropriate in this WQIA update to evaluate post-event changes in copper concentrations over a one-year period until August 2015 in the four monitored waterbodies, regardless of whether copper screened in as a COPC based on concentrations measured from March to August. With respect to other metals identified as COPCs in the PEEIAR WQIA, they were only evaluated further if they screened in as COPCs based on concentrations measured from March to August (Table 1).

Selenium was not identified as a COPC in Table 1 given that concentrations were below guidelines in the monitored waterbodies. However, due to previous concerns regarding a historic selenium source to Polley Lake that has since been mitigated and related monitoring efforts prior to the event (Minnow 2014), trends in selenium concentrations were evaluated further in Polley Lake, Hazeltine Creek, and the near-field area of Quesnel Lake close to the Hazeltine Creek mouth.

3.2.2.1 Polley Lake

Copper

Although initially elevated after the event, total copper concentrations at depth in Polley Lake decreased over time to below applicable BC WQGs by fall turnover in mid-November (Figure 8). Post-event dissolved copper concentrations were consistently below BC WQGs. By April 2015, total and dissolved copper concentrations had converged and stabilized to between 0.002 and 0.003 mg/L through the end of August 2015 (Figure 8).



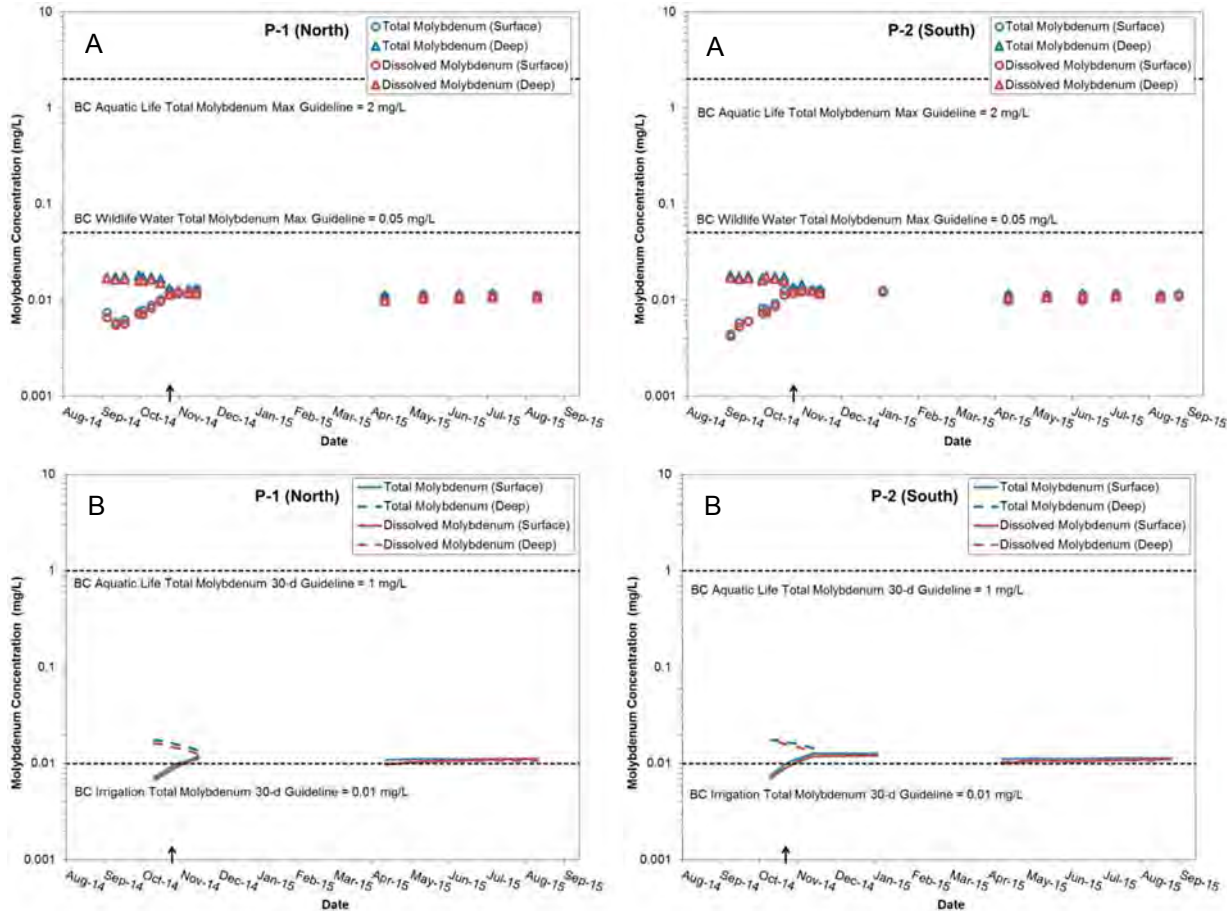
Note: Arrow represents the approximate timing of late-October turnover in Polley Lake. Gaps represent >30 d between sampling.

Figure 8: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total and Dissolved Copper Concentrations at Stations P1 and P2, Polley Lake

Molybdenum

Total and dissolved molybdenum concentrations at stations P1 and P2 in Polley Lake were similar and consistently below the maximum BC WQGs for aquatic life and wildlife water following the event through August 2015 (Figure 9). Concentrations at depth were higher than at the surface until fall turnover, when the water column was vertically mixed and concentrations remained stable at around 0.01 mg/L thereafter.

The 30-d average concentrations of molybdenum were consistently below the 30-d BC WQG for aquatic life, but slightly exceeded the 30-d BC WQG for irrigation (Figure 9). The BC WQG for irrigation was considered in the assessment because it is conservatively expected to be protective of ruminant wildlife that might be exposed through dietary uptake from irrigated plant foods. However, only aquatic vegetation along the edges of Polley Lake is expected to be in contact with lake water because the lake is not used as an irrigation source; consequently, there has been little potential for uptake of molybdenum by ruminant wildlife. Additional discussion regarding the potential for molybdenum uptake by ruminant wildlife in Polley Lake is provided in Golder (2015a).



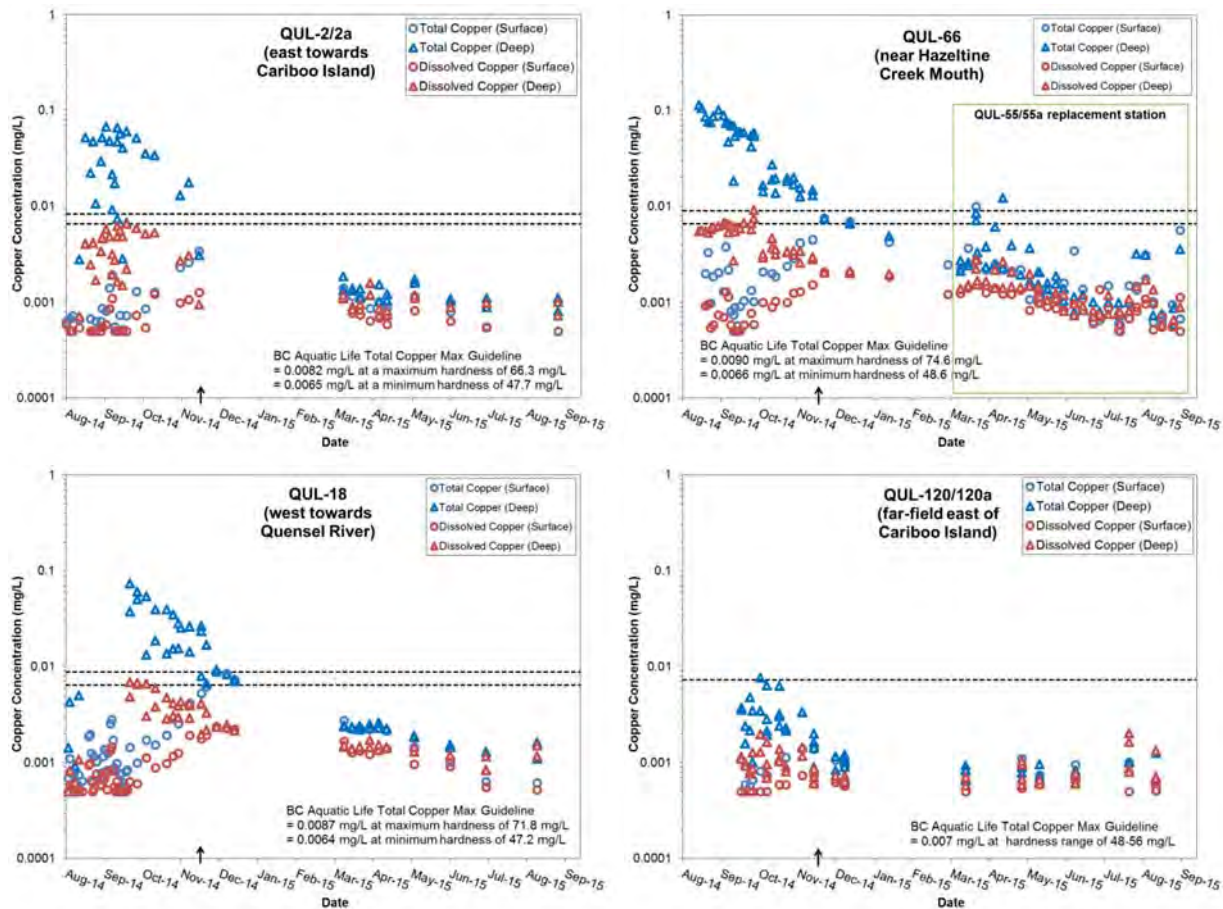
Note: Arrow represents the approximate timing of late-October turnover in Polley Lake. Gaps represent >30 d between sampling.

Figure 9: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total and Dissolved Molybdenum Concentrations at Stations P1 and P2, Polley Lake.

3.2.2.2 Quesnel Lake

Copper

Following the event, total copper concentrations at depth were elevated above the maximum BC WQG for aquatic life in the West Basin of Quesnel Lake, but were not elevated at the far-field station (QUL-120/120a) east of Cariboo Island (Figure 10). Dissolved concentrations (surface and depth) and total concentrations at the surface were typically below the maximum BC WQGs. Total copper concentrations at depth decreased over time, converged with surface and dissolved concentrations by early March 2015, and were below the maximum BC WQG by April. As of late August 2015, copper concentrations reported for QUL-66/55/55a (near the mouth of Hazeltine Creek) were generally similar to concentrations reported elsewhere in the lake, including the far-field station (QUL-120/120a) east of Cariboo Island (Figure 10), with the exception of a few measurements that were higher than the norm, but nonetheless below guidelines. These elevated measurements at the near-field stations are likely associated with periods when Hazeltine Creek flows were more turbid and contained higher TSS levels, as a result of rehabilitation and construction work during that period.

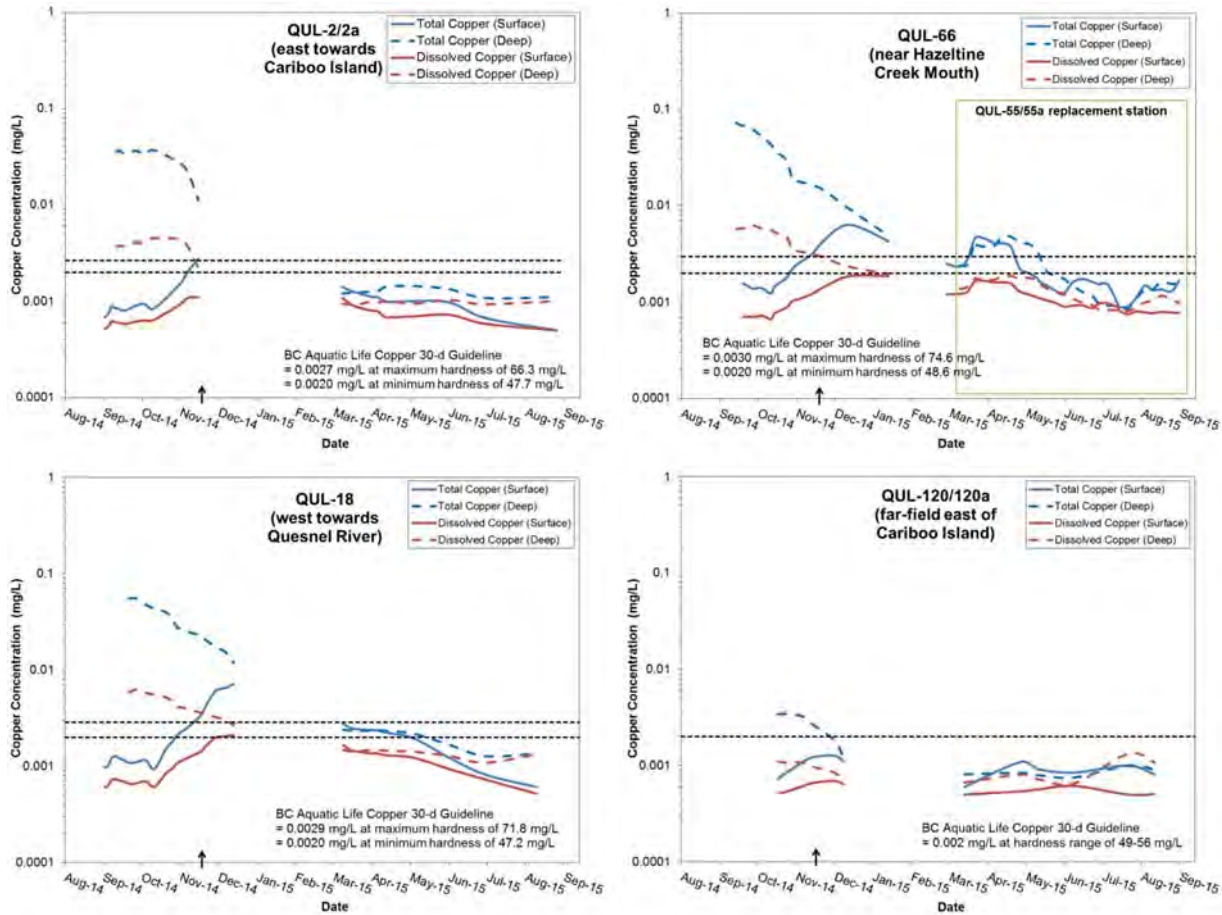


Note: Arrow represents the approximate timing of mid-November turnover in Quesnel Lake.

Figure 10: Post-event Instantaneous Total and Dissolved Copper Concentrations at Stations QUL-2/2a, QUL-66/55/55a, QUL-18, and QUL-120/120a, Quesnel Lake.

Following the event, 30-d average concentrations of total and dissolved copper at depth were elevated above surface concentrations and the 30-d BC WQG for aquatic life at stations in the West Basin (Figure 11). At mid-field stations QUL-2/2a and QUL-18, 30-d average concentrations decreased below the BC WQG by March 2015 (Figure 11). At near-field Station QUL-66/55/55a, near the mouth of Hazeltine Creek, the 30-d average for total copper remained elevated above the BC WQG from March to May 2015, reflective of higher turbidity levels associated with Hazeltine Creek during this period and a concurrent increase in total and dissolved copper concentrations at HAC-01/a/b/c (see Section 3.2.2.4).

Total and dissolved concentrations of copper at each of the four Quesnel Lake stations remained at around 0.001 mg/L by June 2015.



Note: Arrow represents the approximate timing of mid-November turnover in Quesnel Lake. Gaps represent >30 d between sampling.

Figure 11: Post-event Rolling 30-day Average Total and Dissolved Copper Concentrations at Stations QUL-2/2a, QUL-66/55/55a, QUL-18, and QUL-120/120a, Quesnel Lake.

3.2.2.3 Quesnel River

Copper

Total copper concentrations at Station QUR-1 in Quesnel River peaked in December, reflecting increased turbidity during this period, and exceeded the maximum BC WQG until January 2015 (Figure 12). Dissolved copper concentrations were substantially lower than the maximum BC WQG for aquatic life throughout the sampling period. By May 2015, total copper concentrations converged with dissolved concentrations, which would suggest that most of the copper associated with suspended particulate matter had settled out of the water column.

The 30-d average concentrations of total copper declined from a peak in January 2015 to below the 30-d BC WQG for aquatic life by mid-April and continued to decline through August (Figure 12). The 30-d average dissolved concentrations were slightly above the most conservative 30-d BC WQG between December and mid-January, but also declined through to August.

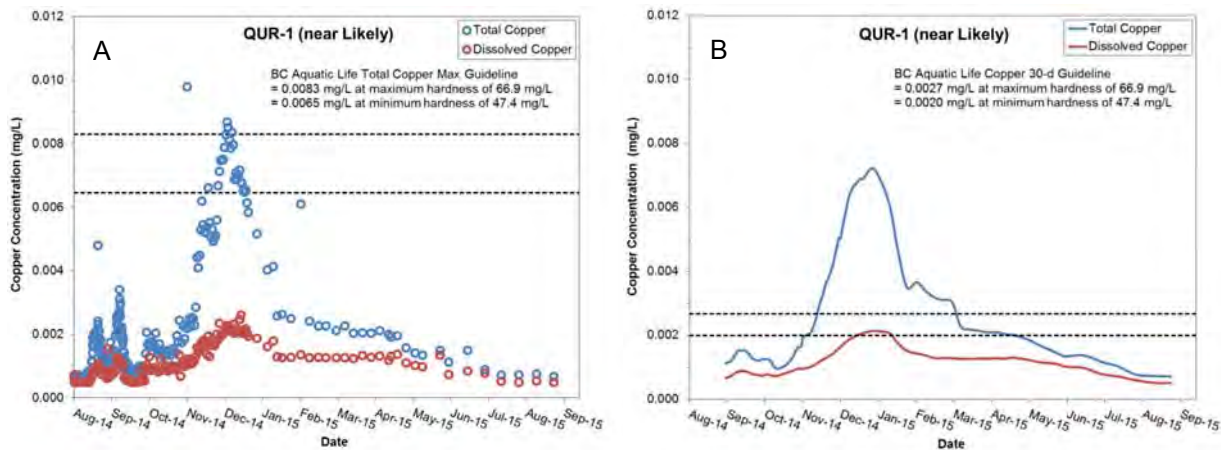


Figure 12: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total and Dissolved Copper Concentrations at Station QUR-1 near Likely, Quesnel River.

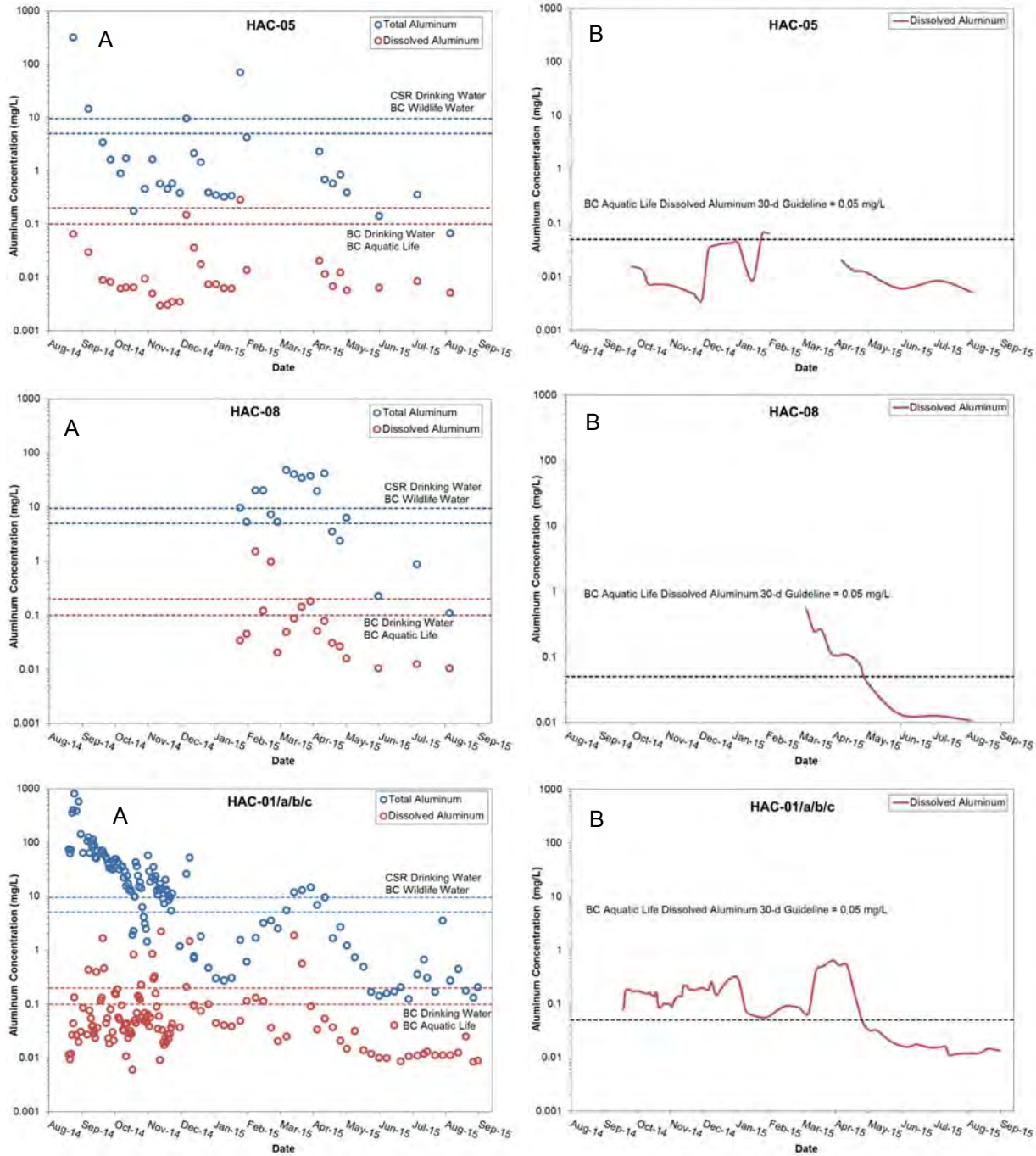
3.2.2.4 Hazeltine Creek

Hazeltine Creek was not defined as a receiving environment in the PEEIAR because the creek was not considered to be fish habitat during the period assessed based on rationale provided in Golder (2015a). For the purpose of the DSI, however, Hazeltine Creek is considered as part of the receiving environment. Spatial and temporal trends in creek water quality are presented graphically for the four metals identified as COPCs in Table 1 that had the largest magnitude of guideline exceedance (i.e., aluminum, copper, chromium, and iron). Trends are shown for Station HAC-05 in upper Hazeltine Creek, Station HAC-08 upstream of the sedimentation ponds, and Station HAC-01/a/b/c downstream of the sedimentation ponds in lower Hazeltine Creek.

Aluminum

In upper Hazeltine Creek (HAC-05), aluminum concentrations remained below BC WQGs or CSR standards for drinking water, wildlife water, and aquatic life following the event through August 2015, with a few exceptions (Figure 13). In the lower creek, total and dissolved aluminum concentrations at HAC-01/a/b/c were above corresponding maximum BC WQGs and CSR standards following the event until December 2014, and again from February to April 2015 (Figure 13). Aluminum concentrations were similarly elevated at HAC-08 during this period in 2015. From May through August 2015, concentrations in lower Hazeltine decreased below maximum guidelines.

The 30-d average dissolved concentrations at stations HAC-05, HAC-08, HAC-01/a/b/c were consistently above the 30-d dissolved aluminum BC WQG for aquatic life until late April 2015 and then decreased below guidelines through August 2015 (Figure 13). Elevated aluminum concentrations at stations in lower Hazeltine Creek reflected the increased turbidity during the same time period.



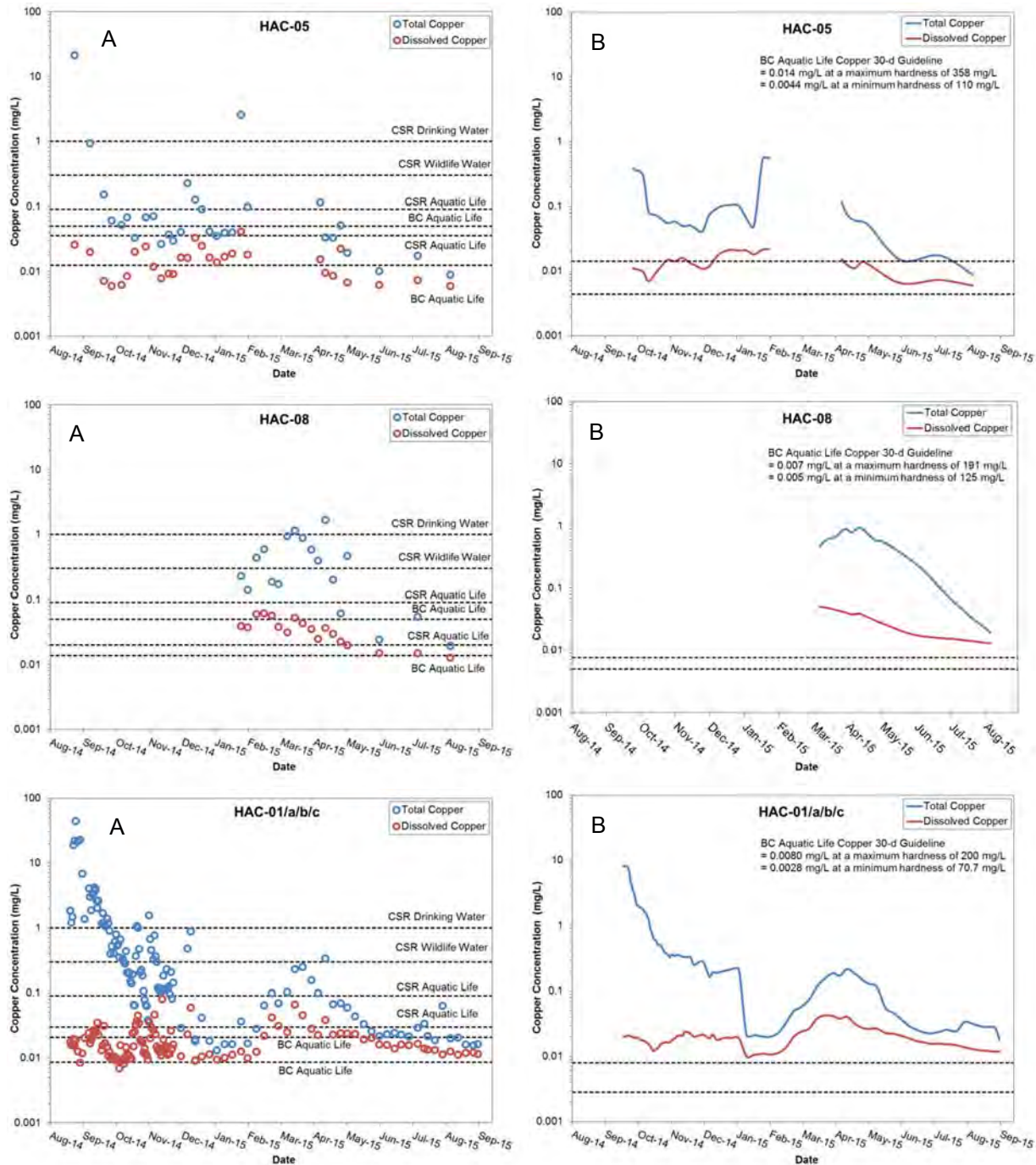
Note: CSR – Schedule 6 Drinking Water Total Aluminum Standard = 9.5 mg/L; BC Wildlife Water Total Aluminum Max Guideline = 5 mg/L; BC Drinking Water Dissolved Aluminum Max Guideline = 0.2 mg/L; BC Aquatic Life Dissolved Aluminum Max Guideline = 0.1 mg/L. Dashed line colour corresponds to total or dissolved values. Gaps represent >30 d between sampling.

Figure 13: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total and Dissolved Aluminum Concentrations at Stations HAC-05, HAC-08, and HAC-01/a/b/c, Hazeltine Creek.

Copper

Following the event and until June 2015, total copper concentrations in Hazeltine Creek were typically above BC WQGs and CSR standards for aquatic life (Figure 14). From June to August 2015, total concentrations in the upper creek were mostly below the maximum BC WQG when minimum hardness conditions were considered. Total concentrations at HAC-08 and HAC-01/a/b/c decreased over time, but showed the same trend of peak concentrations in March 2015 that corresponded with increased turbidity and total forms of other metals during turbid flow episodes that occurred during the early freshet and ongoing rehabilitation work in the creek. Total concentrations decreased below CSR standards by May 2015 and remained within the range of BC WQGs based on the range of hardness observed at this station. Dissolved concentrations at HAC-05, HAC-08, and HAC-01/a/b/c were typically below the maximum BC WQG with the exception of several guideline exceedances that occurred between February and April 2015 (Figure 14).

In the upper creek, 30-d average concentrations of total and dissolved copper were mostly above the 30-d BC WQGs for aquatic life based on maximum and minimum hardness, respectively (Figure 14). Thirty-day average concentrations in the lower creek were consistently above the 30-d BC WQG calculated using the reported hardness range, but appear to continue to decline.



Note: CSR – Schedule 6 Drinking Water Total Copper Standard = 1 mg/L; CSR – Schedule 6 Wildlife Water Standard = 0.3 mg/L; CSR – Schedule 6 Aquatic Life Total Copper Standard = 0.03-0.09 mg/L; BC Aquatic Life Total Copper Max Guideline = 0.009-0.04 mg/L. Gaps represent >30 d between sampling.

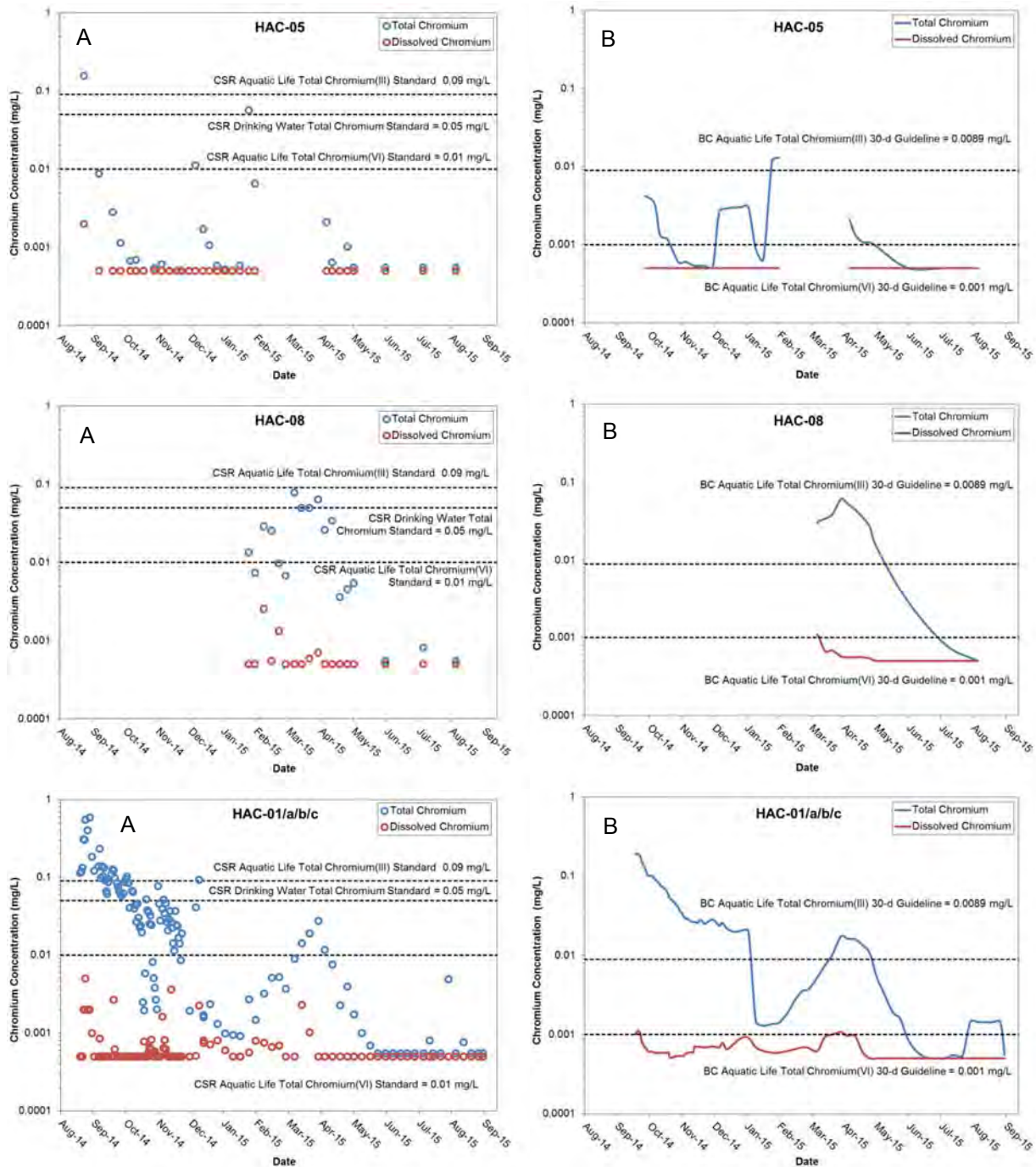
Figure 14: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total and Dissolved Copper Concentrations at Stations HAC-05, HAC-08, and HAC-01/a/b/c, Hazelton Creek.

Chromium

As discussed in Golder (2015a), the available speciation data for Hazeltine Creek indicates the dominant chromium species in Hazeltine Creek was chromium III, which is less toxic than the chromium VI form. However, as a conservative measure, guidelines and standards for both chromium species were considered in this assessment.

At the upper creek station, total concentrations were typically below the CSR Standards for drinking water and aquatic life; however, one sample collected immediately after the event exceeded the Cr-III CSR standard (Figure 15). Total concentrations fluctuated through December 2014 and January 2015, and 30-d average concentrations typically did not exceed the 30-d BC (Cr-III) WQG. In the lower creek, total concentrations at HAC-01/a/b/c were above CSR standards following the event and into early January 2015 and showed the same peak in concentration in March 2015 as was observed for total forms of other metals (Figure 15). The 30-d average concentration of total chromium also exceeded the 30-d BC (Cr-III) WQG during March (Figure 15). Total chromium concentrations were similarly elevated at HAC-08 during this period in 2015. Total concentrations had decreased below CSR standards and the 30-d BC (Cr-III) WQG by May and June 2015, respectively.

Dissolved concentrations in Hazeltine Creek were consistently below the BC WQGs and CSR standards.



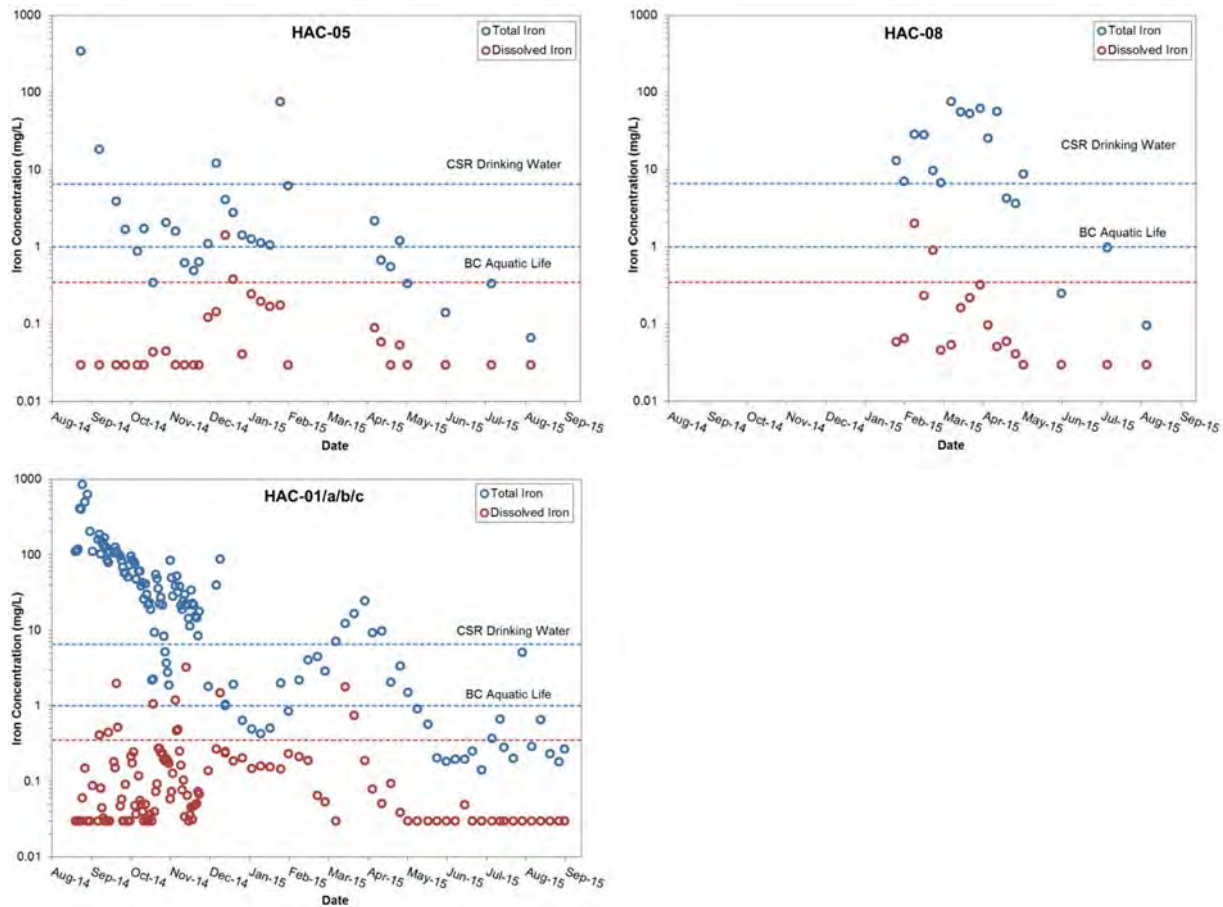
Note: Gaps represent >30 d between sampling.

Figure 15: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total and Dissolved Chromium Concentrations at Stations HAC-05, HAC-08, and HAC-01/a/b/c, Hazeltille Creek.

Iron

Total iron concentrations at the upper station HAC-05 exceeded the CSR drinking water standard intermittently following the event and exceeded the BC WQG for aquatic life consistently until May 2015 (Figure 16). Dissolved iron concentrations were typically below the BC WQG for dissolved iron at this station.

In lower Hazeltine Creek, total iron concentrations at HAC-01/a/b/c were elevated immediately following the event and remained so into late November 2014, after which concentrations decreased below guidelines until they peaked again in March 2015. Total iron concentrations were similarly elevated at HAC-08 during this period in 2015. Total iron concentrations showed the same peaks observed for concentrations of total forms of other metals. Total concentrations exceeded the CSR standard and BC WQG during these periods, then decreased below CSR standard and BC WQG by mid-May (Figure 16). The exception was a single event in August in which total values at both lower stations were more than ten times the preceding and subsequent values taken in July and August. Dissolved concentrations were variable after the event through April 2015, but typically did not exceed the BC WQG and were close to the limit of detection after April 2015.



Note: CSR – Schedule 6 Drinking Water Total Iron Standard = 6.5 mg/L; BC Aquatic Life Total Iron Max Guideline = 1 mg/L; BC Aquatic Life Dissolved Iron Max Guideline = 0.35 mg/L. Dashed line colour corresponds to total or dissolved values.

Figure 16: Post-event Instantaneous Total and Dissolved Iron Concentrations at Stations HAC-05, HAC-08, and HAC-01/a/b/c, Hazeltine Creek.

Other Metals

Spatial and temporal trends for other metals identified as COPCs in Table 1 are presented graphically in Attachment 7 and described below. Note that the order of COPCS presented in Attachment 7 follows the order presented below.

Arsenic

Total arsenic concentrations at Station HAC-05 in upper Hazeltine Creek were initially elevated after the event, but were typically below BC WQGs and CSR standards for aquatic life, wildlife water, and drinking water from September 2014 through August 2015 (Attachment 7). Total and dissolved concentrations converged with time and likely resulted from erosion controls in the creek.

In lower Hazeltine Creek, total concentrations at HAC-08 exceeded maximum BC WQGs and CSR standards in January through April 2015 and remained below guidelines thereafter (Attachment 7). Thirty-day average concentrations of total arsenic were consistently above the 30-d BC WQG for aquatic life until June 2015. Total concentrations at HAC-01/a/b/c exceeded maximum BC WQGs and CSR standards following the event until December 2014 (Attachment 7). Total concentrations decreased over time and remained below guidelines from December 2014 through August 2015. Thirty-day average concentrations of total arsenic were consistently above the 30-d BC WQG for aquatic life until January 2015 and slightly exceeded the guideline in April 2015. Since May 2015, 30-d average concentrations have been below the 30-d BC WQG. Dissolved concentrations remained well below guidelines at all three stations and at all times since September 2014.

Molybdenum

Total and dissolved concentrations of molybdenum at stations HAC-05 and HAC-01/a/b/c were elevated above the BC WQG for wildlife water immediately following the event, but were consistently below maximum BC WQGs from September 2014 through August 2015 (Attachment 7). Molybdenum concentrations at HAC-08 were consistently below guidelines during the monitoring period in 2015. Total and dissolved concentrations were similar throughout the sampling period. Thirty-day average concentrations were well below the 30-d BC WQG for aquatic life and only slightly above the most conservative 30-d BC WQG for irrigation through August 2015, similar to that observed for Polley Lake (Section 3.2.2.1).

Cadmium and Titanium

Total forms of these metals were identified as COPCs in Table 1 based on the 95th percentile values exceeding CSR standards. Consequently, total cadmium and total titanium will be retained as COCs in the DSI (Section 5.0). Dissolved cadmium was not identified as a COPC based on comparison to the BC WQG which is a dissolved guideline. There is no BC WQG for titanium.

Beryllium, Cobalt, Lead, and Manganese

Total forms of these metals were identified as COPCs in Table 1 based on 95th percentile values exceeding the corresponding 30-d BC WQGs for aquatic life.

In upper Hazeltine Creek, 30-d average concentrations of these metals did not exceed the 30-d BC WQGs from March through August 2015 (Attachment 7). In lower Hazeltine Creek, peak concentrations of these metals were identified in March and April relative to other months in 2015 (Attachment 7). Thirty-day average concentrations of total beryllium and cobalt were above the 30-d BC WQGs from March to June at HAC-08 and March to May at HAC-01/a/b/c and decreased below guidelines thereafter. With respect to lead and manganese, 30-d average concentrations at HAC-08 exceeded the 30-d BC WQG under the most conservative site-specific hardness scenario (i.e., lowest hardness) from March to May, but did not exceed the 30-d BC WQGs at HAC-01/a/b/c from March through August 2015.

Zinc

Total zinc was identified as a COPC in Table 1 based on 95th percentile values exceeding the maximum and 30-d BC WQGs for aquatic life under the most conservative site-specific hardness scenario (i.e., lowest hardness).

In upper Hazeltine Creek, total zinc did not exceed BC WQGs from March through August 2015 (Attachment 5). In lower Hazeltine Creek, peak concentrations were identified in February and March relative to other months in 2015 (Attachment 7). At these lower creek stations, instantaneous concentrations only exceeded the most conservative maximum BC WQG in February and March at HAC-08 and in March at HAC-01/a/b/c, and then decreased below the guideline thereafter. The 30-d average concentrations at the lower creek stations exceeded the most conservative 30-d BC WQG from February to June 2015 and decreased below the guideline thereafter.

3.2.3 Selenium

Prior to the event, selenium concentration trends in water, sediment, and biota in Polley Lake were being monitored by MPMC in response to the identification of increasing selenium concentrations in the lake attributed to a mine-related source that was controlled through mitigation measures in 2009 (Minnow 2014). Between 2006 and 2009, selenium increased two-fold above baseline in Polley Lake to a maximum concentration of 0.0019 mg/L due to selenium inputs from North Bell Dump seepage and runoff from the eastern side of the mine site. Concentrations then decreased to approximately 0.0007 mg/L from 2009 to 2013 following construction of a runoff collection system (Minnow 2014).

After the event, total and dissolved concentrations of selenium were similar to each other throughout Polley Lake and did not reflect the trend of higher total concentrations at depth that was observed for copper (Attachment 7). Concentrations remained stable at around 0.0009 mg/L from November 2014 through August 2015. In Hazeltine Creek, selenium was measured above guidelines immediately after the event with total concentrations higher than dissolved. Concentrations decreased to below guidelines by October 2014. Total and dissolved concentrations converged by December 2014, and stabilized at around 0.001 mg/L through August 2015. At station QUL-66/55/55a close to the mouth of Hazeltine Creek, total and dissolved concentrations were measured at or near the detection limits from August 2014 through August 2015. Note that the analytical detection limit for selenium was improved in March 2015 (see Attachment 7, Figure 15), which led to an apparent decrease in concentrations in Quesnel Lake.

Overall, post-event selenium concentrations in Polley Lake, Hazeltine Creek, and the near-field environment of Quesnel Lake remained stable below guidelines or decreased to below guidelines shortly after the event and remained stable thereafter. Current BC water quality guidelines are protective of toxicity to aquatic life, including the potential for food chain accumulation. Since the concentrations are below these guidelines, concentrations of selenium in water as a result of the tailings dam failure are not considered to be a risk to aquatic life.

3.2.4 Nutrients: Phosphorus

Phosphorus was not identified as a COPC for Polley and Quesnel lakes based on screening of total phosphorus (TP) data collected in these lakes from March to August 2015 (Table 1). Concentrations of total and dissolved phosphorus and orthophosphate were, however, evaluated further over time to assess event-related changes at representative lake stations. Unlike some of the nitrogen forms (e.g., ammonia and nitrite), phosphorus is not toxic to aquatic biota, but rather phosphorus tends to limit primary productivity in freshwater lake environments (Environment Canada 2004). Instantaneous concentrations of TP at surface and depth in Polley and Quesnel lakes were compared to the BC WQG range for lakes (i.e., 0.005 to 0.015 mg/L; BC MoE 2015a) that is

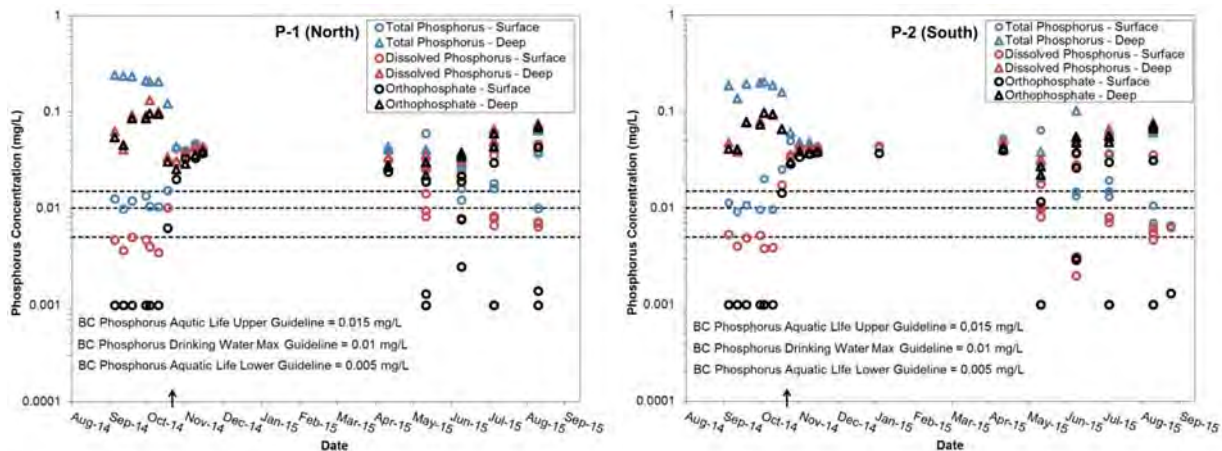
intended to be applied to the spring turnover concentration or the mean epilimnetic growing season concentration (May to September). An assessment of event-related changes in phosphorus and subsequent potential impacts on primary productivity based on this guideline comparison is therefore conservative, as reflected in the discussion of results for each lake. Consistent with the approach taken in the PEEIAR, the evaluation of event-related changes in waterborne phosphorus is intended to be integrated with biological information to assess potential impacts on lake productivity in the HHERA.

3.2.5 Polley Lake

Following the event and through August 2015, concentrations of TP at the surface in Polley Lake were within the pre-event range of concentrations reported in the PEEIAR for Polley Lake. Pre-event TP concentrations were defined as: mean = 0.041 mg/L; 95th percentile = 0.094 mg/L.; minimum = 0.0046 mg/L (Appendix A; Golder 2015a). Both pre-event mean and upper limit concentrations were above the BC WQG range of 0.005 to 0.015 mg/L. This is consistent with the observation by Minnow (2014) that the trophic status of the lake changed from oligotrophic/mesotrophic to mesotrophic/eutrophic in 2012, two years prior to the event. At depth, TP concentrations were elevated above pre-event concentrations prior to fall turnover (Figure 17).

Dissolved phosphorus and orthophosphate were also higher at depth compared to the surface. In deep samples, concentrations of dissolved phosphorus and orthophosphate were similar; but surface samples contained orthophosphate concentrations near or below the detection limit. Pre-event dissolved phosphorus concentrations were defined as: mean = 0.03 mg/L; 95th percentile = 0.08mg/L; minimum = <0.002 mg/L; pre-event orthophosphate concentrations were defined as: mean = 0.03 mg/L; 95th percentile = 0.08mg/L; minimum = <0.001 mg/L (Appendix A; Golder 2015a).

From April through August 2015, a number of total and dissolved phosphorus concentrations and deep orthophosphate concentrations were above the TP BC WQG range (Figure 17). Concentrations were, however, within or below the range of pre-event concentrations reported in the PEEIAR for Polley Lake and so no event-related changes to phosphorus concentrations in Polley Lake were identified from April through August.



Note: Arrow represents the approximate timing of late-October turnover in Polley Lake.

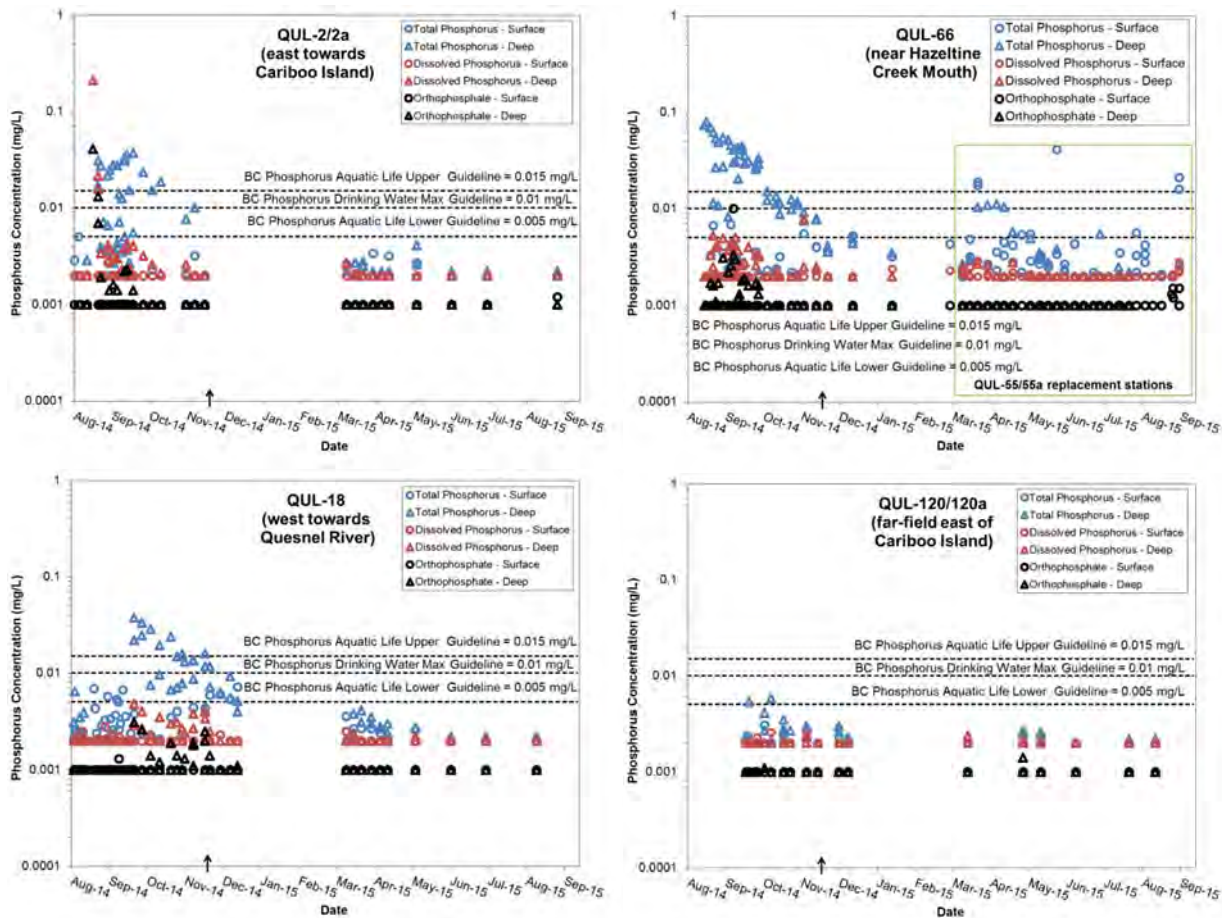
Figure 17: Post-event Instantaneous Total and Dissolved Phosphorus and Orthophosphate at Stations P1 and P2, Polley Lake.

3.2.5.1 Quesnel Lake

After the event, TP concentrations at depth exceeded the BC WQG range in the West Basin of Quesnel Lake, but were not elevated at the far-field station (QUL-120/120a) east of Cariboo Island (Figure 18). By fall turnover, TP concentrations had substantially decreased in the West Basin of Quesnel Lake. Through August 2015, TP concentrations were below the BC WQG range and resembled pre-event concentrations with the exception of a few intermittent exceedances at near-field station QUL-66/55/55a, near the mouth of Hazeltine Creek (Figure 18). Pre-event TP concentrations were defined as: median = 0.004 mg/L; 95th percentile = 0.008 mg/L; minimum = <0.002 (Appendix A; Golder 2015a).

At the near-field, mid-field, and far-field stations, dissolved phosphorus and orthophosphate concentrations reported between March and August were below pre-event concentrations (Figure 18). Pre-event dissolved phosphorus concentrations were defined as: median = 0.003 mg/L; 95th percentile = 0.004mg/L; minimum= <0.002. Pre-event orthophosphate concentrations were defined as: median = 0.003 mg/L; 95th percentile = 0.005mg/L; minimum = <0.001 (Appendix A; Golder 2015a).

Collectively, an evaluation of the phosphorus data collected between March and August suggest that event-related changes of concern for phosphorus were not evident in Quesnel Lake.



Note: Arrow represents the approximate timing of mid-November turnover in Quesnel Lake.

Figure 18: Post-event Instantaneous Total and Dissolved Phosphorus and Orthophosphate at Stations QUL-2/2a, QUL-66, QUL-18, and QUL-120/120a, Quesnel Lake.

4.0 DISCUSSION OF CONTAMINANTS OF POTENTIAL CONCERN

Following initial screening of water quality data using relevant BC WQGs and CSR standards, COPCs were identified for the receiving environment as described in Section 2.2. In this section, the results presented in Section 3 are discussed with reference to whether each COPC will be carried forward for further assessment as Contaminants of Concern (COCs) in the DSI.

Changes in concentrations of COPCs were evaluated for stations selected to be representative of Polley Lake, Hazeltine Creek, Quesnel Lake, and Quesnel River. Where appropriate, COPCs were assessed with respect to concentrations in the near-field (i.e., close to the Hazeltine Creek mouth), mid-field, and far-field areas of Quesnel Lake to provide a spatial representation of lake concentrations. COPCs in Hazeltine Creek were evaluated in the upper creek near the TSF and in the lower creek both upstream and downstream of the sedimentation ponds. Turbidity and copper were evaluated in Quesnel River near the community of Likely downstream of the outflow from Quesnel Lake.

Post-event changes in COPCs evaluated for the DSI are summarized in Tables 2 and 3, which indicate whether guideline exceedances occurred at surface or at depth during two consecutive time periods; between March and May 2015 and between June and August 2015. These time periods are generally reflective of turbid episodes in Hazeltine Creek (March to May) and clear-flow conditions (June to August) in Hazeltine Creek that influenced the nature of inputs to Quesnel Lake (i.e., higher suspended particulate matter and potentially metal inputs during turbid episodes). Consistent with the PEEIAR WQIA, the updated assessment for the DSI was based on comparison to BC WQGs for the protection of aquatic life, but consideration was also given to whether turbidity levels met the requirements specified in amended Pollution Abatement Order 107461. For comparative purposes, Tables 2 and 3 also shows post-event changes in COPCs documented in the PEEIAR WQIA for two consecutive time periods; between August and November 2014 and between November 2014 and April 2015.

Table 2: Summary of Post-Event Changes in Suspended Particulate Matter over Time in Polley Lake, Quesnel Lake, and Quesnel River in Relation to the PEEIAR WQIA and the WQIA Update for the DSI

Study Area	Contaminant of Potential Concern	PEEIAR WQIA				WQIA Update for the DSI			
		Event to Fall Lake Turnover (August 2014 to November 2014)		Fall Lake Turnover to April 2015		March to May 2015		June to August 2015	
		Surface	Deep	Surface	Deep	Surface	Deep	Surface	Deep
Polley Lake	Turbidity	●	●	●	●	●	●	●	●
	TSS	●	●	●	●	●	●	●	●
Hazeltime Creek	Turbidity	No PEEIAR receiving environment assessment				●	n/a	● ^(a)	n/a
	TSS	No PEEIAR receiving environment assessment				●	n/a	● ^(a)	n/a
Quesnel Lake (West Arm)	Turbidity (near-field and mid-field west)	●	●	●	●	●	●	●	●
	Turbidity (mid-field east and far-field)	●	●	●	●	●	●	●	●
	TSS	●	●	●	●	●	●	●	●
Quesnel River near Likley	Turbidity	●	n/a	●	n/a	●	n/a	●	n/a

Notes:

near-field: Near to the Hazeltime Creek Mouth; Stations QUL-66, QUL-54/54a, QUL-55/55a, and QUL-56/56a

mid-field: Stations QUL-18 (west) and QUL-2/2a (east)

far-field: Station QUL-120/120a (east)

Surface = 1-10 m depth in Polley Lake, 1-20 m depth in Quesnel Lake; Deep = >10 m depth in Polley Lake, >20 m depth in Quesnel Lake

n/a: Not applicable; only surface water samples were collected from Hazeltime Creek and Quesnel River

(a): With the exception of a few measurements reflective of brief periods of turbidity at the end of July and middle of August, due to change in discharge location of the creek and maintenance activities in the sedimentation ponds

- = Concentrations are below BC WQG(s) at representative stations or meet requirements under the amended Pollution Abatement Order 107461 (issued July 2015)
- = Concentrations exceed the maximum and/or 30-day BC WQG in one or more samples from at least one representative station or requirements under the amended Pollution Abatement Order 107461 (issued July 2015) are not met

Table 3: Summary of Post-Event Changes in Identified Metal and Nutrient Contaminants of Potential Concern over Time in Polley Lake, Quesnel Lake, and Quesnel River in Relation to the PEEIAR WQIA and the WQIA Update for the DSI

Study Area	Contaminant of Potential Concern	PEEIAR WQIA				WQIA Update for the DSI			
		Event to Fall Lake Turnover (August 2014 to November 2014)		Fall Lake Turnover to April 2015		March to May 2015		June to August 2015	
		Surface	Deep	Surface	Deep	Surface	Deep	Surface	Deep
Polley Lake	Total Copper	●	●	●	●	●	●	●	●
	Dissolved Copper	●	●	●	●	●	●	●	●
	Total Phosphorus	●	●	●	●	●	●	●	●
Hazelatine Creek ^(a)	Total and Dissolved Aluminum	No PEEIAR receiving environment assessment				●	n/a	●	n/a
	Total Chromium ^(b)					●	n/a	●	n/a
	Total Iron					●	n/a	● ^(c)	n/a
	Total and Dissolved Copper					●	n/a	●	n/a
Quesnel Lake (West Arm)	Total Chromium	●	●	●	●	●	●	●	●
	Dissolved Chromium	●	●	●	●	●	●	●	●
	Total Copper (<i>near-field and mid-field west</i>)	● ^(d)	●	●	●	●	●	●	●
	Total Copper (<i>mid-field east and far-field</i>)		●	●	●	●	●	●	●
	Dissolved Copper	●	●	●	●	●	●	●	●
	Total Iron	●	●	●	●	●	●	●	●
	Dissolved Iron	●	●	●	●	●	●	●	●
	Total Phosphorus (<i>near-field</i>)	●	●	●	●	●	●	●	●
	Total Phosphorus (<i>mid and far-field</i>)		●	●	●	●	●	●	●
Quesnel River near Likely	Total Copper	●	n/a	●	n/a	●	n/a	●	n/a
	Dissolved Copper	●	n/a	●	n/a	●	n/a	●	n/a

Notes:

near-field: Near to the Hazelatine Creek Mouth; Stations QUL-66 and QUL-55/55a

mid-field: Stations QUL-18 (west) and QUL-2/2a (east)

far-field: Station QUL-120/120a (east)

Surface = 1-10 m depth in Polley Lake, 1-20 m depth in Quesnel Lake; Deep = >10 m depth in Polley Lake, >20 m depth in Quesnel Lake

n/a: Not applicable; only surface water samples were collected from Hazelatine Creek and Quesnel River

- (a) Focus on the four metals identified as COPCs in Table 1 that had the largest magnitude of guideline exceedance (i.e., aluminum, copper, chromium, and iron). See Section 3.2.2.4 for an assessment of all identified COPCs
- (b) Comparison to chromium (III) WQGs
- (c) Total iron concentrations were below the total maximum BC WQG except one value recorded in August at HAC-01 (see further discussion in Section 3.2.2.4)
- (d) Concentrations began to increase above the 30-d BC WQG range (based on the range of hardness) in October 2014

● = Concentrations are below applicable BC WQGs at representative stations or are below pre-event concentrations

● = Concentrations exceed applicable BC WQGs and are above pre-event concentrations in one or more samples from at least one representative station

4.1 Changes in Water Quality from March to August 2015

4.1.1 Hazeltine Creek

As described in Section 3.2.2.4 and shown in Tables 2 and 3, some COPC guideline exceedances occurred in Hazeltine Creek during February, March, April, and May 2015, when turbid flow periods were evident in the creek due to restoration activities that also coincided with the onset of an early freshet. Turbid flow periods were characterized by elevated concentrations of particulate matter and some metals (mainly total forms) that resulted in increased inputs of these parameters to the near-field environment in Quesnel Lake. Clear-flow conditions, which were defined by instantaneous measures of turbidity less than 9.5 NTU⁷, prevailed in Hazeltine Creek during January, June, July, and August of 2015, with the exception of brief periods of turbidity at the end of July and the middle August. The brief turbid periods in late summer did not correspond with rainfall events (Attachment 6, Figure 5), but were likely a result of the change in discharge location of the creek at that time and maintenance activities in the sedimentation ponds (pers. comm. S. Litke). Photographs showing turbid and clear-flow conditions are shown in Attachment 6, Figures 1-4.

Under clear-flow conditions only total and dissolved copper exceeded BC WQGs for the protection of aquatic life (Attachment 4: Table 4-6). Copper therefore remains the primary substance of concern in Hazeltine Creek. When the creek is subject to erosion resulting in turbid flow events, turbidity and TSS and some other metals such as iron, aluminum, and chromium may also exceed BC WQGs.

4.1.2 Polley Lake

Levels of TSS, turbidity, and copper were low in Polley Lake and have remained below guidelines throughout 2015 for the period assessed. Molybdenum concentrations were below the wildlife water maximum guideline, but were near the most conservative chronic BC WQG (irrigation end use) expected to be protective of ruminant wildlife that might be particularly sensitive to dietary exposure. Molybdenum was not included in Table 3 because, as discussed in Section 3.2.2.1, adverse effects to wildlife are not expected due to a low potential for sustained dietary exposure and the low magnitude of exceedance of the most conservative chronic guideline for irrigation. Total phosphorus concentrations remained within the range previously observed in Polley Lake prior to the event.

4.1.3 Quesnel Lake

Levels of TSS and turbidity were low in the far-field area of Quesnel Lake and remained below guidelines throughout 2015 for the period assessed. In the West Basin of Quesnel Lake, TSS levels were also low and below guidelines, with the exception of some higher levels recorded in the near-field area at the mouth of Hazeltine Creek. Pollution Abatement Order requirements for the near-field and mid-field (west) stations were not always met between March and June 2015. In July and August 2015, turbidity levels were below long-term chronic guidelines in Quesnel Lake and Pollution Abatement Order requirements were met.

In the West Basin of Quesnel Lake, iron and chromium continued to be below BC WQGs. Within the West Basin, event-related changes in total copper were still identified close to the mouth of Hazeltine Creek and at the western mid-field station further away from the mouth, but not at the eastern mid-field station or at the far-field station east of Cariboo Island where concentrations were below guidelines.

⁷ Equivalent to the 24-h BC WQG of +8 NTU above the median pre-event background of 1.5 NTU

Dissolved copper concentrations remained below the BC WQG for total copper at these stations. Observed trends in total copper concentrations at these lake stations were related to particulate copper inputs from Hazeltine Creek to the lake in March through May, when TSS and turbidity concentrations were higher relative to other months in 2015.

From March through August 2015, instantaneous TP concentrations were below the BC WQG range and resembled pre-event concentrations with the exception of a few higher concentrations recorded at near-field Station QUL-66/55/55a, near the mouth of Hazeltine Creek. At the near-field, mid-field and far-field stations, dissolved phosphorus and orthophosphate concentrations reported during the same time period were below pre-event concentrations. The evaluation of phosphorus water data collected between March and August 2015, suggested that event-related changes that might be of concern with respect to the potential for a change in lake trophic status, were not evident in Quesnel Lake.

The updated evaluation of changes in water quality for the DSI confirmed an overall decreasing trend in COPCs since the event. Guideline exceedances generally occurred within a localised area close to the Hazeltine Creek mouth and likely reflected periodically higher levels of sediment transported to the lake from Hazeltine Creek.

This guidelines-based assessment is reliant on BC WQGs that are conservative in their derivation and should not be used for remediation purposes. As discussed by Golder (2015a), two sedimentation ponds were commissioned in lower Hazeltine Creek in December 2014 to manage erosion from exposed banks in Hazeltine Creek, but peaks in TSS have periodically occurred with a localised influence on Quesnel Lake. Ideally, more direct measures of toxicity should be used that take into consideration the mixture of contaminants and other parameters in the water. The results of the follow-up toxicity testing program (March to August 2015) with water samples sampled throughout the post-event period provided a more realistic assessment of potential impact of changes in water quality to aquatic life. These results are presented and discussed in the problem formulation component of the aquatic risk assessment (Golder 2015b). The findings of the toxicity testing program indicate that, although there were still some localised changes in water quality in Quesnel Lake between March and August 2015, toxicological testing results do not show toxicity in the water column and confirm the interim findings of the PEEIAR WQIA.

4.1.4 Quesnel River

Similar to the eastern far-field area of Quesnel Lake, water quality in Quesnel River between March and August did not exhibit event-related changes that were identified to be of concern with respect to exceedance of water quality guidelines or a departure from pre-event conditions.

5.0 IDENTIFICATION OF CONTAMINANTS OF CONCERN FOR THE HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Based on the evaluation of water quality conditions from March through August 2015, COCs are identified below for consideration in the problem formulation components of the HHERA. The risk assessment will focus on water quality uses related to aquatic life, wildlife water, and drinking water for human consumption. Contaminants of concern are identified separately for each of these uses in Tables 4 through 6 based on the findings of the WQIA update and exceedances of BC WQGs or CSR standards specific to the use under consideration. Consistent with the WQIA update presented above, the influence of turbid flow versus clear-flow conditions in Hazeltine Creek on creek and lake water quality has been considered in the identification of COCs. Pre-event background conditions were also considered.

Table 4: Summary of Contaminants of Concern Identified for Aquatic Life Based on Data Collected from March to August 2015

Study Area	Parameters Identified as Contaminants of Concern for the HHERA ¹
Polley Lake²	<i>no substances</i>
Hazeltine Creek²: turbid episodes	<ul style="list-style-type: none"> turbidity, total suspended solids total metals: aluminum, arsenic, beryllium, cadmium, chromium, cobalt, copper, iron, titanium, zinc, dissolved aluminum and copper
Hazeltine Creek²: clear-flow conditions	<ul style="list-style-type: none"> total and dissolved copper
Quesnel Lake: clear-flow conditions in Hazeltine Creek	<i>no substances</i>
Quesnel Lake: turbid episodes in Hazeltine Creek	<ul style="list-style-type: none"> <u>Near-field</u>: turbidity, total copper <u>Mid-field west</u>: turbidity, and total copper <u>Mid-field east</u>: no substances <u>Far-field</u>: no substances
Quesnel River	<i>no substances</i>

Note:

- Parameters were identified based on exceedance of BC WQGs for aquatic life or CSR aquatic life standards and were above pre-event concentrations in one or more samples from at least one representative station.
- Molybdenum in Polley Lake and Hazeltine Creek exceeded the 30-d BC WQG for irrigation, but did not exceed the maximum BC WQG for aquatic life or the CSR aquatic life standard; therefore, molybdenum was not retained as a COC for aquatic life.

Table 5: Summary of Contaminants of Concern Identified for Wildlife Water Based on Data Collected from March to August 2015

Study Area	Parameters Identified as Contaminants of Concern for the HHERA ¹
Polley Lake	<i>no substances</i>
Hazeltine Creek²: turbid episodes	<ul style="list-style-type: none"> turbidity, total suspended solids total metals: aluminum, copper, iron
Hazeltine Creek²: clear-flow conditions	<ul style="list-style-type: none"> total suspended solids
Quesnel Lake	<i>no substances</i>
Quesnel River	<i>no substances</i>

Note:

- Parameters were identified based on exceedance of BC WQGs for wildlife water or CSR wildlife water standards and were above pre-event concentrations in one or more samples from at least one representative station.
- Molybdenum in Polley Lake and Hazeltine Creek exceeded the 30-d BC WQG for irrigation, but did not exceed the maximum BC WQG for wildlife water or the CSR wildlife water standard; therefore, molybdenum was not retained as a COC for wildlife water.

Table 6: Summary of Contaminants of Concern Identified for Drinking Water Based on Data Collected from March to August 2015

Study Area	Parameters Identified as Contaminants of Concern for the HHERA ¹
Polley Lake	<i>no substances</i>
Hazeltine Creek: turbid episodes	<ul style="list-style-type: none"> turbidity total metals: aluminum, arsenic, iron, lead, manganese
Hazeltine Creek: clear-flow conditions	<ul style="list-style-type: none"> turbidity – untreated water only
Quesnel Lake	<ul style="list-style-type: none"> turbidity – untreated water only
Quesnel River	<ul style="list-style-type: none"> turbidity – untreated water only

Note:

- Parameters were identified based on exceedance of BC drinking WQGs or CSR drinking water standards and were above pre-event concentrations in one or more samples from at least one representative station.

6.0 STATEMENT OF LIMITATIONS

This technical memorandum was prepared for the exclusive use of MPMC. The inferences concerning the data, site and receiving environment conditions contained in this memorandum are based on information obtained during investigations conducted at the site by Golder Associates Ltd. (Golder), other consultants and MPMC, and are based solely on the condition of the site at the time of the site studies and subsequent investigations and remediation and other information obtained by Golder, as described in this memorandum. Soil, surface water and groundwater conditions may vary with location, depth, time, sampling methodology, analytical techniques and other factors.

In evaluating the subject site and water quality data, Golder has relied in good faith on information provided. The factual data, interpretations and recommendations pertain to a specific project as described in this memorandum, based on the information obtained during the assessment by Golder on the dates cited in the memorandum, and are not applicable to any other project or site location. Golder accepts no responsibility for any deficiency or inaccuracy contained in this memorandum as a result of reliance on the aforementioned information.

The findings and conclusions documented in this memorandum have been prepared for the specific application to this project, and have been developed in a manner consistent with that level of care normally exercised by environmental professionals currently practising under similar conditions in the jurisdiction. Golder makes no other warranty, expressed or implied and assumes no liability with respect to the use of the information contained in this memorandum at the subject site, or any other site, for other than its intended purpose.

Any use which a third party makes of this memorandum, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Golder accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or action based on this memorandum. All third parties relying on this memorandum do so at their own risk. Electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore no party can rely upon the electronic media versions of Golder's memorandum or other work product. Golder is not responsible for any unauthorized use or modifications of this memorandum.

MPMC may rely on the information contained in this memorandum subject to the above limitations.

Golder makes no other representation whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this memorandum, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein.

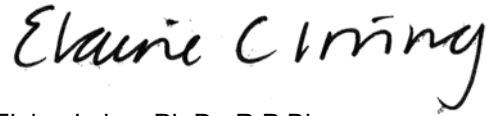
If new information is discovered during future work, including excavations, sampling, soil boring, predictive geochemistry or other investigations, Golder should be requested to re-evaluate the conclusions of this memorandum and to provide amendments, as required, prior to any reliance upon the information presented herein. The validity of this memorandum is affected by any change of site conditions, purpose, development plans or significant delay from the date of this memorandum in initiating or completing the project.

7.0 CLOSURE

We trust that this Technical Memorandum provides sufficient information for your present needs. If you have any questions, please do not hesitate to contact the undersigned at (604) 296-4200.



Jordana Van Geest, Ph.D., R.P.Bio.
Environmental Scientist



Elaine Irving, Ph.D., R.P.Bio.
Senior Environmental Scientist



Jerry Vandenberg, M.Sc., P.Chem.
Associate, Senior Environmental Chemist

JVG/ECI/JV/syd

Attachments

Attachment 1: Post-event Water Quality Monitoring Stations, March to August 2015

Attachment 2: Summary of Mount Polley TSF Breach Water Quality Monitoring Program, March to August 2015

Attachment 3: QA/QC Summary of Mount Polley TSF Breach Water Quality Monitoring Program, March to August 2015

Attachment 4: Post-event Water Quality in Polley Lake, Hazeltine Creek, Quesnel Lake, and Quesnel River, March to August 2015

Attachment 5: Supporting Information for the Assessment of Dissolved Oxygen in Polley Lake, March to August 2015

Attachment 6: Supporting Information for the Assessment of Turbidity in Hazeltine Creek and Quesnel Lake, March to August 2015

Attachment 7: Supplemental Time Series Plots of Water Quality, March to August 2015

Attachment 8: Tabulated Discrete Water Quality Grab Data Collected from Polley Lake, Hazeltine Creek, Quesnel Lake, and Quesnel River, August 2014 to August 2015

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8.0 REFERENCES

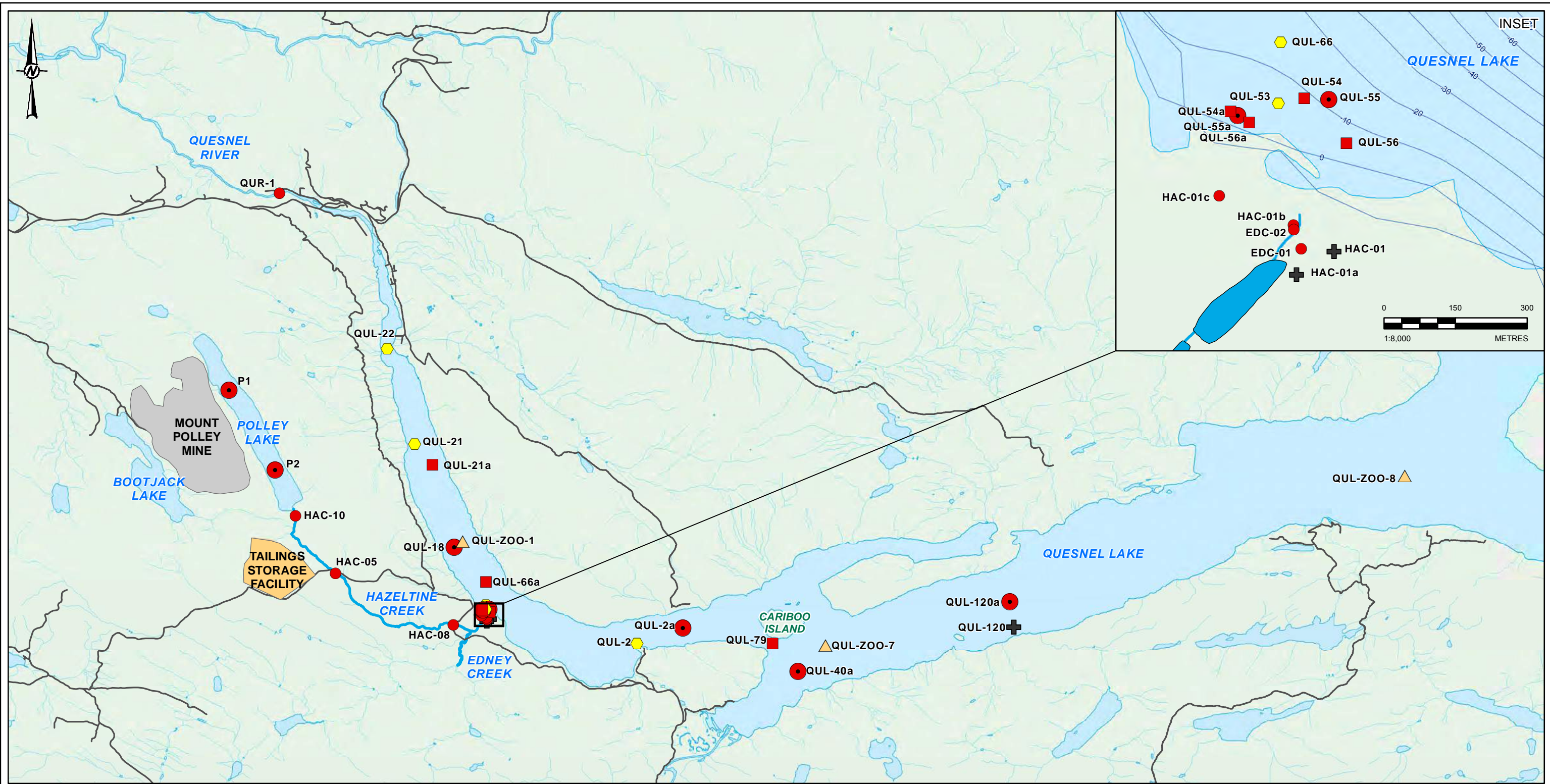
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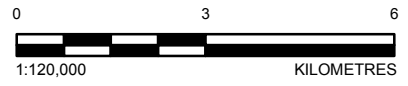
8.2 Personal Communication

- Litke S. 2015. Environmental Technologist, Mount Polley Mining Corporation, Likely, BC. Electronic mail to Jordana Van Geest, Golder Associates Ltd. Vancouver, BC. September 15, 2015 (re: Quesnel River) and November 3, 2015 (re: Hazeltine Creek).

ATTACHMENT 1
Post-event Water Quality Monitoring Stations,
March to August 2015



- LEGEND**
- POST-EVENT MONITORING STATIONS**
- ROUTINE - PROFILE
 - ROUTINE - GRAB
 - ROUTINE - GRAB + PROFILE
 - ▲ NON-ROUTINE - PROFILE
 - ⬡ INTERMITTENTLY SAMPLED (SEE ATTACHMENT 2 FOR DETAILS)
 - ⊕ SUPERSEDED PRIOR TO MARCH 2015
 - TAILINGS STORAGE FACILITY
 - MOUNT POLLEY MINE SITE
 - BATHYMETRY
- ROAD
 - WATERCOURSE
 - SEDIMENTATION PONDS
 - WATERBODY



- REFERENCES**
1. WATER MONITORING STATIONS OBTAINED FROM MOUNT POLLEY MINING CORPORATION.
 2. WATERCOURSE AND LAKE DATA OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
 3. PROJECTION: NAD 1983 UTM ZONE 10

CLIENT	IMPERIAL METALS MOUNT POLLEY MINING CORPORATION	
CONSULTANT	YYYY-MM-DD	2016-01-25
	DESIGNED	JVG
	PREPARED	RH
	REVIEWED	JV
	APPROVED	JV

PROJECT	MOUNT POLLEY MINE WATER QUALITY IMPACT ASSESSMENT	
TITLE	POST-EVENT WATER QUALITY MONITORING STATIONS MARCH - AUGUST 2015	
PROJECT NO.	CONTROL	REV.
1411734	10000	0
		FIGURE
		1

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 IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

ATTACHMENT 2

**Summary of Mount Polley TSF Breach
Water Quality Monitoring Program, March to August 2015**

Attachment 2: Summary of Mount Polley TSF Breach Water Quality Monitoring Program, March to August 2015

Area	Station Name	Sample Location Type	Samples - Surface			Samples - Depth			Profiles		Continuous Logger Data	Comments
			Total Number of Samples	Duplicate Samples	Frequency	Total Number of Samples	Duplicate Samples	Frequency	Total Number of Profiles	Frequency		
Polley Lake	P1	Routine	5	0	Monthly	5m - 4 10m - 5 15m - 4 20m - 5 Bottom - 5	0	Monthly	8	Bi-monthly	-	
	P2	Routine	6	0	Monthly	5m - 4 10m - 5 15m - 4 20m - 5 Bottom - 5	15m - 1	Monthly	7	Bi-monthly	-	
Upper Hazeltine	HAC-05	Routine	8	1	Weekly-Monthly	N/A	N/A	N/A	N/A	N/A	-	Weekly samples transitioned to monthly
	HAC-10	Routine	8	0	Weekly-Monthly	N/A	N/A	N/A	N/A	N/A	-	Weekly samples transitioned to monthly
Lower Hazeltine	HAC-01b	Routine	23	2	Weekly	N/A	N/A	N/A	N/A	N/A	01/19/15 - 07/23/2015	Continuous monitoring stopped when Edney/Hazeltine redirected; discontinued sampling location 7/25/2015
	HAC-01c	Routine	4	0	Weekly	N/A	N/A	N/A	N/A	N/A	-	Established at new outlet of Hazeltine Creek 7/31/2015
	HAC-08	Routine	13	1	Weekly-Monthly	N/A	N/A	N/A	N/A	N/A	-	Weekly samples transitioned to monthly
	HAC-09	Environmental Monitoring	-	-	-	N/A	N/A	N/A	N/A	N/A	-	Upstream of sedimentation ponds. Environmental monitoring turbidity only
Edney Creek	EDC-01	Routine	12	2	Weekly-Monthly	N/A	N/A	N/A	N/A	N/A	-	Weekly samples transitioned to monthly. Discontinued when Edney redirected 7/25/2015
	EDC-02	Routine	24	0	Weekly	N/A	N/A	N/A	N/A	N/A	-	Downstream of confluence with Hazeltine Creek; discontinued after Edney/Hazeltine redirected 7/25/2015
Hydrology Stations	Upper Hazeltine	Flow monitoring	-	-	-	N/A	N/A	N/A	N/A	N/A	03/18/2015 - Present	Continuous monitoring: turbidity, sp. conductance, and temperature only
	Lower Hazeltine	Flow monitoring	-	-	-	N/A	N/A	N/A	N/A	N/A	03/18/2015 - Present	Continuous monitoring: turbidity, sp. conductance, and temperature only
	Lower Edney	Flow monitoring	-	-	-	N/A	N/A	N/A	N/A	N/A	04/17/2015 - Present	Continuous monitoring: pressure and temperature only
Quesnel River	QUR-1	Routine	20	0	Weekly-Bi-weekly	N/A	N/A	N/A	N/A	N/A	08/12/2014 - Present	Weekly samples transitioned to bi-weekly
Quesnel Lake	QUL-2	Profile only (past routine)	-	-	-	-	-	-	2	-	-	Profiled 4/15/2015 and 6/10/2015 (no subsequent sampling)
	QUL-2a	Routine	10	0	Weekly-Monthly	40m - 10 60m - 10	40m - 1 60m - 1	Weekly-Monthly	16	Bi-monthly	-	Weekly samples transitioned to monthly
	QUL-18	Routine	10	0	Weekly-Monthly	40m - 10 80m - 10	40m - 1 80m - 2	Weekly-Monthly	13	Bi-monthly	-	Weekly samples transitioned to monthly
	QUL-21	Profile only (past routine)	-	-	-	-	-	-	1	-	-	Profiled 4/15/2015 (no subsequent sampling)
	QUL-21a	Routine profile only	-	-	-	-	-	-	9	Bi-monthly	-	
	QUL-22	Profile only (past routine)	-	-	-	-	-	-	3	-	-	Profiled 4/15/2015, 4/29/2015 and 5/13/2015
	QUL-40a	Routine	6	0	Monthly	40m - 6 80m - 6 120 m - 6 140m - 6	120m - 1	Monthly	12	Bi-monthly	-	
	QUL-53	Investigation profile only	-	-	-	-	-	-	1	-	-	Profiled 3/24/2015 (no subsequent sampling)
	QUL-54	Routine profile only	-	-	-	10m - 1	0	-	21	Weekly	-	Discontinued when Hazeltine redirected 7/25/2015; sampled 3/25/2015
	QUL-54a	Routine profile only	-	-	-	-	-	-	6	Weekly	-	Established to replace QUL-54 when Hazeltine redirected 7/25/2015
	QUL-55	Routine	22	3	Weekly	15m - 22 30m - 21	0	Weekly	20	Weekly	-	Discontinued when Hazeltine redirected 7/25/2015
	QUL-55a	Routine	6	0	Weekly	5m - 6 11m - 6	0	Weekly	7	Weekly	-	Established to replace QUL-55 when Hazeltine redirected 7/25/2015
	QUL-56	Routine profile only	-	-	-	10m - 1	0	-	21	Weekly	-	Discontinued when Hazeltine redirected 7/25/2015; sampled 3/25/2015
	QUL-56a	Routine profile only	1	0	-	5m - 1 10m - 1	0	-	6	Weekly	-	Established to replace QUL-56 when Hazeltine redirected 7/25/2015; sampled 7/28/2015
	QUL-66	Past routine	1	0	-	-	-	-	1	-	-	Sampled and profiled 3/2/2015. Monitoring at QUL-66 ceased at the end of February and replaced by nearby stations QUL-54, QUL-55, QUL-56.
	QUL-66a	Routine profile only	-	-	-	-	-	-	11	Bi-monthly	-	
	QUL-79	Routine profile only	-	-	-	-	-	-	15	Bi-monthly	-	
QUL-120a	Routine	6	0	Monthly	40m - 6 80m - 6 120m - 6 190m - 6	190m - 1	Monthly	9	Bi-monthly	-		
QUL-ZOO-1	Profile only for zooplankton	-	-	-	-	-	-	2	-	-	Profiled 7/8/2015 and 8/20/2015	
QUL-ZOO-7	Profile only for zooplankton	-	-	-	-	-	-	2	-	-	Profiled 7/8/2015 and 8/20/2015	
QUL-ZOO-8	Profile only for zooplankton	-	-	-	-	-	-	2	-	-	Profiled 7/8/2015 and 8/20/2015	

Notes

Routine samples were taken throughout the period according to 2015 Post-Breach Environmental Monitoring Plan
 Routine stations are consistently monitored; typically either weekly, bi-weekly (every 2 weeks), monthly, or bi-monthly (twice per month)
 Continuous logger measures field parameters (i.e., pH, temperature, specific conductivity, DO, and turbidity) every 15 minute:

ATTACHMENT 3

**QA/QC Summary of Mount Polley TSF Breach
Water Quality Monitoring Program, March to August 2015**

Attachment 3: QA/QC Summary of Mount Polley TSF Breach Water Quality Monitoring Program, March to August 2015

Table 3-1. Summary of Quality Control Samples, March to August 2015

Month	Travel Blanks	Field Blanks	Equipment Blanks ^a	Duplicates	Filter Blanks	Deionized Water Blanks
March	24-Mar-2015 (HAC)	17-Mar-2015 (EDC-02) 19-Mar-2015 (QUL-40a)	25-Mar-15	2-Mar-2015 (EDC-01) 12-Mar-2015 (QUL-18-40m) 17-Mar-2015 (HAC-08) 18-Mar-2015 (QUL-55-0m) 24-Mar-2015 (HAC-01b) 24-Mar-2015 (QUL-2a-60m)	5-Mar-2015	5-Mar-2015
April	none	21-Apr-2015 (QUR-1)	15-Apr-15	1-Apr-2015 (EDC-01) 1-Apr-2015 (QUL-55-0m) 8-Apr-2015 (QUL-18-80m) 14-Apr-2015 (QUL-2a-40m) 15-Apr-2015 (QUL-40a-120m) 21-Apr-2015 (QUL-55-0m) 28-Apr-2015 (HAC-05) 29-Apr-2015 (QUL-120a-90m)	15-Apr-2015	none
May	4-May-2015 (HAC)	5-May-2015 (QUL-55)	13-May-15	7-May-2015 (QUL-18-80m)	none	none
June	none	1-Jun-2015 (QUL-55)	9-Jun-15		none	none
July	7-Jul-2015 (POL)	13-Jul-2015 (QUR-1)	14-Jul-15	7-Jul-2015 (HAC-01B)	14-Jul-2015	14-Jul-2015
August	4-Aug-2015 (QUL)	10-Aug-2015 (QUR-1)	26-Aug-15	11-Aug-2015 (P2-2015m)	none	none
Target	Every Two Months	Every Two Months	Monthly	March-April: 10% May-August: Monthly	Quarterly	Quarterly
Target Achieved	Yes	Yes	Yes	March+April: Yes (total 10%; March 8.7%; April 11%)	Yes	No (Q2 missed)

a) All equipment blanks carried out on MPMC Kemmerer 1 (used for all Polley Lake and Quesnel Lake sampling)

b) Additional duplicate sample was taken as part of another MPMC water quality monitoring program

Table 3-2. Summary of Data Quality Objective Exceedances, March to August 2015

Date	Sample ID	Parameter(s) RPD > DQO	BC WQG Exceedance
5-Mar-2015	De-ionized Water Blank	Dissolved Organic Carbon	No
18-Mar-2015	QUL-55X-0m	Turbidity, Manganese-D	No (turbidity exceedance of chronic guideline in original sample, but not duplicate; no associated 30-d guideline exceedance)
24-Mar-2015	HAC-01bX	Turbidity	Turbidity exceedance in original and duplicate
24-Mar-2015	QUL-2aX-0m	Copper-T	No
1-Apr-2015	EDC-01X	Ammonia, Phosphorus-T, DOC, Aluminum-D, Iron-D	Aluminum-D exceedance in original and duplicate
21-Apr-2015	QUL-55X-0m	Nitrogen-T	No
28-Apr-2015	HAC-05X	Phosphorus-T, Aluminum-T, Cadmium-T, Cobalt-T, Iron-T, Lead-T, Titanium-T, Vanadium-T	Iron-T exceedance in original, but not duplicate

Notes

D - dissolved, T - total

RPD - relative percent difference, DQO - data quality objective

BC WQG - BC water quality guideline

ATTACHMENT 4

**Post-event Water Quality in Polley Lake, Hazeltine Creek,
Quesnel Lake, and Quesnel River, March to August 2015**

Table with columns: Parameter, Units, BC Water Quality Guidelines for the Protection of Freshwater Aquatic Life, BC Drinking Water Quality Guidelines, CSR-Schedule 6, Polley Lake, Hazeltine Creek, Quesnel Lake, Quesnel River. Rows include Physical Parameters (Conductivity, Turbidity, Hardness, etc.), Major Ions (Alkalinity, Chloride, etc.), Nutrients (Ammonia, Nitrate, etc.), Total Metals (Aluminum, Antimony, etc.), and Dissolved Metals (Aluminum, Antimony, etc.).

A = approved guideline, W = working guideline, Min = Minimum concentration requirement based on life stage
nm = not measured
< = reported value is <MDL
CSR-Schedule 6 Generic Numerical Water Standards: Aquatic life standards assume minimum 1:10 dilution available, available at http://www.bclaws.ca/Recon/document/ID/freeside/375_96_08 accessed October 8 2011
BC WQGs for total metals substituted where dissolved metal WQGs do not exist
a) BC Water Quality (BCWQ) guidelines for the protection of freshwater aquatic life, except where noted (WW = wildlife water, IR = irrigation), available at http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines/approved-water-quality-guidelines, accessed October 8 2015
b) BC WQ guideline for the protection of drinking water, available at http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines, accessed October 8 2015
c) CSR Generic Numerical Water Standards for the protection of aquatic life
d) CSR Generic Numerical Water Standards for the protection of drinking water
e) hardness dependent F guideline: BC Max WQG (mg/L) = 0.4 at hardness <10 mg/L, otherwise = (-51.73 + (92.57 * log(hardness))) * 0.01
f) hardness dependent sulphate guideline: BC 30-d WQG (mg/L) = 128 at hardness <30 mg/L, at hardness 31-75 mg/L = 218, at hardness 76-180 mg/L = 309, at hardness 181-250 mg/L = 429, at hardness >250 mg/L determine base on site water
g) pH and temperature dependent ammonia guideline: values selected from Tables 3 and 4 in BC WQG based on maximum temperature of 20°C and pH 8.2
h) chloride dependent nitrite guideline: BC Max WQG (mg/L) = 0.06 at Cl <2 mg/L, at Cl 2-4 mg/L = 0.12, at Cl 4-6 mg/L = 0.18, at Cl 6-8 mg/L = 0.24, at Cl 8-10 = 0.30, at Cl >10 = 0.1
BC 30-d WQG (mg/L) = 0.02 mg/L at Cl <2 mg/L, at Cl 2-4 mg/L = 0.04, at Cl 4-6 mg/L = 0.06, at Cl 6-8 mg/L = 0.08, at Cl 8-10 mg/L = 0.1, at Cl >10 = 0.1
i) pH dependent dissolved Al guideline: BC Max WQG (mg/L) = 0.1 at pH >= 6.5, at pH <6.5 = EXP(1.209-2.426*(pH)+0.286*(pH^2)); BC 30-d WQG (mg/L) = 0.05 at pH >= 6.5, at pH <6.5 = EXP(1.6-3.327*(median pH)+0.402*(median pH^2)); minimum baseline surface water pH = 5.57
j) hardness dependent dissolved Cd guideline: max BC WQG (mg/L) = (exp(1.03*ln(hardness)-5.274))/1000 BC 30-d WQG (mg/L) = (exp(0.736*ln(hardness)-4.943))/1000
k) guideline is for Cr(VI)
l) hardness dependent Cu guideline: BC Max WQG (mg/L) = (0.094(hardness)+2)/1000; BC 30-d WQG (mg/L) = 0.002 at hardness <= 50 mg/L, at hardness >50 mg/L = 0.04*hardness/1000
m) hardness dependent Pb
n) hardness dependent Mn guideline: BC Max WQG (mg/L) = 0.01102*(hardness)+0.54; BC 30-d WQG (mg/L) = 0.0044*hardness+0.60
o) BC 30-d WQG (mg/L) = 0.0001/(MeHg/THg), where MeHg is mass (or concentration) of methyl mercury and THg is total mass (or concentration) of mercury in a given water volume; assumed = 0.00001 at 1% MeHg
p) hardness dependent Ni guideline: BC 30-d WQG = 0.025 at hardness <60 mg/L, at hardness 60-120 mg/L = 0.065, at hardness 120-180 mg/L = 0.11, at hardness >180 mg/L = 0.15
q) hardness dependent Ag guideline: BC Max WQG (mg/L) = 0.0001 at hardness <100 mg/L, at hardness >100 mg/L = 0.003; BC 30-d WQG (mg/L) = 0.00005 at hardness <100 mg/L, at hardness > 100 mg/L = 0.0015
r) hardness dependent Zn guideline: BC Max WQG (mg/L) = (33+0.75(hardness-90))/1000; BC 30-d WQG (mg/L) = (7.5+0.75(hardness-90))/1000
s) up to 10 - highly sensitive to acid inputs; 10 to 20 - moderately sensitive; over 20 - low sensitivity. Refer to calcium regarding sensitivity to acid inputs, the more restrictive of calcium or alkalinity is applicable.
t) up to 4 - highly sensitive to acid inputs; 4 to 8 - moderately sensitive; over 8 - low sensitivity. Refer to alkalinity, the more restrictive of calcium or alkalinity applies.
u) CSR Standard may not protect all amphibians. Consult director for further advice.
v) CSR Standard varies with chloride concentration. Consult director for further advice.
w) value exceeds BC Drinking Water Quality Guidelines for turbidity only for untreated water
x) CSR Standard varies with pH and temperature. 10°C is assumed.
y) CSR Standard to protect freshwater aquatic life.
z) CSR Standard is hardness dependent.
aa) Wildlife Water values are the lowest of CSR Generic Numerical Water Standards for Livestock Water or the Canadian Water Quality Guidelines for the Protection of Agriculture Water Uses - Livestock. For parameters without these standards or guidelines, either the CSR Schedule 6 Generic Numerical Water Standards and Schedule 10 Generic Numerical Soil and Water Standards for Drinking Water were used.
bb) Background turbidity is 1.5 NTU for Hazeltine Creek and 1.0 NTU for Polley Lake, Quesnel Lake, and Quesnel River
cc) Background is equal to MDL of 3.0 mg/L for total suspended solids.

Legend table with 2 columns: Value and Description. Values include 123, 123, 123, 123, 123. Descriptions include: Indicates concentration exceeding the BC Max WQ Guideline, Indicates concentration exceeding the BC 30-d WQ Guideline, Indicates concentration exceeding the BC Drinking Water Guideline, Indicates concentration exceeding CSR aquatic life, Indicates concentration exceeding CSR drinking water, Indicates concentration exceeding CSR wildlife water.

Table 4-2: Post-event Water Quality in Polley Lake, March to August 2015

Parameter	Units	BC Water Quality Guidelines for the Protection of Freshwater Aquatic Life ^a				BC Drinking Water Quality Guidelines ^b		CSR-Schedule 6			Pre-event 95th Percentile	Number of samples	Minimum	Median	95th Percentile	95th Percentile above Pre-event	COPC
		Maximum	Notes	30-Day Average	Notes	Maximum	Notes	Aquatic Life ^c	Drinking Water ^d	Wildlife Water ^e							
Physical Parameters																	
Turbidity (field) ^f	NTU	+8 NTU, +5 NTU if background 8-50 NTU	A	+2 NTU, +10% if background >50 NTU	A	+5 NTU, +10% if >50 NTU for treated DW or +1 NTU, +5 if >5 for non-treated	A	-	-	+10 NTU if background is ≤50 NTU	2.7	51	0.3	0.8	1.7	No	No
Dissolved Oxygen (Field)	mg/L	5-9	A, Min	8-11	A, Min	-	-	-	-	-	7.1	49	3	8.2	15	n/a	No
pH (Field)	pH Unit	6.5 - 9.0	A	6.5 - 9.0	A	6.5-8.5	A	-	-	-	9.4	49	7.2	7.8	<u>8.8</u>	No	No
Nutrients																	
Total Phosphorus	mg/L	-	-	0.005-0.015 in lakes	A	0.01	A, lakes	-	-	-	0.094	57	0.006	0.036	0.064	No	No
Total Metals																	
Molybdenum	mg/L	0.05	A, IR	0.01	A, IR	-	-	10	0.25	0.05	0.0024	57	0.011	0.011	0.012	Yes	Yes
Dissolved Metals																	
Molybdenum	mg/L	0.05	A, IR	0.01	A, IR	-	-	-	-	-	0.0022	57	0.01	0.011	0.011	Yes	Yes

Notes:

A = Approved guideline, Min = Minimum concentration requirement based on life stage
 CSR-Schedule 6 Generic Numerical Water Standards: Aquatic life standards assume minimum 1:10 dilution available.
 BC WQGs for total metals substituted where dissolved metal WQGs do not exist

- a) BC Water Quality (BCWQ) guidelines for the protection of freshwater aquatic life, except where noted (IR = irrigation), available at <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines/approved-water-quality-guidelines>, accessed October 8 2015
- b) BC WQ guideline for the protection of drinking water, available at <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines>, accessed October 8 2015
- c) CSR Generic Numerical Water Standards for the protection of aquatic life, available at http://www.bclaws.ca/Recon/document/ID/freeside/375_96_08 accessed October 8 2015
- d) CSR Generic Numerical Water Standards for the protection of drinking water, available at http://www.bclaws.ca/Recon/document/ID/freeside/375_96_08 accessed October 8 2015
- e) Wildlife Water values are the lowest of CSR Generic Numerical Water Standards for Livestock Water or the Canadian Water Quality Guidelines for the Protection of Agriculture Water Uses – Livestock. For parameters without these standards or guidelines, either the CSR Schedule 6 Generic Numerical Water Standards and Schedule 10 Generic Numerical Soil and Water Standards for Drinking Water were used.
- f) Background turbidity is 1.0 NTU

n/a - not applicable

123	Indicates concentration exceeding the BC Max WQ Guideline
123	Indicates concentration exceeding the BC 30-d WQ Guideline
123	Indicates concentration exceeding the BC Drinking Water Guideline
123	Indicates concentration exceeding CSR aquatic life
123	Indicates concentration exceeding CSR drinking water
123	Indicates concentration exceeding CSR wildlife water

Table 4-3: Post-event Water Quality in Hazeltine Creek, March to August 2015

Parameter	Units	BC Water Quality Guidelines for the Protection of Freshwater Aquatic Life ^a				BC Drinking Water Quality Guidelines ^b		CSR-Schedule 6			Pre-event 95th Percentile	Number of samples	Minimum	Median	95th Percentile	95th Percentile above Pre-event	COPC
		Maximum	Notes	30-Day Average	Notes	Maximum	Notes	Aquatic Life ^c	Drinking Water ^d	Wildlife Water ^e							
Physical Parameters																	
Turbidity (field) ^m	NTU	+8 NTU, +5 NTU if background 8-50 NTU	A	+2 NTU, +10% if background >50 NTU	A	+5 NTU, +10% if >50 NTU for treated DW or +1 NTU, +5 if >5 for non-treated	A	-	-	+10 NTU if background is ≤50 NTU	4.4	95	0.61	7.0	514	Yes	Yes
Total Suspended Solids ^m	mg/L	+25 mg/L, +10 mg/L if background 25-100 mg/L	A	+5 mg/L, +10% if background >100 mg/L	A	-	-	-	-	+20 mg/L from background	8.5	95	1.5	13	1468	Yes	Yes
Total Metals																	
Aluminum	mg/L	5	A, WW	-	-	-	-	-	9.5	5	0.35	95	0.045	0.43	24	Yes	Yes
Arsenic	mg/L	-	-	0.005	A	0.025	Interim	0.05	0.01	0.025	0.0009	95	0.00021	0.0014	0.014	Yes	Yes
Beryllium	mg/L	-	-	0.00013	W	0.004	W	0.053	-	0.1	<0.0001	95	<0.0001	<0.0001	0.00074	Yes	Yes
Cadmium	mg/L	no T-Cd WQG, see D-Cd WQG				-	-	0.0003 - 0.0006	0.005	0.08	<0.00010	95	2.5E-06	0.000016	(0.00048)	Yes	Yes
Chromium	mg/L	-	-	0.001	W, d	-	-	0.01	0.05	0.05	0.0013	95	0.00025	0.00069	0.029	Yes	Yes
Cobalt	mg/L	0.11	A	0.004	A	-	-	0.04	-	1	<0.00050	95	0.00005	0.00033	0.019	Yes	Yes
Copper	mg/L	0.007 - 0.022	A, e	0.002 - 0.008	A, e	0.5	A	0.02 - 0.09	1	0.3	0.0061	95	0.0037	(0.023)	0.50	Yes	Yes
Iron	mg/L	1	A	-	-	-	-	-	6.5	-	0.45	95	0.042	0.45	34	Yes	Yes
Lead	mg/L	0.032 - 0.21	A, f	0.005 - 0.011	A, f	0.05	A	0.04 - 0.11	0.01	0.1	<0.0005	95	0.000025	0.00023	0.012	Yes	Yes
Manganese	mg/L	1.1 - 2.8	A, g	0.82 - 1.5	A, g	-	-	0.55	-	-	0.049	95	0.0053	0.075	[1.1]	Yes	Yes
Mercury	mg/L	-	-	0.00001	A, h	0.001	A	0.001	0.001	0.002	0.000029	17	<0.000005	<0.000005	0.000096	No	No
Molybdenum	mg/L	0.05	A, IR	0.01	A, IR	-	-	10	0.25	0.05	0.00029	95	0.00029	0.010	0.012	Yes	Yes
Selenium	mg/L	-	-	0.002	A	0.01	A	0.01	0.01	0.03	0.00098	95	0.00011	0.00092	0.0014	Yes	No
Titanium	mg/L	-	-	-	-	-	-	1	-	-	0.00023	95	0.005	0.019	1.2	Yes	Yes
Vanadium	mg/L	-	-	-	-	-	-	-	-	0.1	<0.020	81	0.00058	0.0012	0.0021	No	No
Zinc	mg/L	0.03 - 0.12	A, i	0.008 - 0.096	A, i	5	A	0.075 - 1.65	5	2	0.0049	95	0.0015	0.0056	[(0.081)]*	Yes	Yes
Dissolved Metals																	
Aluminum	mg/L	0.1	A, c	0.05	A, c	0.2	A	-	-	-	0.19	95	0.005	0.016	0.18	No	No
Chromium	mg/L	-	-	0.001	W, d	-	-	-	-	-	0.0011	95	<0.0005	<0.0005	0.00089	No	No
Copper	mg/L	0.007 - 0.022	A, e	0.002 - 0.008	A, e	0.5	A	-	-	-	0.0051	95	0.0021	0.014*	0.038	Yes	Yes
Iron	mg/L	0.35	A	-	-	-	-	-	-	-	0.25	95	<0.030	<0.030	0.26	Yes	No
Molybdenum	mg/L	0.05	A, IR	0.01	A, IR	-	-	-	-	-	0.0027	95	0.00023	0.010	0.012	Yes	Yes

Notes:

- A = approved guideline, W = working guideline
- CSR-Schedule 6 Generic Numerical Water Standards: Aquatic life standards assume minimum 1:10 dilution available, available at http://www.bclaws.ca/Recon/document/ID/freeside/375_96_08 accessed October 8 2015
- BC WQGs for total metals substituted where dissolved metal WQGs do not exist
- a) BC Water Quality (BCWQ) guidelines for the protection of freshwater aquatic life, except where noted (WW = wildlife water, IR = irrigation), available at <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines/approved-water-quality-guidelines>, accessed October 8 2015
- b) BC WQ guideline for the protection of drinking water, available at <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines>, accessed October 8 2015
- c) pH dependent dissolved Al guideline: BC Max WQG (mg/L) = 0.1 at pH>6.5, at pH <6.5 = EXP(1.209-2.426*(pH)+0.286*(pH²)); BC 30-d WQG (mg/L) = 0.05 at pH>6.5, at pH <6.5 = EXP(1.6-3.327*(median pH)+0.402*(median pH²)); minimum baseline surface water pH = 5.57
- d) guideline is for Cr(VI)
- e) hardness dependent Cu guideline: BC Max WQG (mg/L) = (0.094(hardness)+2)/1000; BC 30-d WQG (mg/L) = 0.002 at hardness≤50 mg/L, at hardness >50 mg/L = 0.04*hardness/1000
- f) hardness dependent Pb guideline: BC Max WQG (mg/L) = 0.003 at hardness≤8 mg/L, at hardness >8 mg/L = (EXP(1.273*ln(hardness)-1.46))/1000; BC 30-d WQG (mg/L) = (3.31+EXP(1.273*ln(hardness)-4.704))/1000 at hardness >8 mg/L, no guideline at hardness ≤8 mg/L
- g) hardness dependent Mn guideline: BC Max WQG (mg/L) = 0.01102*(hardness)+0.54; BC 30-d WQG (mg/L) = 0.0044*hardness+0.60
- h) BC 30-d WQG (mg/L) = 0.0001/(MeHg/THg), where MeHg is mass (or concentration) of methyl mercury and THg is total mass (or concentration) of mercury in a given water volume; assumed = 0.00001 at 1% MeHg
- i) hardness dependent Zn guideline: BC Max WQG (mg/L) = (33+0.75(hardness-90))/1000; BC 30-d WQG (mg/L) = (7.5+0.75(hardness-90))/1000
- j) CSR Generic Numerical Water Standards for the protection of aquatic life
- k) CSR Generic Numerical Water Standards for the protection of drinking water
- l) Wildlife Water values are the lowest of CSR Generic Numerical Water Standards for Livestock Water or the Canadian Water Quality Guidelines for the Protection of Agriculture Waters – Livestock. For parameters without these standards or guidelines, either the CSR Schedule 6 Generic Numerical Water Standards and Schedule 10 Generic Numerical Soil and Water Standards for Drinking Water were used
- m) Background turbidity is 1.5 NTU and 3.0 mg/L for total suspended solids.

< reported value is <MDL

- [] = value-exceeds the most conservative site-specific maximum hardness-dependant BC WQG but does not exceed the least conservative site-specific maximum hardness-dependant BC WQG
- * = value-exceeds the most conservative site-specific 30-d average hardness-dependant BC WQG but does not exceed the least conservative site-specific 30-d average hardness-dependant BC WQG
- () = value-exceeds the most conservative site-specific hardness-dependant CSR Schedule 6 Standard for the protection of aquatic life but does not exceed the least conservative site-specific hardness-dependant CSR standard

123	Indicates concentration exceeding the BC Max WQ Guideline
123	Indicates concentration exceeding the BC 30-d WQ Guideline
123	Indicates concentration exceeding the BC Drinking Water Guideline
123	Indicates concentration exceeding CSR aquatic life
123	Indicates concentration exceeding CSR drinking water
123	Indicates concentration exceeding CSR wildlife water

Table 4-4: Post-event Water Quality in Quesnel Lake, March to August 2015

Parameter	Units	BC Water Quality Guidelines for the Protection of Freshwater Aquatic Life ^a				BC Drinking Water Quality Guidelines ^b		CSR-Schedule 6			Pre-event 95th Percentile	Number of samples	Minimum	Median	95th Percentile	95th Percentile above Pre-event	COPC
		Maximum	Notes	30-Day Average	Notes	Maximum	Notes	Aquatic Life ^e	Drinking Water ^f	Wildlife Water ^d							
Physical Parameters																	
Turbidity (field) ^h	NTU	+8 NTU, +5 NTU if background 8-50 NTU	A	+2 NTU, +10% if background >50 NTU	A	+5 NTU, +10% if >50 NTU for treated DW or +1 NTU, +5 if >5 for non-treated	A	-	-	+10 NTU if background is ≤50 NTU	1.0 ⁱ	174	0	0.92	3.1 ^g	Yes	Yes
Total Suspended Solids ^h	mg/L	+25 mg/L, +10 mg/L if background 25-100 mg/L	A	+5 mg/L, +10% if background >100 mg/L	A	-	-	-	-	+20 mg/L from background	<3.0 ⁱ	209	<3.0	<3.0	4.0	Yes	No
pH (field)	pH Unit	6.5 - 9.0	A	6.5 - 9.0	A	6.5-8.5	A	-	-	-	nm	174	7.2	7.8	8.4	n/a	No
Nutrients																	
Total Phosphorus	mg/L	-	-	0.005-0.015 in lakes	A	0.01	A, lakes	-	-	-	0.008	209	0.001	0.0022	0.0070	No	No
Total Metals																	
Copper	mg/L	0.0065 - 0.0078	A, c	0.002 - 0.0025	A, c	0.5	A	0.02 - 0.03	1	0.3	nm	209	0.00025	0.0011	0.0037	n/a	Yes
Dissolved Metals																	
Copper	mg/L	0.0065 - 0.0078	A, c	0.002 - 0.0025	A, c	0.5	A	-	-	-	nm	209	0.00025	0.00088	0.0017	n/a	No

Notes:
 A = approved guideline
 CSR-Schedule 6 Generic Numerical Water Standards: Aquatic life standards assume minimum 1:10 dilution available, available at http://www.bclaws.ca/Recon/document/ID/freeside/375_96_08 accessed October 8 2011
 BC WQGs for total metals substituted where dissolved metal WQGs do not exist
 a) BC Water Quality (BCWQ) guidelines for the protection of freshwater aquatic life, available at <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines/approved-water-quality-guidelines>, accessed October 8 2011
 b) BC WQ guideline for the protection of drinking water, available at <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines>, accessed October 8 2011
 c) hardness dependent Cu guideline: BC Max WQG (mg/L) = (0.094(hardness)+2)/1000; BC 30-d WQG (mg/L) = 0.002 at hardness≤50 mg/L, at hardness >50 mg/L = 0.04*hardness/1000
 d) Wildlife Water values are the lowest of CSR Generic Numerical Water Standards for Livestock Water or the Canadian Water Quality Guidelines for the Protection of Agriculture Water Uses – Livestock. For parameters without these standards or guidelines, either the CSR Schedule 6 Generic Numerical Water Standards and Schedule 10 Generic Numerical Soil and Water Standards for Drinking Water were used.
 e) CSR Generic Numerical Water Standards for the protection of aquatic life
 f) CSR Generic Numerical Water Standards for the protection of drinking water
 g) value exceeds BC Drinking Water Quality Guidelines for turbidity only for untreated water
 h) Background turbidity is 1.0 NTU and 3.0 mg/L for total suspended solids.
 i) Not measured, assumed background turbidity is 1.0 NTU and <3.0 mg/L (MDL) for total suspended solids.
 nm - not measured
 < reported value is less than the method detection limit
 n/a - not applicable

123	Indicates concentration exceeding the BC Max WQ Guideline
123	Indicates concentration exceeding the BC 30-d WQ Guideline
123	Indicates concentration exceeding the BC Drinking Water Guideline
123	Indicates concentration exceeding CSR aquatic life
123	Indicates concentration exceeding CSR drinking water

Table 4-5: Post-event Water Quality in Quesnel River, March to August 2015

Parameter	Units	BC Water Quality Guidelines for the Protection of Freshwater Aquatic Life ^a				BC Drinking Water Quality Guidelines ^b		CSR-Schedule 6			Pre-event 95th Percentile	Number of samples	Minimum	Median	95th Percentile	95th Percentile above Pre-event	COPC
		Maximum	Notes	30-Day Average	Notes	Maximum	Notes	Aquatic Life ^c	Drinking Water ^d	Wildlife Water ^e							
Physical Parameters																	
Turbidity (field)	NTU	+8 NTU, +5 NTU if background 8-50 NTU	A	+2 NTU, +10% if background >50 NTU	A	+5 NTU, +10% if >50 NTU for treated DW or +1 NTU, +5 if >5 for non-treated	A	-	-	+10 NTU if background is ≤50 NTU	1.0	15	0.05	1.6	<u>2.6^f</u>	Yes	Yes

Notes:

A = approved guideline

CSR-Schedule 6 Generic Numerical Water Standards: Aquatic life standards assume minimum 1:10 dilution available, available at http://www.bclaws.ca/Recon/document/ID/freeside/375_96_08 accessed October 8 2015

a) BC Water Quality (BCWQ) guidelines for the protection of freshwater aquatic life, available at <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines/approved-water-quality-guidelines>, accessed October 8 2015

b) BC WQ guideline for the protection of drinking water, available at <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines>, accessed October 8 2015

c) CSR Generic Numerical Water Standards for the protection of aquatic life

d) CSR Generic Numerical Water Standards for the protection of drinking water

e) Wildlife Water values are the lowest of CSR Generic Numerical Water Standards for Livestock Water or the Canadian Water Quality Guidelines for the Protection of Agriculture Water Uses – Livestock. For parameters without these standards or guidelines, either the CSR Schedule 6 Generic Numerical Water Standards and Schedule 10 Generic Numerical Soil and Water Standards for Drinking Water were used.

f) Background turbidity is 1.0 NTU

g) value exceeds BC Drinking Water Quality Guidelines for turbidity only for untreated water

<u>123</u>	Indicates concentration exceeding the BC Max WQ Guideline
<u>123</u>	Indicates concentration exceeding the BC 30-d WQ Guideline
<u>123</u>	Indicates concentration exceeding the BC Drinking Water Guideline
<u>123</u>	Indicates concentration exceeding CSR aquatic life
<u>123</u>	Indicates concentration exceeding CSR drinking water

Table 4-6: Post-event Water Quality in Hazeltine Creek during clear-flow conditions, March to August 2015

Parameter	Units	BC Water Quality Guidelines for the Protection of Freshwater Aquatic Life ^a				BC Drinking Water Quality Guidelines ^b		CSR-Schedule 6			Pre-event 95th Percentile	Number of samples	Minimum	Median	95th Percentile	95th Percentile above Pre-event	COC
		Maximum	Notes	30-Day Average	Notes	Maximum	Notes	Aquatic Life ^b	Drinking Water ^c	Wildlife Water ^d							
Hazeltine Creek clear-flow conditions of turbidity <9.5 NTU (equivalent to BC max WQG of +8 NTU above median background of 1.5 NTU)																	
Physical Parameters																	
Turbidity (field) ^k	NTU	+8 NTU, +5 NTU if background 8-50 NTU	A	+2 NTU, +10% if background >50 NTU	A	+5 NTU, +10% if >50 NTU for treated DW or +1 NTU, +5 if >5 for non-treated	A	-	-	+10 NTU if background is ≤50 NTU	4.4	55	0.73	3.4	<u>8.4</u>	Yes	Yes
Total Suspended Solids ^k	mg/L	+25 mg/L, +10 mg/L if background 25-100 mg/L	A	+5 mg/L, +10% if background >100 mg/L	A	-	-	-	-	+20 mg/L from background	8.5	55	<3	7.1	37	Yes	Yes
Total Metals																	
Aluminum	mg/L	5	A, WW	-	-	-	-	-	9.5	5	0.35	55	0.045	0.21	0.61	Yes	No
Arsenic	mg/L	-	-	0.005	A	0.025	Interim	0.05	0.01	0.025	0.0009	55	0.00021	0.0013	0.0019	Yes	No
Beryllium	mg/L	-	-	0.00013	W	0.004	W	0.053	-	0.1	<0.0001	55	<0.0001	<0.0001	<0.0001	No	No
Cadmium	mg/L	no T-Cd WQG, see D-Cd WQG				-	-	0.0003 - 0.0006	0.005	0.08	<0.00010	55	<0.000005	0.0000089	0.000027	No	No
Chromium	mg/L	-	-	0.001	W, c	-	-	0.01	0.05	0.05	0.0013	55	<0.0005	<0.0005	0.0013	No	No
Cobalt	mg/L	0.11	A	0.004	A	-	-	0.04	-	1	<0.00050	55	<0.0001	0.00016	0.00052	Yes	No
Copper	mg/L	0.007 - 0.022	A, d	0.002 - 0.008	A, d	0.5	A	0.02 - 0.09	1	0.3	0.0061	55	0.0037	0.019*	{0.031}	Yes	Yes
Iron	mg/L	1	A	-	-	-	-	-	6.5	-	0.45	55	0.042	0.25	0.61	Yes	No
Lead	mg/L	0.032 - 0.21	A, e	0.005 - 0.011	A, e	0.05	A	0.04 - 0.11	0.01	0.1	<0.0005	55	<0.00005	0.00009	0.00028	No	No
Manganese	mg/L	1.1 - 2.8	A, f	0.82 - 1.5	A, f	-	-	-	0.55	-	0.049	55	0.0053	0.043	0.12	Yes	No
Titanium	mg/L	-	-	-	-	-	-	1	-	-	0.00023	55	<0.01	<0.01	0.040	Yes	No
Zinc	mg/L	0.033 - 0.12	A, g	0.008 - 0.096	A, g	5	A	0.075 - 1.65	5	2	0.0049	55	<0.003	<0.003	0.0082	Yes	No
Dissolved Metals																	
Copper	mg/L	0.007 - 0.022	A, d	0.002 - 0.008	A, d	0.5	A	-	-	-	0.0051	55	0.0021	0.0096*	0.018	Yes	Yes

Notes:

A = approved guideline, W = working guideline

CSR-Schedule 6 Generic Numerical Water Standards: Aquatic life standards assume minimum 1:10 dilution available, available at http://www.bclaws.ca/Recon/document/ID/freeside/375_96_08 accessed October 8 2011

BC WQGs for total metals substituted where dissolved metal WQGs do not exist

a) BC Water Quality (BCWQ) guidelines for the protection of freshwater aquatic life, except where noted (WW = wildlife water), available at <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines/approved-water-quality-guidelines>, accessed October 8 2015

b) BC WQ guideline for the protection of drinking water, available at <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines>, accessed October 8 2011

c) guideline is for Cr(VI)

d) hardness dependent Cu guideline: BC Max WQG (mg/L) = (0.094(hardness)+2)/1000; BC 30-d WQG (mg/L) = 0.002 at hardness ≤50 mg/L, at hardness >50 mg/L = 0.04*hardness/1000

e) hardness dependent Pb guideline: BC Max WQG (mg/L) = 0.003 at hardness ≤8 mg/L, at hardness >8 mg/L = (EXP((1.273*ln(hardness))-1.46))/1000; BC 30-d WQG (mg/L) = (3.31+EXP(1.273(ln(hardness))-4.704))/1000 at hardness >8 mg/L, no guideline at hardness ≤8 mg/L

f) hardness dependent Mn guideline: BC Max WQG (mg/L) = 0.01102*(hardness)+0.54; BC 30-d WQG (mg/L) = 0.0044*hardness+0.605

g) hardness dependent Zn guideline: BC Max WQG (mg/L) = (33+0.75(hardness-90))/1000; BC 30-d WQG (mg/L) = (7.5+0.75(hardness-90))/1000

h) CSR Generic Numerical Water Standards for the protection of aquatic life

i) CSR Generic Numerical Water Standards for the protection of drinking water

j) Wildlife Water values are the lowest of CSR Generic Numerical Water Standards for Livestock Water or the Canadian Water Quality Guidelines for the Protection of Agriculture Water Uses – Livestock. For parameters without these standards or guidelines, either the CSR Schedule 6 Generic Numerical Water Standards and Schedule 10 Generic Numerical Soil and Water Standards for Drinking Water were used.

k) Background turbidity is 1.5 NTU and 3.0 mg/L for total suspended solids.

< reported value is <MDL

[] = value exceeds the most conservative site-specific maximum hardness-dependant BC WQG but does not exceed the least conservative site-specific maximum hardness-dependant BC WQG

* = value exceeds the most conservative site-specific 30-d average hardness-dependant BC WQG but does not exceed the least conservative site-specific 30-d average hardness-dependant BC WQG

{ } = value exceeds the most conservative site-specific hardness-dependant CSR Schedule 6 Standard for the protection of aquatic life but does not exceed the least conservative site-specific hardness-dependant CSR standard

95th Percentile Values were screened against maximum BC WQGs or CSR standards, minimum and median values were screened against maximum and 30-day BC WQGs and CSR standards:

123	Indicates concentration exceeding the BC Max WQ Guideline
<u>123</u>	Indicates concentration exceeding the BC 30-d WQ Guideline
<u>123</u>	Indicates concentration exceeding the BC Drinking Water Guideline
<u>123</u>	Indicates concentration exceeding CSR aquatic life
<u>123</u>	Indicates concentration exceeding CSR drinking water
<u>123</u>	Indicates concentration exceeding CSR wildlife water

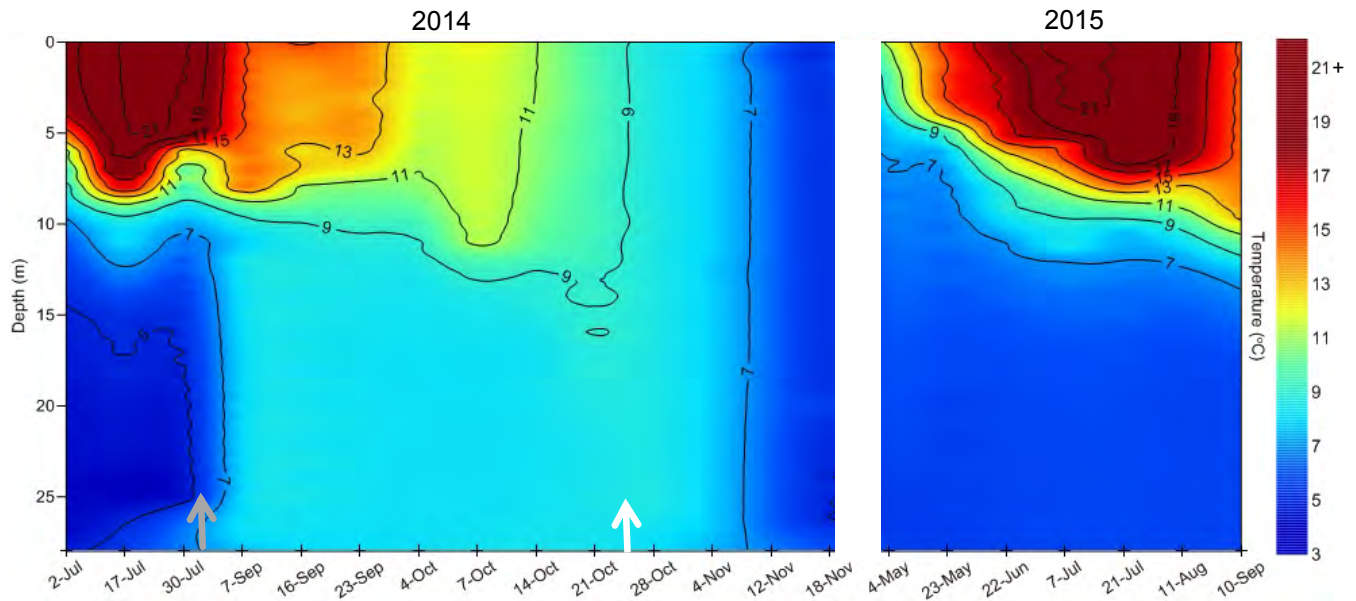
ATTACHMENT 5

**Supporting Information for the Assessment of
Dissolved Oxygen in Polley Lake, March to August 2015**



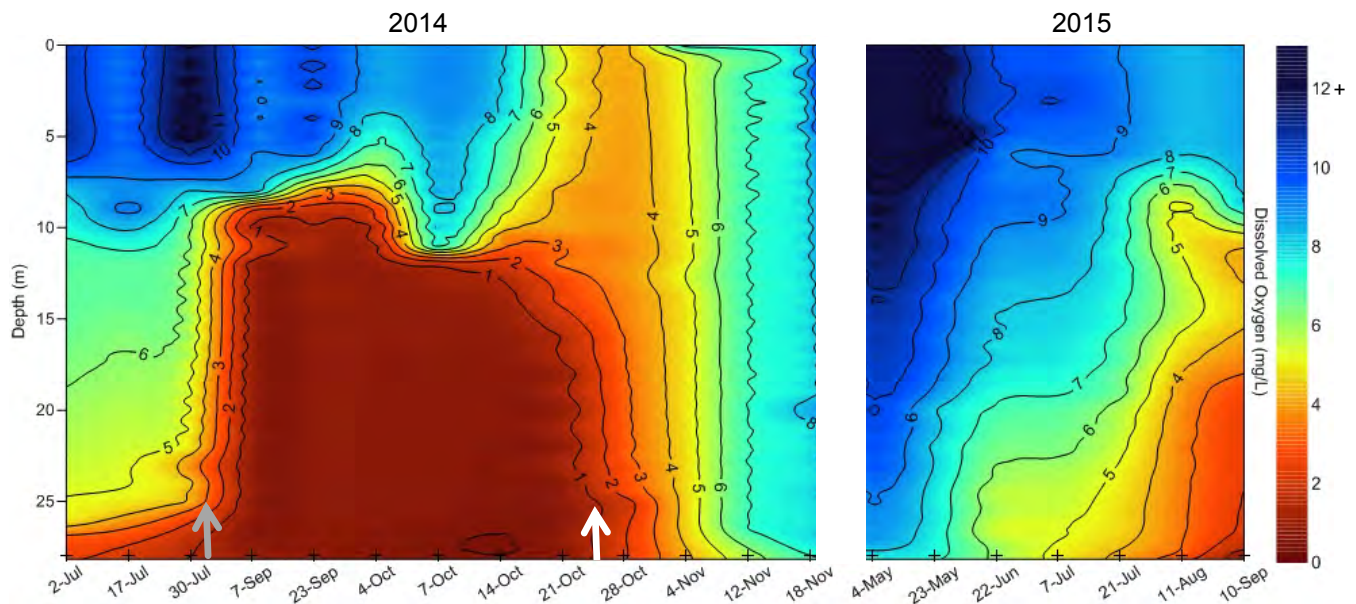
ATTACHMENT 5

Supporting Information for the Assessment of Dissolved Oxygen in Polley Lake, March to August 2015



Note: The grey arrow represents the approximate timing of the event August 2014; the white arrow represents the approximate timing of late-October 2014 turnover in Polley Lake. Sampling did not occur late November 2014 through April 2015 because of unsafe access to the lake during winter conditions.

Figure 1: Contours of Temperature Measured In-situ over Time at Station P-2 in Polley Lake pre-event (July 2014) and post-event (August 2014 to September 2015).



Note: The grey arrow represents the approximate timing of the event August 2014; the white arrow represents the approximate timing of late-October 2014 turnover in Polley Lake. Sampling did not occur late November 2014 through April 2015 because of unsafe access to the lake during winter conditions.

Figure 2: Contours of Dissolved Oxygen Measured In-situ over Time at Station P-2 in Polley Lake pre-event (July 2014) and post-event (August 2014 to September 2015).

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ATTACHMENT 6

**Supporting Information for the Assessment of Turbidity in
Hazeltine Creek and Quesnel Lake, March to August 2015**



ATTACHMENT 6

Supporting Information for the Assessment of Turbidity in Hazeltine Creek and Quesnel Lake, March to August 2015



Figure 1: Hazeltine Creek April 26, 2015.



Figure 2: Hazeltine Creek April 25, 2015.



ATTACHMENT 6

Supporting Information for the Assessment of Turbidity in Hazeltine Creek and Quesnel Lake, March to August 2015



Figure 3: Hazeltine Creek July 8, 2015.



Figure 4: Hazeltine Creek July 8, 2015.



ATTACHMENT 6

Supporting Information for the Assessment of Turbidity in Hazeltine Creek and Quesnel Lake, March to August 2015

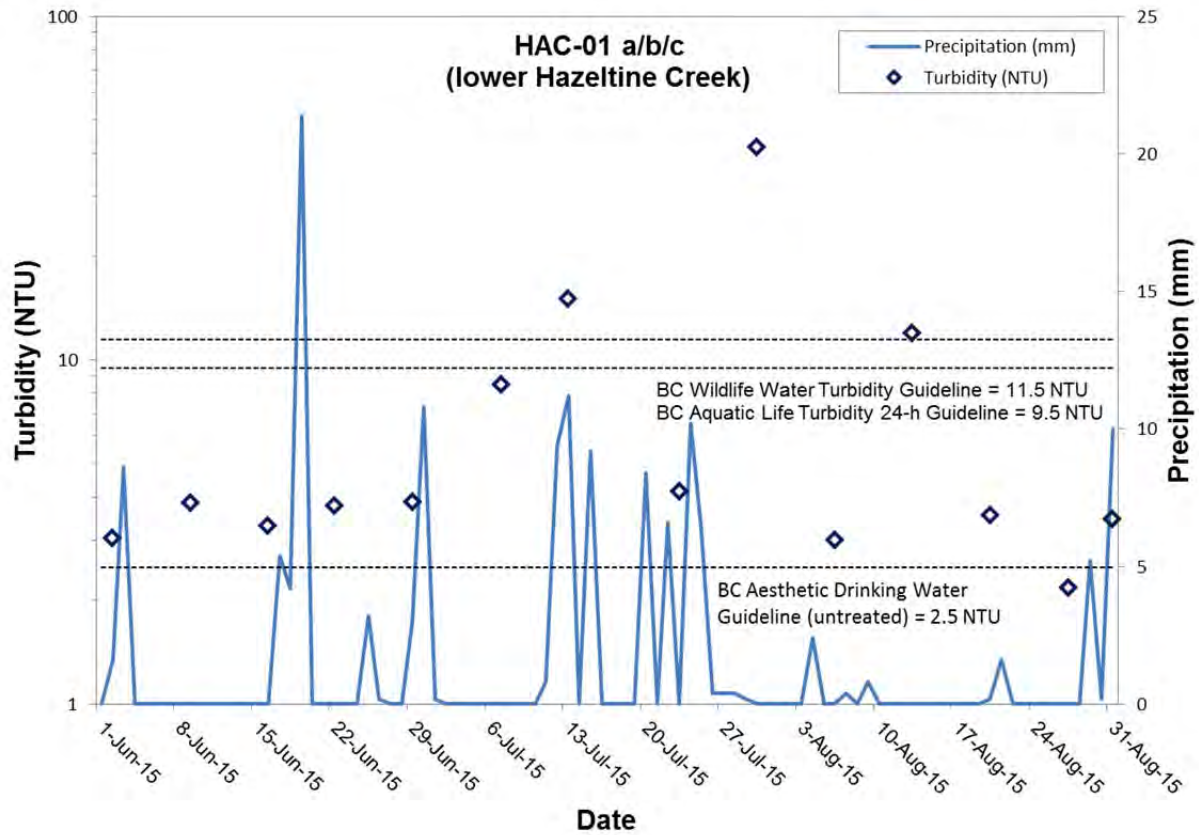


Figure 5: Comparison of Turbidity Measured in Lower Hazeltine Creek (HAC-01a/b/c) with Precipitation Recorded at the Mine Site Weather Station, June to August, 2015. Relevant BC Water Quality Guidelines are also shown.



ATTACHMENT 6

Supporting Information for the Assessment of Turbidity in Hazeltine Creek and Quesnel Lake, March to August 2015

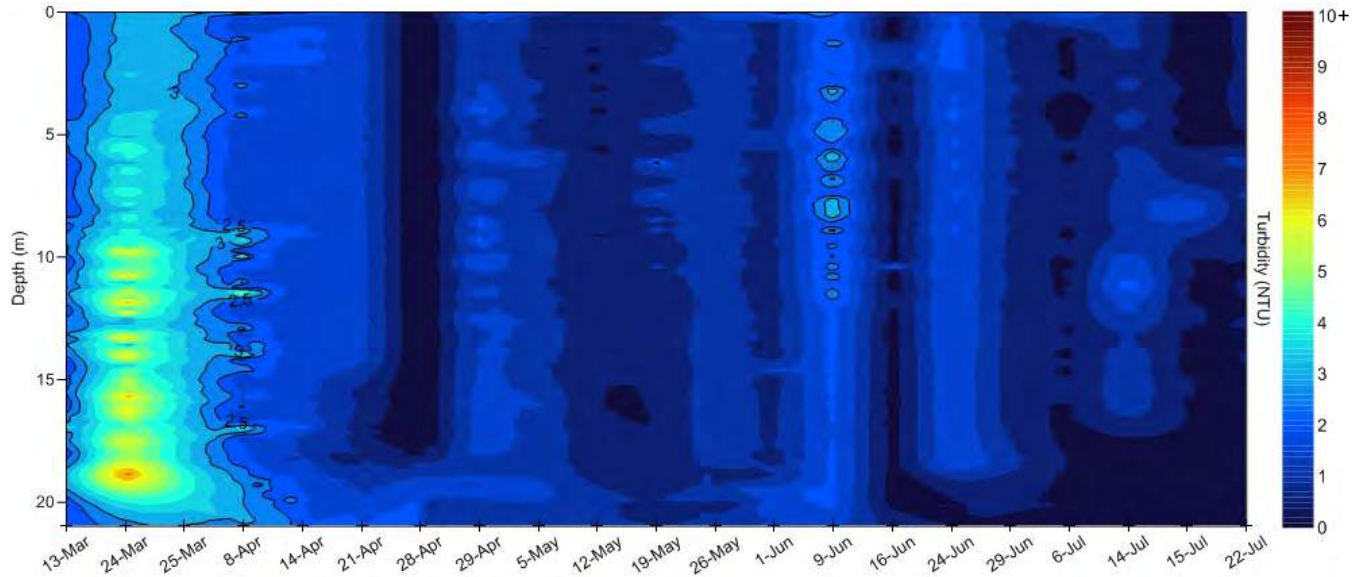


Figure 6: Contours of Turbidity Measured In-situ over Time at Station QUL-54 in Quesnel Lake, March to July 2015. The Contour at 3 NTU Represents the Criterion of 2 NTU above Background (1 NTU).

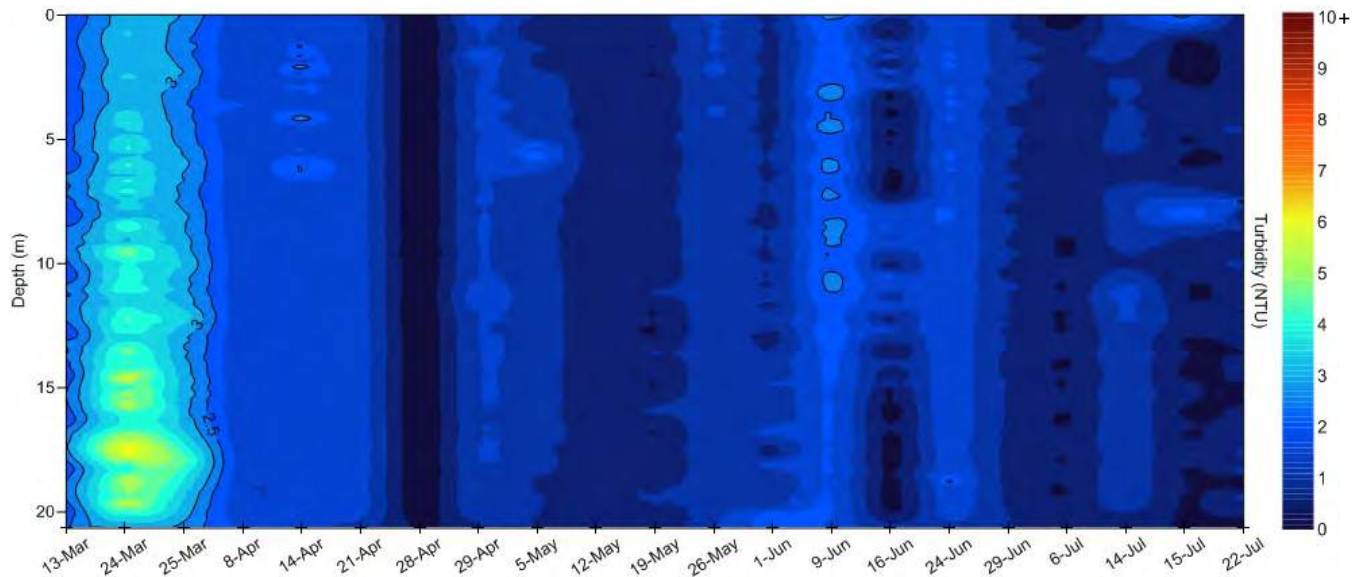


Figure 7: Contours of Turbidity Measured In-situ over Time at Station QUL-56 in Quesnel Lake, March to July 2015. The Contour at 3 NTU Represents the Criterion of 2 NTU above Background (1 NTU).



ATTACHMENT 6

Supporting Information for the Assessment of Turbidity in Hazeltine Creek and Quesnel Lake, March to August 2015

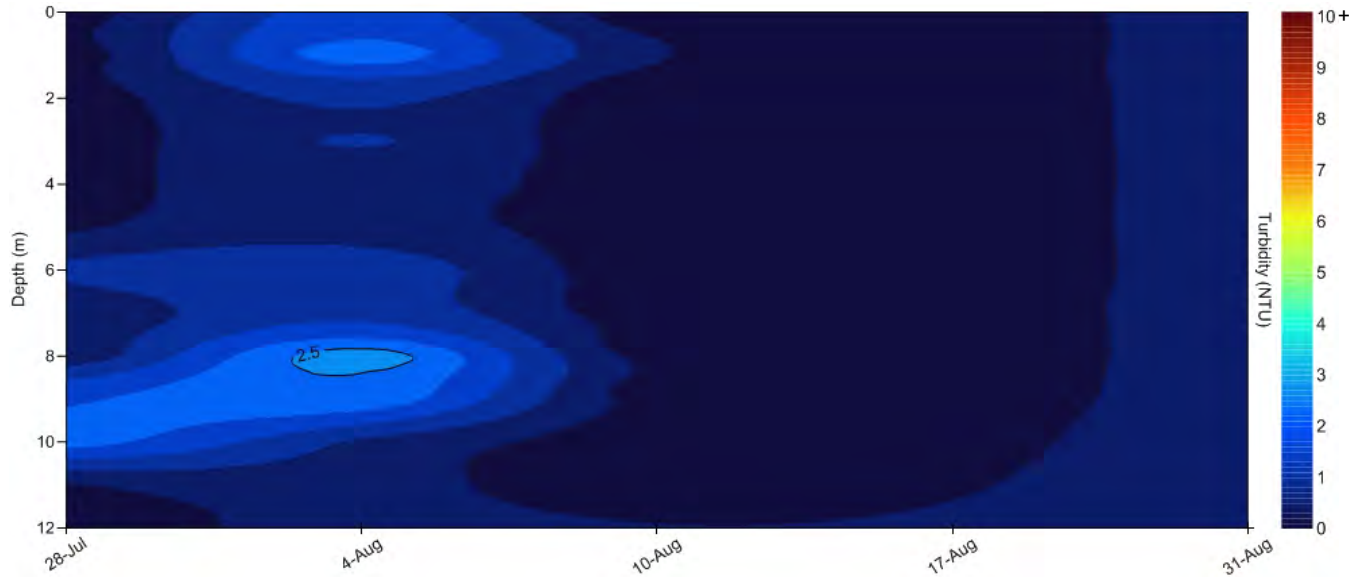


Figure 8: Contours of Turbidity Measured In-situ over Time at Station QUL-54a in Quesnel Lake, July to August 2015. The Contour at 3 NTU Represents the Criterion of 2 NTU above Background (1 NTU).

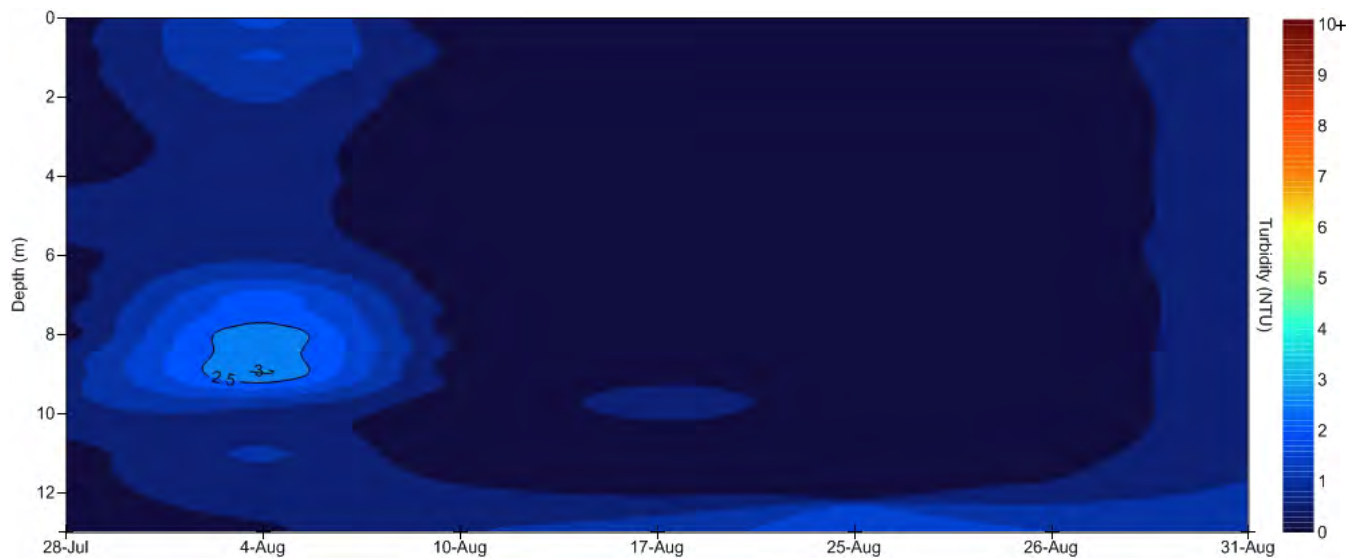


Figure 9: Contours of Turbidity Measured In-situ over Time at Station QUL-55a in Quesnel Lake, July to August 2015. The Contour at 3 NTU Represents the Criterion of 2 NTU above Background (1 NTU).



ATTACHMENT 6

Supporting Information for the Assessment of Turbidity in Hazeltine Creek and Quesnel Lake, March to August 2015

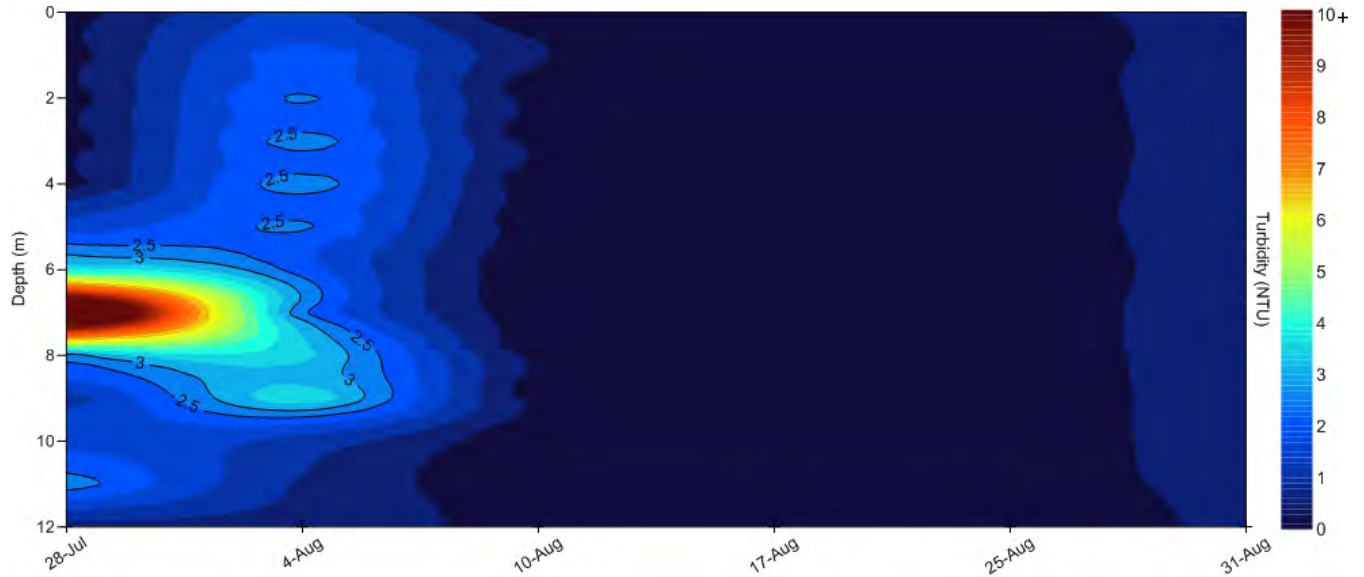


Figure 10: Contours of Turbidity Measured In-situ over Time at Station QUL-56a in Quesnel Lake, July to August 2015. The Contour at 3 NTU Represents the Criterion of 2 NTU above Background (1 NTU).

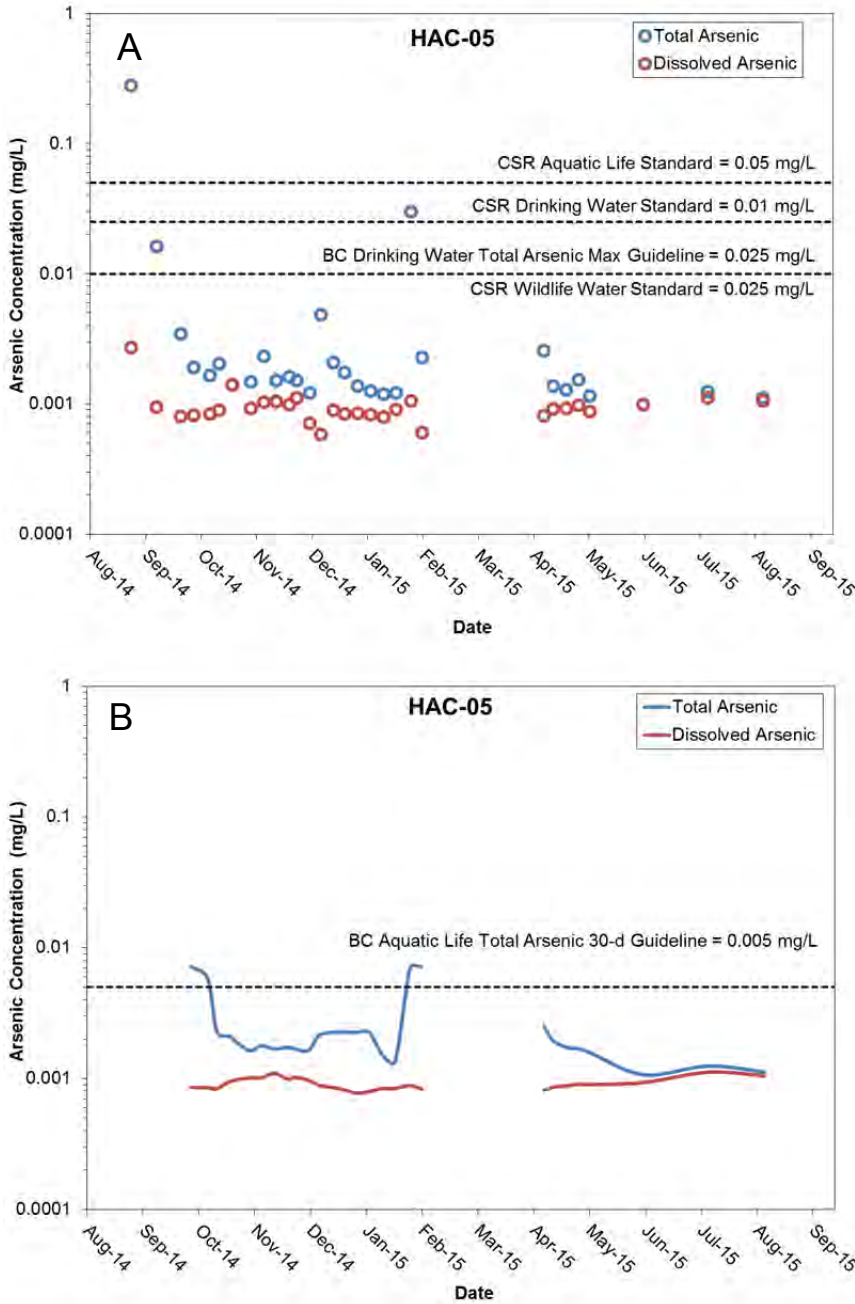
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ATTACHMENT 7

**Supplemental Time Series Plots of Water Quality,
March to August 2015**



1.1 Arsenic



Note: Gaps represent >30 d between sampling.

Figure 1: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total and Dissolved Arsenic Concentrations at Station HAC-05, Hazeltine Creek.



ATTACHMENT 7

Supplemental Time Series Plots of Water Quality March to August 2015

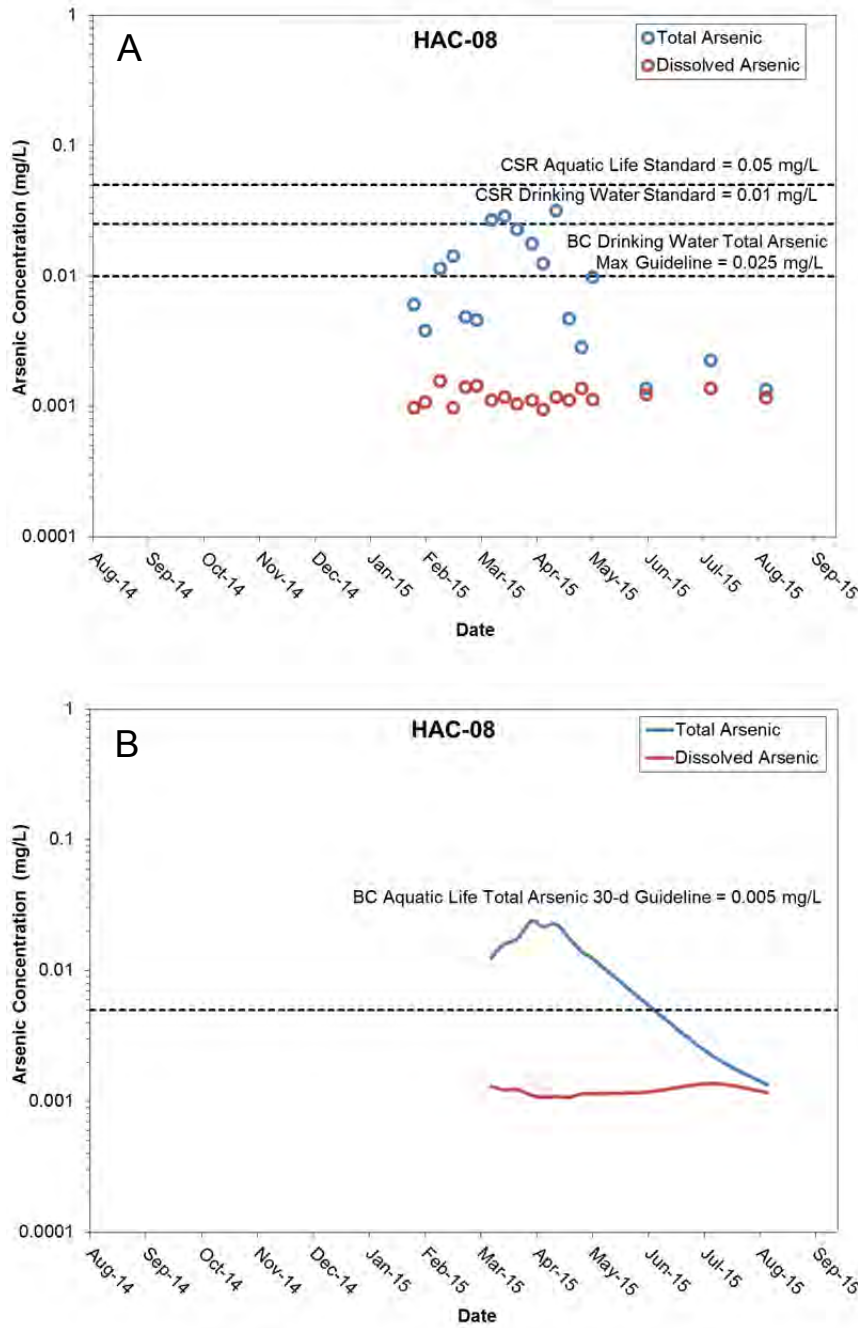


Figure 2: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total and Dissolved Arsenic Concentrations at Station HAC-08, Hazeltine Creek.



ATTACHMENT 7

Supplemental Time Series Plots of Water Quality March to August 2015

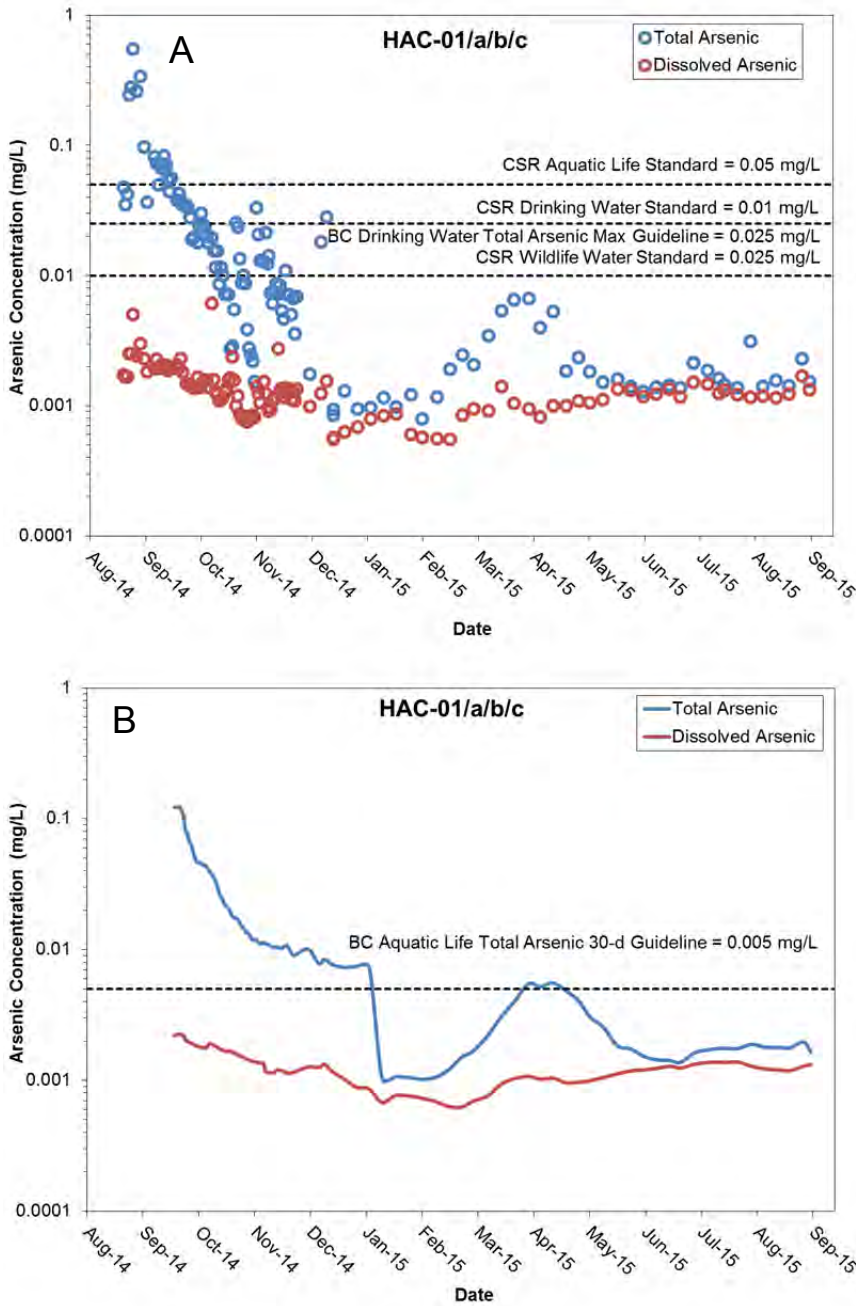
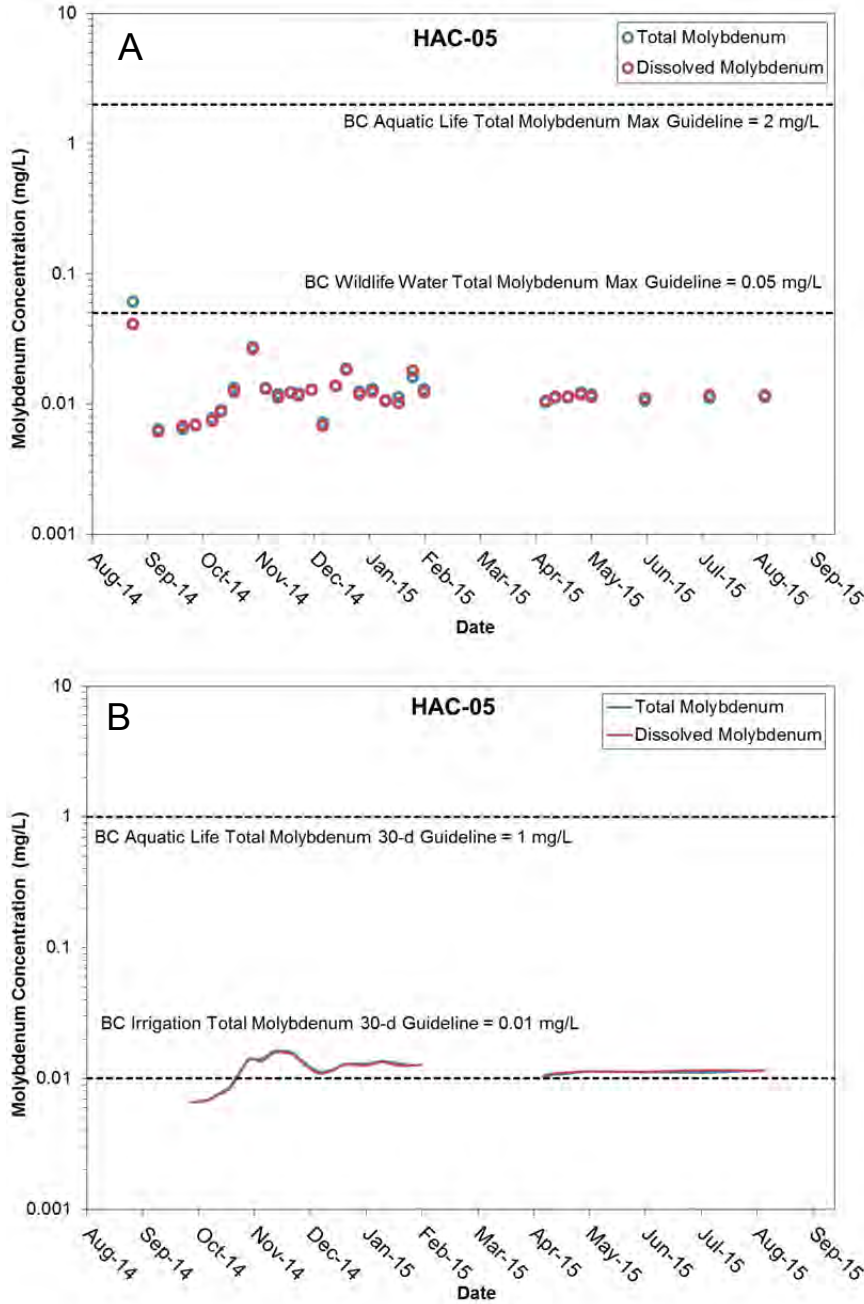


Figure 3: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total and Dissolved Arsenic Concentrations at Station HAC-01/a/b/c, Hazeltine Creek.



1.2 Molybdenum



Note: Gaps represent >30 d between sampling.

Figure 4: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total and Dissolved Molybdenum Concentrations at Station HAC-05, Hazeltine Creek.



ATTACHMENT 7

Supplemental Time Series Plots of Water Quality March to August 2015

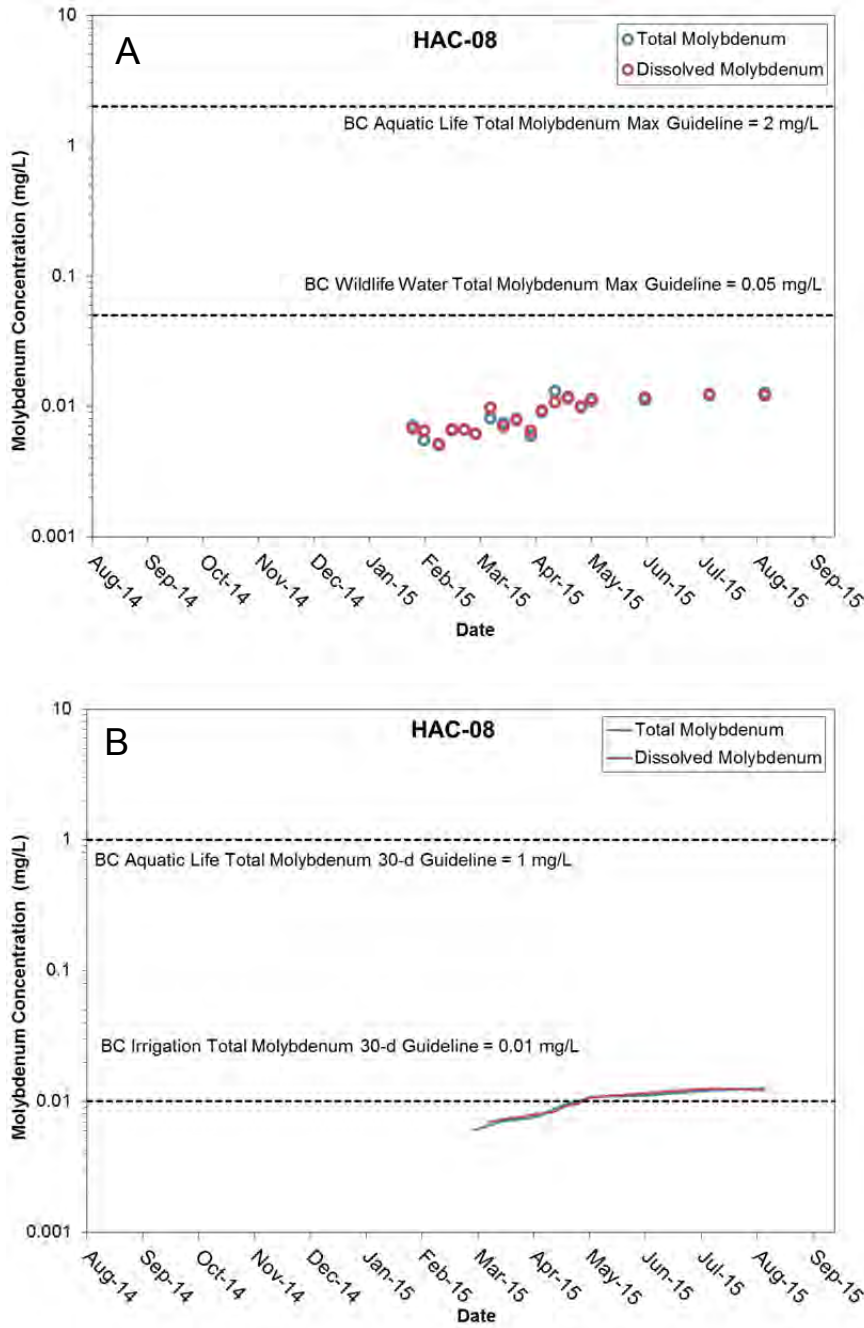


Figure 5: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total and Dissolved Molybdenum Concentrations at Station HAC-08, Hazeltine Creek.



ATTACHMENT 7

Supplemental Time Series Plots of Water Quality March to August 2015

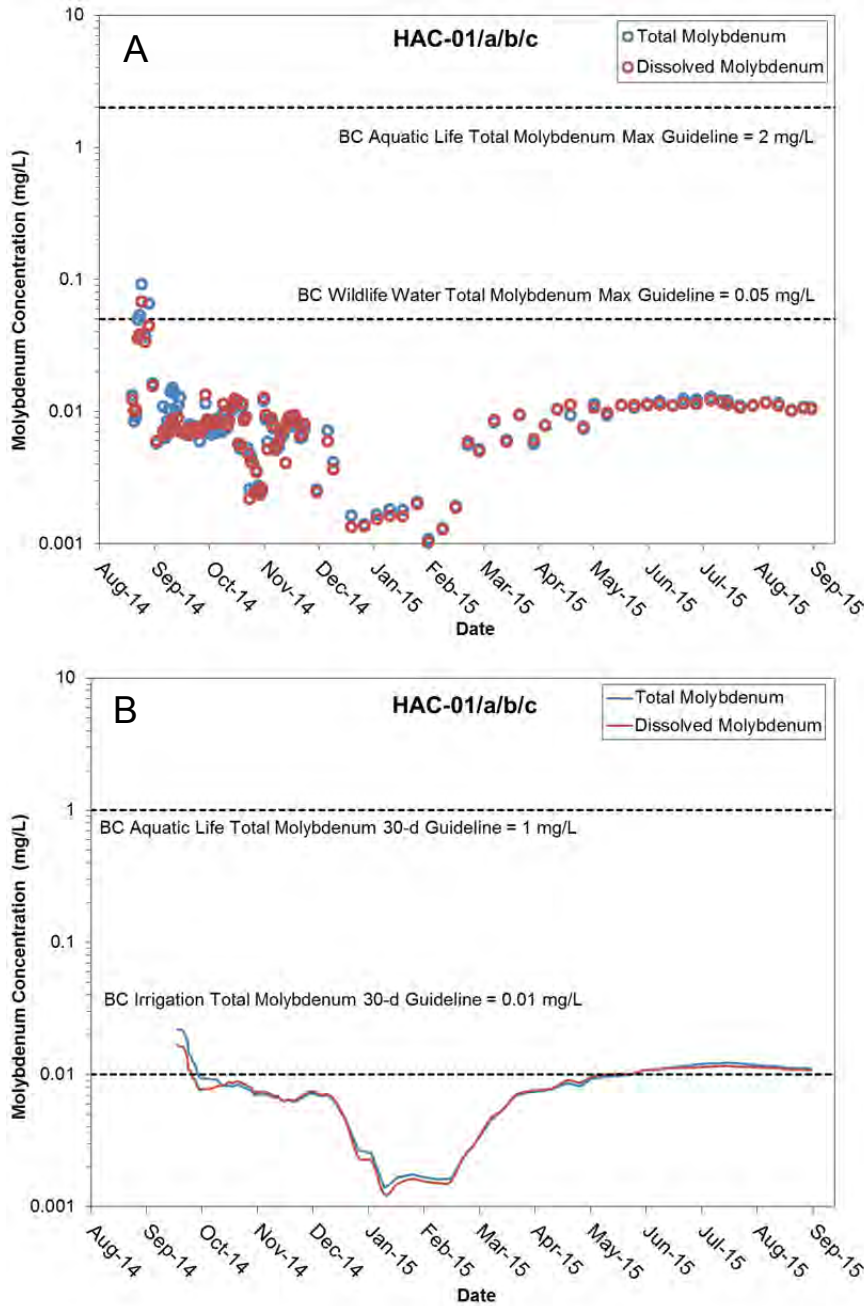
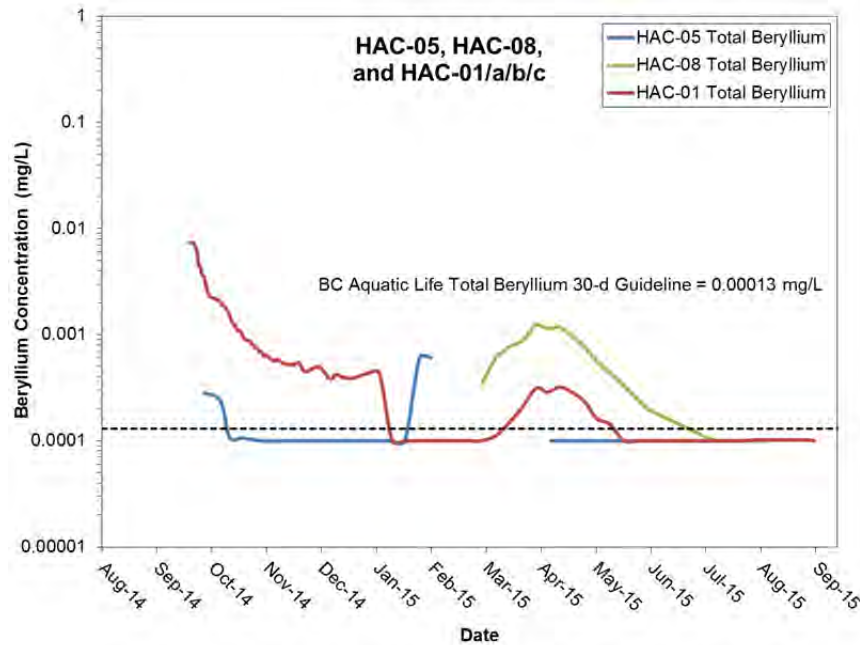


Figure 6: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total and Dissolved Molybdenum Concentrations at Station HAC-01/a/b/c, Hazeltine Creek.



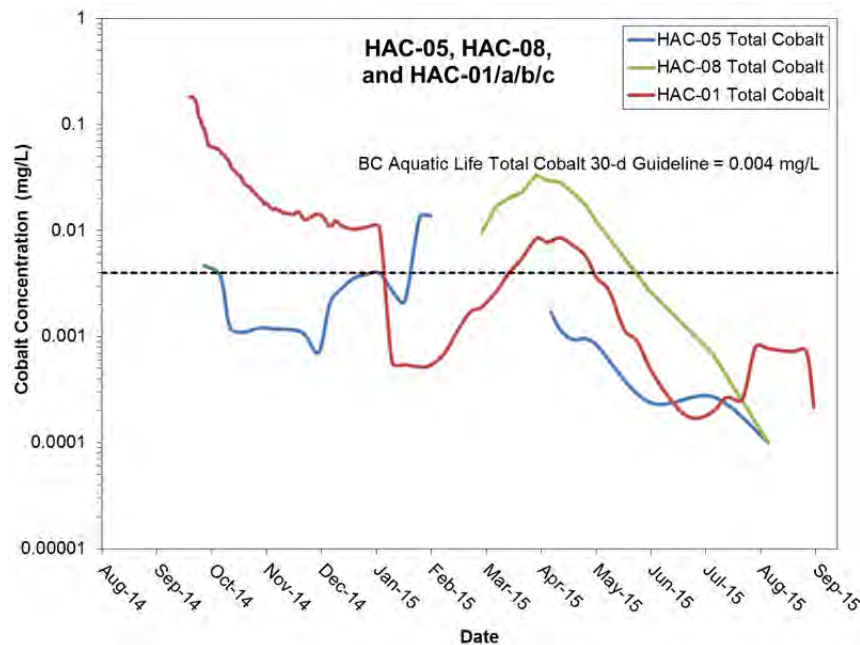
1.3 Beryllium



Note: Gaps represent >30 d between sampling.

Figure 7: Post-event Rolling 30-day Average Total Beryllium Concentrations at Stations HAC-05, HAC-08, and HAC-01/a/b/c, Hazelatine Creek.

1.4 Cobalt



Note: Gaps represent >30 d between sampling.

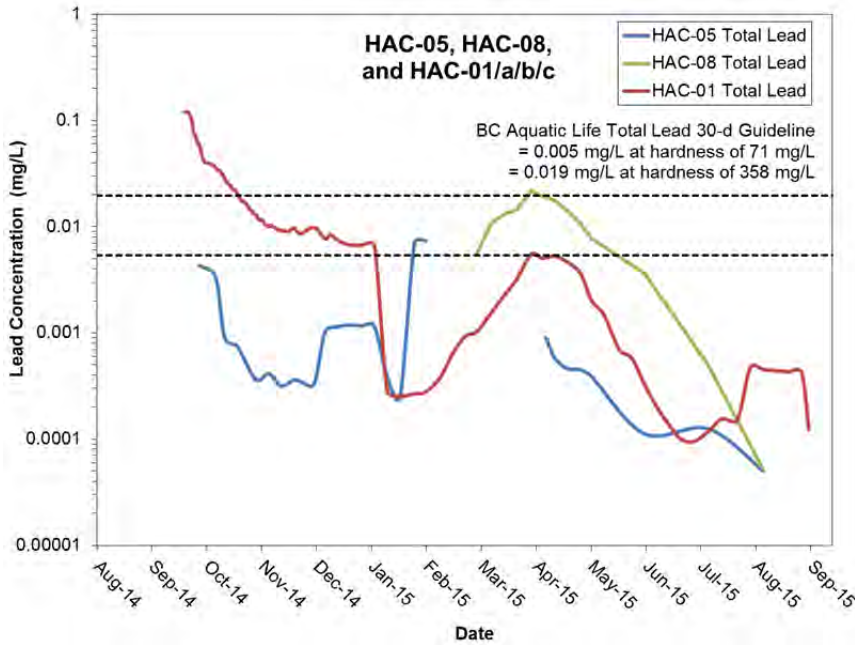
Figure 8: Post-event Rolling 30-day Average Total Cobalt Concentrations at Stations HAC-05, HAC-08, and HAC-01/a/b/c, Hazelatine Creek.



ATTACHMENT 7

Supplemental Time Series Plots of Water Quality March to August 2015

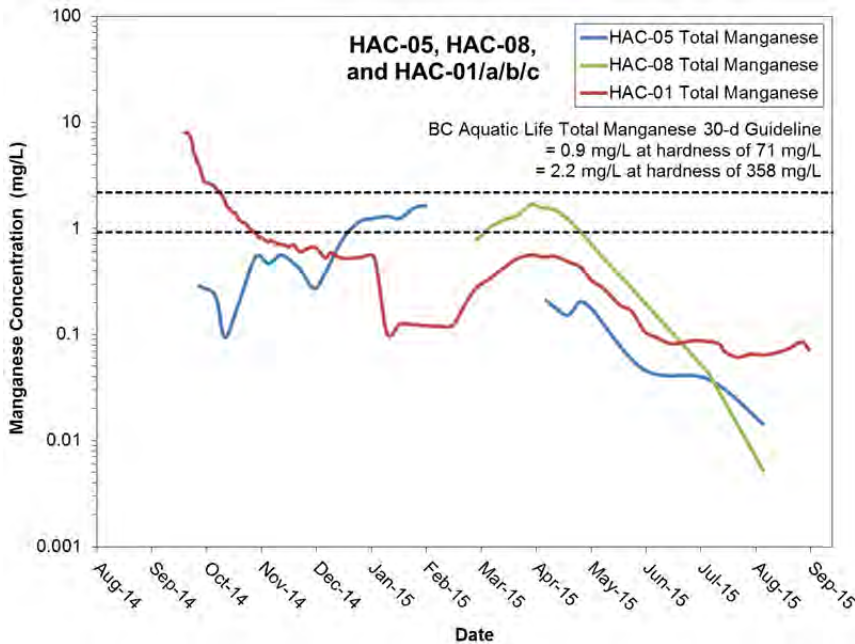
1.5 Lead



Note: Gaps represent >30 d between sampling.

Figure 9: Post-event Rolling 30-day Average Total Lead Concentrations at Stations HAC-05, HAC-08, and HAC-01/a/b/c, Hazeltime Creek.

1.6 Manganese

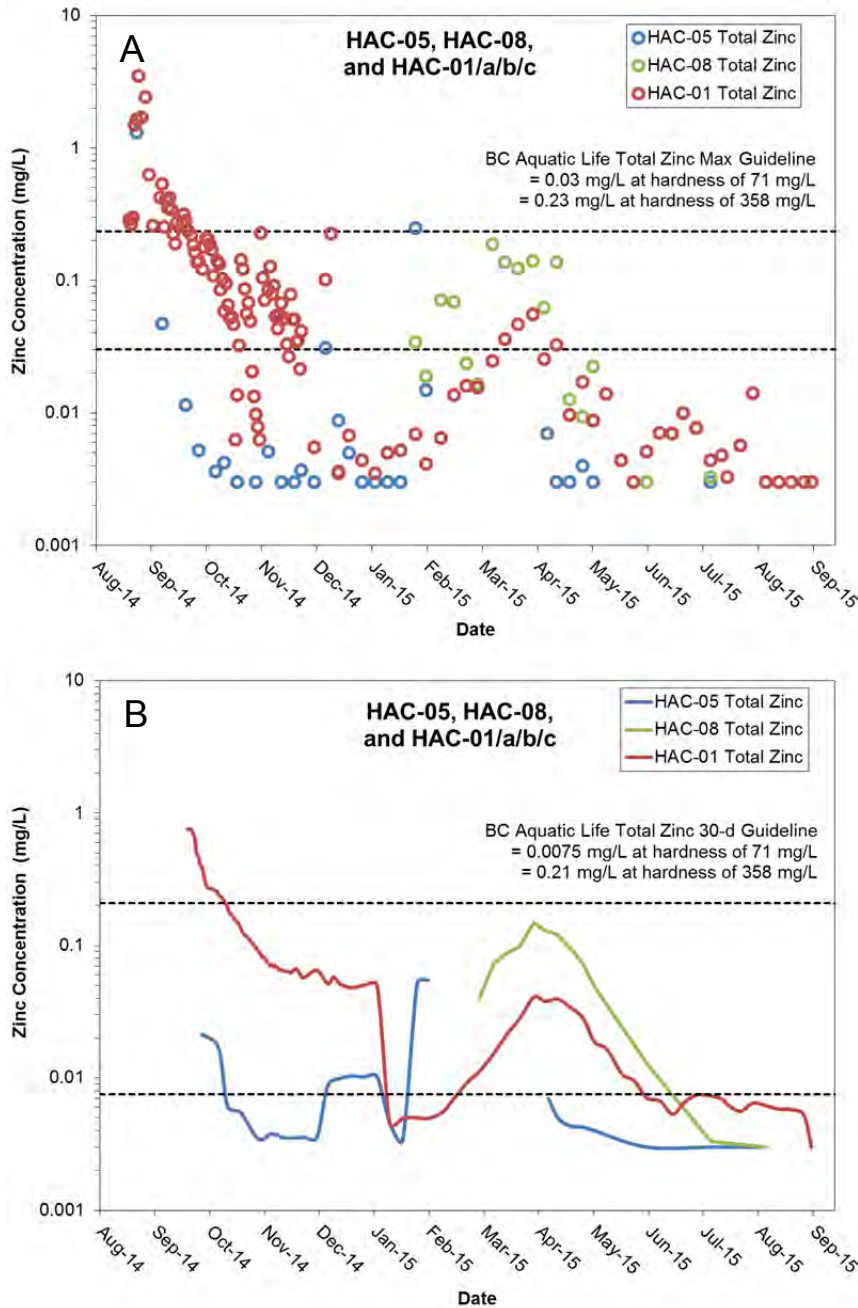


Note: Gaps represent >30 d between sampling.

Figure 10: Post-event Rolling 30-day Average Total Manganese Concentrations at Stations HAC-05, HAC-08, and HAC-01/a/b/c, Hazeltime Creek.



1.7 Zinc

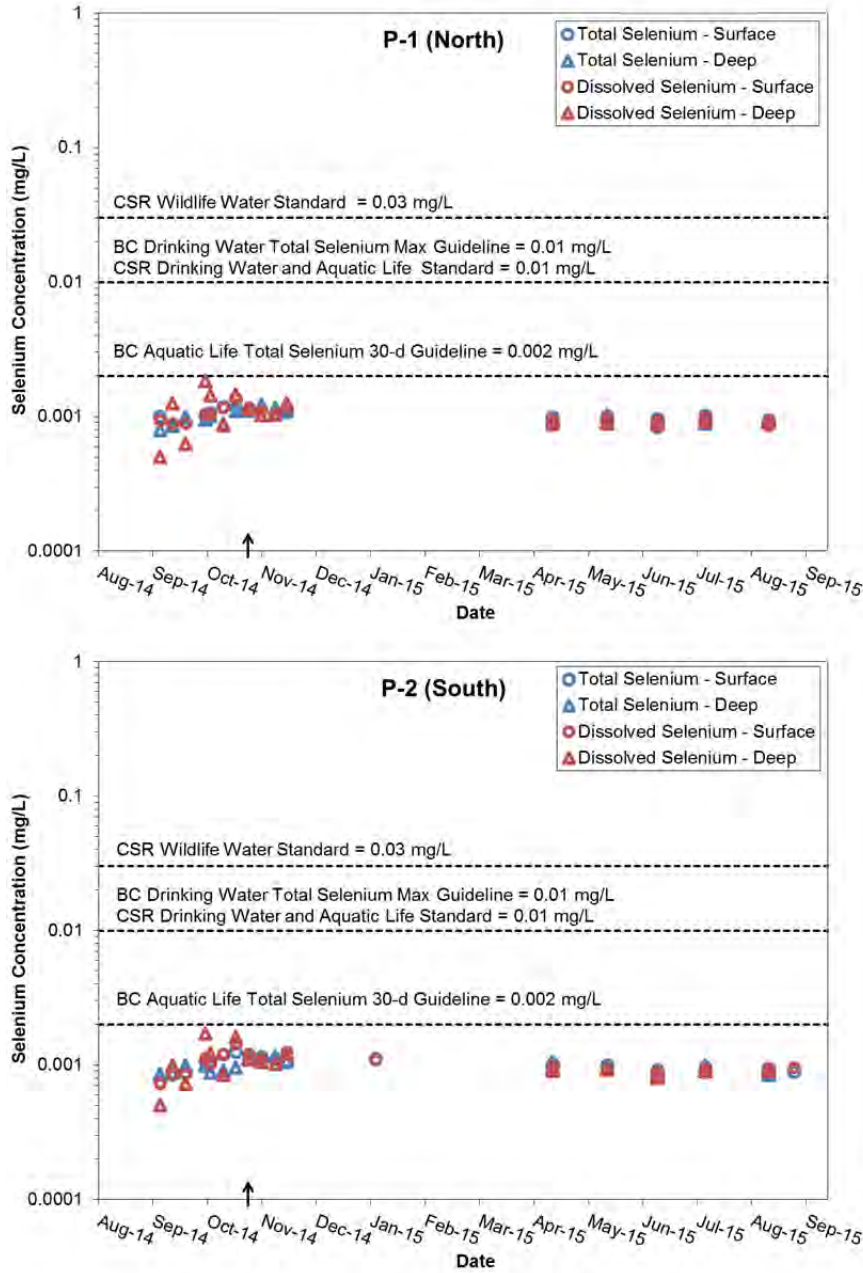


Note: Gaps represent >30 d between sampling.

Figure 11: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total Zinc Concentrations at Stations HAC-05, HAC-08, and HAC-01/a/b/c, Hazeltine Creek.



1.8 Selenium



Note: Arrow represents the approximate timing of late-October turnover in Polley Lake.

Figure 12: Post-event Instantaneous Total and Dissolved Selenium Concentrations at Stations P1 and P2, Polley Lake.



ATTACHMENT 7

Supplemental Time Series Plots of Water Quality March to August 2015

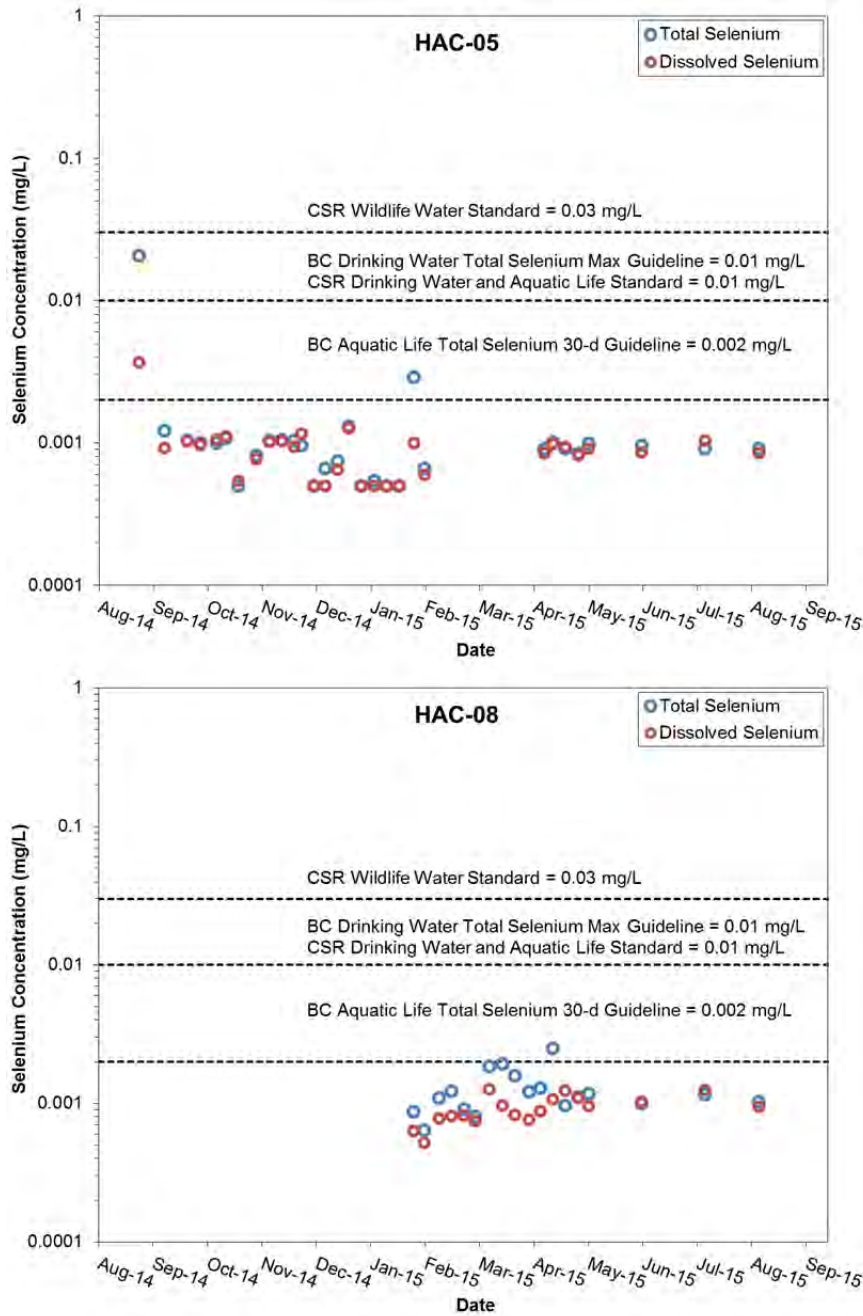


Figure 13: Post-event Instantaneous Total and Dissolved Selenium Concentrations at Stations HAC-05 and HAC-08, Hazeltime Creek.



ATTACHMENT 7

Supplemental Time Series Plots of Water Quality March to August 2015

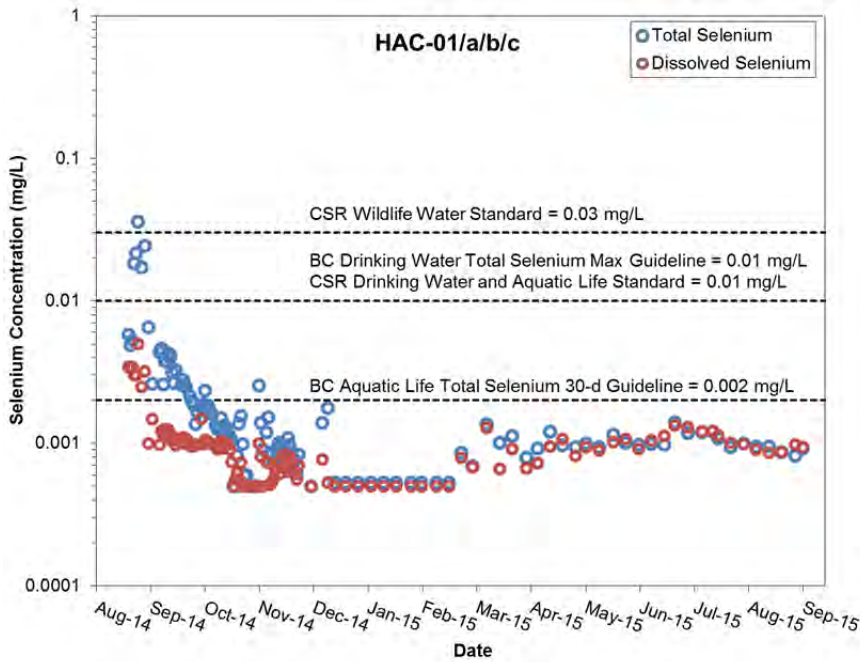
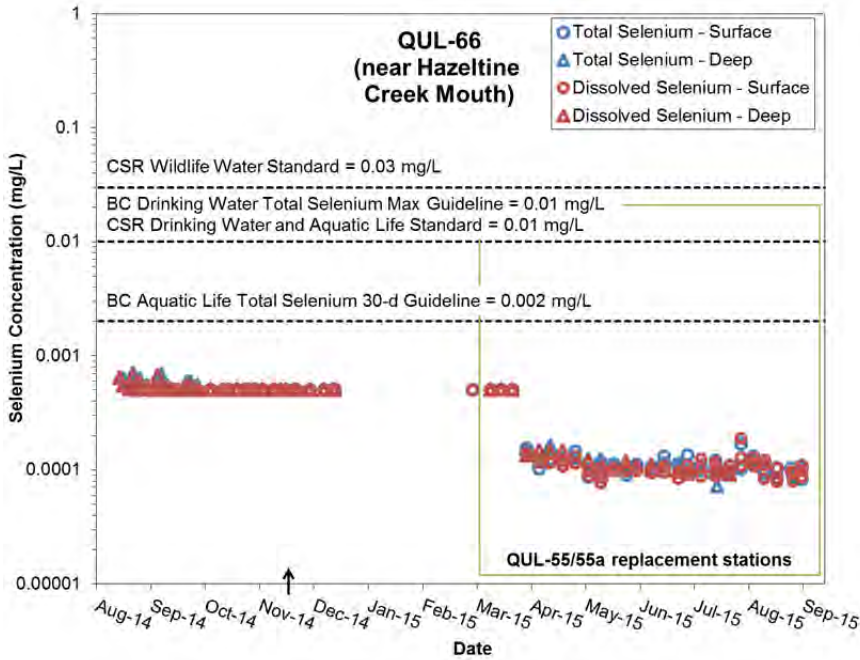


Figure 14: Post-event Instantaneous Total and Dissolved Selenium Concentrations at Station HAC-01/a/b/c, Hazeltine Creek.



Note: Arrow represents the approximate timing of mid-November turnover in Quesnel Lake.

Figure 15: Post-event Instantaneous Total and Dissolved Selenium Concentrations at Station QUL-66/55/55a, Quesnel Lake.

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ATTACHMENT 8

**Tabulated Discrete Water Quality Grab Data Collected from
Polley Lake, Hazeltine Creek, Quesnel Lake, and Quesnel River,
August 2014 to August 2015**

Provided on CD

March 30, 2016

Reference No. 1411734-135-L-Rev1

Colleen Hughes
Mount Polley Mining Corporation
Box 12
Likely.BC
V0L 1N0

ADDENDUM TO MOUNT POLLEY SURFACE WATER QUALITY IMPACT ASSESSMENT UPDATE

Dear Ms. Hughes:

Golder Associates Ltd. (Golder) is pleased to provide Mount Polley Mining Corporation (MPMC) with the following addendum to the Surface Water Quality Impact Assessment (WQIA) update undertaken by Golder (2016). This addendum is intended to provide an update on post-event water quality conditions in Polley Lake, Hazeltine Creek, Lower Edney Creek, Quesnel Lake, and Quesnel River primarily based on water quality monitoring undertaken by MPMC from September to December 2015 and in consideration of 2015 data collected from January through August by MPMC and previously reported by Golder.

1.0 INTRODUCTION

This addendum represents the second update to the original water quality impact assessment (WQIA) for the Post-Event Environmental Impact Assessment Report (PEEIAR) (Golder 2015a). The 'event' refers to the tailings dam failure that occurred at the Mount Polley Mine on August 4, 2014, when the Tailings Storage Facility (TSF) Perimeter Embankment failed and there was a subsequent debris flow into the receiving environment.

A chronology of post-event water quality assessments submitted to MPMC by Golder is summarized below. The assessment approach has involved the progressive evaluation of data collected by MPMC during their post-breach monitoring program that was initiated following the event in August 2014.

- **Original WQIA for the PEEIAR** (Golder 2015a) was based on water quality data collected by MPMC just after the event from August to 2014 to April 2015.



- **Surface WQIA Update** undertaken by Golder (2016) to provide an update to the original PEEIAR WQIA and to inform the Detailed Site Investigation (DSI) for the forthcoming Human Health and Ecological Risk Assessment (HHERA). The HHERA is being completed in 2016 in response to the Pollution Abatement Order (BC MoE 2015a). The WQIA update primarily considered water quality data collected by MPMC from March to August 2015, with consideration of post-event data collected prior to March 2015 as needed to evaluate temporal trends.
- **Addendum to the Surface WQIA Update** presented here is intended to provide an update to the two preceding post-event assessments. The addendum includes previously unreported data collected by MPMC from September to December, 2015.

The objective of the addendum is to evaluate water quality data collected by MPMC in 2015 to assess temporal trends of contaminants of potential concern through to December 2015 in Polley Lake, Hazeltine Creek, Lower Edney Creek, Quesnel Lake and Quesnel River.

2.0 METHODS

Water quality data collected from receiving environments in Polley Lake, Hazeltine Creek (including lower Edney Creek), Quesnel Lake, and Quesnel River were screened using relevant BC water quality guidelines (BC WQGs) (BC MoE 2015b, BC MoE 2015c) and *Contaminated Sites Regulation* (CSR) standards (CSR 2014). For contaminants of potential concern (COPCs) identified for further evaluation as described in Section 2.2, temporal trends were evaluated within the context of applicable BC WQGs and CSR standards. Based on this evaluation contaminants that remained of concern in each receiving environment by the end of 2015 were identified.

2.1 Data Collection and Compilation

The addendum focussed on water quality data collected by MPMC in 2015, including data collected between September and December 2015 that had not previously been evaluated. Data collected from January to August 2015 were reported in the two previous assessments (Golder 2015a, 2016).

From September to December 2015, water quality samples were collected in accordance with the Post TSF-Breach 2015 Monitoring Plan (MPMC 2015); methods are described in Golder (2016). In general, the addendum focused on stations assessed in the WQIA (Golder 2016; Figure 1); however due to the continued evolution of the post-breach monitoring program, a small number of stations were moved, renamed, added, or discontinued. A summary of updated monitoring stations and sampling frequencies is provided in Table A1.

Following completion of quality assurance/quality control (QA/QC) and database entry procedures, MPMC provided Golder with updated electronic data files containing water quality data for September through December 2015 (Table A2). These data were used as received from MPMC with an additional check of transcription by Golder prior to being screened to identify COPCs.

2.2 COPC Identification

To confirm COPCs for the updated assessment, discrete water quality data collected from September through December 2015 were compiled and screened against BC WQGs and CSR standards. Data compiled for all stations sampled within a given area (i.e., Polley Lake, Hazeltine and Edney creeks, Quesnel Lake, and Quesnel River) were evaluated as one dataset per area, for screening purposes. Substances were classified as COPCs based on criteria described in the WQIA (Golder 2016); however, in this addendum maximum concentrations of each substance were used to conservatively identify COPCs.

2.3 COPC Evaluation

Changes in COPC concentrations in 2015 were evaluated qualitatively over time at representative stations previously assessed in the original PEEIAR WQIA (Golder 2015a) and the WQIA update (Golder 2016), as well as at additional representative stations identified during the post-event monitoring program. This updated 2015 assessment included 13 representative stations that are described below with additional details provided in Table A1.

- **Polley Lake:** Station P1 and P2 that have been routinely sampled since August 2014.
- **Hazeltine Creek:** Stations HAC-10, HAC-05/a, HAC-08/a, and HAC-01/a/b/c, listed in order from upstream to downstream.
 - Station HAC-10 is the furthest upstream station in Hazeltine Creek and is located downstream of the Polley Lake inflow. Data collected at this station from April through December 2015 were expected to contribute to a greater spatial representation of water quality conditions in the creek.
 - Station HAC-05 was moved upstream of the Gavin Lake Road bridge to avoid potential water quality impacts associated with the road. HAC-05 and HAC-05a (upstream of the bridge) have contiguous sampling periods and for the purposes of this assessment are considered to represent the same location (i.e., HAC-05/a).
 - Station HAC-08 was temporarily moved downstream of the Ditch Road bridge. HAC-08 and HAC-08a (downstream of the bridge) have contiguous sampling periods and for the purposes of this assessment are considered to represent the same location (i.e., HAC-08/a).
 - HAC-01/a/b/c is located immediately downstream of the sedimentation ponds close to the confluence with Quesnel Lake. This station represents water quality at the outflow of Hazeltine Creek and was the most frequently sampled station in the creek between August 2014 and October 2015. To adapt to changes in the creek channel due to rehabilitation activities and construction of sedimentation ponds HAC-01/a/b/c has been moved slightly over time (a change in location was indicated with a subsequent letter in the station code). Samples collected at HAC-01, HAC-01a, HAC-01b, and HAC 01c in lower Hazeltine Creek have contiguous sampling periods and for the purposes of this assessment are considered to represent the same location (i.e., HAC-01/a/b/c). This station was discontinued in October, 2015 due to lack of flow through the lower sedimentation pond and was replaced by monitoring at HAC-12 in the upper sedimentation pond.

- **Lower Edney Creek:** Stations EDC-01 and EDC-02 are located below the sedimentation ponds close to the confluence with Quesnel Lake.
 - Station EDC-01 was sampled before and after Hazeltine and Edney creeks were re-directed. Data collected at this station from February through December 2015 were expected to contribute to a greater spatial representation of water quality conditions.
 - Station EDC-02 is located downstream of the confluence with Hazeltine Creek. Data collected at this station from February through July 2015 were expected to contribute to a greater spatial representation of water quality conditions.
- **Quesnel Lake:** Stations QUL-2/2/a, QUL-66, QUL-18, and QUL-120/120a.
 - Station QUL-66 was replaced by QUL-55, QUL-55a, and then QUL-58 due to changes in the location of the Hazeltine Creek outflow into the lake. These stations have contiguous sampling periods and for the purposes of this assessment are considered to represent the same location (i.e., are collectively referred to as QUL-66 throughout this addendum).

Stations meeting the following criteria were not included in the COPC evaluation:

- stations not previously assessed as a representative station (Golder 2015a, 2016);
- stations do not contribute to a greater spatial representation of water quality conditions; and
- stations with all parameter concentrations below relevant BC WQGs or CSRs, based on the results of the initial screening step described in Section 2.2.

2.3.1 Changes in COPC Concentrations Over Time

Instantaneous measurements and/or rolling 30-day (d) average values for each COPC were assessed qualitatively and compared to BC WQGs and CSR standards. Data values, guidelines, and standards were plotted and compared based on the methods outline in Section 2.3.2 of the WQIA update (Golder 2016).

Concentrations reported as less than the method detection limit (MDL) were set equal to the MDL for purposes of plotting data and calculating 30-d averages. Typically, 30-d averages would be calculated using, at a minimum, data from at least five samples per 30-d period. If only monthly data were available, and reported concentrations were not stable from month-to-month, plotted 30-d rolling average concentrations were replaced with instantaneous data values (see appended figures 2 to 21). For the relevant figures, instantaneous data shown on the 30-d rolling average plots were identified by open circles connected by dashed lines.

As in the previous WQIA assessments (i.e., Golder 2015a, 2016), water quality trends for identified COPCs were evaluated against hardness-dependent WQGs calculated using hardness concentrations measured during the post-event period. Minimum and maximum hardness concentrations reported for each receiving environment area (i.e., Polley Lake, Hazeltine and Edney creeks, Quesnel Lake, and Quesnel River) during the post-event period were used, rather than station-specific minimums and maximums. With respect to Quesnel Lake and Quesnel River, exposure mean hardness values in 2015 were sufficiently similar to pre-event mean hardness values; for other waterbodies such as Hazeltine Creek and Polley Lake, exposure hardness in 2015 was higher than the pre-event mean hardness value reported prior to the event. Consequently, for Hazeltine Creek and Polley Lake, 2015

data were also compared to WQGs calculated based on mean pre-event hardness concentrations for these waterbodies as previously reported in the original PEEIAR WQIA (Golder 2015a). These guidelines provided conservative lower guideline boundaries for COPCs based on conditions not necessarily reflective of those present in these waterbodies in 2015. It should however be noted that for some receiving environments, such as Hazeltine Creek, the pre-event hardness value was higher than the minimum hardness value measured in 2015 and therefore did not represent the most conservative exposure condition.

3.0 RESULTS

3.1 COPC Identification

Table 1 contains a list of the COPCs identified for this assessment based on the COPCs examined in the PEEIAR (Golder 2015) and the WQIA update (Golder 2016) and confirmed by screening data from September to December 2015 against guidelines and standards. Dissolved aluminum and total and dissolved selenium were identified as COPCs for Hazeltine Creek and Edney Creek, based on elevated concentrations in the September to December 2015 dataset.

Table 1: Contaminants of Potential Concern (COPCs) Identified in the Receiving Environment Based on Water Quality Monitoring in 2015¹

Waterbody	COPC: Physical ²	COPC: Total Metals	COPC: Dissolved Metals	COPC: Non-Metal Substances
Polley Lake	<i>no substances</i>	copper	copper	TP
Hazeltine Creek and Edney Creek	turbidity, TSS	aluminum, arsenic, beryllium, chromium, cobalt, copper, iron, lead, manganese, selenium, zinc	aluminum, copper, selenium	<i>no substances</i>
Quesnel Lake	turbidity (QUL-66 only)	copper	<i>no substances</i>	TP (QUL-66 only)
Quesnel River	turbidity³	<i>no substances</i>	<i>no substances</i>	<i>no substances</i>

Notes: TP = total phosphorus; TSS = total suspended solids; QUL = Quesnel Lake

1. Refer to Golder (2015) (January to April 2015), Golder (2016) (March to August 2015) and Section 2.2 (September to December 2015)
2. Background turbidity concentrations are 1.5 NTU in Hazeltine Creek based on pre-event median value and 1 NTU in Quesnel Lake and Quesnel River.
3. Turbidity was identified as a COPC for Quesnel River based on in-situ data from a continuous logger.

To be conservative in the assessment for Polley Lake, copper was retained as a COPC because it was considered a primary COPC for the PEEIAR (Golder 2015a) and was assessed in the WQIA update (Golder 2016) even though the maximum copper concentration from September to December was below applicable guidelines. Total phosphorus was retained as a COPC for Polley Lake and Quesnel Lake because the maximum concentrations were above the BC WQG range and data are intended to be integrated with biological information to assess potential impacts on lake productivity.

3.2 Changes in COPC Concentrations Over Time

The following section describes post-event changes in receiving environment water quality with respect to COPCs listed in Table 1. Changes in COPC concentrations over time from January through December 2015 are discussed below in comparison to relevant BC WQGs and CSR standards. Results are presented according to each group of COPCs (i.e., suspended particulate matter, metals, nutrients), then within each COPC group. Changes in specific COPCs are discussed for each waterbody.

Data shown for Hazeltine Creek and Quesnel River represent discrete surface grab samples collected as described in the PEEIAR WQIA (Golder 2016), except where a continuous data logger measured turbidity. Quesnel Lake and Polley Lake data are from discrete grab samples taken at various depths and were categorized as either surface (1-20 m) or deep (greater than [$>$] 20 m) for the purpose of evaluating changes over time.

3.2.1 Suspended Particulate Matter (Turbidity/TSS)

3.2.1.1 Hazeltine Creek and Edney Creek

Turbidity levels in Hazeltine Creek showed a progressive decrease from peak levels in the first few months of 2015 to levels closer to applicable BC WQGs by the end of the year. However, levels in upper Hazeltine Creek (HAC-10 and HAC-05/a) and the lower creek above the sedimentation ponds (HAC-08/a) fluctuated during September-December 2015. During this time monthly concentrations at these stations were occasionally above the maximum and 30-d BC WQGs (Figure 2).

In lower Edney Creek at EDC-01 turbidity levels were typically below maximum and 30-d guideline values, except for a spike in October 2015. Turbidity levels at EDC-02 exhibited a general decrease over time until the station was discontinued in July 2015; however, concentrations were predominantly above the 30-d guideline. Elevated turbidity observed at HAC-01/a/b/c throughout July and August continued through September and October (Figure 2) with reported concentrations above the 24-h aquatic life and/or 30-d guidelines. Turbidity concentrations in Hazeltine Creek and Edney Creek were routinely above the BC WQG for untreated drinking water but were within the turbidity range reported for the creek prior to the event.

A similar progressive decline in TSS concentrations was also observed in Hazeltine Creek from peak concentrations in the first few months of 2015 to concentrations below BC WQGs by the end of the year (with the exception of HAC-08/a). Concentrations of TSS at HAC-10, HAC-05/a, and HAC-01/ab/c in Hazeltine Creek and at EDC-01 in Edney Creek were consistently below the 24-h aquatic life and 30-d guidelines throughout September-December 2015 (Figure 3). Before the station was discontinued in July 2015, TSS concentrations at EDC-02 exhibited a general decrease that was similar to the temporal trend observed at HAC-01/a/b/c (Golder 2016; Figure 3). Concentrations at HAC-08/a were variable throughout September-December 2015 and were intermittently above the 24-h aquatic life and 30-d guidelines.

3.2.1.2 Quesnel Lake

Turbidity concentrations measured at the surface and at depth in Quesnel Lake at stations QUL-2/2a, QUL-66, QUL-18, and QUL-120/120a were below BC WQGs from approximately April through August 2015 (Golder 2016). At the surface at QUL-66, turbidity levels generally remained below guideline values with the exception of a single exceedance of the aesthetic drinking water guideline for untreated water and the 30-d aquatic life guideline in spring 2015. Turbidity at QUL-66 continued to decline through September and remained below guidelines into December 2015 with concentrations close to or below background (1 NTU) (Figure 4).

3.2.1.3 Quesnel River

Daily average and in-situ turbidity concentrations at station QUR-1 in Quesnel River showed a progressive decrease over time throughout 2015. Turbidity levels remained well below guidelines with the exception of a few intermittent spikes measured by the continuous data recorder (Figure 5). The elevated values measured by the

continuous recorder were not corroborated by the in-situ grab sample data and as discussed in Golder (2016) these measurements can be influenced by fouling associated with long-term deployment.

3.2.2 Copper

3.2.2.1 Polley Lake

Copper concentrations measured in Polley Lake were not elevated above BC WQGs during the March-August 2015 period, and so copper was no longer considered a COPC by the WQIA update (Golder 2016). However, as described in Section 3.1, copper was retained in this addendum because it is considered a primary COPC within the overall context of the PEEIAR. Both total and dissolved concentrations were below BC WQGs, with the exception of the total 30-d rolling average concentration associated with surface samples collected at P2 in early November 2015 that approximated the most conservative 30-d guideline based on pre-event hardness (Figure 6).

3.2.2.2 Quesnel Lake

Total and dissolved copper concentrations measured in Quesnel Lake were typically below maximum BC WQGs by the end of April 2015 (Golder 2016). By late August 2015, copper concentrations reported for QUL-66 near the mouth of Hazeltine Creek were similar or only slightly elevated relative to concentrations reported elsewhere in the lake, including the far field station (QUL-120/120a) east of Cariboo Island (Golder 2016). Total and dissolved copper concentrations at QUL-2/2a, QUL-66, QUL-18, and QUL-120/120a were below maximum and 30-d guidelines from September through December 2015, with the exception of a single monthly sample collected at near-field (QUL-66) and far-field (QUL-120/120a) stations in September (Figure 7). The corresponding monthly sample in September at the mid-field west station (QUL-18) approximated the most conservative 30-d guideline based on minimum measured hardness.

3.2.2.3 Quesnel River

No metals were identified as COPCs for the receiving environment in Quesnel River in the original WQIA and the WQIA update; this was also the case for data collected from September to December 2015.

3.2.2.4 Hazeltine Creek and Edney Creek Discrete Grab Samples (Instantaneous values)

In upper Hazeltine Creek at HAC-05/a, total copper concentrations were above the maximum BC WQG (based on measured maximum hardness) from January to May 2015, after which concentrations decreased to concentrations below the maximum guideline (based on mean pre-event hardness) by the end of the year (Figure 8). From April to December 2015 total concentrations were below applicable CSR standards. Dissolved concentrations at HAC-05/a were within the WQG range based on measured hardness but were above the WQG based on pre-event hardness until May 2015. Dissolved concentrations decreased thereafter and were below the WQG based on pre-event hardness from May to December 2015. At the most upstream station (HAC-10) total and dissolved concentrations followed a similar trends to those described for HAC-05/a.

In lower Hazeltine Creek (HAC-08/a, EDC-01, EDC-02, HAC-01/a/b/c), total concentrations peaked above BC maximum WQGs and at least one CSR standard¹ from February through April (Figure 8). Total concentrations then decreased at all four stations to concentrations within the BC maximum guideline range (based on measured hardness values) by the end of the year and generally remained above the maximum guideline based on pre-event hardness. Dissolved concentrations at HAC-08/a and HAC-01/a/b/c peaked above the maximum guideline and were within the CSR aquatic life standard range based on measured hardness. Dissolved concentrations decreased thereafter at these stations and were below the maximum guideline based on pre-event hardness at both HAC-08/a and HAC-01/a/b/c by the end of the year. The same was true for EDC-01.

Thirty-Day Rolling Average Values

During the months prior to June, total copper concentrations in upper and lower Hazeltine Creek (HAC-05/a, HAC-08/a, EDC-02, HAC-01/a/b/c) peaked above the 30-d BC WQG range based on measured hardness (Figure 8). Concentrations then decreased to values within the 30-d guideline range based on measured hardness and remained above the guideline based on pre-event hardness. Dissolved concentrations in the lower creek (HAC-08/a, HAC-01/a/b/c) only peaked above the 30-d guideline range (based on measured hardness) from March to May, with a subsequent decrease to concentrations within this guideline range. Concentrations remained above the 30-d guideline based on pre-event hardness (Figure 8). Dissolved concentrations at the other Hazeltine Creek stations were within the 30-d guideline range based on measured hardness and either approximated or were above the guideline based on pre-event hardness.

3.2.3 Other Metals

3.2.3.1 Hazeltine Creek and Edney Creek

Aluminum

In upper Hazeltine Creek (HAC-10, HAC-05/a), total and dissolved concentrations remained below maximum guideline values in 2015, with the exception of a single sample in January at HAC-05/a. In lower Hazeltine Creek (HAC-08/a, EDC-01, EDC-02, HAC-01/a/b/c), concentrations peaked in February through April and were above or approximated maximum guideline values; concentrations then decreased below guidelines by May and remained stable until the end of the year. Concentrations at HAC-05/a in upper Hazeltine and HAC-08/a in lower Hazeltine showed slight increases in November and December, based on monthly sampling; in the case of HAC-08/a concentrations approximated maximum guidelines for the protection of aquatic life (Figure 9).

Dissolved concentrations were above the 30-d dissolved guideline in lower Hazeltine Creek until May and June, when they decreased below this guideline and remained relatively stable until November, when concentrations at HAC-05/a and HAC-08/a increased to approach but not exceed the 30-d guideline value (Figure 10).

Arsenic

Total arsenic was evaluated as a COPC in the WQIA update, based on guideline exceedances that occurred in Hazeltine Creek in spring 2015 (Golder 2016; Figure 11). During this time concentrations at HAC-08/a peaked

¹ The CSR standard for aquatic life at the Edney Creek stations; the CSR for wildlife at HAC-01/a/b/c, and the CSR for drinking water at HAC-08/a.

above the CSR drinking water and wildlife standards as well as the BC drinking water maximum guideline. Thirty-day rolling average total concentrations at HAC-08/a also peaked above the 30-d BC WQG during this time, before decreasing to concentrations more typical of the other stations on the creek by August. Total concentrations at the stations in Hazeltine and Edney creeks shown on Figure 11 were typically well below the maximum and 30-d guidelines from June through December, with the exception of two measurements at HAC-08/a upstream of the sediment ponds in September and December.

Beryllium

Thirty-day rolling average total concentrations were elevated above the 30-d WQG at HAC-08/a and HAC-01/a/b/c during spring 2015 (Figure 12). Concentrations at EDC-02 were also elevated during this time. From July through December 2015, total concentrations at the Hazeltine and Edney Creek stations were below guideline values and were at or near the MDL, with the exception of one sample collected at HAC-08/a in December 2015 that was detected above the WQG (Figure 12).

Chromium

As discussed in Golder (2015a), the available speciation data for Hazeltine Creek indicates the dominant chromium species in Hazeltine Creek was chromium (III), which is less toxic than the chromium (VI) form. However, as a conservative measure, guidelines and standards for both chromium species have been considered when assessing water quality in Hazeltine Creek.

Total chromium was evaluated as a COPC in the WQIA update, largely based on guideline exceedances recorded in spring 2015 in Hazeltine Creek at stations HAC-08/a, HAC-05/a, and HAC-01/a/b/c (Golder 2016; Figure 13). However, by June 2015, total concentrations in Hazeltine Creek had decreased below the most conservative guidelines shown on Figure 13. In 2015, concentrations at stations HAC-10 and EDC-01 and EDC-02 in Edney Creek exhibited temporal trends similar to those previously reported for other stations in Hazeltine Creek (Figure 13).

Total chromium concentrations measured at the Hazeltine and Edney creek stations were below applicable maximum guidelines from June to December 2015, and many were at or near the MDL. The same was true for total 30-d rolling average concentrations that were below the Cr(III) and Cr(VI) 30-day guidelines at all stations, with the exception of intermittent exceedances of the Cr(VI) guideline by total concentrations at HAC-08/a and HAC-01/a/b/c that were still below the more applicable Cr(III) 30-day guideline.

Cobalt

Instantaneous total concentrations reported in 2015 for the Hazeltine Creek stations shown on Figure 14 were below the maximum BC WQG. Thirty-day average total concentrations were above the 30-d BC WQG from March to June at HAC-08/a and March to May at HAC-01/a/b/c, then decreased below the 30-d guideline thereafter (Figure 14). Stations EDC-01 and EDC-02 exhibited a similar temporal trend over the time period leading up to the end of August 2015, but did not exceed the guideline. Total concentrations remained stable well below the 30-d guideline from September through December, with the exception of intermittent values in the monthly September and December samples at HAC-08/a that approached or approximated the guideline.

Iron

Total concentrations at stations in lower Hazeltine Creek were consistently above the BC maximum WQG for aquatic life and the CSR drinking water standard until May 2015 (Figure 15). The higher CSR standard was mostly exceeded at HAC-08/a and HAC-01/a/b/c, with only a few exceedances at other stations. From May to December, total concentrations remained below this guideline, with the exception of one sampling event in August, during which total values at HAC-08/a and HAC-01/a/b/c were more than ten times the preceding and subsequent values recorded in July and August (Golder 2016). Intermittent values measured in September and December at station HAC-08/a were above the BC maximum guideline. Concentrations at the other stations monitored in 2015 were below the BC maximum guideline.

Lead

Total lead was assessed as a COPC in the WQIA update (Golder 2016). In upper Hazeltine Creek, instantaneous concentrations were typically below guideline values in 2015 and 30-d average concentrations were below the long-term average guideline, with the exception of a concentration reported for HAC-05/a in January that was also above the CSR drinking water standard (Figure 16). In lower Hazeltine Creek, after peaking in March through April, rolling 30-d average concentrations declined below the 30-d BC WQG in May and remained relatively stable through the end of December. The exception was an intermittent increase at HAC-08/a in December that approached the 30-d guideline range shown on Figure 16.

Manganese

Total concentrations were below BC maximum WQGs and the CSR drinking water standard (Figure 17). The exceptions were total concentrations at HAC-05/a (January and February) and HAC-08/a (February to April) that were within the BC maximum guideline range, and concentrations at HAC-01/a/b/c (February to April) that were below the BC maximum guideline but above the CSR drinking water standard. Rolling-average 30-d manganese concentrations in Hazeltine Creek stations were below the 30-day guideline based on measured hardness and pre-event hardness, with the exception of HAC-08/a (March through May) and HAC-05/a (January and February) (Figure 17).

Selenium

The WQIA update indicated that post-event selenium concentrations in Hazeltine Creek remained stable below applicable guidelines/standards or decreased below these regulatory benchmarks shortly after the event, remaining stable thereafter (Golder 2016). In 2015, instantaneous and rolling 30-day average concentrations remained well below applicable BC WQGs and CSR standards with the exception of the monthly sampling event in December 2015 at HAC-05/a and HAC-08/a located below the authorized discharge of treated effluent that commenced in December 2015 (Figure 18). Continued monitoring of water quality in Hazeltine Creek through March 2016 confirmed that selenium concentrations at HAC-05/a and HAC-08/a are above the BC WQGs and CSR drinking water and aquatic life standards (MPMC, unpublished data). However, concentrations showed a progressive decrease from 0.024 mg/L in December to 0.014 mg/L in March at HAC-05/a and from 0.020 mg/L in December to 0.012 mg/L in March at HAC-08/a. Selenium concentrations reported at these stations between December 2015 and March 2016 are within the range predicted by Golder (2015b) that did not consider Hazeltine Creek to be a receiving environment in the short-term, but rather a conduit to Quesnel Lake, where fish were

present and potential breeding habitat for aquatic feeding birds is more prevalent. Water quality continues to be monitored in Hazeltine Creek, including stations downstream of the authorized discharge of treated effluent.

Zinc

Total and 30-d rolling average concentrations reported for HAC-05/a, HAC-08/a, EDC-02, and HAC-01/a/b/c between January and June were typically within the BC WQG range based on measured hardness and above BC WQGs calculated using mean pre-event hardness (Figure 19). Concentrations reported for the other stations shown on Figure 19 were below the BC maximum guideline range. Between June and December, total and 30-day rolling average concentrations for all stations shown on Figure 19 were below the most conservative BC WQG, with the exception of a few intermittent values for HAC-08/a.

3.2.4 Nutrients: Total Phosphorus

3.2.4.1 Polley Lake

Following the event and through August 2015, concentrations of total phosphorus (TP) at the surface in Polley Lake were within the pre-event range of concentrations reported in the PEEIAR for Polley Lake (Golder 2015a). Pre-event TP concentrations were defined as: mean = 0.041 mg/L; 95th percentile = 0.094 mg/L.; minimum = 0.0046 mg/L. Both pre-event mean and upper limit concentrations were above applicable BC WQGs (i.e., 0.005 to 0.015 mg/L). This is consistent with the observation by Minnow (2014) that the trophic status of the lake changed from oligotrophic/mesotrophic to mesotrophic/eutrophic by 2012, two years prior to the event.

Prior to fall turnover in 2014, concentrations of all three forms of phosphorus at depth were elevated above pre-event concentrations, unlike surface concentrations that were within pre-event concentration ranges (Golder 2016). Pre-event dissolved phosphorus concentrations were defined in Golder (2015) as: mean = 0.03 mg/L; 95th percentile = 0.08mg/L; minimum = <0.002 mg/L; pre-event orthophosphate concentrations were defined as: mean = 0.03 mg/L; 95th percentile = 0.08mg/L; minimum = <0.001 mg/L (Appendix A; Golder 2015a). Several months after the 2014 fall turnover, in April 2015, total and dissolved phosphorus and orthophosphate concentrations measured at depth were within or below these pre-event concentration ranges reported in the PEEIAR (Figure 20).

From July to October, there was a greater degree of disparity in phosphorus concentrations between those measured at the surface and those measured at depth. Higher concentrations above the TP WQG range were reported at depth and these concentrations remained relatively stable over the summer months, whereas surface concentrations decreased to concentrations within or below the TP WQG range. The noted disparity was likely the result of lake stratification during the summer, such that after mixing during fall turnover, concentrations measured at the surface and at depth in November were similar. Sampling in Polley Lake was suspended in November due to the onset of winter conditions.

Golder (2016) concluded that in 2015 there were no event-related changes to phosphorus concentrations in Polley Lake based on an analysis of data collected from April through August 2015. This conclusion is supported by data collected from September through November shown on Figure 20.

3.2.4.2 Quesnel Lake

After the event, TP concentrations at depth exceeded the BC WQG range in the West Basin of Quesnel Lake, but were not elevated at the far-field station (QUL-120/120a) east of Cariboo Island (Golder 2015a). By fall turnover in 2014, TP concentrations had substantially decreased in the West Basin of Quesnel Lake. Through August 2015, TP concentrations were below the BC WQG range and resembled pre-event concentrations with the exception of a few intermittent exceedances at near-field station QUL-66, near the mouth of Hazeltine Creek (Golder 2016; Figure 21). At the near-field, mid-field, and far-field stations, dissolved phosphorus and orthophosphate concentrations reported between March and August were below pre-event concentrations (Golder 2016; Figure 21).

Collectively, an evaluation of the phosphorus data collected between March and August 2015 suggest that event-related changes of concern for phosphorus were not evident in Quesnel Lake (Golder 2016). After September 2015, total phosphorus concentrations were intermittently above the most conservative BC WQG at near-field station QUL-66, near the mouth of Hazeltine Creek, but did not exceed the drinking water BC WQG or the upper boundary of the aquatic life guideline. Dissolved and orthophosphate concentrations remained at or near the MDL through to the end of December 2015 (Figure 21).

4.0 SUMMARY OF CHANGES IN WATER QUALITY IN 2015

Based on the evaluation of water quality trends in this addendum, the following parameters remain as COPCs due to measured concentrations in December 2015 that remain above BC WQGs and CSR Standards (Table 2). A summary of water quality during 2015 in each receiving environment is provided below.

Table 2: Contaminants that Remain of Potential Concern in the Receiving Environment Based on Water Quality Monitoring as of December 2015

Waterbody	COPC: Physical ²	COPC: Total Metals	COPC: Dissolved Metals	COPC: Non-Metal Substances
Polley Lake	<i>no substances</i>	<i>no substances</i>	<i>no substances</i>	<i>no substances</i>
Hazeltine Creek and Edney Creek	turbidity, TSS	copper, selenium	copper, selenium	<i>no substances</i>
Quesnel Lake	<i>no substances</i>	<i>no substances</i>	<i>no substances</i>	<i>no substances</i>
Quesnel River	<i>no substances</i>	<i>no substances</i>	<i>no substances</i>	<i>no substances</i>

Notes: TSS = total suspended solids

4.1.1 Hazeltine Creek

As described in Golder (2016), there were exceedances of total metal WQGs and CSR standards in Hazeltine Creek in the first half of 2015, mainly during turbid flow periods typically associated with elevated concentrations of particulate matter. Clear-flow conditions ensued upon the completion of channel stabilization activities that typically resulted in much lower concentrations of particulate matter and subsequently lower concentrations of total forms of various metals.

The majority of metals identified as COPCs by Golder (2016) had decreased to below guideline levels by mid-summer and remained stable through December 2015, with a few noted exceptions (e.g., beryllium, chromium, and cobalt at HAC-08/a). By December 2015, only total and dissolved copper consistently exceeded BC WQGs for the protection of aquatic life. Copper, turbidity and total suspended solids therefore remain the primary substances of concern in Hazeltine Creek.

Concomitant with the initiation of the authorized discharge of treated effluent in December 2015, selenium concentrations increased at HAC-05/a and HAC-08/a, located close to and downstream from the discharge location, respectively. Even though the most sensitive receptors to selenium (i.e., egg laying vertebrates) are either excluded (fish) or are limited in number (aquatic feeding birds), selenium is also conservatively flagged to be of concern in Hazeltine Creek. However, as discussed in Section 3.2.2.4, concentrations appear to have decreased in the first quarter of 2016 by 1- 2 times compared to the concentrations reported in December 2015.

Copper therefore remains the primary substance of concern in Hazeltine Creek based on the 2015 data. When the creek is subject to erosion resulting in turbid flow events, turbidity, TSS, and some other metals also exceed guidelines. Selenium is conservatively flagged to be of concern but concentrations appear to be decreasing following the initial discharge of treated effluent to the creek; and selenium will continue to be monitored as part of routine monitoring programs.

4.1.2 Polley Lake

Levels of TSS, turbidity, and copper were low in Polley Lake and remained below guidelines throughout 2015. With respect to nutrients, total phosphorus concentrations were within the range observed in Polley Lake prior to the event. Therefore no contaminants remained of concern by December 2015 in Polley Lake.

4.1.3 Quesnel Lake

Levels of TSS and turbidity were low in the far-field area of Quesnel Lake as well as in the West Basin and remained below guidelines throughout 2015, with the exception of some higher levels recorded in the near-field area at the mouth of Hazeltine Creek when turbid inflows from Hazeltine Creek were present from March to May 2015. Close to the mouth of Hazeltine Creek, turbidity progressively declined between June and December to levels close to or below background (1 NTU).

Within the West Basin, total copper was below applicable BC WQGs and CSR standards in the near-field, mid-field and far-field stations. Exceptions to this were instances where concentrations were above applicable BC WQGs between March and May in the near-field close to the mouth of Hazeltine Creek and to a lesser extent at the western mid-field station further away from the mouth. These higher total concentrations coincided with turbid flow periods in Hazeltine Creek and dissolved concentrations did not exceed BC WQGs. Other metals monitored at the Quesnel Lake stations in 2015 were below applicable BC WQGs and CSR standards.

In agreement with Golder (2016), phosphorus data collected throughout 2015 suggested that event-related changes of concern with respect to the potential for a change in lake trophic status were not evident in Quesnel Lake.

Based on the evaluation of the 2015 dataset, no contaminants remained of concern by December in Quesnel Lake.

4.1.4 Quesnel River

Similar to the eastern far-field area of Quesnel Lake, water quality in Quesnel River between March and August did not exhibit event-related changes that were identified to be of concern with respect to exceedance of water quality guidelines. Therefore no contaminants remained of concern by December 2015 in Quesnel River.

5.0 STATEMENT OF LIMITATIONS

This technical memorandum was prepared for the exclusive use of MPMC. The inferences concerning the data, site and receiving environment conditions contained in this memorandum are based on information obtained during investigations conducted at the site by Golder Associates Ltd. (Golder), other consultants and MPMC, and are based solely on the condition of the site at the time of the site studies and subsequent investigations and remediation and other information obtained by Golder, as described in this memorandum. Soil, surface water and groundwater conditions may vary with location, depth, time, sampling methodology, analytical techniques and other factors.

In evaluating the subject site and water quality data, Golder has relied in good faith on information provided. The factual data, interpretations and recommendations pertain to a specific project as described in this memorandum, based on the information obtained during the assessment by Golder on the dates cited in the memorandum, and are not applicable to any other project or site location. Golder accepts no responsibility for any deficiency or inaccuracy contained in this memorandum as a result of reliance on the aforementioned information.

The findings and conclusions documented in this memorandum have been prepared for the specific application to this project, and have been developed in a manner consistent with that level of care normally exercised by environmental professionals currently practising under similar conditions in the jurisdiction. Golder makes no other warranty, expressed or implied and assumes no liability with respect to the use of the information contained in this memorandum at the subject site, or any other site, for other than its intended purpose.

Any use which a third party makes of this memorandum, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Golder accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or action based on this memorandum. All third parties relying on this memorandum do so at their own risk. Electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore no party can rely upon the electronic media versions of Golder's memorandum or other work product. Golder is not responsible for any unauthorized use or modifications of this memorandum.

MPMC may rely on the information contained in this memorandum subject to the above limitations.

Golder makes no other representation whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this memorandum, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein.

If new information is discovered during future work, including excavations, sampling, soil boring, predictive geochemistry or other investigations, Golder should be requested to re-evaluate the conclusions of this memorandum and to provide amendments, as required, prior to any reliance upon the information presented herein. The validity of this memorandum is affected by any change of site conditions, purpose, development plans or significant delay from the date of this memorandum in initiating or completing the project.

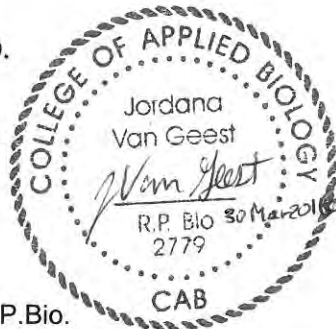
6.0 CLOSURE

We trust that this Addendum provides sufficient information for your present needs. If you have any questions, please do not hesitate to contact the undersigned at (604) 296-4200.

GOLDER ASSOCIATES LTD.



Jordana Van Geest, Ph.D., R.P.Bio.
Environmental Scientist



Amy Wiebe, M.Sc.
Aquatic Biologist



Elaine Irving, Ph.D., R.P.Bio.
Senior Environmental Scientist



Jerry Vandenberg, M.Sc., P.Chem
Associate, Senior Environmental Chemist

JVG/AW/EI/JVB/syd

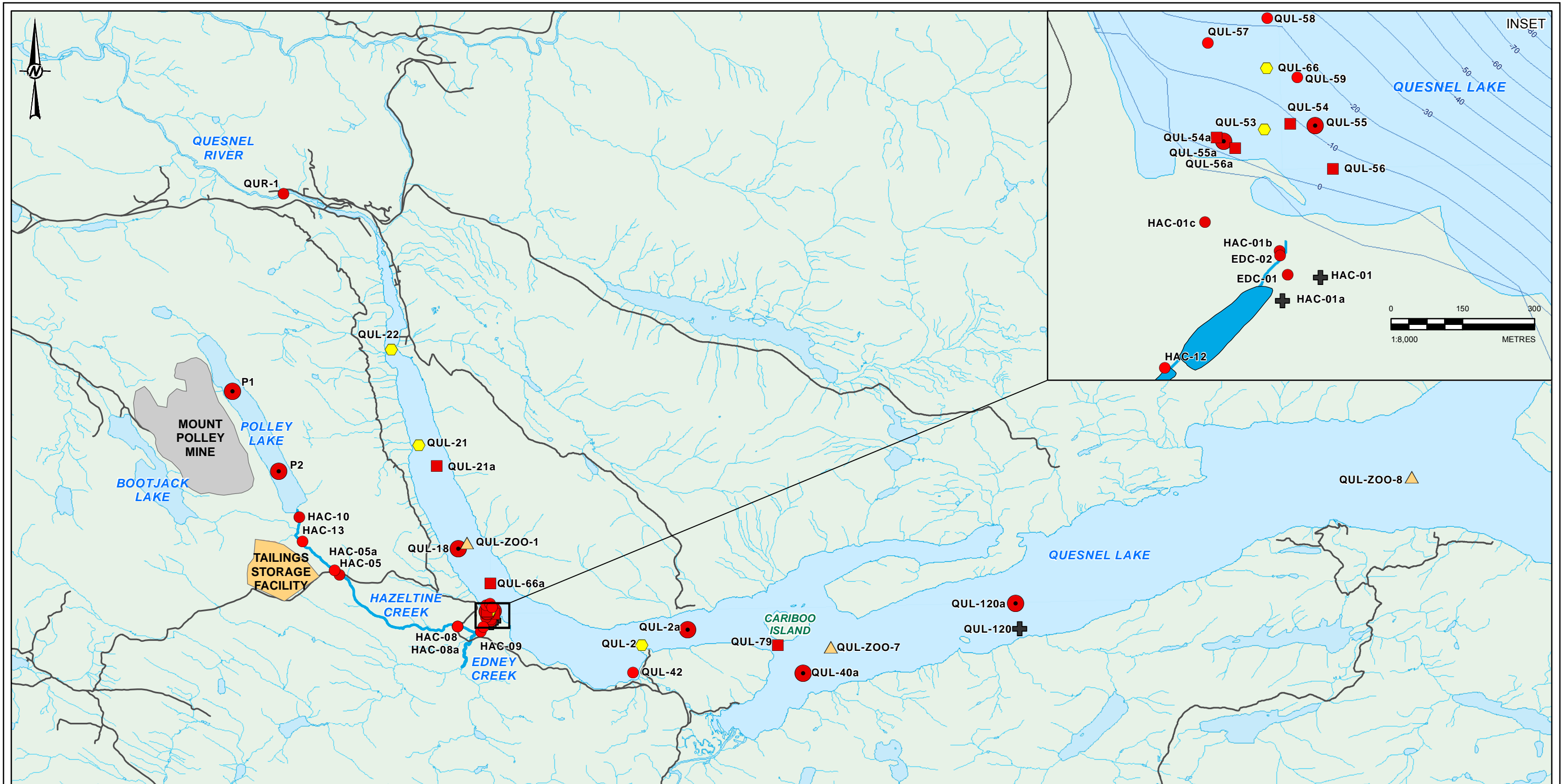
- Attachments:
- Figure 1: Post-event Water Quality Monitoring Stations, March to December 2015
 - Figure 2: Post-event Instantaneous (A) and Rolling 30-day Average (B) Turbidity Concentrations at Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeline and Edney Creeks
 - Figure 3: Post-event Instantaneous (A) and Rolling 30-day Average (B) TSS Concentrations at Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeline and Edney Creeks
 - Figure 4: Post-event Instantaneous (A) and Rolling 30-day Average (B) Turbidity Concentrations at Stations QUL-66 (i.e., QUL-66/55/55a/66a), Quesnel Lake
 - Figure 5: Post-event Instantaneous (A) and Rolling 30-day Average (B) Turbidity Concentrations at Stations QUL-1 near Likely, Quesnel River
 - Figure 6: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total and Dissolved Copper Concentrations at Stations P1 and P2, Polley Lake
 - Figure 7: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total and Dissolved Copper Concentrations at Stations QUL-2/2a, QUL-66, QUL-18, and qul-120/120a, Quesnel Lake
 - Figure 8: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total and Dissolved Copper Concentrations at Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeline and Edney Creeks
 - Figure 9: Post-event Instantaneous Total and Dissolved Aluminum Concentrations at HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeline and Edney Creeks
 - Figure 10: Post-event Rolling 30-day Average Dissolved Aluminum Concentrations at Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeline and Edney Creeks
 - Figure 11: Post-event Instantaneous (A) and Rolling 30-Day Average (B) Total Arsenic Concentrations at Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeline and Edney Creeks
 - Figure 12: Post-event Rolling 30-Day Average Total Beryllium Concentrations at Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeline and Edney Creeks
 - Figure 13: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total Chromium Concentrations at Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeline and Edney Creeks

- Figure 14: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total Cobalt Concentrations at Stations HAC-10, HAC-05/a.
- Figure 15: Post-event Instantaneous Total Iron Concentrations at Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeline and Edney Creeks
- Figure 16: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total Lead Concentrations Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeline and Edney Creeks
- Figure 17: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total Manganese Concentrations Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeline and Edney Creeks
- Figure 18: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total Dissolved Selenium Concentrations Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeline and Edney Creeks
- Figure 19: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total Zinc Concentrations Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeline and Edney Creeks
- Figure 20: Post-event Instantaneous Total Phosphorus Concentrations at Stations P1 and P2, Polley Lake
- Figure 21: Post-event Instantaneous Total Phosphorus Concentrations at Station QUL-66, Quesnel Lake
- Table A1: Summary of Mount Polley TSF Breach Water Quality Monitoring Program, September to December 2015
- Table A2: Tabulated Discrete Water Quality Grab Data Collected from Polley Lake, Hazeltine Creek, Quesnel Lake, and Quesnel River, September to December 2015 (*Provided on CD*)

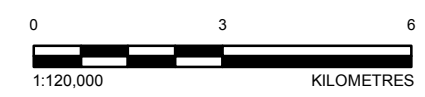
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7.0 REFERENCES

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- LEGEND**
- POST-EVENT MONITORING STATIONS**
- ROUTINE - PROFILE
 - ROUTINE - GRAB
 - ROUTINE - GRAB + PROFILE
 - ▲ NON-ROUTINE - PROFILE
 - ⬡ INTERMITTENTLY SAMPLED
 - + SUPERSEDED PRIOR TO MARCH 2015
 - TAILINGS STORAGE FACILITY
 - MOUNT POLLEY MINE SITE
 - BATHYMETRY
- ROAD
 - WATERCOURSE
 - SEDIMENTATION PONDS
 - WATERBODY



- REFERENCES**
1. WATER MONITORING STATIONS OBTAINED FROM MOUNT POLLEY MINING CORPORATION.
 2. WATERCOURSE AND LAKE DATA OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
 3. PROJECTION: NAD 1983 UTM ZONE 10

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	PREPARED	MH
	REVIEWED	JV
	APPROVED	EI



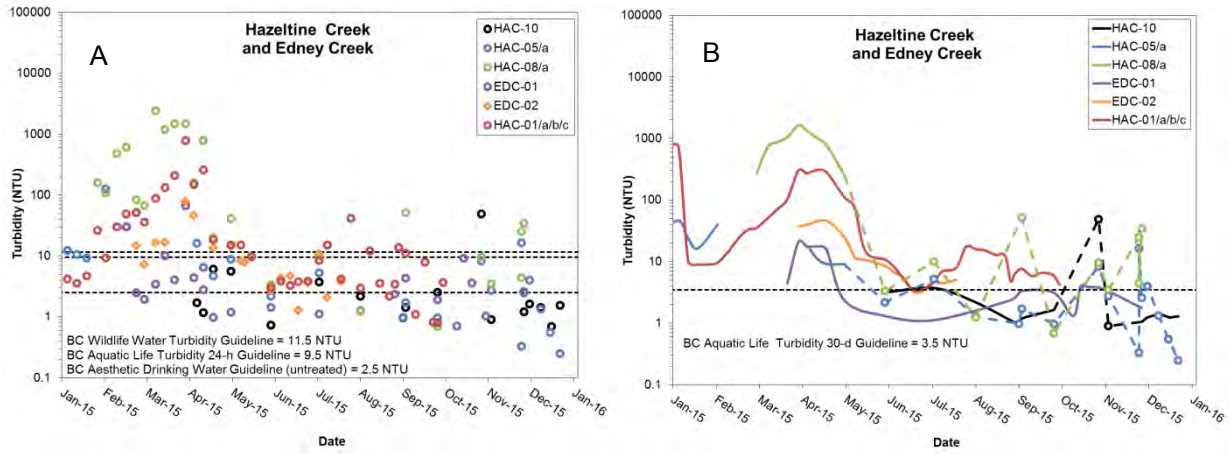
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PROJECT NO.	CONTROL	REV.	FIGURE
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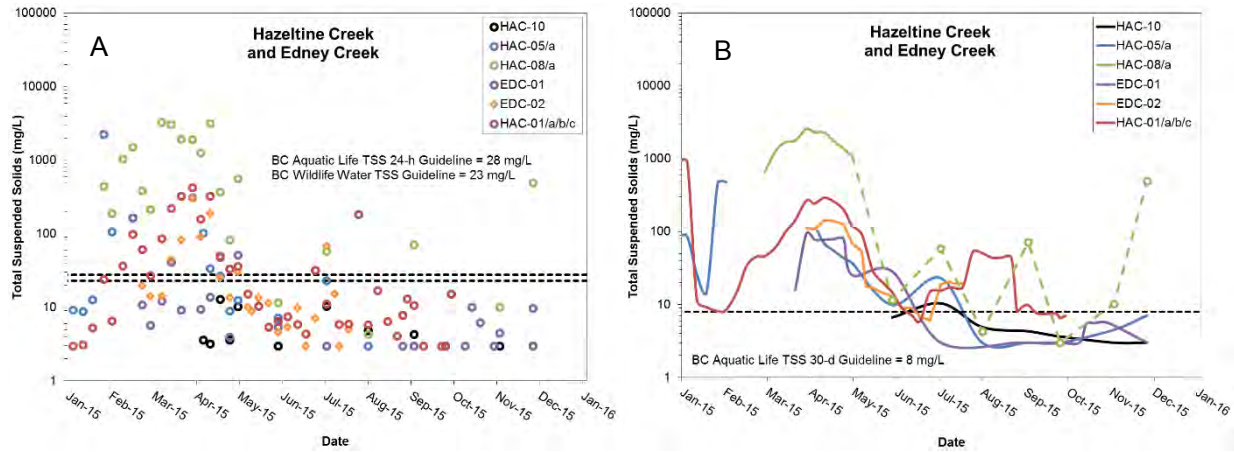


Addendum to the Water Quality Impact Assessment Update



Note: Baseline assumed equal to pre-event median turbidity of 1.5 NTU. Gaps represent >30 d between sampling. Dashed lines and open circles represent series of monthly samples that contained at least one guideline exceedance and had fewer than five data points per 30-d period.

Figure 2: Post-event Instantaneous (A) and Rolling 30-day Average (B) Turbidity Concentrations at Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeltine and Edney Creeks.

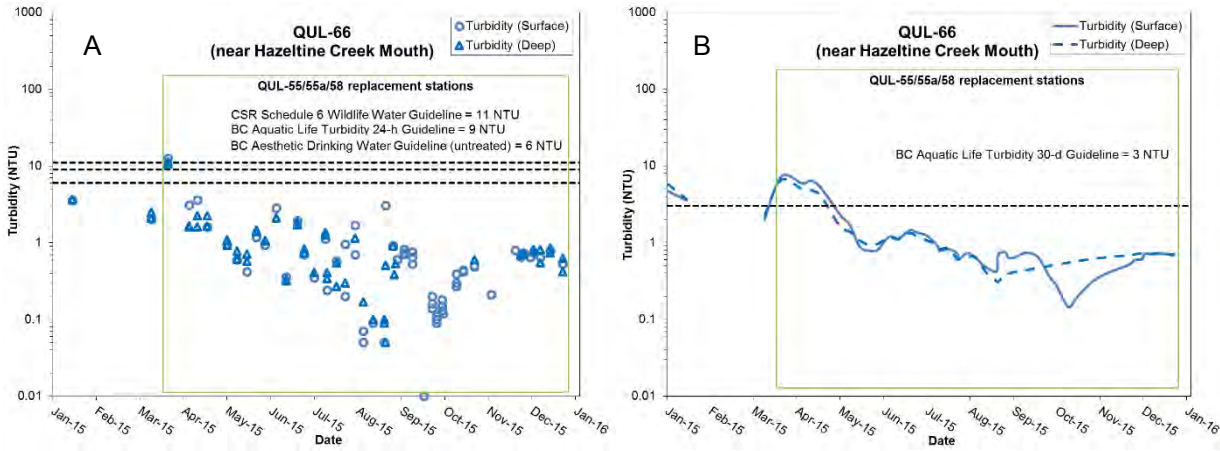


Note: Baseline assumed equal to the MDL of 3 mg/L. Gaps represent >30 d between sampling. Dashed lines and open circles represent series of monthly samples that contained at least one guideline exceedance and had fewer than five data points per 30-d period.

Figure 3: Post-event Instantaneous (A) and Rolling 30-day Average (B) TSS Concentrations at Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeltine and Edney Creeks.

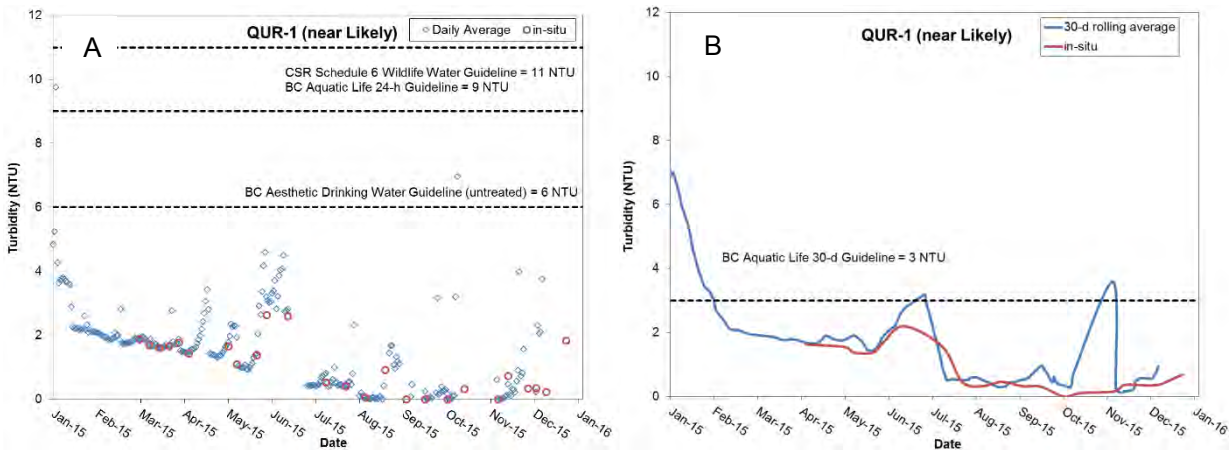


Addendum to the Water Quality Impact Assessment Update



Note: Background assumed equal to 1 NTU. Gaps represent >30 d between sampling.

Figure 4: Post-event Instantaneous (A) and Rolling 30-day Average (B) Turbidity Concentrations at Station QUL-66 (i.e., QUL-66/55/55a/66a), Quesnel Lake.

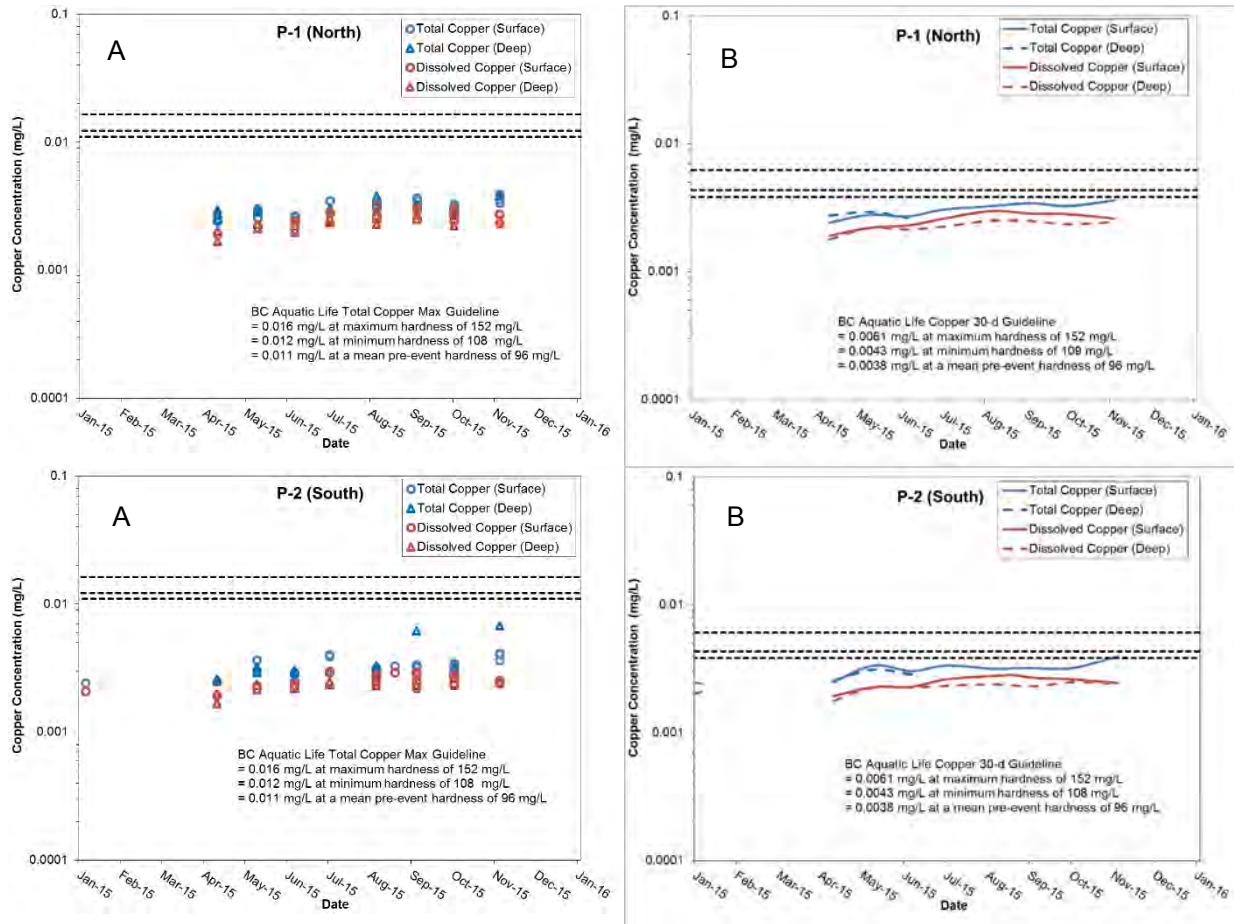


Note: Background assumed equal to 1 NTU.

Figure 5: Post-event Instantaneous (A) and Rolling 30-day Average (B) Turbidity Concentrations at Station QUR-1 near Likely, Quesnel River.

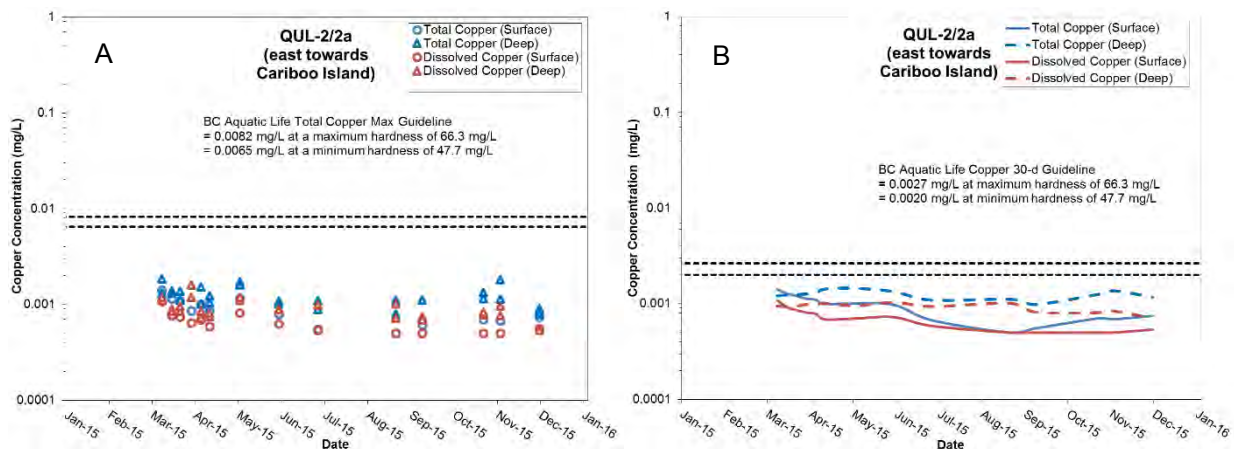


Addendum to the Water Quality Impact Assessment Update



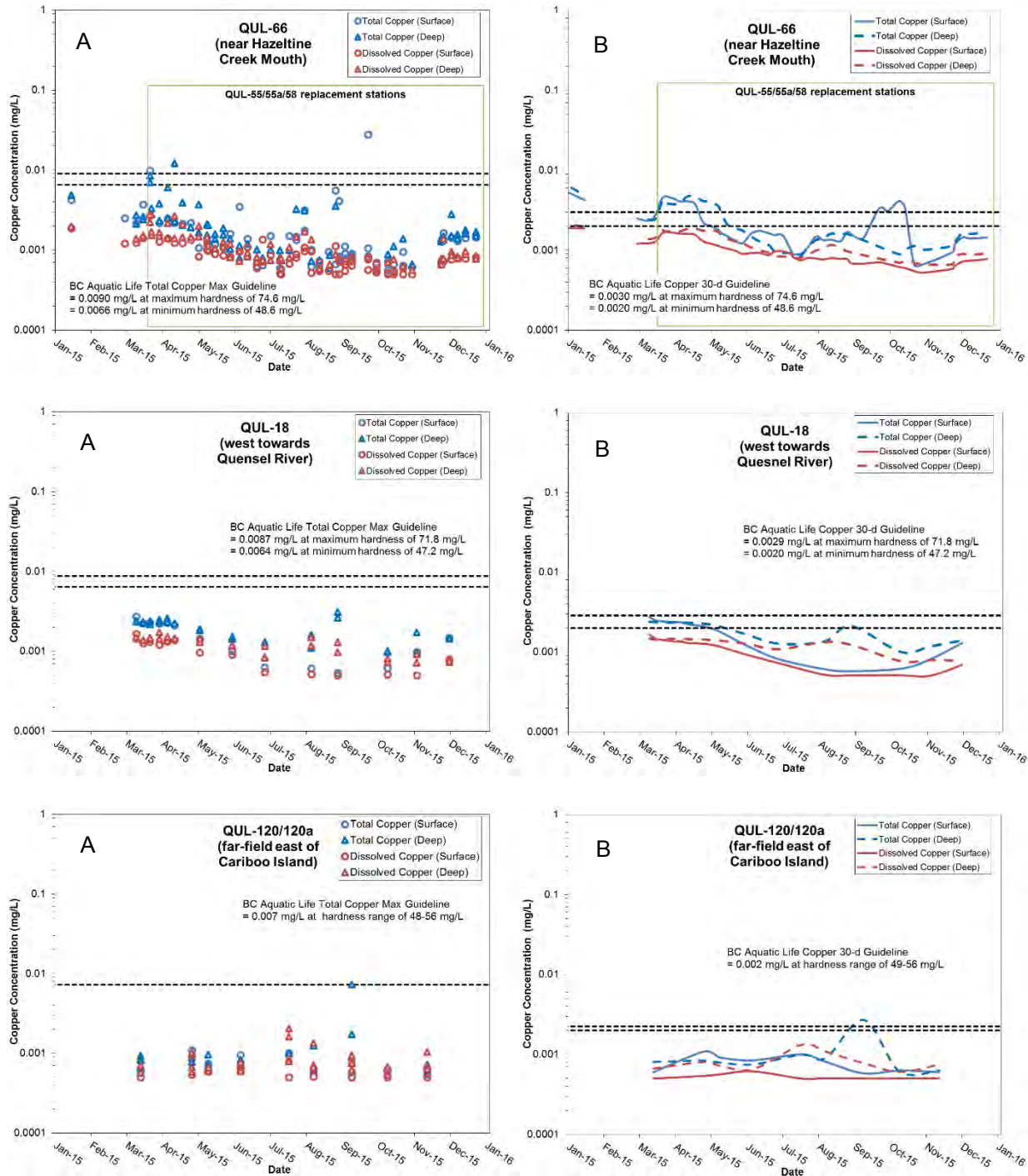
Note: Gaps represent >30 d between sampling.

Figure 6: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total and Dissolved Copper Concentrations at Stations P1 and P2, Polley Lake





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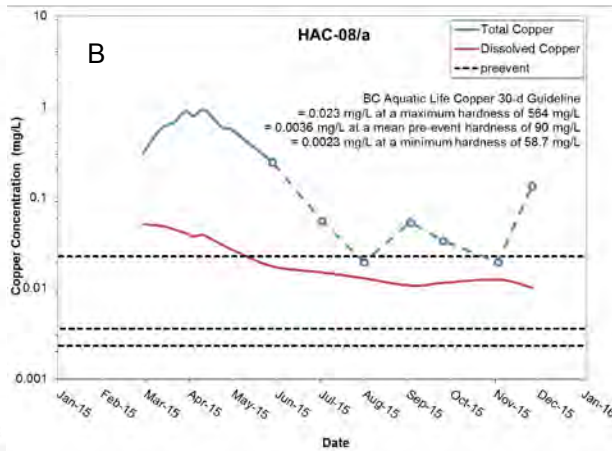
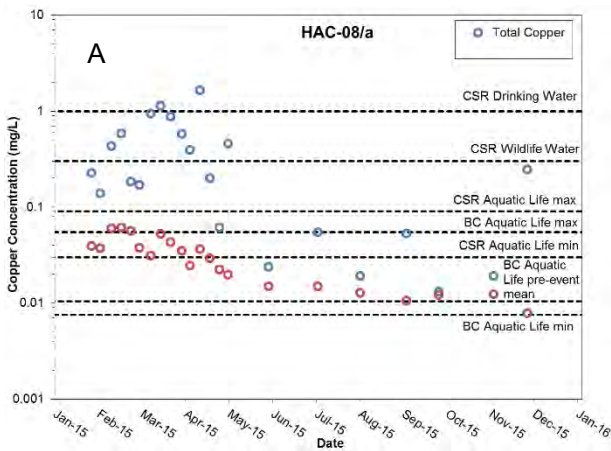
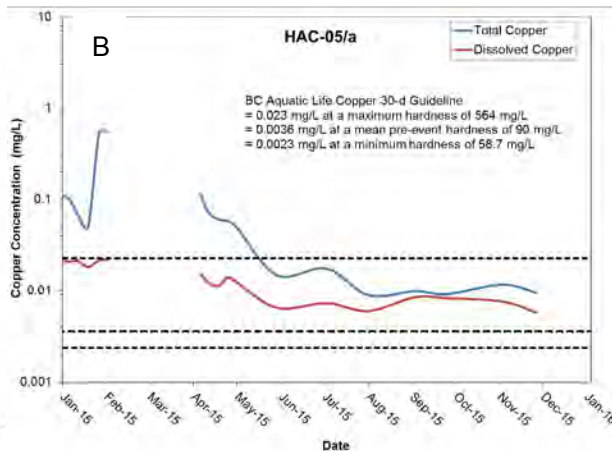
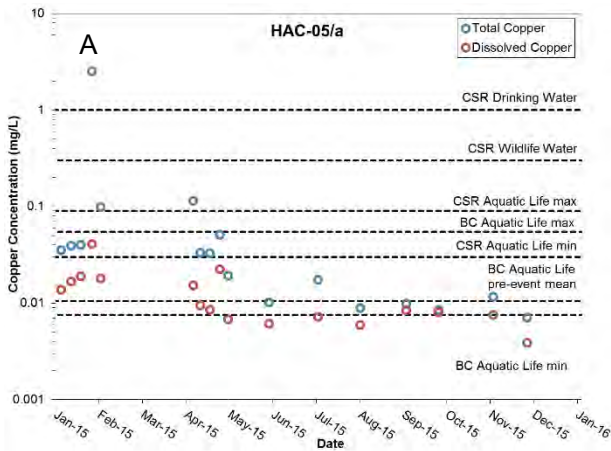
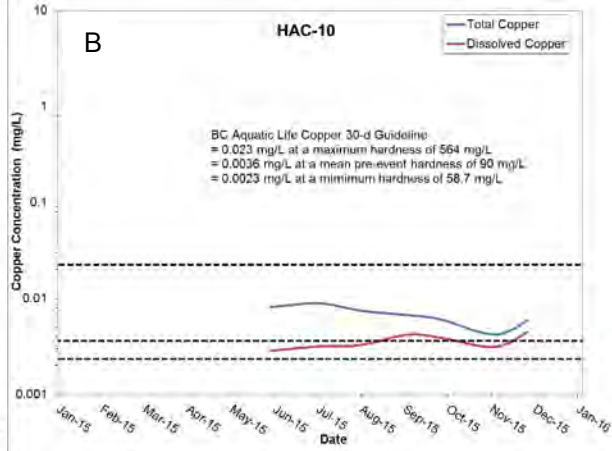
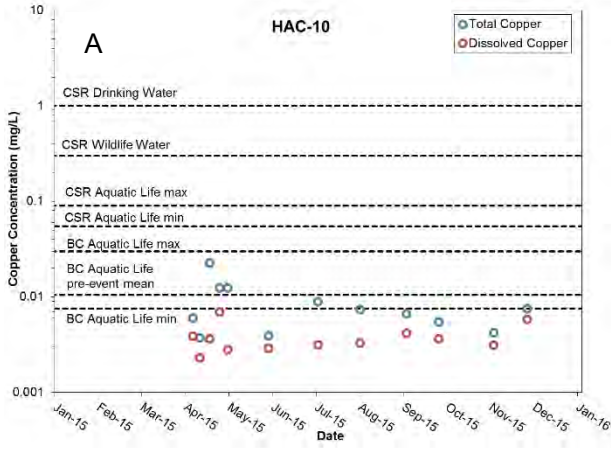


Note: Gaps represent >30 d between sampling.

Figure 7: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total and Dissolved Copper Concentrations at Stations QUL-2/2a, QUL-66, QUL-18, and QUL-120/120a, Quesnel Lake.

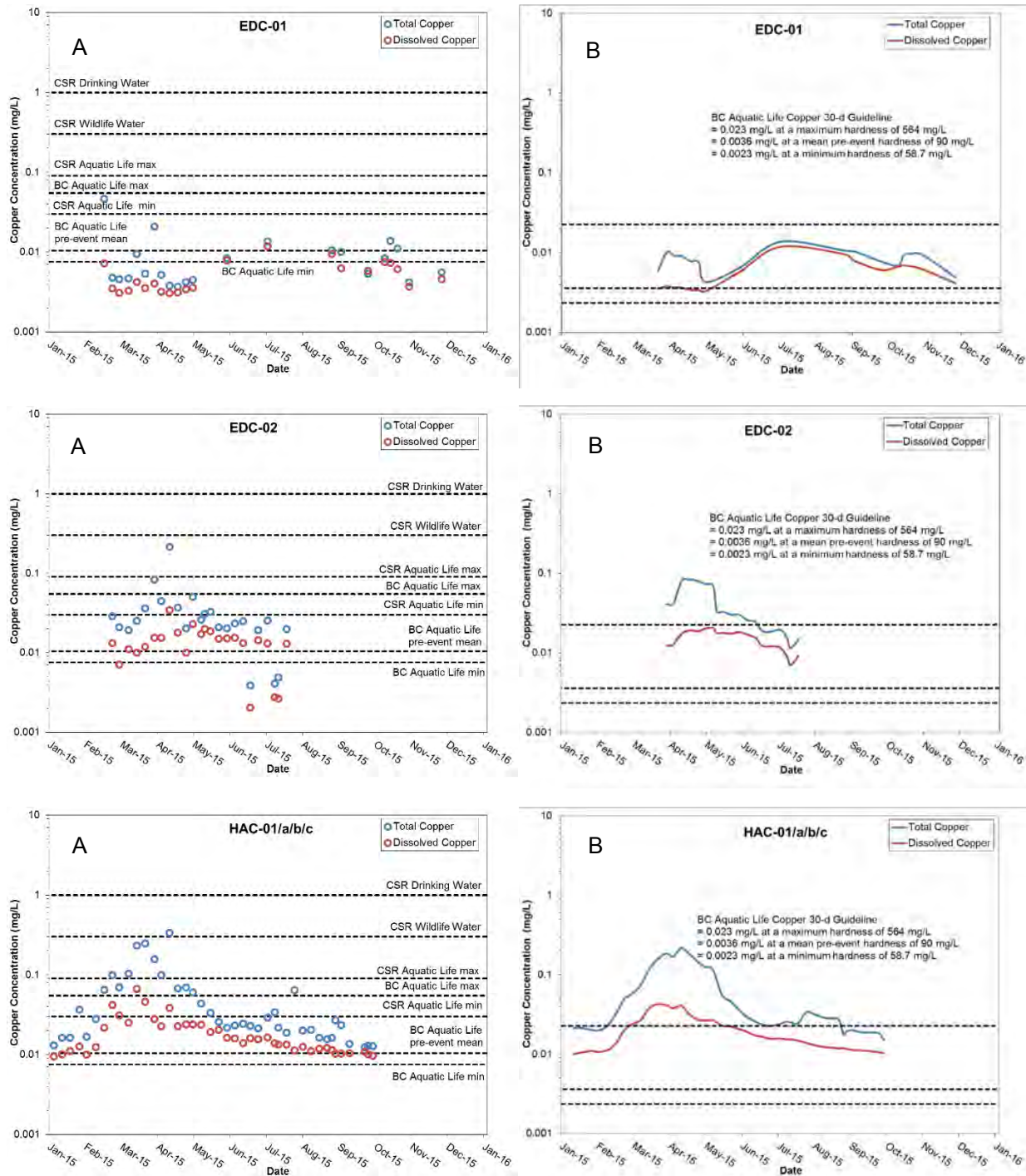


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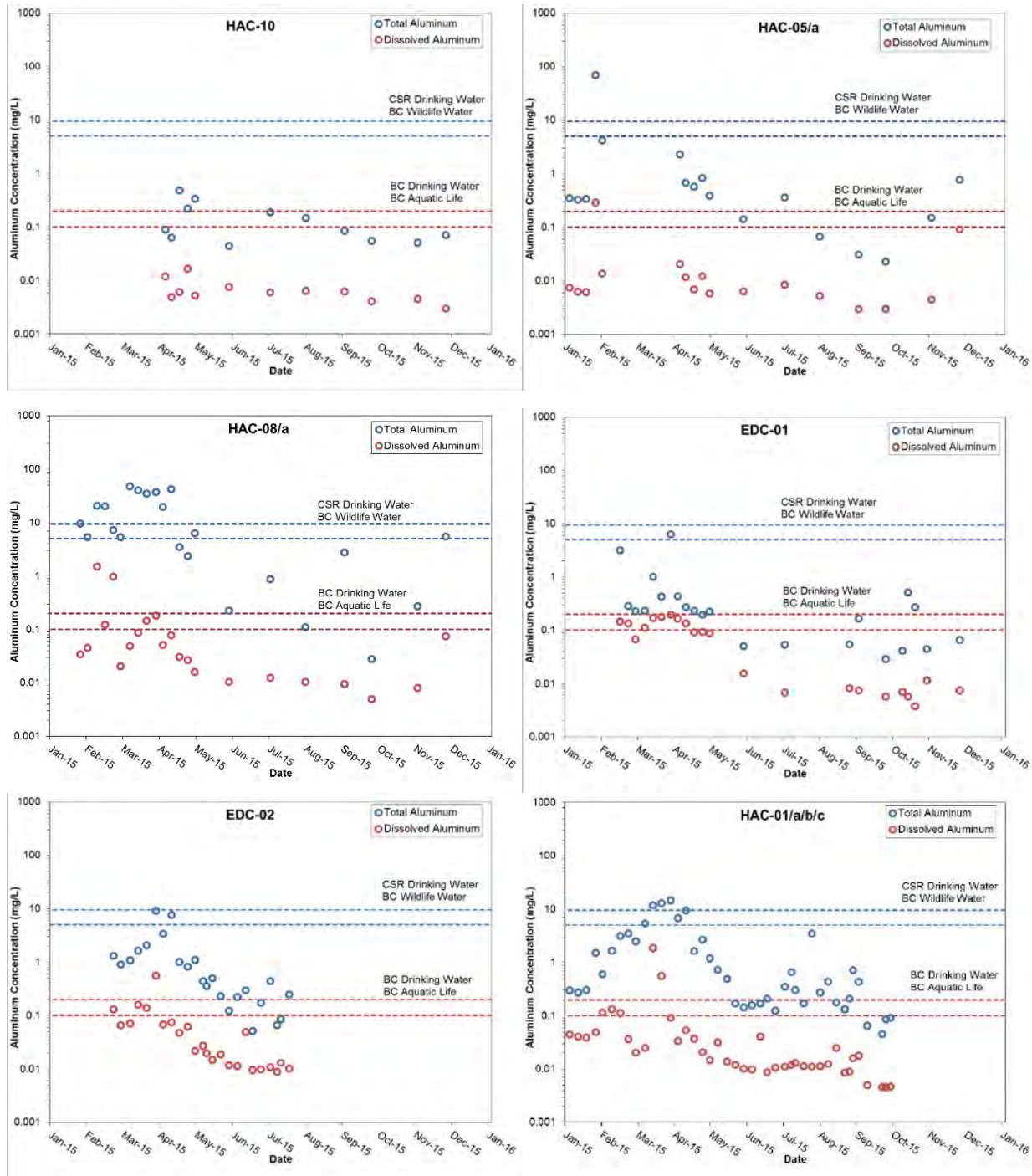


Note: CSR – Schedule 6 Drinking Water Copper Standard = 1 mg/L; BC Wildlife Water Copper Max Guideline = 0.3 mg/L; CSR – Schedule 6 Aquatic Life Total Copper Standard = 0.03-0.09 mg/L; BC Aquatic Life Total Copper Max Guideline = 0.0075-0.055 mg/L. Gaps represent >30 d between sampling. Dashed lines and open circles represent series of monthly samples that contained at least one guideline exceedance and had fewer than five data points per 30-d period.

Figure 8: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total and Dissolved Copper Concentrations at Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeltime and Edney Creeks.

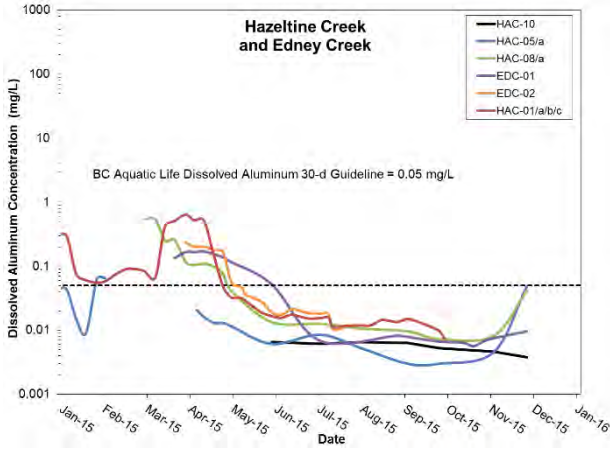


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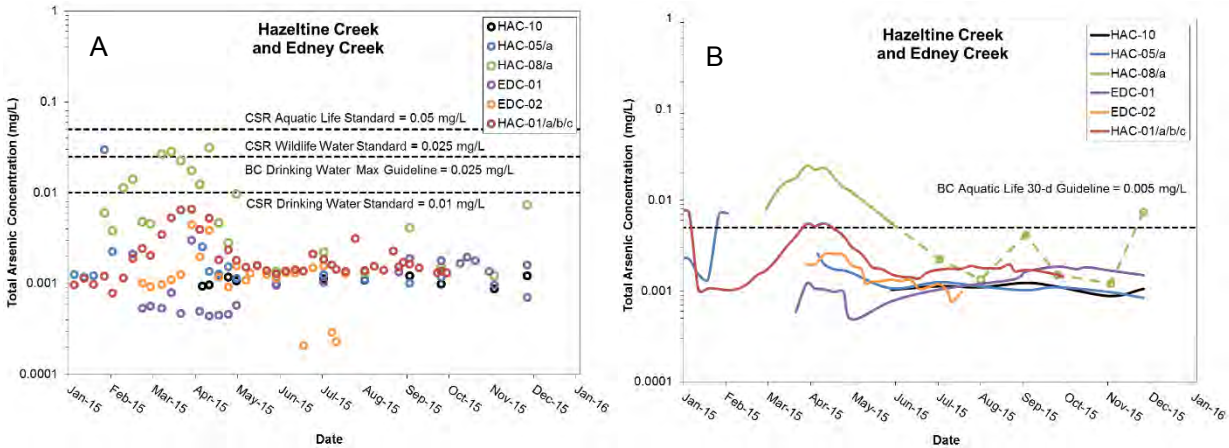
Note: CSR – Schedule 6 Drinking Water Total Aluminum Standard = 9.5 mg/L; BC Wildlife Water Total Aluminum Max Guideline = 5 mg/L; BC Drinking Water Dissolved Aluminum Max Guideline = 0.2 mg/L; BC Aquatic Life Dissolved Aluminum Max Guideline = 0.1 mg/L. Dashed line colour corresponds to total or dissolved values.

Figure 9: Post-event Instantaneous Total and Dissolved Aluminum Concentrations at HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeltime and Edney Creeks.



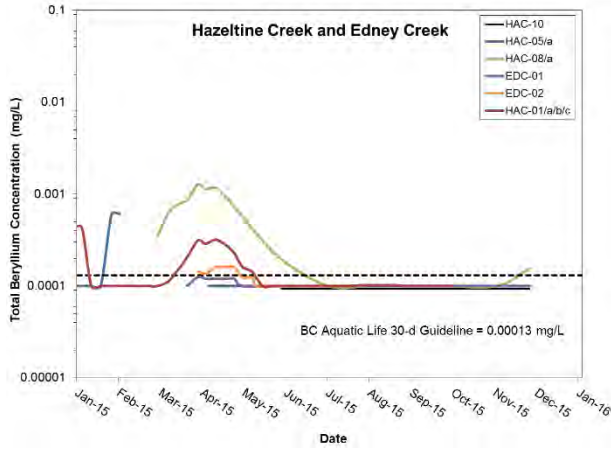
Note: Gaps represent >30 d between sampling.

Figure 10: Post-event Rolling 30-day Average Dissolved Aluminum Concentrations at Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeltine and Edney Creeks.



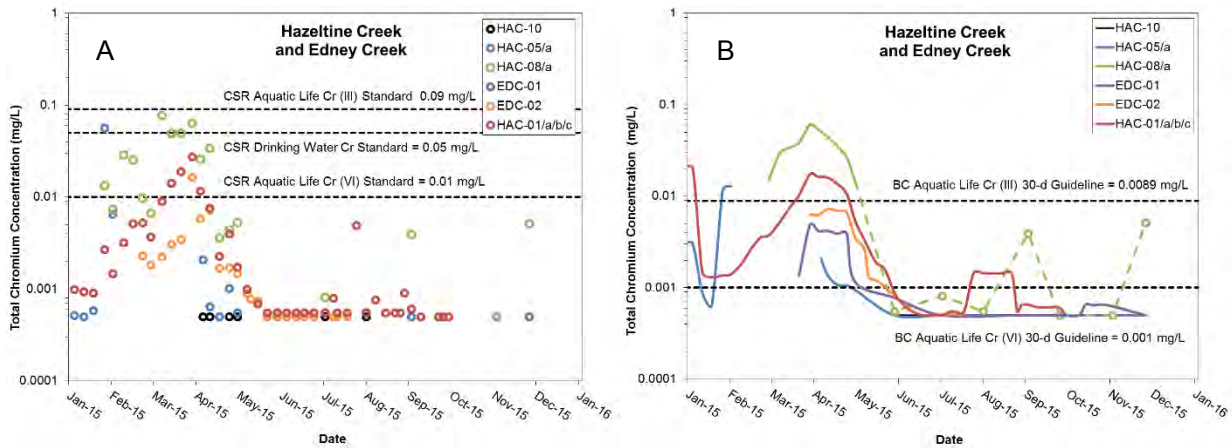
Note: Gaps represent >30 d between sampling. Dashed lines and open circles represent series of monthly samples that contained at least one guideline exceedance and had fewer than five data points per 30-d period.

Figure 11: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total Arsenic Concentrations at Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeltine and Edney Creeks.



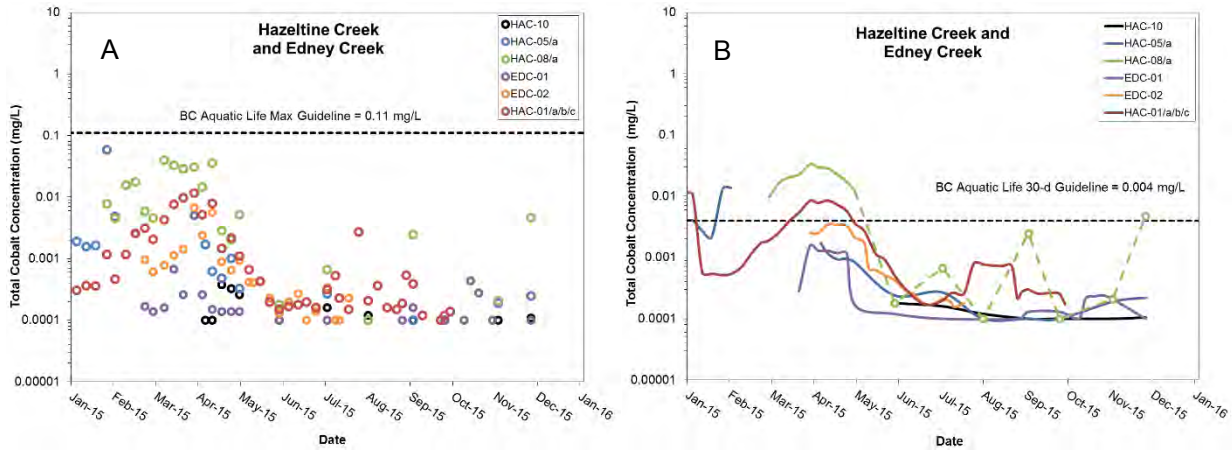
Note: Gaps represent >30 d between sampling.

Figure 12: Post-event Rolling 30-day Average Total Beryllium Concentrations at Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeltine and Edney Creeks.



Note: Gaps represent >30 d between sampling. Dashed lines and open circles represent series of monthly samples that contained at least one guideline exceedance and had fewer than five data points per 30-d period.

Figure 13: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total Chromium Concentrations at Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeltine and Edney Creeks.



Note: Gaps represent >30 d between sampling. Dashed lines and open circles represent series of monthly samples that contained at least one guideline exceedance and had fewer than five data points per 30-d period.

Figure 14: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total Cobalt Concentrations at Stations HAC-10, HAC-05/a,

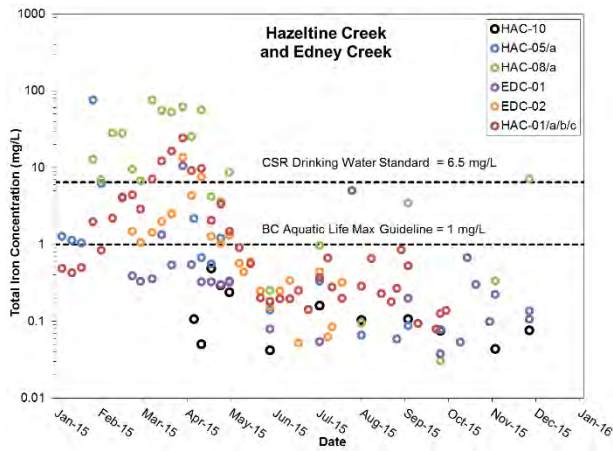
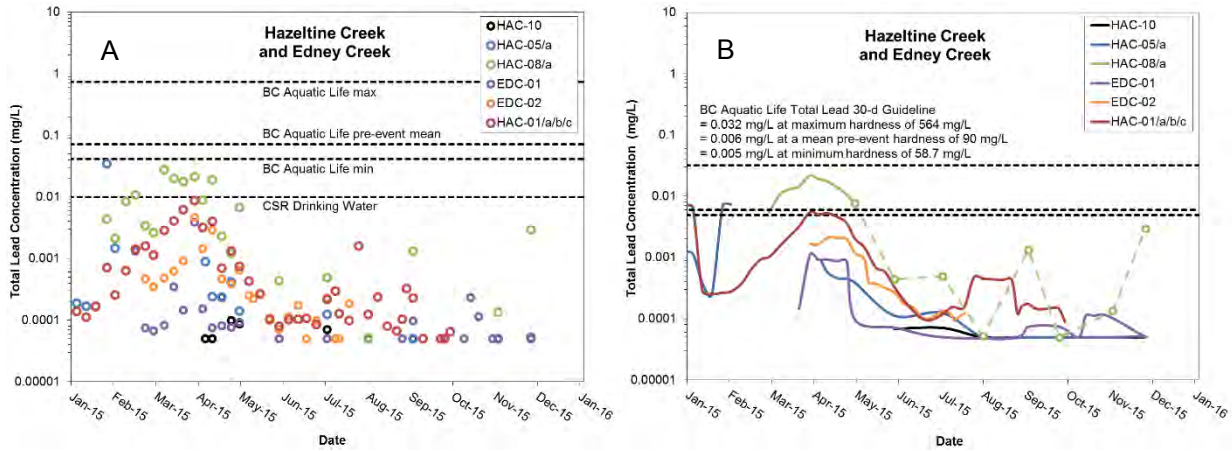


Figure 15: Post-event Instantaneous Total Iron Concentrations at Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeltine and Edney Creeks.

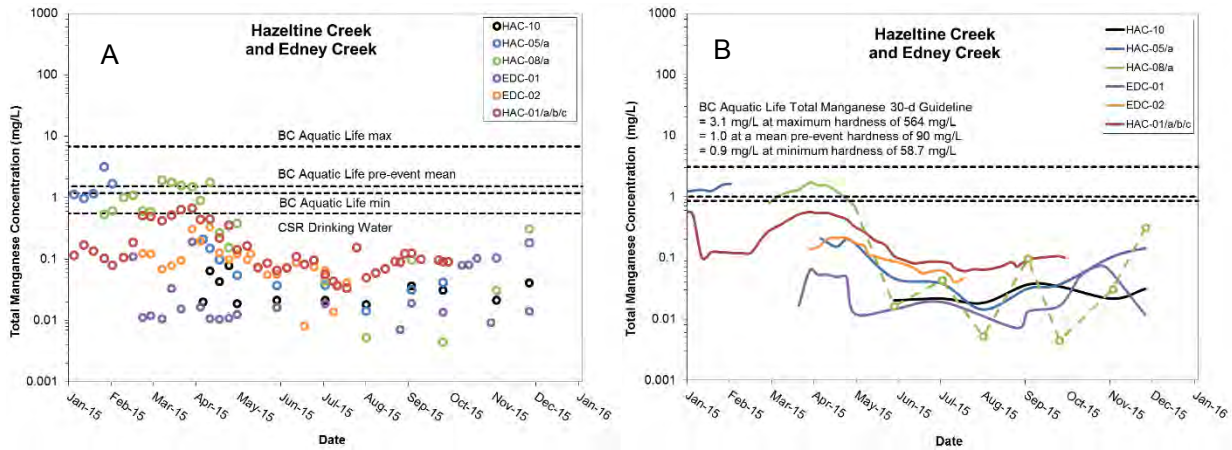


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Note: CSR – Schedule 6 Drinking Water Total Lead Standard = 0.01 mg/L; BC Aquatic Life Total Lead Max Guideline = 0.041-0.74 mg/L. Gaps represent >30 d between sampling. Dashed lines and open circles represent series of monthly samples that contained at least one guideline exceedance and had fewer than five data points per 30-d period.

Figure 16: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total Lead Concentrations at Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeltine and Edney Creeks.

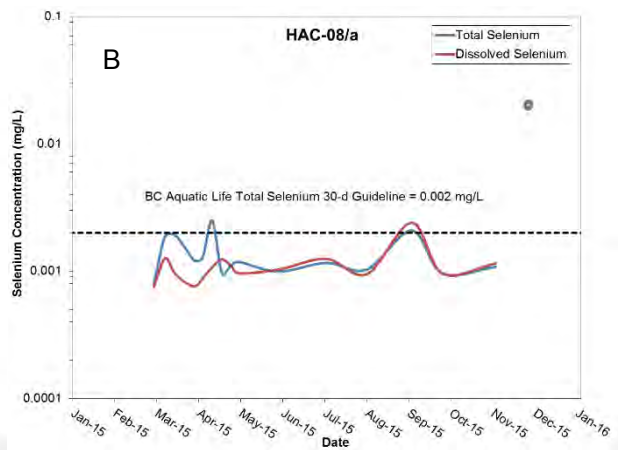
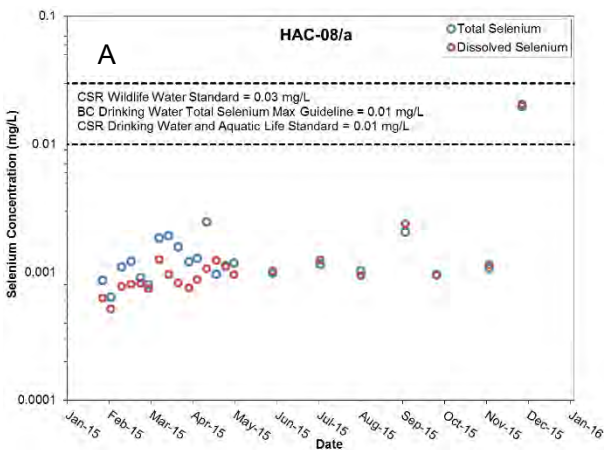
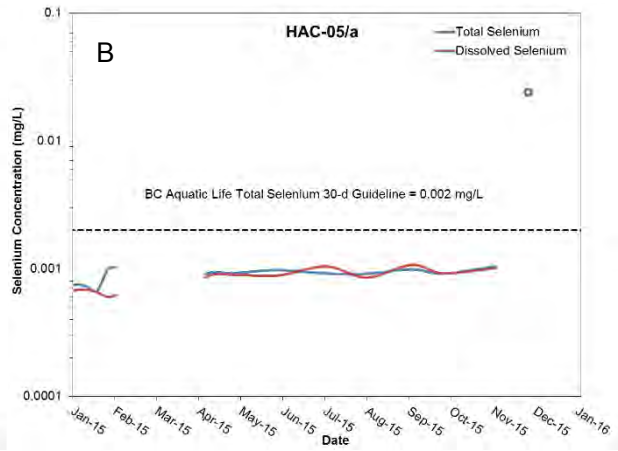
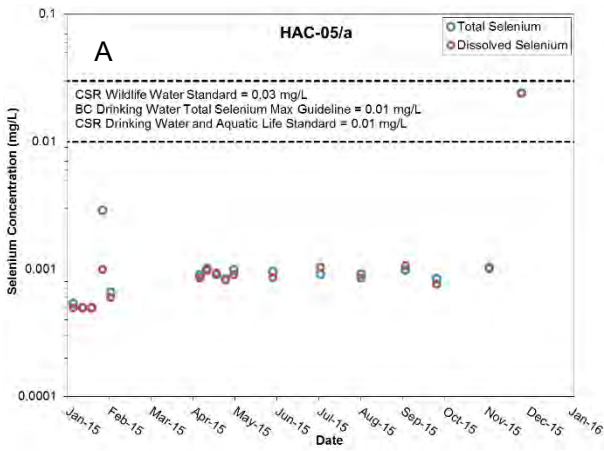
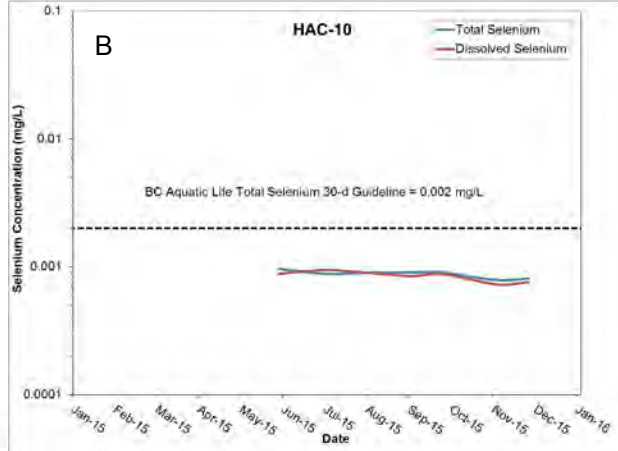
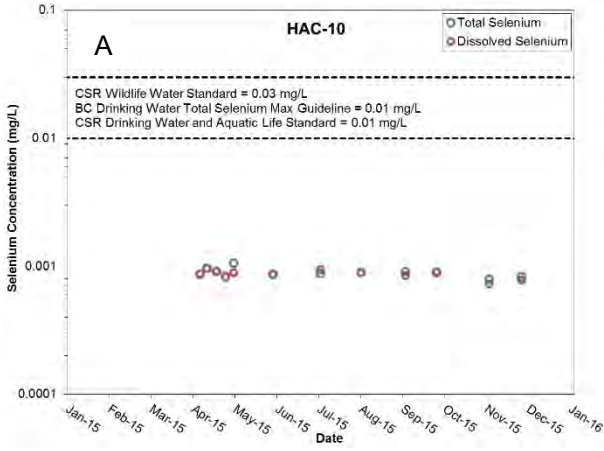


Note: CSR – Schedule 6 Drinking Water Manganese Standard = 0.55 mg/L; BC Aquatic Life Total Manganese Max Guideline = 1.2-6.8 mg/L. Gaps represent >30 d between sampling. Dashed lines and open circles represent series of monthly samples that contained at least one guideline exceedance and had fewer than five data points per 30-d period.

Figure 17: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total Manganese Concentrations at Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeltine and Edney Creeks.

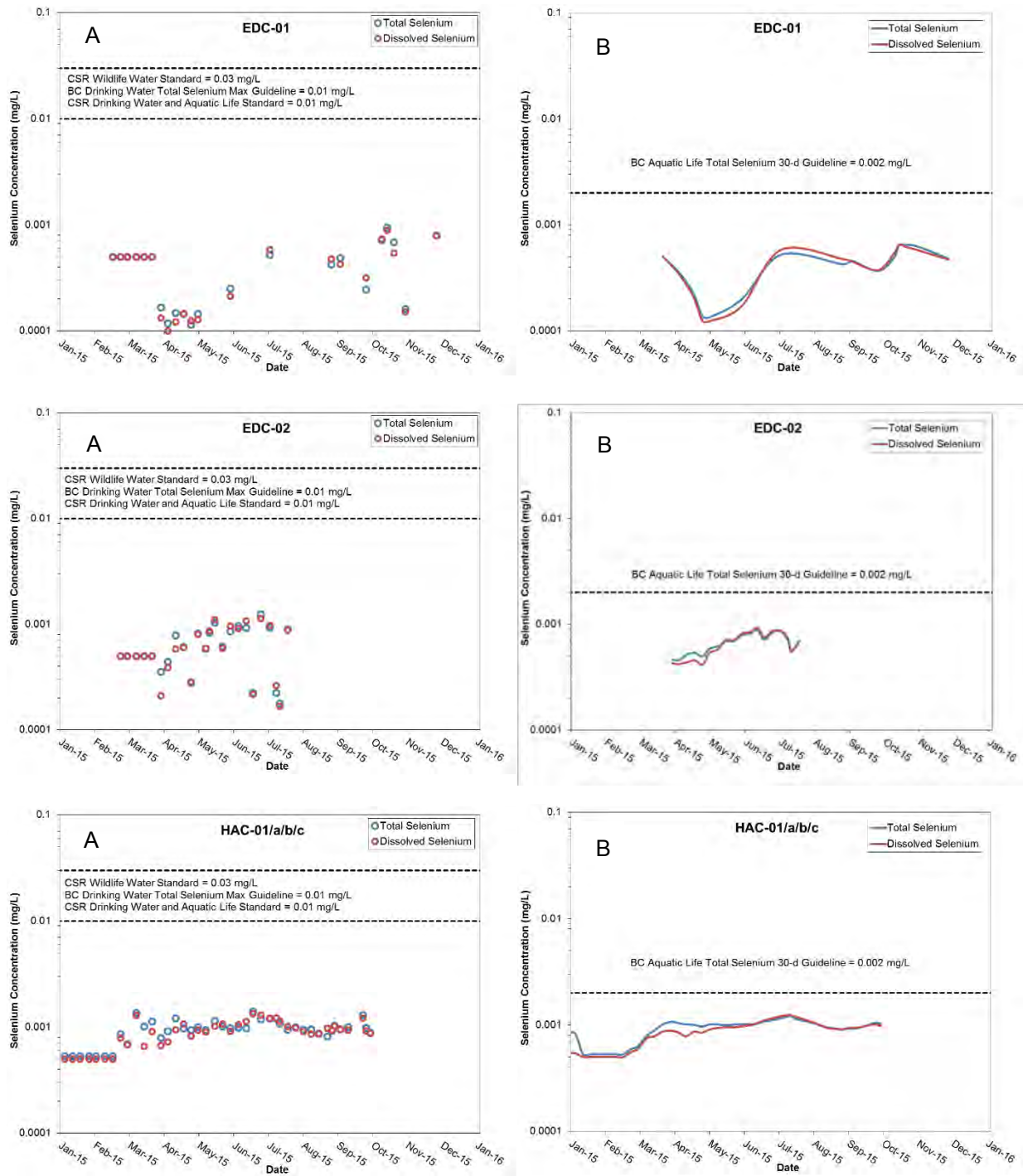


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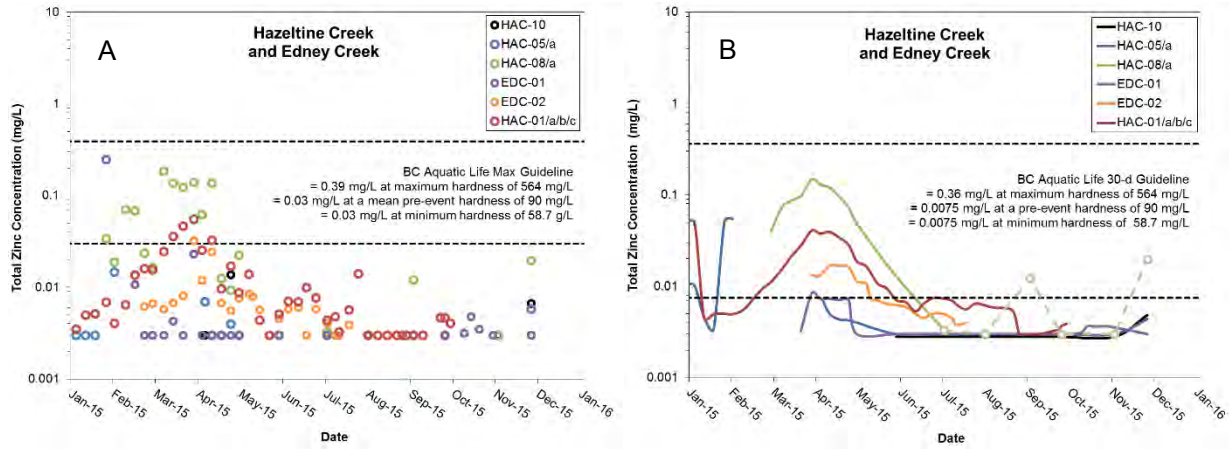


Note: Gaps represent >30 d between sampling.

Figure 18: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total and Dissolved Selenium Concentrations at Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeltine and Edney Creeks.



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Note: Gaps represent >30 d between sampling. Dashed lines and open circles represent series of monthly samples that contained at least one guideline exceedance and had fewer than five data points per 30-d period.

Figure 19: Post-event Instantaneous (A) and Rolling 30-day Average (B) Total Zinc Concentrations at Stations HAC-10, HAC-05/a, HAC-08/a, EDC-01, EDC-02, and HAC-01/a/b/c, Hazeltine and Edney Creeks.

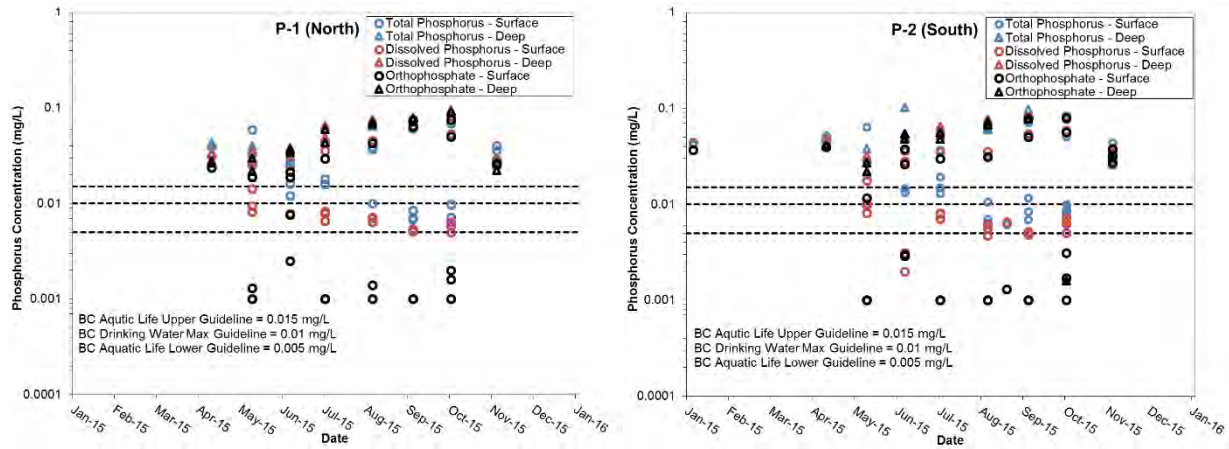


Figure 20: Post-event Instantaneous Total Phosphorus Concentrations at Stations P1 and P2, Polley Lake.

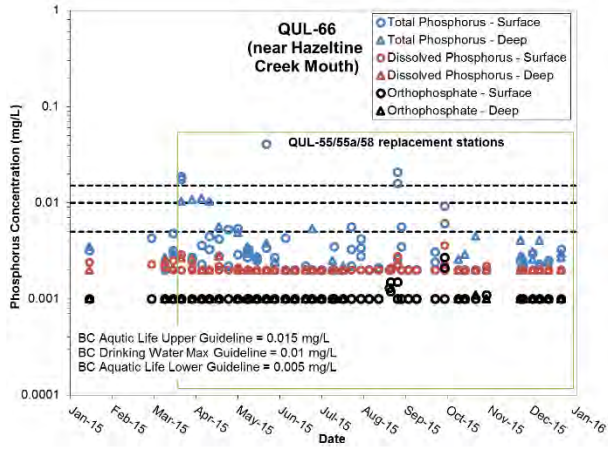


Figure 21: Post-event Instantaneous Total Phosphorus Concentrations at Station QUL-66, Quesnel Lake.

Table A1: Summary of Mount Polley TSF Breach Water Quality Monitoring Program, September to December 2015

Area	Station Name	Sample Location Type	Frequency	Comments
Polley Lake	P1	Routine	Monthly	
	P2	Routine	Monthly	
Upper Hazeltine	HAC-05	Routine	Weekly-Monthly	Weekly samples transitioned to monthly. Replaced by HAC-05a upstream of the bridge after 10/1/2015, except for one sample collected 12/22/2015.
	HAC-05a	Routine	Weekly	Established upstream of the Gavin Lake Road bridge to replace HAC-05 as of 11/2/2015.
	HAC-10	Routine	Weekly-Monthly	Weekly samples transitioned to monthly as of 5/4/2015.
Lower Hazeltine	HAC-01c	Routine	Weekly	Established at new outlet of HAC 7/31/2015. Discontinued 10/5/2015 due to lack of flow through lower sedimentation pond. Replaced by HAC-12.
	HAC-08	Routine	Weekly-Monthly	Temporarily replaced by HAC-08a downstream of the bridge between 8/6/2015 and 10/1/2015.
	HAC-08a	Routine	Weekly-Monthly	Temporarily sampled on 9/8/2015, in place of HAC-08.
	HAC-12	Routine	Weekly	Established 11/2/2015 to replace HAC-01/a/b/c. Located in the upper sedimentation pond.
	HAC-13	Routine	Weekly	Established in upper HAC, upstream of the discharge, on 12/3/2015.
Edney Creek	EDC-01	Routine	Weekly-Monthly	Weekly samples transitioned to monthly.
	EDC-02	Routine	Weekly	Downstream of confluence with HAC; discontinued after HAC/EDC redirected 7/25/2015.
Quesnel River	QUR-1	Routine	Weekly-Bi-weekly	Weekly samples transitioned to bi-weekly.
Quesnel Lake	QUL-2a	Routine	Weekly-Monthly	Weekly samples transitioned to monthly.
	QUL-18	Routine	Weekly-Monthly	Weekly samples transitioned to monthly.
	QUL-21a	Routine profile only	-	
	QUL-40a	Routine	Monthly	
	QUL-42	Routine	Monthly	In Mitchell Bay, east of HAC mouth and just before the sill. Established 9/17/2015.
	QUL-54	Routine profile only	-	Replaced by QUL-54a when HAC redirected 7/25/2015. However, was sampled weekly in October 2015.
	QUL-54a	Routine profile only	-	Established to replace QUL-54 when HAC redirected 7/25/2015. Discontinued after 10/5/2015 and replaced by QUL-57.
	QUL-55	Routine	Weekly	Discontinued and replaced by QUL-55a when HAC redirected 7/25/2015. However, was sampled weekly in October 2015.
	QUL-55a	Routine	Weekly	Established to replace QUL-55 when HAC redirected 7/25/2015. Discontinued 10/5/2015 and replaced with QUL-58.
	QUL-56	Routine profile only	-	Discontinued when HAC redirected 7/25/2015. Sampled weekly in October 2015.
	QUL-56a	Routine profile only	-	Established to replace QUL-56 when HAC redirected 7/25/2015. Sampled 7/28/2015, 10/1/2015, and 10/5/2015 only. Discontinued and replaced by QUL-59.
	QUL-57	Routine	Weekly	Located in the IDZ of the effluent discharge in QUL. Established 12/9/2015 as a replacement for QUL-54/54a.
	QUL-58	Routine	Monthly-Weekly	Located in the IDZ of the effluent discharge in QUL. Established 11/5/2015 to replace QUL-55/55a; transitioned to weekly sampling 12/2/2015.
	QUL-59	Routine	Weekly	Located in the IDZ of the effluent discharge in QUL. Established 12/2/2015 to replace QUL-56/56a.
	QUL-66a	Routine profile only	-	2015 sampling limited to October and November only.
	QUL-79	Routine profile only	-	2015 sampling limited to October and November only.
QUL-120a	Routine	Monthly		
QUL-ZOO-1	Profile only for zooplankton	-	Profiled 7/8/2015, 8/20/2015, and 9/10/2015.	
QUL-ZOO-7	Profile only for zooplankton	-	Profiled 7/8/2015, 8/20/2015, and 9/10/2015.	
QUL-ZOO-8	Profile only for zooplankton	-	Profiled 7/8/2015, 8/20/2015, and 9/10/2015.	

Notes

Routine samples were taken throughout the period according to 2015 Post-Breach Environmental Monitoring Plan

Routine stations are consistently monitored; typically either weekly, bi-weekly (every 2 weeks), monthly, or bi-monthly (twice per month)

HAC = Hazeltine Creek; EDC = Edney Creek; QUR = Quesnel River; QUL = Quesnel Lake; IDZ = initial dilution zone; ZOO = zooplankton station.

TABLE A2

**Tabulated Discrete Water Quality Grab Data Collected from
Polley Lake, Hazeltine Creek, Quesnel Lake, and Quesnel River,
September to December 2015**

Provided on CD

Memorandum



Date: April 8, 2016

To: Dale Reimer, Mount Polley Mining Corporation

From: Pierre Stecko, Minnow Environmental Inc.

Cc: Colleen Hughes, Katie McMahan, Mount Polley Mining Corporation
'Lyn Anglin, Imperial Metals Corporation

Re: Results of Diffusive Gradients in Thin Films Device Deployment – August to October 2015

The ongoing assessment of the impact to aquatic environmental health following the failure of the Mount Polley tailings dam in August 2014 includes monitoring of water and sediment chemistry. A number of evaluations have indicated low mobility of metals in Mount Polley tailings and tailings-influenced sediment (e.g., SRK 2015a,b; Minnow 2015a, 2016) and this has been supported by the results of water quality monitoring (Golder 2015). Water quality monitoring has focused on total and dissolved metals, both of which over-represent the metal fraction that is available for uptake by aquatic organisms in natural surface waters (i.e., free metal ions and weakly complexed metals, often referred to as the “labile” metal fraction).

This memorandum provides a brief summary and interpretation of metal concentration results associated with diffusive gradients in thin films (DGT) passive sampling devices deployed in waterbodies adjacent to the Mount Polley Mine from August to October 2015. The objective of the deployment of DGT devices in waterbodies adjacent to the Mount Polley Mine was to characterize concentrations of DGT-labile metal in water overlying sediments impacted by the Mount Polley Mine tailings dam failure relative to reference areas.

Background

DGT devices are small devices that contain a membrane filter, a gel diffusion layer and a gel binding layer (e.g., Davison and Zhang 1994). The devices are designed to accumulate labile (free and weakly complexed) substances by diffusion in a controlled manner. Labile metals are the fraction of metals that are considered to be potentially bioavailable (i.e., that can be readily transported across biological membranes of aquatic organisms; e.g., Campbell and Tessier 1996; Luoma and Rainbow 2008). DGT devices used in this

evaluation are optimized for metals and include a 0.45 μm Millipore™ cellulose nitrate membrane, a polyacrylamide gel diffusion layer, and a mixed binding layer composed of Chelex-100™ and Metsorb™ binding resins, all housed in a small polypropylene container approximately two inches in diameter (Panther et al. 2014). Only the membrane is exposed to the sampling environment (as a “window” in the DGT device). Labile metals diffuse through the membrane and gel diffusion layer and are captured in the resin. Following deployment for a time period that results in accumulation to detectable concentrations (but not to resin saturation, which can be calculated based on water chemistry data and avoided), the DGT devices are retrieved and the resin removed, digested, and analyzed. Analytical results are expressed as the mass of metal accumulated in the resin, which can also be used to back-calculate average labile metal concentrations during deployment. DGT-measured labile metal concentrations better represent the fraction of metals that are potentially bioavailable than do total or dissolved concentrations (e.g., Tusseau-Vuillemin 2004; Martin 2008; Simpson et al. 2012; Peijnenburg et al. 2014; Greenberg et al. 2014). This is because total metals include metals associated with particulate and dissolved binding materials (ligands), and dissolved metals include metals associated with binding materials (ligands) that are dissolved and those associated with very small particles and colloids (<0.45 μm in diameter).

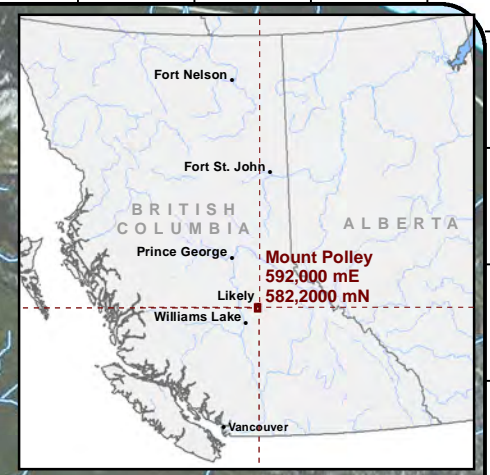
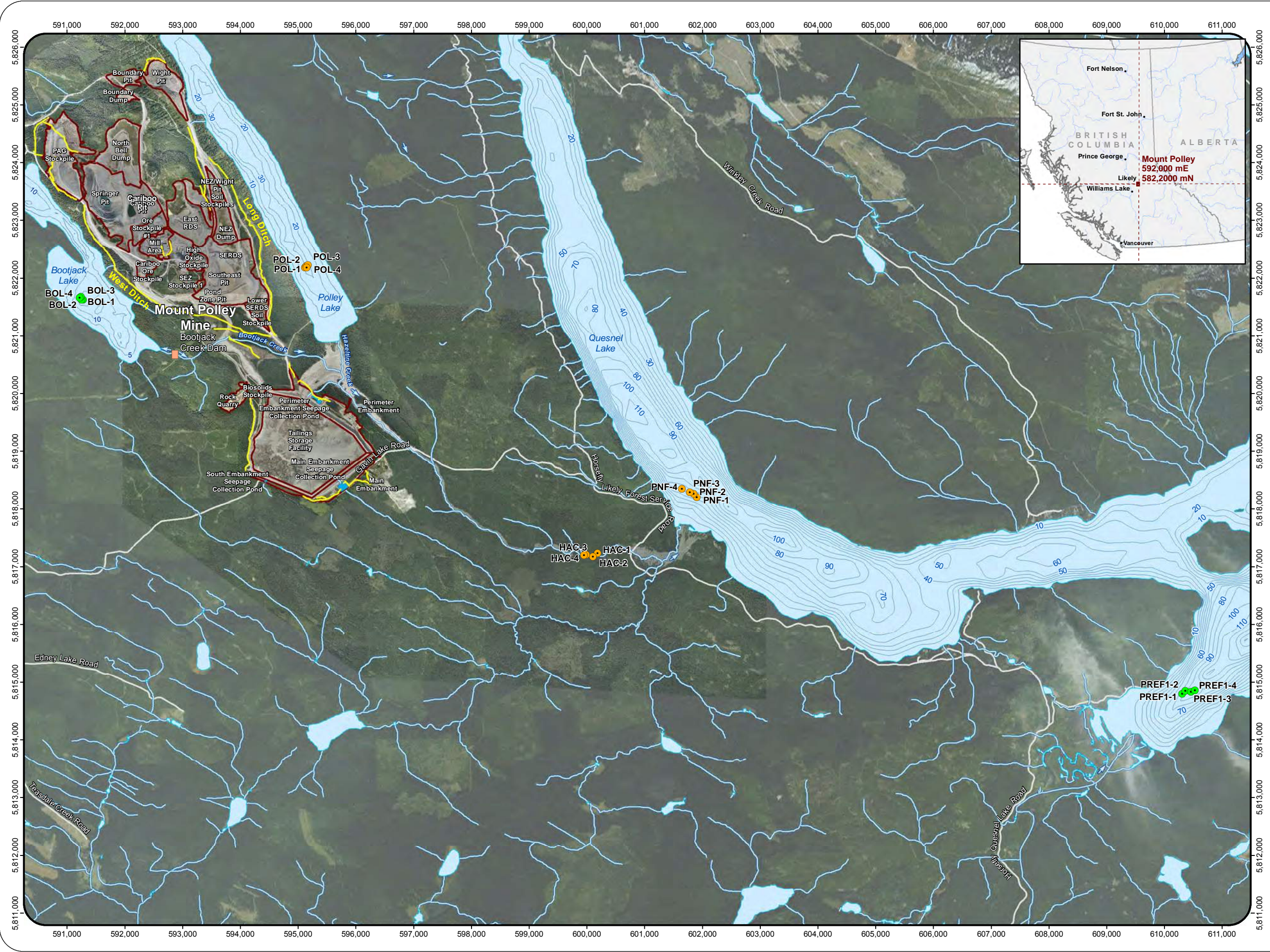
Methods

Study Design

A simple study was undertaken to characterize labile metal concentrations using DGT devices in water overlying sediments at areas impacted by the tailings dam failure, as well as at un-impacted reference areas. DGT devices were deployed at five areas from late August to early October 2015; two lake areas impacted by the tailings dam failure, two reference areas for the impacted lake areas, and Hazeltine Creek (Figure 1; Appendix Table A1). Four replicate DGT devices were deployed at each area.

Deployment and Retrieval

In lakes, DGT devices were installed in the lower water column approximately one meter above the sediment surface. This was achieved by placing a line with anchor and float at each sample location. A flat tray was placed above the anchor to prevent excessive sinking into the sediment. A loop was tied in the rope one meter above the tray and the DGT device was tied to the loop using fishing line. In Hazeltine Creek, DGT devices were placed in small pools within a canyon (Figure 1), where they were tied to a loop of rope, which was then tied to two brick anchors placed in the creek in a manner that kept them approximately 15 centimeters above the creek bottom. At the time of sampling, Hazeltine Creek was not



LEGEND

Passive Sampler Locations

- Exposed
- Reference
- Bootjack Creek Dam
- Seepage Collection Pond
- Mine Infrastructure
- Waterbody
- Water Collection Ditch
- Quesnel Lake Bathymetry (10 m Intervals)
- Bootjack Lake Bathymetry (5 m Intervals)
- Polley Lake Bathymetry (10 m Intervals)
- Watercourse
- Roads
- Water Flow Direction

0 800 1,600 3,200
Meters

MAP INFORMATION
 Datum: NAD 83 Map Projection: UTM Zone 10N
 Data Source: Department of Natural Resources Canada. All rights reserved.
 Creation Date: February 2016
 Project No.: 2574

Figure 1: Polley Lake, Bootjack Lake, Quesnel Lake and Hazeltine Creek Passive Sampler Locations, Mount Polley Mine, 2016.



considered to be fish habitat as: 1) access to fish was blocked; and 2) it was subject to rehabilitation. During all DGT deployments, exposure to air was kept to a minimum (less than one minute) to avoid desiccation of the DGT devices.

DGT devices were retrieved 34 to 38 days after deployment (Appendix Table A1). DGT devices in Polley Lake, Bootjack Lake and Hazeltine Creek were retrieved by hand hauling, whereas DGT devices in Quesnel Lake (mean depth approximately 100 meters) were retrieved with the assistance of a commercial line hauler (Ace Line Hauler Brutus Plus 40). Upon retrieval, DGT devices were handled with care while wearing metal free disposable nitrile gloves. Particular care was taken not to touch the DGT window. Each DGT device was gently rinsed with metal free water and placed into a labelled glass soil jar with a few drops of metal free water to prevent desiccation. Jars were then placed into clean Ziploc™ bags and then into a dedicated cooler with ice packs, where they were maintained cool prior to transport to the field laboratory. At the field laboratory, the bagged jars were placed in a refrigerator and held until shipment to the analytical laboratory. After collection of all DGT devices, the DGT devices (in bagged jars) were placed in a cooler with frozen ice packs and a chain-of-custody form was prepared and packed with the samples. Coolers were shipped overnight for next day delivery to Maxxam Analytics (Burnaby, BC).

Supporting Measures

Supporting information collected at each deployment location included GPS (Geographic Positioning System) coordinates, sampling depth, Secchi depth (lakes only), field meter measurements of temperature, specific conductance, dissolved oxygen and pH (using a YSI EXO™ handheld portable field meter equipped with YSI EXO2™ Sonde), site photographs (including photographs of the DGT devices), and notes on the presence or absence of any fouling of the DGT devices. Supporting water samples were also collected from each sampling area, including field-filtered samples for dissolved analytes (0.45 µm filter). Water samples were placed into a dedicated cooler with frozen ice packs, where they were maintained cool prior to transport to the field laboratory where they were placed in a refrigerator and held until shipment to the analytical laboratory. At program completion, water samples were placed in a cooler with frozen ice packs and a chain-of-custody form was prepared and packed with the samples. Coolers were shipped overnight for next day delivery to ALS Environmental (Burnaby, BC).

Laboratory Analysis

Upon receipt of the DGT devices, Maxxam opened the coolers, measured temperature to verify the maintenance of cold samples, removed each device from the coolers, logged the sample, and assigned each sample a unique sample identification code. A sample receipt

confirmation was then sent to Minnow for verification. Laboratory analysis of the DGT devices involved dismantling the devices followed by digestion of the resin to provide a determination of total metal in the resin by ICP-MS (Inductively Coupled Plasma – Mass Spectrometry). Free metal ion was subsequently calculated by Maxxam based on total metal in the resin, water temperature during deployment, total deployment time, and manufacturer-supplied peer-reviewed diffusion coefficients, which, in turn, are based on Fick's first law of diffusion (Zhang and Davison 1995; Panther et al. 2014). Upon completion of the analyses, a data report was provided by Maxxam to Minnow electronically in Adobe Acrobat Portable Document Format (PDF; Appendix C) and in MSExcel. Similarly, upon receipt of the water samples, ALS Environmental opened the coolers, measured temperature to verify the maintenance of cold samples, removed each sample from the coolers, logged the sample, and assigned each sample a unique identification code. A sample receipt confirmation was then sent to MPMC and Minnow for verification. Laboratory analyses included all analytes in the Mount Polley routine surface water quality monitoring program, including total and dissolved metals by ICP-MS. Upon completion of the analyses, a data report was provided by ALS to MPMC and Minnow electronically in Adobe Acrobat PDF (Appendix D) and in MSExcel.

Data Analysis

Upon receipt of the analytical data, a Data Quality Assessment (DQA) was completed, including an examination of data completeness, method detection limits achieved, field blank and travel blank results, laboratory precision, laboratory accuracy, and field precision. Following the completion of DQA, in-situ water quality data, DGT mass accumulation data, and DGT-based free metal concentration data were summarized by area, by calculating mean, standard deviation, standard error and 95% confidence limits. In-situ water quality data and DGT-based free metal concentration data were then evaluated by comparing concentrations of detectable analytes in failure-affected areas (Polley Lake and Quesnel Lake exposed area) to reference concentrations. In-situ water quality data and DGT-based free metal concentration data were also compared to British Columbia Water Quality Guidelines (BCWQG) for the protection of aquatic life (BCMOE 2016). Lastly, concentrations of DGT-detectable analytes were compared to total and dissolved concentrations.

Results

Supporting Measures

Supporting meter measurements indicated some differences between Polley Lake (impacted by the 2014 dam failure) and Bootjack Lake (reference), whereas conditions in

the impacted area of Quesnel Lake were very similar to the Quesnel Lake reference (Appendix Table A.2; Appendix Figures A.1 and A.2). Differences between Polley and Bootjack lakes included lower temperature and higher dissolved oxygen at depth in Polley Lake, as well as slightly higher pH and specific conductance throughout the water column of Polley Lake (Appendix Figure A.1). Specific conductance and pH of Hazeltine Creek were notably higher (up to 439 $\mu\text{S}/\text{cm}$ and 8.46 pH units; Appendix Table A.2) than at any of the other area evaluated.

Conventional Water Chemistry

Data Quality Assessment indicated good water data quality, meaning that data can be used with a high level of confidence for interpretation and the derivation of conclusions (Appendix B). Copper was the only analyte present at impacted areas at total concentrations greater than BCWQG (Appendix Table C.2). At Hazeltine Creek, which is not currently fish habitat, mean total copper concentration was 0.015 mg/L (compared to an applicable hardness-based 30-day BCWQG of 0.0083 mg/L). At the Quesnel Lake near-field exposed area, mean total copper concentration was 0.0021 mg/L (compared to a mean hardness-based 30-day BCWQG of 0.0023 mg/L), but total concentration at deployment (0.0027 mg/L) was slightly greater than the applicable BCWQG (Appendix Table C.2). Concentrations of total manganese and dissolved iron in water samples from reference Bootjack Lake were elevated relative to BCWQG at DGT deployment and retrieval, but were not similarly elevated at impacted areas (Appendix Table C.2).

DGT Device Results

Data Quality Assessment indicated good DGT data quality with the exception of one trip blank result that suggested contamination but was inconsistent with field blank results and individual sample results (Appendix B). A total of 13 metals accumulated in DGT devices to detectable concentrations (Appendix Table D.1). Four of these (copper, manganese, iron and zinc) were previously identified as Parameters of Interest (POIs) representing the chemical influence of the tailings dam failure on sediment quality (Minnow 2015a) and two more (phosphorus and molybdenum) were previously identified as POIs representing the chemical influence of the tailings dam failure on water quality (Golder 2015).

Examination of total, dissolved, and time-weighted average labile concentrations of the POIs (Appendix Table C.2 and Table 1, respectively) indicated that copper was the only DGT-detectable analyte with some concentrations greater than BCWQG (above) and a spatial pattern consistent with impact from the tailings dam failure (i.e., greater concentrations at the impacted lake areas than at reference lake areas; Figure 2a; Appendix Figures D.1 to D.6). DGT-labile copper concentrations were detectable in Hazeltine Creek

Table 1: Detectable metals in DGT devices and calculated time-weighted free metal concentrations, Mount Polley 2015

A) Metal accumulated in DGT-device resin

Metal Name	Method Detection Limit	Reporting Detection Limit	Units	Hazeltine Creek		Polley Lake (P2)		Bootjack Lake (B2)		Qusenel Lake Profundal - Exposed		Qusenel Lake Profundal - Reference	
				Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Aluminum (Al)	0.59	1.96	µg	3.00	1.67	<0.59	-	<0.59	-	2.31	0.7	2.24	0.56
Barium (Ba)	0.063	0.25	µg	6.57	2.22	1.86	0.10	3.31	0.54	1.75	0.24	1.51	0.07
Calcium (Ca)	20	66	µg	172	26	116	13	<66	-	125	10	117	23
Copper (Cu)	0.025	0.13	µg	2.38	0.19	0.15	0.01	<0.13	-	<0.13	-	<0.13	-
Iron (Fe)	1.25	6.3	µg	<1.25	-	<1.25	-	137	16	<6.3	-	<1.25	-
Magnesium (Mg)	1.25	6.3	µg	7.7	1.2	<6.3	-	<1.25	-	<1.25	-	<1.25	-
Manganese (Mn)	0.05	0.25	µg	0.77	0.19	2.69	0.50	22.5	4.2	1.14	0.12	1.19	0.47
Molybdenum (Mo)	0.044	0.15	µg	<0.15	-	1.23	0.06	0.23	0.01	<0.15	-	<0.15	-
Phosphorus (P)	1.25	6.3	µg	<1.25	-	<1.25	-	15.1	2.9	<1.25	-	<1.25	-
Strontium (Sr)	0.082	0.27	µg	1.94	0.91	0.99	0.12	0.71	0.08	0.84	0.14	0.86	0.12
Uranium (U)	0.0025	0.013	µg	0.020	0.010	0.04	0.00	<0.0025	-	0.03	0.00	0.02	0.00
Vanadium (V)	0.025	0.063	µg	0.33	0.04	0.15	0.01	<0.025	-	<0.063	-	<0.025	-
Zinc (Zn)	0.125	0.63	µg	<0.125	-	<0.125	-	<0.125	-	1.78	3.30	<0.125	-

B) Calculated time-weighted free metal concentrations

Metal Name	Method Detection Limit	Reporting Detection Limit	Units	Hazeltine Creek		Polley Lake (P2)		Bootjack Lake (B2)		Qusenel Lake Profundal - Exposed		Qusenel Lake Profundal - Reference	
				Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Aluminum (Al)	0.0016	0.0054	mg/L	0.0083	0.0045	<0.0016	-	<0.0016	-	0.0071	0.0033	0.0071	0.0033
Barium (Ba)	0.00017	0.00068	mg/L	0.018	0.006	0.006	0.000	0.010	0.002	0.006	0.001	0.006	0.000
Calcium (Ca)	0.033	0.109	mg/L	0.29	0.05	0.23	0.03	<0.011	-	0.28	0.02	0.28	0.05
Copper (Cu)	0.000058	0.00029	mg/L	0.0056	0.0005	0.00039	0.00007	<0.00029	-	<0.00029	-	<0.00029	-
Iron (Fe)	0.0027	0.013	mg/L	<0.0027	-	<0.0027	-	0.32	0.04	<0.013	-	<0.0027	-
Magnesium (Mg)	0.0023	0.012	mg/L	0.015	0.002	<0.012	-	<0.0023	-	<0.0023	-	<0.0023	-
Manganese (Mn)	0.00014	0.0007	mg/L	0.0021	0.0005	0.0090	0.0018	0.0688	0.0127	0.0043	0.0005	0.0048	0.0019
Molybdenum (Mo)	0.000091	0.0003	mg/L	<0.0003	-	0.0030	0.0002	0.0005	0.0000	<0.0003	-	<0.0003	-
Phosphorus (P)	0.0027	0.013	mg/L	<0.0027	-	<0.013	-	0.036	0.007	<0.0027	-	<0.0027	-
Strontium (Sr)	0.00013	0.00045	mg/L	0.0032	0.0015	0.0019	0.0002	0.0013	0.0002	0.0019	0.0003	0.0021	0.0003
Uranium (U)	0.000005	0.000024	mg/L	0.000038	0.000019	0.000091	0.000004	<0.000005	-	0.078	0.006	0.000061	0.000007
Vanadium (V)	0.000059	0.00015	mg/L	0.00077	0.00009	0.00043	0.00003	<0.000059	-	<0.00015	-	<0.000059	-
Zinc (Zn)	0.0002	0.001	mg/L	<0.0002	-	<0.0002	-	<0.0002	-	0.0039	0.0074	<0.0002	-

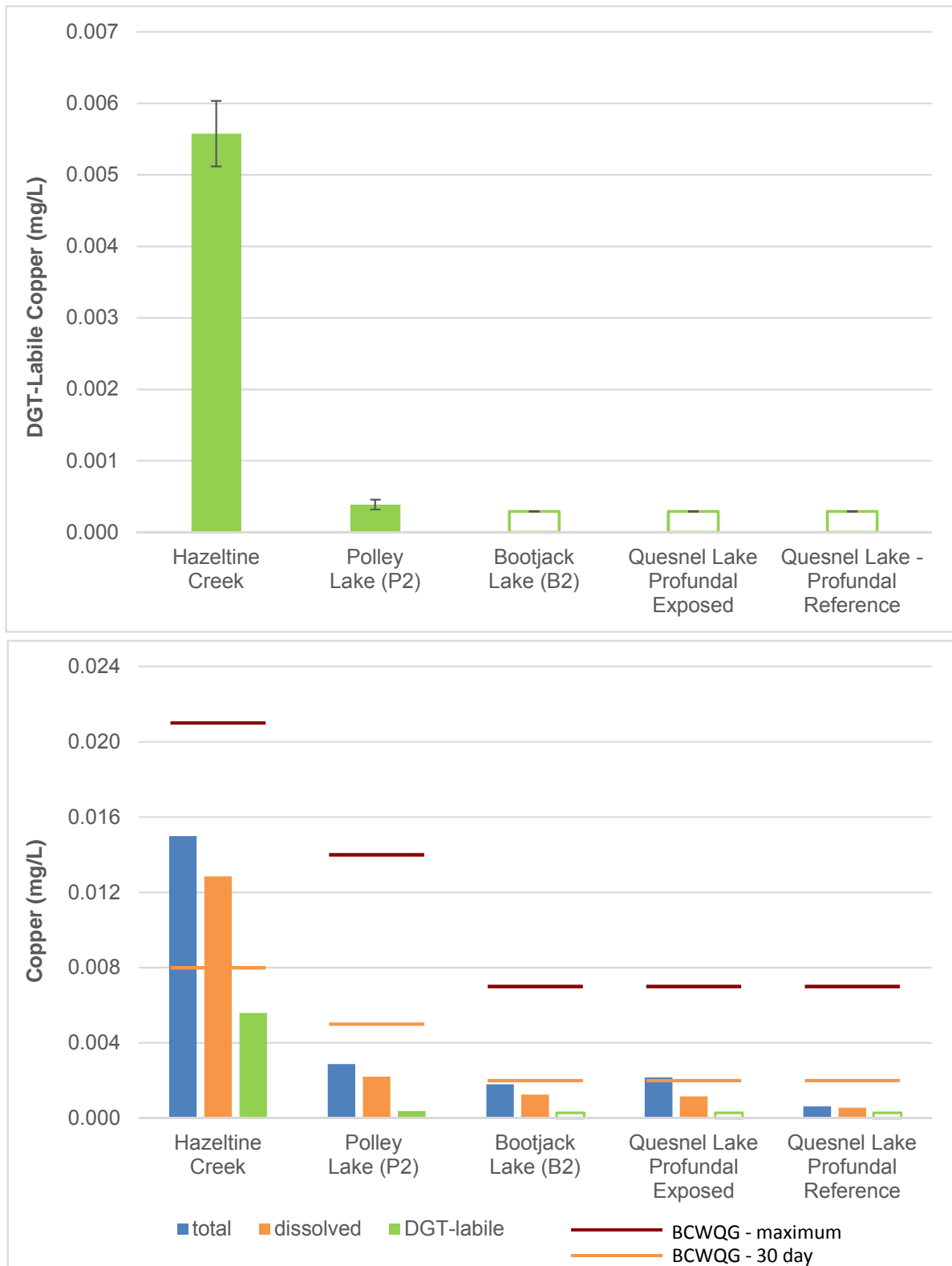


Figure 2: Concentrations of copper in water. A) DGT-labile concentrations (\pm standard deviation); B) total, dissolved and DGT-labile concentrations ¹

¹ open bars indicate less than detect results

and Polley Lake only (0.0056 ± 0.0005 mg/L and 0.00039 ± 0.00007 mg/L, respectively; Table 1 and Figure 2a). Despite average sediment copper concentrations of 823 mg/kg at Polley Lake versus 382 mg/kg at Bootjack Lake, and despite average sediment copper concentrations of 859 mg/kg at the Quesnel Lake profundal exposed area versus 55.1 mg/kg at the Quesnel Lake profundal reference area (Appendix Table D.3), near-bottom DGT-labile copper concentrations at all of these lake areas were ≤ 0.0004 mg/L (Figure 2a). This suggests limited mobility of the sediment-associated copper, which is consistent with previous observations of limited mobility and bioavailability of metals associated with Mount Polley tailings and tailings-influenced sediments (e.g., SRK 2015a,b; Minnow 2015a, 2016).

Concentrations of total copper greater than the 30-day BCWQG for the protection of aquatic life were observed at Hazeltine Creek and at the Quesnel Lake profundal exposed area (Appendix Table C.2). As previously indicated, Hazeltine Creek is not currently considered fish habitat. At the Quesnel Lake profundal exposed area, concentration of total copper was slightly greater than the 30-day BCWQG at deployment (0.0027 mg/L versus an applicable BCWG of 0.0023 mg/L) but not at retrieval (Appendix Table C.2). Dissolved copper was 54% of total, indicating that approximately half the total copper concentration was particulate (Figure 2b; Appendix Table D.3). DGT-labile copper was a fraction of total and dissolved (<13% and <25%, respectively; Figure 2b; Appendix Table D.3). This indicates that a substantial fraction of copper classified as dissolved after filtration using a 0.45 μm filter is not DGT-labile (i.e., is not in free ion and/or weakly complexed forms) and an even larger fraction of total metal is not DGT-labile.

Although copper was the only POI with a spatial pattern consistent with impact from the tailings dam failure, measurement of DGT-labile metal concentrations provided some perspective on water concentrations of several additional metals. Despite the near-bottom concentrations of total manganese and dissolved iron greater than BCWQG at Bootjack Lake (perhaps related to low near-bottom dissolved oxygen concentrations), DGT-labile concentrations were low and the DGT-labile fraction was 30% for iron and only 6% for manganese (Appendix Table D.3; Appendix Figures D.2 and D.3). This suggests that the majority of total and dissolved iron and manganese was in fine colloidal form unavailable to the DGT-device. Molybdenum was present at total concentrations well below BCWQG, but was highest at Hazeltine Creek and Polley Lake, suggesting some influence of proximity to the Mount Polley Mine (Appendix Figure D.4). The DGT-labile molybdenum fraction was highest at Polley Lake, where it was approximately 30% of total and dissolved concentrations (Appendix Table D.3). Phosphorus concentrations in Polley and Bootjack lakes were greater than the BCWQG range for lakes supporting salmonids, but were only DGT-detectable in Bootjack Lake, with DGT-labile concentrations of 24% and 34% of total

and dissolved phosphorus, respectively (Appendix Figure D.5; Appendix Table D.3). Lastly, one of the four replicate DGT-labile zinc results for Quesnel Lake was elevated (0.015 mg/L; Appendix Table D.1). Although this may represent an anomaly, verification is justified.

Summary

Measurement of DGT-labile metal concentrations (i.e., free metal ions and weakly complexed metals) in water near the bottom of lakes impacted by the Mount Polley Mine tailings dam failure (Polley Lake and Quesnel Lake) indicate DGT-labile metal concentrations that are a fraction of total and dissolved. For copper, the POI of greatest concern and the only DGT-detectable analyte with elevated total concentrations and a spatial pattern consistent with impact from the tailings dam failure, DGT-labile concentrations were less than 13% of total and less than 25% of dissolved concentrations in bottom waters of these lakes. These low concentrations add to the weight-of-evidence of the apparent post-depositional stability of the Mount Polley tailings and tailings-impacted sediment (e.g., SRK 2015a,b; Minnow 2015a, 2016).

Recommendations

DGT-devices provide a promising means of evaluating the mobility of metals associated with tailings-influenced sediments and tracking labile metal concentrations over time. It is therefore recommended that DGT devices are deployed in 2016 in areas impacted by the 2014 tailings dam failure. Lower method detection limits can likely be achieved by extending the deployment period.



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APPENDIX A

**SAMPLE LOCATIONS AND
SUPPORTING DATA**

Table A.1: Sampling locations and dates of passive sampler (DGT) deployment and retrieval, Mount Polley Mine, August 2015

Location	Area Code	Type	Replicate	GPS Coordinates		Deployment		Retrieval		Deployment duration (hours)
				Easting	Northing	Date	Time	Date	Time	
Polley Lake - South Basin	POL-P2	Exposed	1	595122	5822187	28-Aug-15	11:39	5-Oct-15	17:12	917.5
			2	595141	5822212	28-Aug-15	12:02	5-Oct-15	17:03	917.0
			3	595172	5822229	28-Aug-15	12:20	5-Oct-15	16:57	916.6
			4	595150	5822183	28-Aug-15	12:43	5-Oct-15	17:07	916.4
Bootjack Lake - South Basin	BOL-B2	Reference	1	591279	5821629	28-Aug-15	17:06	5-Oct-15	13:57	908.9
			2	591253	5821623	28-Aug-15	17:21	5-Oct-15	13:53	908.5
			3	591241	5821676	28-Aug-15	17:35	5-Oct-15	13:46	908.2
			4	591218	5821665	28-Aug-15	17:53	5-Oct-15	13:49	907.9
Quesnel Lake - Profundal Near-Field	PNF	Exposed	1	601906	5818200	31-Aug-15	17:55	6-Oct-15	8:21	854.4
			2	601849	5818258	31-Aug-15	18:12	6-Oct-15	8:14	854.0
			3	601782	5818289	31-Aug-15	18:33	6-Oct-15	8:33	854.0
			4	601649	5818354	31-Aug-15	18:49	6-Oct-15	8:44	853.9
Quesnel Lake - Profundal Reference	PREF1	Reference	1	610306	5814797	2-Sep-15	14:52	6-Oct-15	11:01	823.2
			2	610362	5814849	2-Sep-15	15:07	6-Oct-15	10:52	822.6
			3	610458	5814834	2-Sep-15	15:26	6-Oct-15	10:43	822.0
			4	610527	5814860	2-Sep-15	15:42	6-Oct-15	10:35	821.5
Hazeltine Creek	HAC	Exposed	1	600184	5817232	29-Aug-15	11:39	6-Oct-15	16:35	916.9
			2	600106	5817179	29-Aug-15	12:02	6-Oct-15	16:11	916.2
			3	599989	5817210	29-Aug-15	12:20	6-Oct-15	16:00	915.7
			4	599951	5817204	29-Aug-15	12:43	6-Oct-15	15:47	915.1

Table A.2: Supporting measures for passive sampler (DGT) deployment and retrieval, Mount Polley Mine, August 2015

A) Surface Water

Location	Area Code	Type	Replicate	Deployment					Retrieval				
				Temp.	DO	DO	SpC	pH	Temp.	DO	DO	SpC	pH
				°C	mg/L	%	µS/cm	pH units	°C	mg/L	%	µS/cm	pH units
Polley Lake	POL-P2	Exposed		18.0	8.49	90	288	8.3	12.1	10.3	96	291	8.12
Bootjack Lake	BOL-B2	Reference		17.9	8.34	88	99	7.92	11.8	10.7	99	100	7.32
Quesnel Lake	PNF	Exposed		17.2	9.01	94	110	7.98	12.6	10.7	101	111	8.26
	PREF1	Reference		17.0	9.00	93	111	7.97	12.6	11.1	105	110	8.24
Hazeltine Creek	HAC	Exposed	1	13.0	9.46	90	402	8.34	8.8	12.1	104	439	8.46
			2	13.2	9.41	90	404	8.39	8.9	12.0	104	436	8.43
			3	13.2	9.41	90	405	8.33	9.1	12.0	104	438	8.46
			4	13.2	9.41	85	402	8.32	9.2	11.7	102	435	8.37

B) Lake Bottom Water

Location	Area Code	Type	Replicate	Deployment					Retrieval				
				Temp.	DO	DO	SpC	pH	Temp.	DO	DO	SpC	pH
				°C	mg/L	%	µS/cm	pH units	°C	mg/L	%	µS/cm	pH units
Polley Lake	POL-P2	Exposed		6.0	2.04	16.4	297	7.02	6.1	1.11	8.9	298	7.26
Bootjack Lake	BOL-B2	Reference		8.9	0.01	0.1	107	6.64	8.72	0.66	5.7	160	6.64
Quesnel Lake	PNF	Exposed		4.5	10.3	80	118	7.38	4.6	12.5	97	116	7.67
	PREF1	Reference		3.9	10.4	79	114	7.44	3.9	13.4	102	113	7.68

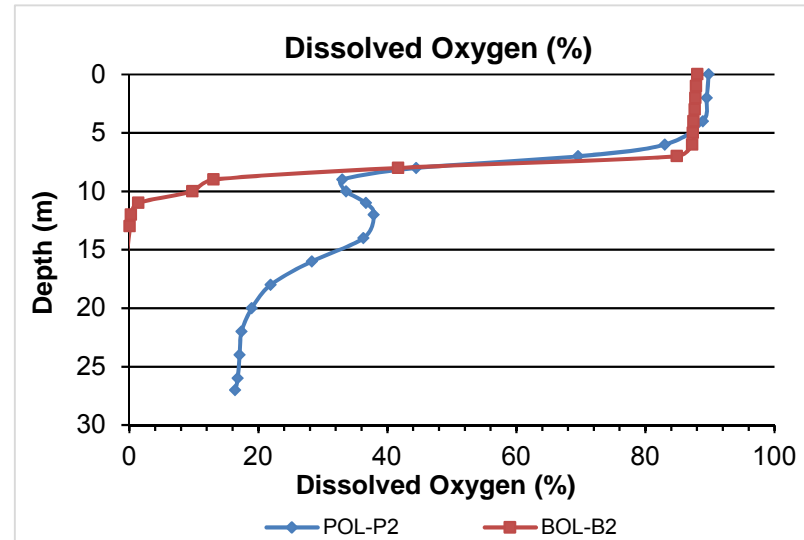
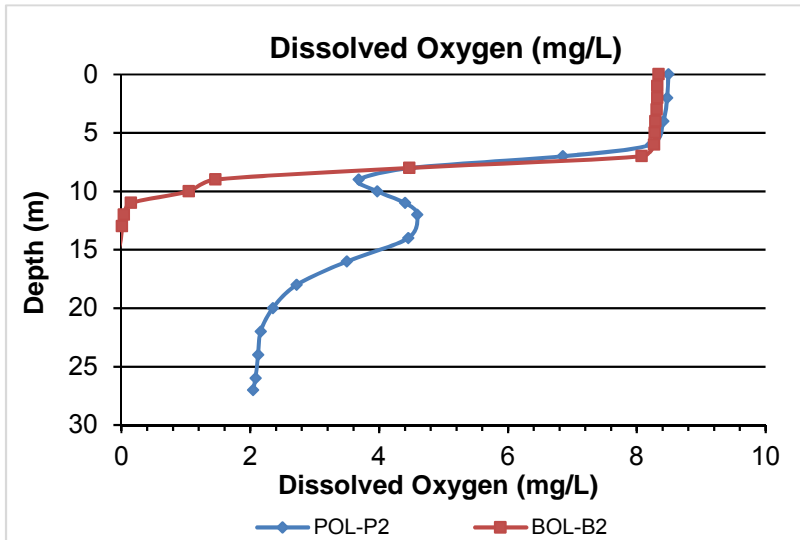
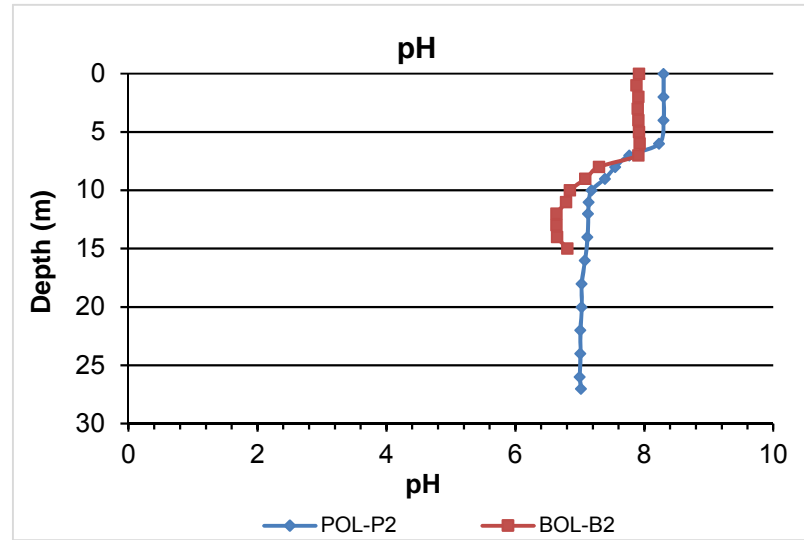
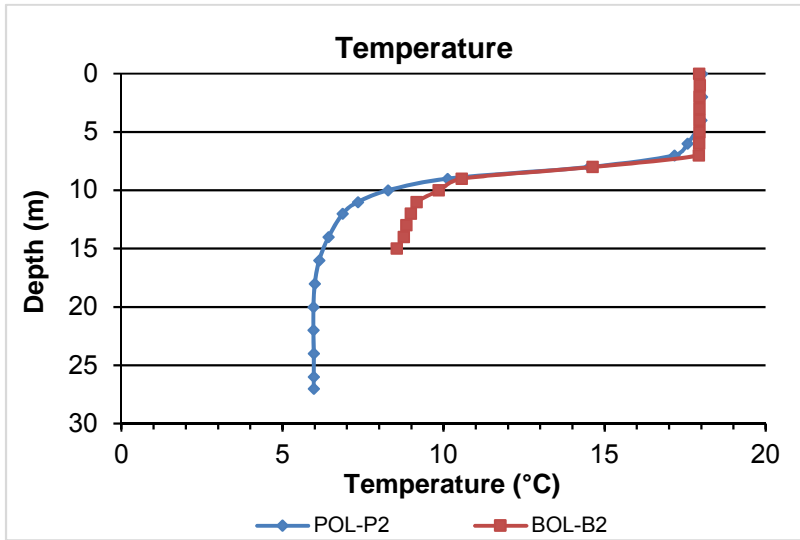


Figure A.1: Vertical profiles of temperature, pH, dissolved oxygen, and specific conductance in Polley Lake and Bootjack Lal during the deployment of Diffusive Gradient in Thin-Film (DGT) passive samplers, Mount Polley Mine, August 20'

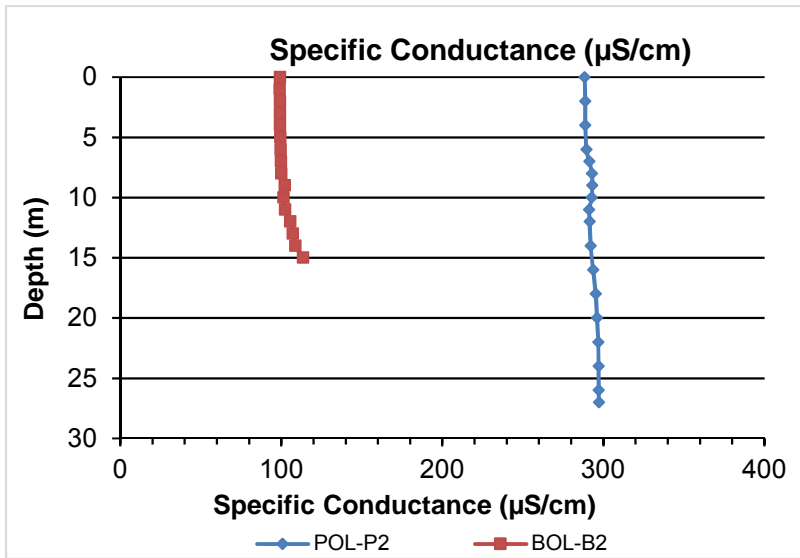


Figure A.1: Vertical profiles of temperature, pH, dissolved oxygen, and specific conductance in Polley Lake and Bootjack Lal during the deployment of Diffusive Gradient in Thin-Film (DGT) passive samplers, Mount Polley Mine, August 20'

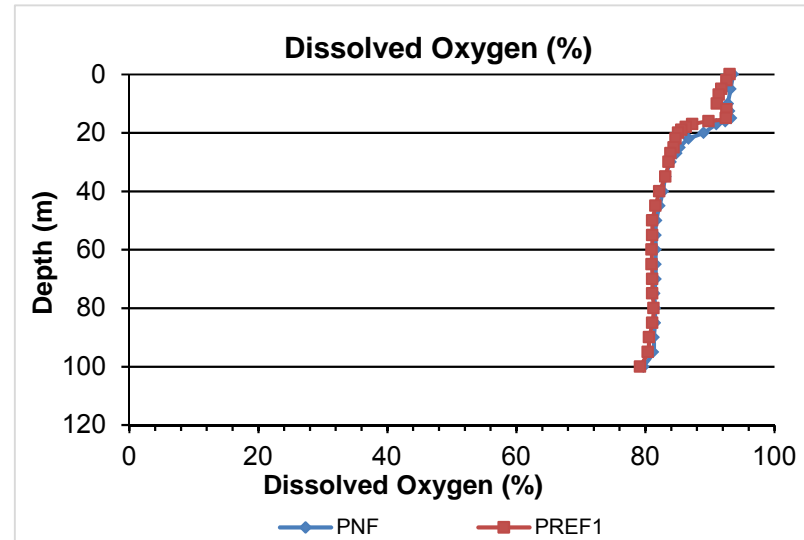
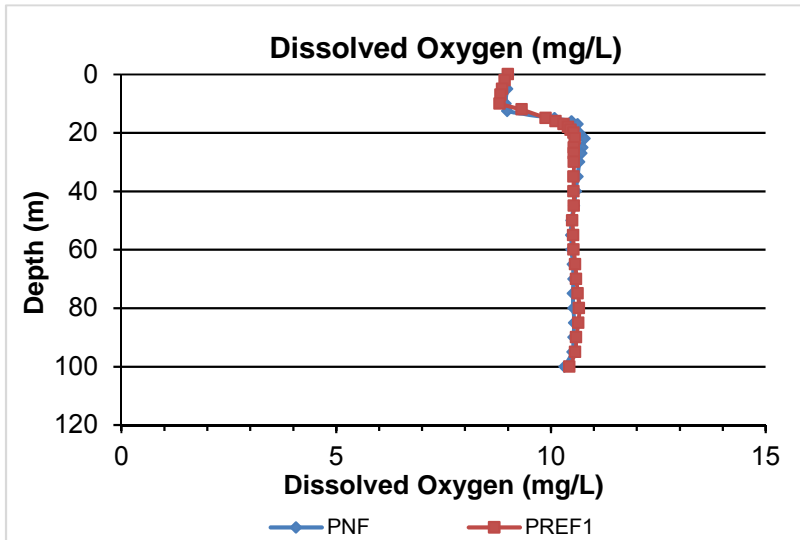
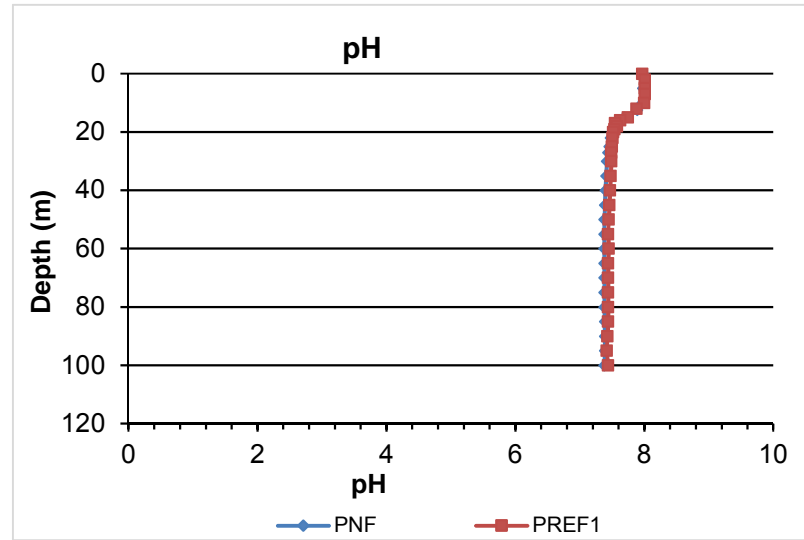
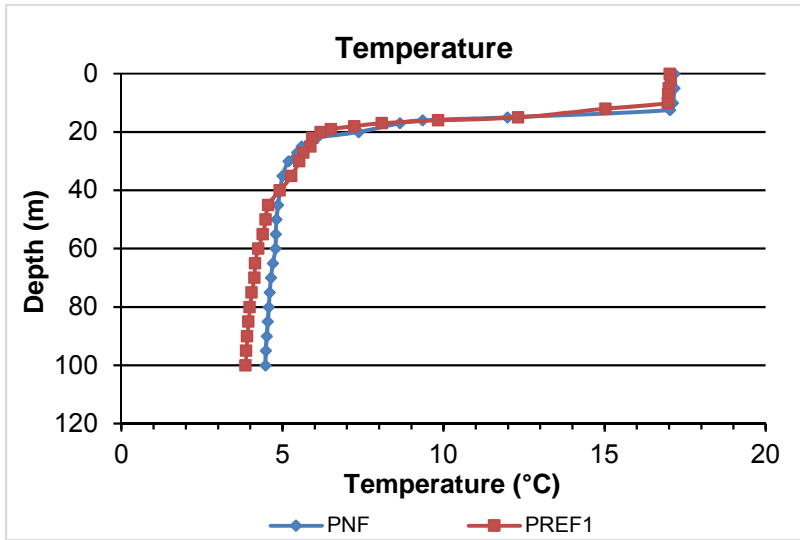


Figure A.2: Vertical profiles of temperature, pH, dissolved oxygen, and specific conductance in Quesnel Lake profundal area during the deployment of Diffusive Gradient in Thin-Film (DGT) passive samplers, Mount Polley Mine, August 20'

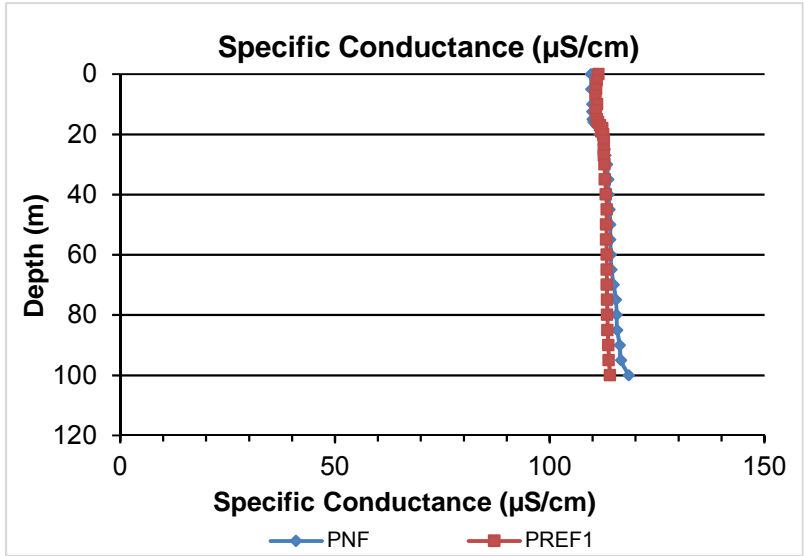


Figure A.2: Vertical profiles of temperature, pH, dissolved oxygen, and specific conductance in Quesnel Lake profundal area during the deployment of Diffusive Gradient in Thin-Film (DGT) passive samplers, Mount Polley Mine, August 20'

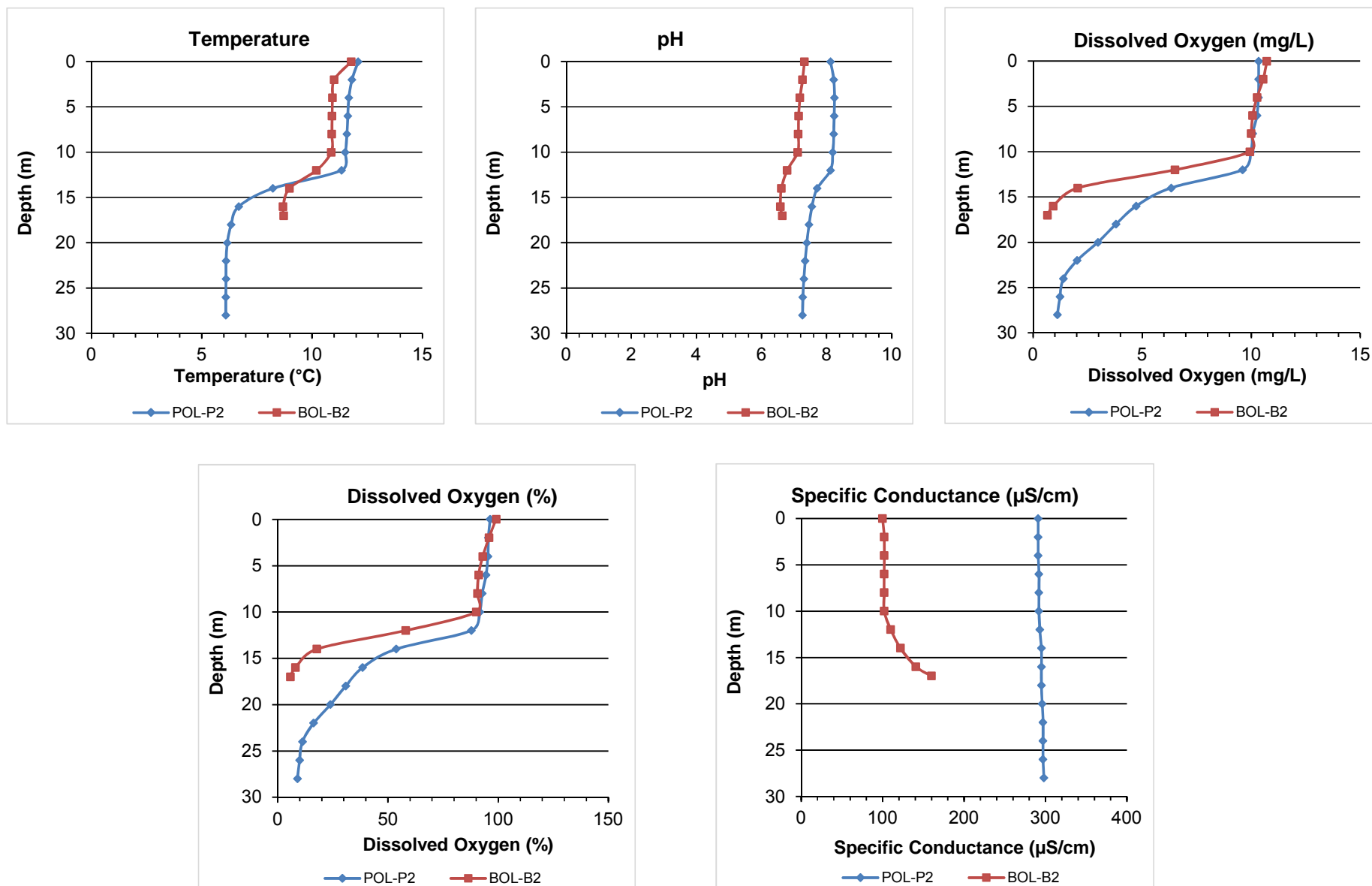


Figure A.3: Vertical profiles of temperature, pH, dissolved oxygen, and specific conductance in Polley Lake and Bootjack Lake during the retrieval of Diffusive Gradient in Thin-Film (DGT) passive samplers, Mount Polley Mine, October 2015

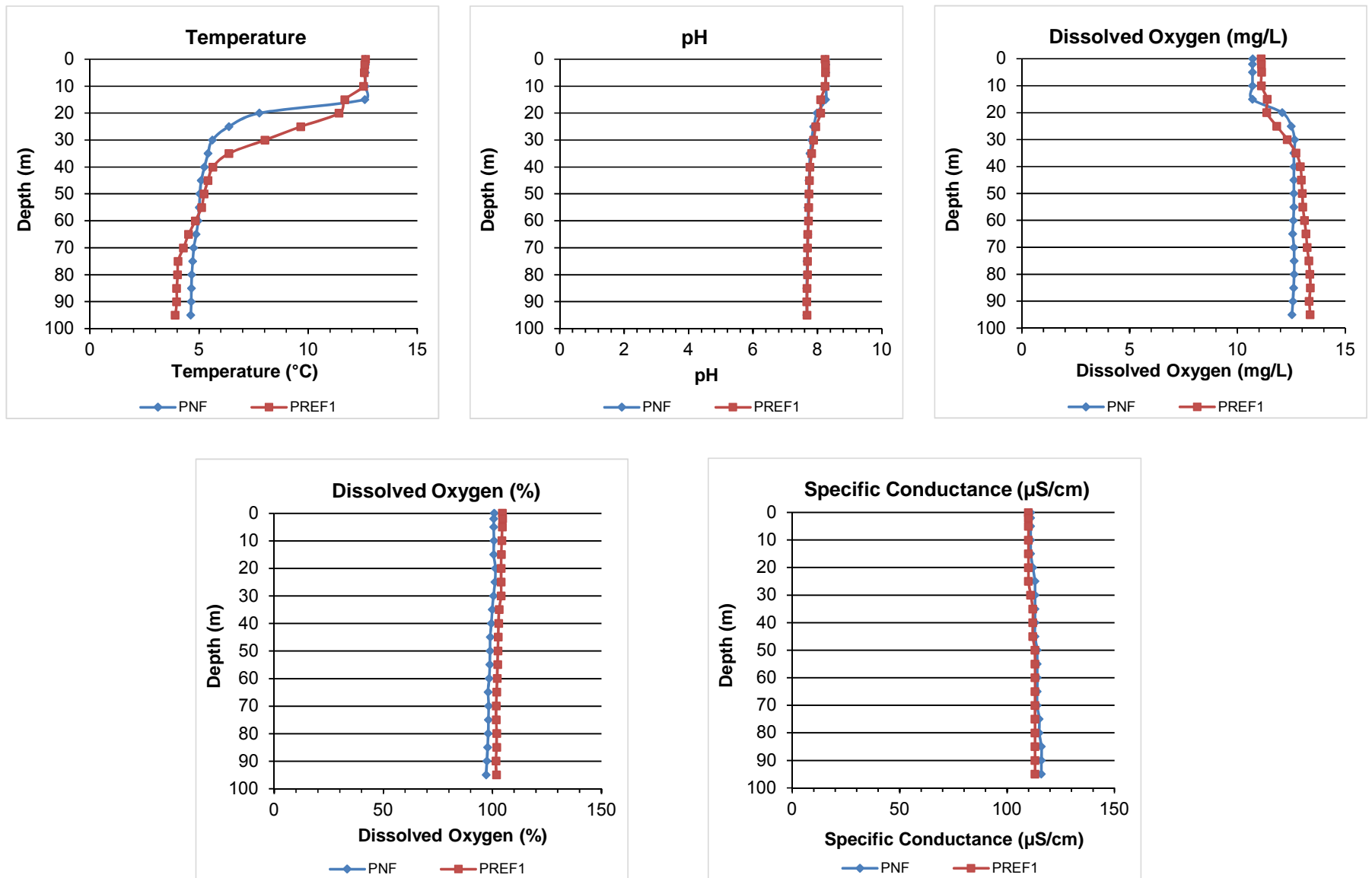


Figure A.4: Vertical profiles of temperature, pH, dissolved oxygen, and specific conductance in Quesnel Lake profundal areas during the retrieval of Diffusive Gradient in Thin-Film (DGT) passive samplers, Mount Polley Mine, October 2015.

APPENDIX B

DATA QUALITY ASSESSMENT

APPENDIX B: DATA QUALITY ASSESSMENT

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B1.0 INTRODUCTION

Data Quality Assessment (DQA) was conducted on data collected as part of the Mount Polley Mining Corporation 2015 Diffusive Gradients in Thin Films (DGT) Device Deployment. The objective of the DQA is to define the overall quality of the data presented in the report, and, by extension, the confidence with which the data can be used to derive conclusions.

B1.1 Background

A variety of factors can influence the physical, chemical and biological measurements made in an environmental study and thus affect the accuracy and/or precision of the data. Inconsistencies in sampling or laboratory methods, use of instruments that are inadequately calibrated or which cannot measure to the desired level of accuracy or precision, and contamination of samples in the field or laboratory are just some of the potential factors that can lead to the reporting of data that do not accurately reflect actual environmental conditions. Depending on the magnitude of the problem, inaccuracy or imprecision have the potential to affect the reliability of any conclusions made from the data. Therefore, it is important to ensure that programs incorporate appropriate steps to control the non-natural sources of data variability (i.e., minimize the variability that does not reflect natural spatial and temporal variability in the environment) and thus assure the quality of the data.

Data quality as a concept is meaningful only when it relates to the intended use of the data. That is, one must know the context in which the data will be interpreted in order to establish a relevant basis for judging whether or not the data set is adequate. DQA involves comparison of actual field and laboratory measurement performance to data quality objectives (DQOs) established for a particular study, such as evaluation of method detection limits, blank sample data, data precision (based on field and laboratory duplicate samples), and data accuracy (based on matrix spike recoveries and/or analysis of standards or certified reference materials). Only trusted and certified laboratories (e.g., analytical chemistry laboratories certified by Canadian Association for Laboratory Accreditation [CALA]) were involved in the current program and such certified laboratories have rigorous internal quality assurance programs that ensure the highest possible quality.

DQOs were established a-priori at the outset of the program to reflect reasonable and achievable performance expectations. Programs involving a large number of samples and analytes usually yield some results that exceed the DQOs. This is particularly so for multi-element scans since the analytical conditions are not necessarily optimal for every

element included in the scan. Generally, scan results may be considered acceptable if no more than 20% of the parameters fail to meet the DQOs. Overall, the intent of DQA is not to reject any measurement that did not meet a DQO, but to ensure that any questionable data received more scrutiny to determine what effect, if any, this had on interpretation of results within the context of this project.

B1.2 Types of Quality Control Samples

Several types of quality control (QC) samples were assessed based on samples collected (or prepared) in the field and laboratory. These samples include the following:

- **Blanks** are samples of de-ionized water, sampling devices, and/or appropriate reagent(s) that are handled and analyzed the same way as regular samples. These samples will reflect any contamination that occurred in the field (in the case of field or trip blanks) or the laboratory (in the case of laboratory or method blanks). Analyte concentrations should be non-detectable, although a data quality objective of twice the method detection limit allows for slight “noise” around the detection limit.
- **Fabrication Controls** are blank DGT resins that are digested and analyzed in the same manner as regular samples. The fabrication controls account for interferences or contamination from the DGT sampler components, storage and analysis.
- **Field Duplicates** are replicate samples collected from a randomly selected field station using identical collection and handling methods that are then analyzed separately in the laboratory. The duplicate samples are handled and analyzed in an identical manner in the laboratory. The data from field duplicate samples reflect natural variability, as well as the variability associated with sample collection methods, and therefore provide a measure of field precision.
- **Laboratory Duplicates** are replicate sub-samples created in the laboratory from randomly selected field samples which are sub-sampled and then analyzed independently using identical analytical methods. The laboratory duplicate sample results reflect any variability introduced during laboratory sample handling and analysis and thus provide a measure of laboratory precision.
- **Certified Reference Materials and QC Standards** are samples containing known chemical concentrations that are processed and analyzed along with batches of environmental samples. The sample results are then compared to target results

to provide a measure of analytical accuracy. The results are reported as the percent of the known amount that was recovered in the analysis.

B2.0 WATER SAMPLES

B2.1 Detection Limits

Method detection limits (MDLs) achieved by ALS Environmental for the supporting water samples were examined and assessed in all cases where sample results were reported as less than the MDL. For analytes for which a water quality guideline for the protection of aquatic life is available, the MDL should be lower than the guideline value (Table B.1). All reported MDLs were lower than the applicable guideline values (Table B.1), and were therefore of good quality for effective data interpretation.

B2.2 Laboratory Blank Sample Analysis

All laboratory blank results reported for the ALS Environmental laboratory reports L1666722, L1668250, L1684482, L1685536 (a total of 657 results) were non-detectable with the exception of a handful of results (0.6% of results; Appendix C). Detectable laboratory method blank results were reported for alkalinity and conductivity but in all cases the associated sample results were at least five times greater than the blank levels, therefore the sample results were deemed reliable by the laboratory (Appendix C). Overall, this indicates no inadvertent contamination of samples within the laboratory during analysis.

B2.3 Data Precision

Field Duplicate Samples

One duplicate water sample was collected in the field as part of the water sampling conducted to support the evaluation of Diffusive Gradient in Thin-Film (DGT) passive samplers deployed in Hazeltine Creek, Polley Lake, Bootjack Lake and Quesnel Lake. The duplicates showed excellent agreement in concentrations of all analytes except dissolved orthophosphate, dissolved phosphorus, and total silver which had relative percent differences (RPD) among the duplicates of 40.0%, 43.1%, and 57.1%, respectively (Table B.2). Although the data quality objective of a relative percent difference (RPD) of $\leq 25\%$ was not met for these three analytes, each analyte had low reported results, with one detectable and one undetectable result. Consequently, although the absolute difference was small (approximately 0.001 mg/L in the case of dissolved orthophosphate and dissolved phosphorus and < 0.00001 mg/L in the case of silver) the relative percent differences exceeded the DQO (Table B.2). Overall, the field

Table B.1: Laboratory method detection limit (MDL) evaluation for water chemistry analysis relative to guidelines. Highlighting indicate MDLs that did not meet guideline.

Parameter	Units	British Columbia Water Quality Guidelines ^a	Maximum Method Detection Limit Achieved
Physical Tests			
Total Suspended Solids	mg/L	-	3
Anions and Nutrients			
Total Ammonia (as N)	mg/L	0.102 / 0.681 ^b	0.005
Chloride	mg/L	150/600	0.5
Nitrate and Nitrite (as N)	mg/L	-	0.0051
Nitrate (as N)	mg/L	3.0 / 32.8	0.005
Nitrite (as N)	mg/L	0.02 / 0.06 ^c	0.001
Orthophosphate (Dissolved)	mg/L	-	0.001
Phosphorus (Total Dissolved)	mg/L	-	0.002
Phosphorus (Total)	mg/L	-/0.005	0.002
Total Metals			
Antimony	mg/L	0.009/ -	0.0001
Beryllium	mg/L	0.00013 / -	0.0001
Bismuth	mg/L	-	0.00005
Boron	mg/L	- /1.2	0.01
Cadmium	mg/L	-	0.000005
Chromium	mg/L	0.001/- ^d	0.0005
Cobalt	mg/L	0.004/0.11	0.0001
Iron	mg/L	- /1	0.03
Lead	mg/L	0.005/0.033 ^e	0.00005
Lithium	mg/L	-	0.001
Nickel	mg/L	- /0.025 ^e	0.0005
Silver	mg/L	0.00005/0.0001 ^e	0.00001
Thallium	mg/L	0.0008/-	0.00001
Tin	mg/L	-	0.0001
Titanium	mg/L	-	0.01
Vanadium	mg/L	-	0.0005
Zinc	mg/L	0.0075/0.033 ^e	0.003
Dissolved Metals			
Aluminum	mg/L	0.05/0.10	0.003
Antimony	mg/L	-	0.0001
Arsenic	mg/L	-	0.0001
Beryllium	mg/L	-	0.0001
Bismuth	mg/L	-	0.00005
Boron	mg/L	-	0.01
Cadmium	mg/L	0.0001/0.0003 ^e	0.000005
Chromium	mg/L	-	0.0005
Cobalt	mg/L	-	0.0001
Copper	mg/L	-	0.0005
Iron	mg/L	-/0.35	0.03
Lead	mg/L	-	0.00005
Lithium	mg/L	-	0.001
Nickel	mg/L	-	0.0005
Silver	mg/L	-	0.00001
Thallium	mg/L	-	0.00001
Tin	mg/L	-	0.0001
Titanium	mg/L	-	0.01
Vanadium	mg/L	-	0.0005
Zinc	mg/L	-	0.003

^a British Columbia Water Quality Guidelines (BCMOE 2015a, BCMOE 2015b); Chronic / Acute.

^b Lowest tabulated chronic and acute ammonia guidelines based on pH and temperature reported in BCMOE (2015a).

^c For low chloride water (< 2mg/L)

^d Applies to chromium as Cr (IV); guideline for Cr(III) is 0.0089 mg/L.

^e Guideline value calculated using the lowest hardness for surface water hardness for applicable water bodies (Quesnel Lake, Bootjack Lake, Polley Lake, and Hazeltine Creek) of 48.8 mg/L.

Table B.2: Field duplicate results for water chemistry analyses. Highlighted values did not meet the data quality objective of ≤ 25% Relative Percent Difference (RPD).

Client Sample ID	Units	Lab report L1684482		
		PNF-DGT	PNF-X	RPD (%) ^a
		6-Oct-15 L1684482-1	6-Oct-15 L1684482-2	
Date Sampled				
ALS Sample ID				
Physical Tests				
Conductivity	µS/cm	114	115	0.9
Hardness (as CaCO ₃)	mg/L	57.3	57.4	0.2
pH	pH	7.73	7.73	0.0
Total Suspended Solids	mg/L	<3.0	<3.0	0.0
Total Dissolved Solids	mg/L	72	71	1.4
Turbidity	NTU	0.37	0.47	23.8
Anions and Nutrients				
Alkalinity, Total (as CaCO ₃)	mg/L	53.2	52.7	0.9
Ammonia, Total (as N)	mg/L	<0.0050	<0.0050	0.0
Chloride (Cl)	mg/L	<0.50	<0.50	0.0
Fluoride (F)	mg/L	0.036	0.036	0.0
Nitrate and Nitrite (as N)	mg/L	0.153	0.151	1.3
Nitrate (as N)	mg/L	0.153	0.151	1.3
Nitrite (as N)	mg/L	<0.0010	<0.0010	0.0
Total Nitrogen	mg/L	0.221	0.220	0.5
Orthophosphate-Dissolved (as P)	mg/L	<0.0010	0.0015	40.0
Phosphorus (P)-Total Dissolved	mg/L	<0.0020	0.0031	43.1
Phosphorus (P)-Total	mg/L	0.0022	0.0028	24.0
Sulfate (SO ₄)	mg/L	6.90	6.90	0.0
Organic / Inorganic Carbon				
Dissolved Organic Carbon	mg/L	2.00	1.91	4.6
Total Metals				
Aluminum	mg/L	0.0288	0.0247	15.3
Antimony	mg/L	<0.00010	<0.00010	0.0
Arsenic	mg/L	0.00016	0.00015	6.5
Barium	mg/L	0.00663	0.00649	2.1
Beryllium	mg/L	<0.00010	<0.00010	0.0
Bismuth	mg/L	<0.000050	<0.000050	0.0
Boron	mg/L	<0.010	<0.010	0.0
Cadmium	mg/L	0.0000109	0.0000106	2.8
Calcium	mg/L	19.5	18.7	4.2
Chromium	mg/L	<0.00050	<0.00050	0.0
Cobalt	mg/L	<0.00010	<0.00010	0.0
Copper	mg/L	0.00165	0.00161	2.5
Iron	mg/L	<0.030	<0.030	0.0
Lead	mg/L	0.000054	0.000053	1.9
Lithium	mg/L	<0.0010	0.0010	0.0
Magnesium	mg/L	2.21	2.12	4.2
Manganese	mg/L	0.00415	0.00386	7.2
Molybdenum	mg/L	0.000897	0.000858	4.4
Nickel	mg/L	<0.00050	<0.00050	0.0
Potassium	mg/L	0.571	0.546	4.5
Selenium	mg/L	0.000102	0.000108	5.7
Silicon	mg/L	1.96	1.87	4.7
Silver	mg/L	0.000018	<0.000010	57.1
Sodium	mg/L	1.24	1.22	1.6
Strontium	mg/L	0.144	0.143	0.7
Thallium	mg/L	<0.000010	<0.000010	0.0
Tin	mg/L	<0.00010	<0.00010	0.0
Titanium	mg/L	<0.010	<0.010	0.0
Uranium	mg/L	0.000191	0.000185	3.2
Vanadium	mg/L	<0.00050	<0.00050	0.0
Zinc	mg/L	0.0073	0.0073	0.0

^a The method detection limit (MDL) value was used in instances where values less than the MDL were reported.

RPD calculation: $=(\text{Absolute}(\text{Replicate 1} - \text{Replicate 2}))/\text{Average}(\text{Replicate 1}, \text{Replicate 2}) \times 100$

Table B.2: Field duplicate results for water chemistry analyses. Highlighted values did not meet the data quality objective of ≤ 25% Relative Percent Difference (RPD).

Client Sample ID	Units	Lab report L1684482		
		PNF-DGT	PNF-X	RPD (%) ^a
		6-Oct-15 L1684482-1	6-Oct-15 L1684482-2	
Date Sampled				
ALS Sample ID				
Dissolved Metals				
Aluminum	mg/L	0.0068	0.0067	1.5
Antimony	mg/L	<0.00010	<0.00010	0.0
Arsenic	mg/L	0.00013	0.00013	0.0
Barium	mg/L	0.00596	0.00599	0.5
Beryllium	mg/L	<0.00010	<0.00010	0.0
Bismuth	mg/L	<0.000050	<0.000050	0.0
Boron	mg/L	<0.010	<0.010	0.0
Cadmium	mg/L	<0.0000050	<0.0000050	0.0
Calcium	mg/L	19.4	19.4	0.0
Chromium	mg/L	<0.00050	<0.00050	0.0
Cobalt	mg/L	<0.00010	<0.00010	0.0
Copper	mg/L	0.00109	0.00108	0.9
Iron	mg/L	<0.030	<0.030	0.0
Lead	mg/L	<0.000050	<0.000050	0.0
Lithium	mg/L	0.0011	0.0011	0.0
Magnesium	mg/L	2.16	2.17	0.5
Manganese	mg/L	0.00107	0.00114	6.3
Molybdenum	mg/L	0.000780	0.000780	0.0
Nickel	mg/L	<0.00050	<0.00050	0.0
Potassium	mg/L	0.548	0.549	0.2
Selenium	mg/L	0.000089	0.000100	11.6
Silicon	mg/L	1.84	1.84	0.0
Silver	mg/L	<0.000010	<0.000010	0.0
Sodium	mg/L	1.19	1.20	0.8
Strontium	mg/L	0.137	0.138	0.7
Thallium	mg/L	<0.000010	<0.000010	0.0
Tin	mg/L	<0.00010	<0.00010	0.0
Titanium	mg/L	<0.010	<0.010	0.0
Uranium	mg/L	0.000167	0.000168	0.6
Vanadium	mg/L	<0.00050	<0.00050	0.0
Zinc	mg/L	<0.0030	<0.0030	0.0

^a The method detection limit (MDL) value was used in instances where values less than the MDL were reported.

RPD calculation: $=(\text{Absolute}(\text{Replicate 1} - \text{Replicate 2}))/\text{Average}(\text{Replicate 1}, \text{Replicate 2}) \times 100$

duplicate sampling did not indicate any inconsistencies in sampling technique nor issues that could impair data interpretability.

Laboratory Duplicate Samples

All laboratory duplicate results evaluated within laboratory reports L1666722, L1668250, L1684482, L1685536 (1,474 results in total) met ALS Environmental's data quality objectives for the parameters reported (generally < 25% RPD; Appendix C). Among the four laboratory reports, 34 laboratory duplicate samples were evaluated for dissolved metals and alkalinity, 33 for conductivity, 30 for pH, sulphate, and nitrate, and 29 samples were evaluated for nitrite. In addition, 25 laboratory duplicate samples were evaluated for the precision of fluoride, 23 for chloride, 17 for total nitrogen, 15 for ammonia, 13 for dissolved orthophosphate, 12 for total suspended solids and turbidity, and 11 for dissolved organic carbon. Ten laboratory duplicate samples were assessed for precision of total dissolved solids results, five samples for total metals and dissolved phosphorus, and three samples were evaluated for the precision of total phosphorus results. Overall, the laboratory precision achieved in this study is considered good.

B2.4 Data Accuracy

The accuracy of laboratory data from within laboratory reports L1666722, L1668250, L1684482, L1685536 was assessed based on the results of certified reference materials (CRM), laboratory control samples (LCS) and matrix spike samples (MS; Appendix C). Specifically, the following CRM samples were used among the four laboratory reports to assess the accuracy of various analyses; forty one CRM samples were analysed to assess the accuracy of pH and conductivity analyses, forty for alkalinity, twenty five for ammonia, sixteen for turbidity, nine for dissolved orthophosphate, five for dissolved phosphorus, and four CRM samples were used to assess the accuracy of total phosphorus analyses (Appendix C). Sixteen LCS samples were used to evaluate the accuracy of total nitrogen samples, twelve for total suspended solids and dissolved organic carbon analyses, and eleven samples were used to assess chloride, fluoride, nitrate, nitrite, and sulfate analyses accuracy. An additional ten LCS samples were used to assess the accuracy of total dissolved solids analyses, five for total metals, and four LCS samples were analysed to evaluate the accuracy of dissolved metals analyses (Appendix C). Finally, MS samples were also used to assess the accuracy of multiple parameters, with twenty eight MS samples used to evaluate the accuracy of dissolved metals, nitrite, and sulphate analyses, fourteen for ammonia and total nitrogen accuracy, eight for dissolved orthophosphate, eight for dissolved organic carbon, five for total metals and dissolved phosphorus

accuracy, and four MS samples used to assess the accuracy of total phosphorus analyses (Appendix C). All CRM, LCS, and MS results (a total of 1,479 results) met ALS Environmental's data quality objectives for accuracy (Appendix C) and thus laboratory accuracy associated with water samples in this study is considered excellent.

B2.5 Holding Time and General Laboratory Flags

Several hold times were exceeded due to the combination of short optimal hold times and remote sampling (Appendix C). Analytes for which recommended hold times were exceeded included nitrate/nitrite (3-day hold time), pH (15-minute hold time), dissolved phosphorus (3-day hold time), turbidity (3-day hold time), and dissolved orthophosphate (3-day hold time). Results associated with the hold time exceedances appear not to have been affected as they were comparable to those associated with samples where hold times were met, or comparable to field measures in the case of pH. Furthermore, water samples were collected primarily to provide supporting water metals concentration data for the deployed Diffusive Gradient in Thin-Film (DGT) passive samplers and hold time for metals analyses were not exceeded, therefore the observed hold time exceedances will not affect data interpretability. There were no general laboratory flags associated with the water quality data (Appendix C).

B3.0 DGT SAMPLES

B3.1 Detection Limits

Method detection limits (MDLs) and reporting detection limits (RDLs) achieved by Maxxam for the DGT devices were reported for both mass analyses and for estimated average water concentrations (Appendix D). Data quality assessment of MDLs and RDLs is focussed on the average water concentrations as these are ultimately the data of greatest interest, and because water quality guidelines for the protection of aquatic life are available, the MDLs and RDLs should be lower than the guideline value. Of the analytes for which estimated average water concentrations were reported (27 analytes), some less than MDL or RDL results were returned for all but three analytes due to very low concentrations (Appendix D). However, all MDLs were well below water quality guidelines and RDLs for all but one analyte were below water quality guidelines (Table C.3). This exception occurred for chromium, where the RDL (0.0016 mg/L) was slightly greater than the guideline of 0.001 mg/L. Overall, detection limits were good and appropriate for data interpretation. In addition, chromium, the only analyte with a RDL greater than guideline, as not been identified as a parameter of interest within the study area.

B3.2 Laboratory Blank Sample Analysis

Results for the analysis of four blanks were reported in association DGT analyses – two water blanks and two method blanks. All analytes except sodium were reported as below MDL or RDL (Appendix D). This result does not indicate contamination; rather is due to a digestion solution that contains sodium (sodium hydroxide). Furthermore, all DGT data for sodium were reported as less than MDL.

B3.3 Fabrication Controls

Three fabrication control results were reported in association DGT analyses and returned results below MDL or RDL for all analytes except sodium (Appendix D). As noted above, this result does not indicate contamination; rather is due to a digestion solution that contains sodium (sodium hydroxide). Furthermore, all DGT data for sodium were reported as less than MDL.

B3.4 Field Blank Sample Analysis

Two field blanks and one trip blank were included in the program. The two field blanks returned results below MDL or RDL for all analytes (Appendix D). The trip blank returned results below MDL or RDL for all analytes except copper (Appendix D). Based on this

Table B.3: Laboratory method detection limit (MDL) evaluation for DGT-estimated average water concentrations relative to guidelines. Highlighting indicate MDLs that did not meet guideline.

Metal	Units	British Columbia Water Quality Guidelines ¹		Application (d or t)	MDLw	RDLw
		30-day	maximum			
Aluminum	mg/L	0.05	0.10	d	0.0016	0.0054
Antimony	mg/L	0.009	-	t	0.000053	0.00026
Arsenic	mg/L	-	0.005	t	0.000054	0.00027
Barium	mg/L	1.0	-	t	0.00017	0.00068
Beryllium	mg/L	-	-	-	0.000054	0.00027
Cadmium ²	mg/L	0.00013	0.00029	d	0.0000059	0.000029
Calcium	mg/L	-	-	-	0.033	0.109
Chromium	mg/L	0.001	-	t	0.00032	0.0016
Cobalt	mg/L	0.004	0.11	t	0.000031	0.00015
Copper	mg/L	0.002	0.007	t	0.000058	0.00029
Iron	mg/L	-	0.35	d	0.0027	0.013
Lead ²	mg/L	0.0046	0.034	t	0.00002	0.0001
Lithium	mg/L	-	-	-	0.00016	0.00079
Magnesium	mg/L	-	-	-	0.0023	0.012
Manganese ²	mg/L	0.83	1.09	t	0.00014	0.0007
Molybdenum	mg/L	-	0.073	t	0.000091	0.0003
Nickel ²	mg/L	-	0.06	t	0.00024	0.00081
Phosphorus	mg/L	-	-	-	0.0027	0.013
Potassium	mg/L	-	-	-	0.0033	0.017
Selenium	mg/L	0.002	-	t	0.000073	0.00037
Silver ²	mg/L	0.00005	0.0001	t	0.0000023	0.000012
Sodium	mg/L	-	-	-	93	310
Strontium	mg/L	-	-	-	0.00013	0.00045
Thallium	mg/L	0.0008	-	t	0.00000081	0.0000041
Uranium	mg/L	-	-	-	0.0000047	0.000024
Vanadium	mg/L	-	-	-	0.000059	0.00015
Zinc ²	mg/L	0.0075	0.033	t	0.0002	0.001

¹ British Columbia Water Quality Guidelines (BCMOE 2015a,b) except for molybdenum, which is the Canadian Water Quality Guideline (CCME 2015).

² at lowest applicable hardness of 50 mg/L

result (1.06 ug in the gel), a request was sent to the analytical laboratory for re-analysis, which confirmed the original result, suggesting contamination. Despite this results, there was no evidence of contamination in the field sample results – all reference results were less than RDL (<0.39 ug) and all results from exposed areas showed good agreement among replicates.

B3.5 Data Accuracy

Spikes of cadmium, thallium and uranium were added to method blanks and DGT resins to evaluate recovery. In all cases, recovery was well within the acceptable range (Appendix D).

B3.6 Holding Time and General Laboratory Flags

There were no hold time exceedences or general laboratory flags associated with the DGT samples (Appendix D).

B4.0 DATA QUALITY STATEMENT

Water quality data collected in support of the Diffusive Gradient in Thin-Film passive sampler deployment at the Mount Polley Mine were of good quality. This was characterized by good detectability, negligible analyte concentrations in method blanks, good field and laboratory precision, and good laboratory accuracy. Therefore, the supporting water quality data can be used with a high level of confidence in the derivation of conclusions. Similarly, the DGT data were characterized by good detectability, as well as negligible analyte concentrations in most blanks and all fabrication controls. Copper was detected in a trip blank, suggesting contamination, but was not supported by results from two field blanks, nor in the field samples themselves, which had low concentrations in reference areas and higher concentrations with good agreement among stations at the exposed areas. Although this data point is considered to most likely represent an anomaly, it does detract from the overall confidence in DGT copper results.

B5.0 REFERENCES

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Minnow (Minnow Environmental Inc.). 2015. Mount Polley Tailings Dam Failure – Sediment Quality Impact Characterization. Prepared for Mount Polley Mining Corporation, May 2015.

APPENDIX C

SUPPORTING WATER CHEMISTRY DATA

Table C.1: British Columbia Water Quality Guidelines for the Protection of Aquatic Life

Analyte		Units	Guidelines for the Protection of Aquatic Life ¹		Guideline Status	Hardness-Dependent Guidelines for the Protection of Aquatic Life applicable at Three Benchmark Hardness Concentrations ²					
						30-day			Maximum		
						50	130	200	50	130	200
Field	Temperature	C	narrative		approved	0.9			-		
	pH	pH	6.5 - 9.0		approved	-			-		
Lab	Dissolved Oxygen	mg/L	8.0 minimum	5.0 minimum	approved	-	-	-	-	-	-
Aggregate	Alkalinity (total)	mg/L	10 - 20 minimum		working	-	-	-	-	-	-
	Total Suspended Solids	mg/L	narrative		approved	-	-	-	-	-	-
Ions	Sulphate (dissolved)	mg/L	218 - 429		approved	-	-	-	218	309	429
	Fluoride (dissolved)	mg/L	$-51.73 + 92.57(\log(\text{hardness})) \times 0.01$		approved	-	-	-	1.1	1.4	1.6
Nutrients	Nitrate (as nitrogen)	mg/L	3.0	32.8	approved	-	-	-	-	-	-
	Nitrite (as nitrogen) ³	mg/L	0.020	0.06	approved	-	-	-	-	-	-
	Ammonia (as nitrogen) ⁴	mg/L	0.45	1.9	approved	-	-	-	-	-	-
	Phosphorus (total) ⁵	mg/L	0.005 - 0.015 (inclusive)		approved	-	-	-	-	-	-
Dissolved Metals	Dissolved Organic Carbon	mg/L	narrative		approved	-	-	-	-	-	-
	Aluminum	mg/L	0.05	0.10	approved	-	-	-	-	-	-
Total Metals	Cadmium	mg/L	$e^{(0.736(\ln(\text{hardness}))-4.943)}$	$e^{(1.03(\ln(\text{hardness}))-5.274)}$	approved	0.00013	0.00026	0.00035	0.00029	0.00077	0.0012
	Iron	mg/L	-	0.35	approved	-	-	-	-	-	-
	Antimony	mg/L	0.009	-	working	-	-	-	-	-	-
	Arsenic	mg/L	-	0.005	approved	-	-	-	-	-	-
	Barium	mg/L	1.0	-	working	-	-	-	-	-	-
	Beryllium	mg/L	0.00013	-	working	-	-	-	-	-	-
	Boron	mg/L	-	1.2	approved	-	-	-	-	-	-
	Chromium ⁶	mg/L	0.001 CrVI; 0.0089 CrIII	-	working	-	-	-	-	-	-
	Cobalt	mg/L	0.004	0.11	approved	-	-	-	-	-	-
	Copper	mg/L	0.04*hardness	0.094*hardness + 2	approved	0.0020	0.0052	0.0080	0.007	0.014	0.021
	Iron	mg/L	-	1.0	approved	-	-	-	-	-	-
	Lead	mg/L	$3.31 + e^{(1.273(\ln(\text{hardness}))-4.704)}$	$e^{(1.273(\ln(\text{hardness}))-1.46)}$	approved	0.0046	0.0078	0.0110	0.034	0.114	0.197
	Manganese	mg/L	0.0044*hardness - 0.605	0.01102*hardness + 0.54	approved	0.83	1.18	1.49	1.09	1.97	2.74
	Mercury	mg/L	0.00001 when meHg = 1%	-	approved	-	-	-	-	-	-
	Molybdenum	mg/L	-	0.073	approved	-	-	-	-	-	-
	Nickel	mg/L	-	$e^{(0.76(\ln(\text{hardness}))+1.06)}$	working	-	-	-	0.06	0.12	0.16
Selenium	mg/L	0.002	-	approved	-	-	-	-	-	-	
Silver	mg/L	0.0001 when hardness ≤ 100 mg/L	0.0001 when hardness ≤ 100 mg/L	approved	0.00005	0.0015	0.0015	0.0001	0.003	0.003	
Thallium	mg/L	0.0008	-	working	-	-	-	-	-	-	
Zinc ⁷	mg/L	0.0075 when hardness < 90	0.033 when hardness < 90	approved	0.0075	0.038	0.090	0.033	0.063	0.12	

¹ British Columbia Water Quality Guidelines (BCMOE 2015a,b) except for molybdenum, which is the Canadian Water Quality Guideline (CCME 2015).

² Hardness value of 50 mg/L is representative of Quesnel Lake and Bootjack Lake, 130 mg/L is representative of Polley Lake, and 200 mg/L is representative of Hazeltine Creek. However, exact hardness values were used in the data screening presented in Table C.2.

³ Applicable to low chloride water (<2 mg/L chloride) as observed at all sampling locations.

⁴ Ammonia guideline values were selected based on a high pH (8.4) and temperature (15°C)

⁵ Applicable to lakes where salmonids are the predominant fish species

⁶ Guideline for Chromium VI (0.001 mg/L) was selected, as this is the principal species found in surface waters.

⁷ 30-d guideline when hardness is greater than 90 mg/L is $7.5 + 0.75(\text{hardness} - 90)$ and maximum is $33 + 0.75(\text{hardness} - 90)$

APPENDIX D

DGT (DIFFUSIVE GRADIENTS IN THIN FILMS) DATA

Table D.1: Mass of Metals extracted by Diffusive Gradients in Thin Films (DGT), Mount Polley Mine, August to October, 2015 ^{a,b,c}

				Hazeltime Creek						Polley Lake						Bootjack Lake					
Client ID				HAC-1	HAC-2	HAC-3	HAC-4	Hazeltime Creek		P2-1	P2-2	P2-3	P2-4	Polley Lake		B2-1	B2-2	B2-3	B2-4	Bootjack Lake	
Deployment time				38.2 days	38.2 days	38.2 days	38.1 days			38.2 days	38.2 days	38.2 days	38.2 days			37.9 days	37.9 days	37.8 days	37.8 days		
Temperature				10.9 °C	11.1 °C	11.2 °C	11.2 °C	Mean	SD	6.05 °C	6.05 °C	6.05 °C	6.05 °C	Mean	SD	8.65 °C	8.65 °C	8.65 °C	8.65 °C	Mean	SD
Metal Name	MDL	RDL	Units	Mass Extracted by DGT																	
Aluminum (Al)	0.59	1.96	µg	2.19	5.49	2.35	<RDL	3.00	1.67	<MDL	<MDL	<MDL	<MDL	<0.59	-	<MDL	<MDL	<MDL	<MDL	<0.59	-
Antimony (Sb)	0.025	0.13	µg	<MDL	<MDL	<MDL	<MDL	<0.025	-	<MDL	<MDL	<MDL	<MDL	<0.025	-	<MDL	<MDL	<MDL	<MDL	<0.025	-
Arsenic (As)	0.025	0.13	µg	<RDL	<RDL	<RDL	<RDL	<0.13	-	<RDL	<RDL	<RDL	<RDL	<0.13	-	<RDL	<RDL	<RDL	<RDL	<0.13	-
Barium (Ba)	0.063	0.25	µg	6.87	9.60	5.01	4.81	6.57	2.22	1.76	1.86	1.99	1.84	1.86	0.10	2.70	3.14	3.43	3.98	3.31	0.54
Beryllium (Be)	0.013	0.063	µg	<MDL	<MDL	<MDL	<MDL	<0.013	-	<MDL	<MDL	<MDL	<MDL	<0.013	-	<MDL	<MDL	<MDL	<MDL	<0.013	-
Bismuth (Bi)	0.077	0.26	µg	<MDL	<MDL	<MDL	<MDL	<0.077	-	<MDL	<MDL	<MDL	<MDL	<0.077	-	<MDL	<MDL	<MDL	<MDL	<0.077	-
Boron (B)	0.25	1.3	µg	<MDL	<MDL	<MDL	<RDL	<0.25	-	<MDL	<RDL	<RDL	<RDL	<1.3	-	<RDL	<RDL	<MDL	<RDL	<1.3	-
Cadmium (Cd)	0.0025	0.013	µg	<MDL	<MDL	<MDL	<RDL	<0.0025	-	<MDL	<MDL	<MDL	<MDL	<0.0025	-	<MDL	<MDL	<MDL	<MDL	<0.0025	-
Calcium (Ca)	20	66	µg	168	210	152	158	172	26	112	114	134	103	116	13	<RDL	<RDL	<RDL	<RDL	<66	-
Chromium (Cr)	0.125	0.63	µg	<MDL	<MDL	<MDL	<MDL	<0.125	-	<MDL	<MDL	<MDL	<MDL	<0.125	-	<MDL	<MDL	<MDL	<MDL	<0.125	-
Cobalt (Co)	0.013	0.063	µg	<MDL	<MDL	<MDL	<MDL	<0.013	-	<MDL	<MDL	<MDL	<MDL	<0.013	-	<RDL	<RDL	<RDL	<RDL	<0.013	-
Copper (Cu)	0.025	0.13	µg	2.34	2.64	2.37	2.18	2.38	0.19	0.15	<RDL	0.14	0.16	0.15	0.01	<RDL	<RDL	<RDL	<RDL	<0.13	-
Iron (Fe)	1.25	6.3	µg	<MDL	<MDL	<MDL	<MDL	<1.25	-	<MDL	<MDL	<MDL	<MDL	<1.25	-	145	147	113	142	137	16
Lead (Pb)	0.013	0.063	µg	<MDL	<MDL	<MDL	<MDL	<0.013	-	<MDL	<MDL	<MDL	<MDL	<0.013	-	<MDL	<MDL	<MDL	<MDL	<0.013	-
Lithium (Li)	0.125	0.63	µg	<MDL	<MDL	<MDL	<MDL	<0.125	-	<MDL	<MDL	<MDL	<MDL	<0.125	-	<MDL	<MDL	<MDL	<MDL	<0.125	-
Magnesium (Mg)	1.25	6.3	µg	7.78	9.3	7.5	<RDL	7.7	1.2	<MDL	<MDL	<RDL	<MDL	<6.3	-	<MDL	<MDL	<MDL	<MDL	<1.25	-
Manganese (Mn)	0.05	0.25	µg	0.68	1.05	0.68	0.65	0.77	0.19	3.18	2.71	2.00	2.87	2.69	0.50	18.41	20.83	22.61	28.22	22.5	4.2
Molybdenum (Mo)	0.044	0.15	µg	<RDL	<RDL	<RDL	<MDL	<0.15	-	1.16	1.20	1.30	1.24	1.23	0.06	0.22	0.23	0.23	0.24	0.23	0.01
Nickel (Ni)	0.095	0.32	µg	<MDL	<MDL	<MDL	<MDL	<0.095	-	<MDL	<MDL	<MDL	<MDL	<0.095	-	<MDL	<MDL	<MDL	<MDL	<0.095	-
Phosphorus (P)	1.25	6.3	µg	<MDL	<MDL	<MDL	<MDL	<1.25	-	<RDL	<RDL	<RDL	<RDL	<1.25	-	11.46	14.73	15.77	18.5	15.1	2.9
Potassium (K)	5	25	µg	<MDL	<MDL	<MDL	<MDL	<5	-	<MDL	<MDL	<MDL	<MDL	<5	-	<MDL	<MDL	<MDL	<MDL	<5	-
Selenium (Se)	0.05	0.25	µg	<MDL	<MDL	<MDL	<MDL	<0.05	-	<MDL	<MDL	<MDL	<MDL	<0.05	-	<MDL	<MDL	<MDL	<MDL	<0.05	-
Strontium (Sr)	0.082	0.27	µg	1.97	3.22	1.28	1.28	1.94	0.91	0.88	0.94	1.15	0.97	0.99	0.12	0.62	0.70	0.69	0.82	0.71	0.08
Silver (Ag)	0.0025	0.013	µg	<RDL	<MDL	<MDL	<MDL	<0.0025	-	<MDL	<MDL	<MDL	<MDL	<0.0025	-	<MDL	<MDL	<MDL	<MDL	<0.0025	-
Sodium (Na)	94000	310000	µg	<MDL	<MDL	<MDL	<MDL	<94000	-	<MDL	<MDL	<MDL	<MDL	<94000	-	<MDL	<MDL	<MDL	<MDL	<94000	-
Thallium (Tl)	0.0013	0.013	µg	<MDL	<MDL	<MDL	<MDL	<0.0013	-	<MDL	<MDL	<MDL	<MDL	<0.0013	-	<MDL	<MDL	<MDL	<MDL	<0.0013	-
Tin (Sn)	0.092	0.31	µg	<MDL	<MDL	<MDL	<MDL	<0.092	-	<MDL	<MDL	<MDL	<MDL	<0.092	-	<MDL	<MDL	<MDL	<MDL	<0.092	-
Uranium (U)	0.0025	0.013	µg	0.020	0.034	<RDL	<RDL	0.020	0.010	0.04	0.04	0.04	0.04	0.04	0.00	<MDL	<MDL	<MDL	<MDL	<0.0025	-
Vanadium (V)	0.025	0.063	µg	0.29	0.36	0.36	0.30	0.33	0.04	0.15	0.14	0.16	0.16	0.15	0.01	<MDL	<MDL	<MDL	<MDL	<0.025	-
Zinc (Zn)	0.125	0.63	µg	<MDL	<MDL	<MDL	<MDL	<0.125	-	<MDL	<MDL	<MDL	<MDL	<0.125	-	<MDL	<MDL	<MDL	<MDL	<0.125	-

^a mean and standard deviation calculated using substitution of the method detection limit (MDL) or reporting detection limit (RDL)

^b in cases where all replicates were reported as less than MDL or RDL, the mean is reported as the applicable MDL or RDL

^c in cases where results were a mixture of less than MDL and less than RDL, the mean is reported as less than RDL

Table D.1: Mass of Metals extracted by Diffusive Gradients in Thin Films (DGT), Mount Polley Mine, August to October, 2015 ^{a,b,c}

Client ID				Quesnel Lake Profundal Exposed						Quesnel Lake Profundal Reference					
				PNF-1	PNF-2	PNF-3	PNF-4	Quesnel Lake Profundal Exposed		PRef1-1	PRef1-2	PRef1-3	PRef1-4	Quesnel Lake Profundal Reference	
Deployment time				35.6 days	35.6 days	35.6 days	35.6 days			34.3 days	34.3 days	34.3 days	34.2 days		
Temperature				4.55 °C	4.55 °C	4.55 °C	4.55 °C	Mean	SD	3.9 °C	3.9 °C	3.9 °C	3.9 °C	Mean	SD
Metal Name	MDL	RDL	Units	Mass Extracted by DGT											
Aluminum (Al)	0.59	1.96	µg	<RDL	3.36	<RDL	<RDL	2.31	0.70	<RDL	<RDL	3.08	<RDL	2.24	0.56
Antimony (Sb)	0.025	0.13	µg	<MDL	<MDL	<MDL	<MDL	<0.025	-	<MDL	<MDL	<MDL	<MDL	<0.025	-
Arsenic (As)	0.025	0.13	µg	<MDL	<MDL	<MDL	<MDL	<0.025	-	<MDL	<MDL	<MDL	<MDL	<0.025	-
Barium (Ba)	0.063	0.25	µg	1.88	1.73	1.42	1.98	1.75	0.24	1.49	1.44	1.6	1.49	1.51	0.07
Beryllium (Be)	0.013	0.063	µg	<MDL	<MDL	<MDL	<MDL	<0.013	-	<MDL	<MDL	<MDL	<MDL	<0.013	-
Bismuth (Bi)	0.077	0.26	µg	<MDL	<MDL	<MDL	<MDL	<0.077	-	<MDL	<MDL	<MDL	<MDL	<0.077	-
Boron (B)	0.25	1.3	µg	<MDL	<MDL	<RDL	<RDL	<1.3	-	<RDL	<MDL	<RDL	<MDL	<1.3	-
Cadmium (Cd)	0.0025	0.013	µg	<MDL	<MDL	<MDL	<MDL	<0.0025	-	<MDL	<MDL	<MDL	<MDL	<0.0025	-
Calcium (Ca)	20	66	µg	139	125	119	118	125	10	83	121	131	132	117	23
Chromium (Cr)	0.125	0.63	µg	<MDL	<MDL	<MDL	<MDL	<0.125	-	<MDL	<MDL	<MDL	<MDL	<0.125	-
Cobalt (Co)	0.013	0.063	µg	<MDL	<MDL	<MDL	<MDL	<0.013	-	<MDL	<MDL	<MDL	<MDL	<0.013	-
Copper (Cu)	0.025	0.13	µg	<RDL	<RDL	<RDL	<RDL	<0.13	-	<RDL	<RDL	<RDL	<MDL	<0.13	-
Iron (Fe)	1.25	6.3	µg	<MDL	<RDL	<MDL	<MDL	<6.3	-	<MDL	<MDL	<MDL	<MDL	<1.25	-
Lead (Pb)	0.013	0.063	µg	<MDL	<MDL	<MDL	<MDL	<0.013	-	<MDL	<MDL	<MDL	<MDL	<0.013	-
Lithium (Li)	0.125	0.63	µg	<MDL	<MDL	<MDL	<MDL	<0.125	-	<MDL	<MDL	<MDL	<MDL	<0.125	-
Magnesium (Mg)	1.25	6.3	µg	<MDL	<MDL	<MDL	<MDL	<1.25	-	<MDL	<MDL	<MDL	<MDL	<1.25	-
Manganese (Mn)	0.05	0.25	µg	1.05	1.3	1.03	1.17	1.14	0.12	1.13	0.60	1.28	1.74	1.19	0.47
Molybdenum (Mo)	0.044	0.15	µg	<RDL	<RDL	<RDL	<RDL	<0.15	-	<MDL	<MDL	<MDL	<RDL	<0.15	-
Nickel (Ni)	0.095	0.32	µg	<MDL	<MDL	<MDL	<MDL	<0.095	-	<MDL	<MDL	<MDL	<MDL	<0.095	-
Phosphorus (P)	1.25	6.3	µg	<MDL	<MDL	<MDL	<MDL	<1.25	-	<MDL	<MDL	<MDL	<MDL	<1.25	-
Potassium (K)	5	25	µg	<MDL	<MDL	<MDL	<MDL	<5	-	<MDL	<MDL	<MDL	<MDL	<5	-
Selenium (Se)	0.05	0.25	µg	<MDL	<MDL	<MDL	<MDL	<0.05	-	<MDL	<MDL	<MDL	<MDL	<0.05	-
Strontium (Sr)	0.082	0.27	µg	0.98	0.83	0.65	0.89	0.84	0.14	0.68	0.92	0.93	0.92	0.86	0.12
Silver (Ag)	0.0025	0.013	µg	<MDL	<MDL	<MDL	<MDL	<0.0025	-	<MDL	<MDL	<MDL	<MDL	<0.0025	-
Sodium (Na)	94000	310000	µg	<MDL	<MDL	<MDL	<MDL	<94000	-	<MDL	<MDL	<MDL	<MDL	<94000	-
Thallium (Tl)	0.0013	0.013	µg	<MDL	<MDL	<MDL	<MDL	<0.0013	-	<MDL	<MDL	<MDL	<MDL	<0.0013	-
Tin (Sn)	0.092	0.31	µg	<MDL	<RDL	<MDL	<MDL	<0.092	-	<MDL	<MDL	<MDL	<MDL	<0.092	-
Uranium (U)	0.0025	0.013	µg	0.03	0.03	0.03	0.03	0.03	0.00	0.03	0.02	0.02	0.02	0.02	0.00
Vanadium (V)	0.025	0.063	µg	<RDL	<RDL	<MDL	<RDL	<0.063	-	<MDL	<MDL	<MDL	<MDL	<0.025	-
Zinc (Zn)	0.125	0.63	µg	<MDL	6.73	<MDL	<MDL	1.78	3.30	<MDL	<MDL	<MDL	<MDL	<0.125	-

^a mean and standard deviation calculated using substitution of the me

^b in cases where all replicates were reported as less than MDL or RDL

^c in cases where results were a mixture of less than MDL and less tha

Table D.2: Calculated labile metal concentrations using Diffusive Gradients in Thin Films (DGT), Mount Polley Mine, August to October 2015 ^{a,b,c}

				Hazeltine Creek						Polley Lake						Bootjack Lake					
Client ID				HAC-1	HAC-2	HAC-3	HAC-4	Hazeltine Creek		P2-1	P2-2	P2-3	P2-4	Polley Lake		B2-1	B2-2	B2-3	B2-4	Bootjack Lake	
Deployment time				38.2 days	38.2 days	38.2 days	38.1 days			38.2 days	38.2 days	38.2 days	38.2 days			37.9 days	37.9 days	37.8 days	37.8 days		
Temperature				10.9 °C	11.1 °C	11.2 °C	11.2 °C	Mean	SD	6.0 °C	6.0 °C	6.0 °C	6.0 °C	Mean	SD	8.6 °C	8.6 °C	8.6 °C	8.6 °C	Mean	SD
Metal Name	MDLw	RDLw	Units	Calculated Labile Metals Extracted by DGT																	
Aluminum (Al)	1.6	5.4	µg/L	6.1	15	6.5	<RDLw	8.3	4.5	<MDLw	<MDLw	<MDLw	<MDLw	<1.6	-	<MDLw	<MDLw	<MDLw	<MDLw	<1.6	-
Antimony (Sb)	0.053	0.26	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.053	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.053	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.053	-
Arsenic (As)	0.054	0.27	µg/L	<RDLw	<RDLw	<RDLw	<RDLw	<0.27	-	<RDLw	<RDLw	<RDLw	<RDLw	<0.27	-	<RDLw	<RDLw	<RDLw	<RDLw	<0.27	-
Barium (Ba)	0.17	0.68	µg/L	19	26	14	13	18.0	5.9	5.7	6	6.4	5.9	6.0	0.3	8.1	9.4	10	12	9.9	1.6
Beryllium (Be)	0.054	0.27	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.054	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.054	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.054	-
Bismuth (Bi)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	-	-	n/a	n/a	n/a	n/a	-	-	n/a	n/a	n/a	n/a	-	-
Boron (B)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	-	-	n/a	n/a	n/a	n/a	-	-	n/a	n/a	n/a	n/a	-	-
Cadmium (Cd)	0.0059	0.029	µg/L	<MDLw	<MDLw	<MDLw	<RDLw	<0.029	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.0059	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.0059	-
Calcium (Ca)	33	109	µg/L	280	350	250	260	285	45	220	220	260	200	225	25	<RDLw	<RDLw	<RDLw	<RDLw	<109	-
Chromium (Cr)	0.32	1.6	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.32	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.32	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.32	-
Cobalt (Co)	0.031	0.15	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.031	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.031	-	<RDLw	<RDLw	<RDLw	<RDLw	<0.15	-
Copper (Cu)	0.058	0.29	µg/L	5.5	6.2	5.5	5.1	5.6	0.5	0.42	<RDLw	0.39	0.45	0.39	0.07	<RDLw	<RDLw	<RDLw	<RDLw	<0.29	-
Iron (Fe)	2.7	13	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<2.7	-	<MDLw	<MDLw	<MDLw	<MDLw	<2.7	-	340	350	264	333	322	39
Lead (Pb)	0.02	0.1	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.02	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.02	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.02	-
Lithium (Li)	0.16	0.79	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.16	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.16	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.16	-
Magnesium (Mg)	2.3	12	µg/L	15	17	14	<RDLw	14.5	2.1	<MDLw	<MDLw	<RDLw	<MDLw	<12	-	<MDLw	<MDLw	<MDLw	<MDLw	<2.3	-
Manganese (Mn)	0.14	0.7	µg/L	1.9	2.9	1.9	1.8	2.1	0.5	11	9	6.6	9.5	9.0	1.8	56	64	69	86	69	13
Molybdenum (Mo)	0.091	0.3	µg/L	<RDLw	<RDLw	<RDLw	<MDLw	<0.3	-	2.8	2.9	3.2	3.0	3.0	0.2	0.51	0.53	0.52	0.54	0.53	0.01
Nickel (Ni)	0.24	0.81	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.24	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.24	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.24	-
Phosphorus (P)	2.7	13	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<2.7	-	<RDLw	<RDLw	<RDLw	<RDLw	<13	-	27	35	37	44	36	7
Potassium (K)	3.3	17	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<3.3	-	<MDLw	<MDLw	<MDLw	<MDLw	<3.3	-	<MDLw	<MDLw	<MDLw	<MDLw	<3.3	-
Selenium (Se)	0.073	0.37	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.073	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.073	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.073	-
Silver (Ag)	0.0023	0.012	µg/L	<RDLw	<MDLw	<MDLw	<MDLw	<0.012	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.0023	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.0023	-
Sodium (Na)	93000	310000	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<93000	-	<MDLw	<MDLw	<MDLw	<MDLw	<93000	-	<MDLw	<MDLw	<MDLw	<MDLw	<93000	-
Strontium (Sr)	0.13	0.45	µg/L	3.3	5.3	2.1	2.1	3.2	1.5	1.7	1.8	2.2	1.9	1.9	0.2	1.1	1.3	1.2	1.5	1.3	0.2
Thallium (Tl)	0.00081	0.0041	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.00081	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.00081	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.00081	-
Tin (Sn)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	-	-	n/a	n/a	n/a	n/a	-	-	n/a	n/a	n/a	n/a	-	-
Titanium (Ti)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	-	-	n/a	n/a	n/a	n/a	-	-	n/a	n/a	n/a	n/a	-	-
Uranium (U)	0.0047	0.024	µg/L	0.041	0.064	<RDLw	<RDLw	0.038	0.019	0.086	0.093	0.091	0.094	0.091	0.004	<MDLw	<MDLw	<MDLw	<MDLw	<0.0047	-
Vanadium (V)	0.059	0.15	µg/L	0.7	0.85	0.85	0.69	0.77	0.09	0.43	0.39	0.46	0.44	0.43	0.03	<MDLw	<MDLw	<MDLw	<MDLw	<0.059	-
Zinc (Zn)	0.2	1	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.2	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.2	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.2	-

^a mean and standard deviation calculated using substitution of the method detection limit (MDL) or reporting detection limit (RDL)

^b in cases where all replicates were reported as less than MDL or RDL, the mean is reported as the applicable MDL or RDL

^c in cases where results were a mixture of less than MDL and less than RDL, the mean is reported as less than RDL

Table D.2: Calculated labile metal concentrations using Diffusive Gradients in Thin Films (DGT), Mount Polley Mine, August to October 2015 ^{a,b,c}

				Quesnel Lake Profundal Exposed					Quesnel Lake Profundal Reference						
Client ID				PNF-1	PNF-2	PNF-3	PNF-4	Quesnel Lake Profundal Exposed		PRef1-1	PRef1-2	PRef1-3	PRef1-4	Quesnel Lake Profundal Reference	
Deployment time				35.6 days	35.6 days	35.6 days	35.6 days			34.3 days	34.3 days	34.3 days	34.2 days		
Temperature				4.5 °C	4.5 °C	4.5 °C	4.5 °C	Mean	SD	3.9 °C	3.9 °C	3.9 °C	3.9 °C	Mean	SD
Metal Name	MDLw	RDLw	Units	Calculated Labile Metals Extracted by DGT											
Aluminum (Al)	1.6	5.4	µg/L	<RDLw	12	<RDLw	<RDLw	7.1	3.3	<RDLw	<RDLw	12	<RDLw	7.1	3.3
Antimony (Sb)	0.053	0.26	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.053	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.053	-
Arsenic (As)	0.054	0.27	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.054	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.054	-
Barium (Ba)	0.17	0.68	µg/L	6.9	6.3	5.2	7.2	6.4	0.9	5.8	5.6	6.2	5.8	5.9	0.3
Beryllium (Be)	0.054	0.27	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.054	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.054	-
Bismuth (Bi)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	-	-	n/a	n/a	n/a	n/a	-	-
Boron (B)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	-	-	n/a	n/a	n/a	n/a	-	-
Cadmium (Cd)	0.0059	0.029	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.0059	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.0059	-
Calcium (Ca)	33	109	µg/L	310	280	260	260	278	24	200	290	310	310	278	53
Chromium (Cr)	0.32	1.6	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.32	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.32	-
Cobalt (Co)	0.031	0.15	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.031	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.031	-
Copper (Cu)	0.058	0.29	µg/L	<RDLw	<RDLw	<RDLw	<RDLw	<0.29	-	<RDLw	<RDLw	<RDLw	<MDLw	<0.29	-
Iron (Fe)	2.7	13	µg/L	<MDLw	<RDLw	<MDLw	<MDLw	<2.7	-	<MDLw	<MDLw	<MDLw	<MDLw	<2.7	-
Lead (Pb)	0.02	0.1	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.02	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.02	-
Lithium (Li)	0.16	0.79	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.16	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.16	-
Magnesium (Mg)	2.3	12	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<2.3	-	<MDLw	<MDLw	<MDLw	<MDLw	<2.3	-
Manganese (Mn)	0.14	0.7	µg/L	3.9	4.9	3.9	4.4	4.3	0.5	4.5	2.4	5.1	7.0	4.8	1.9
Molybdenum (Mo)	0.091	0.3	µg/L	<RDLw	<RDLw	<RDLw	<RDLw	<0.3	-	<MDLw	<MDLw	<MDLw	<RDLw	<0.3	-
Nickel (Ni)	0.24	0.81	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.24	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.24	-
Phosphorus (P)	2.7	13	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<2.7	-	<MDLw	<MDLw	<MDLw	<MDLw	<2.7	-
Potassium (K)	3.3	17	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<3.3	-	<MDLw	<MDLw	<MDLw	<MDLw	<3.3	-
Selenium (Se)	0.073	0.37	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.073	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.073	-
Silver (Ag)	0.0023	0.012	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.0023	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.0023	-
Sodium (Na)	93000	310000	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<93000	-	<MDLw	<MDLw	<MDLw	<MDLw	<93000	-
Strontium (Sr)	0.13	0.45	µg/L	2.2	1.8	1.4	2.0	1.9	0.3	1.6	2.2	2.2	2.2	2.1	0.3
Thallium (Tl)	0.00081	0.0041	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	<0.00081	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.00081	-
Tin (Sn)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	-	-	n/a	n/a	n/a	n/a	-	-
Titanium (Ti)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	-	-	n/a	n/a	n/a	n/a	-	-
Uranium (U)	0.0047	0.024	µg/L	0.072	0.078	0.075	0.086	0.078	0.006	0.07	0.054	0.061	0.058	0.061	0.007
Vanadium (V)	0.059	0.15	µg/L	<RDLw	<RDLw	<MDLw	<RDLw	<0.15	-	<MDLw	<MDLw	<MDLw	<MDLw	<0.059	-
Zinc (Zn)	0.2	1	µg/L	<MDLw	15	<MDLw	<MDLw	3.9	7.4	<MDLw	<MDLw	<MDLw	<MDLw	<0.2	-

^a mean and standard deviation calculated using substitution of the method detection limit (MDL) or reporting detection limit (RDL)

^b in cases where all replicates were reported as less than MDL or RDL, the mean is reported as the applicable MDL or RDL

^c in cases where results were a mixture of less than MDL and less than RDL, the mean is reported as less than RDL

Appendix Table D.3: Comparison of Concentrations of Parameters of Interest in Sediment and Water (Total, Dissolved and DGT-Labile)

Copper in Sediment and Water

Sampling Area	Sediment mg/kg	Water			RATIOS				
		Total mg/L	Dissolved mg/L	DGT-Labile mg/L	T / S ¹	D / S ²	D / T ³	DGT / T ⁴	DGT / D ⁵
Hazeltine Creek	469	0.015	0.013	0.0056	0.0032%	0.0027%	86%	37%	44%
Polley Lake	823	0.0029	0.0022	0.00039	0.0004%	0.0003%	77%	13%	18%
Bootjack Lake	382	0.0018	0.0013	<0.00029	0.0005%	0.0003%	70%	< 16%	< 23%
Quesnel Lake - Exposed	859	0.0022	0.0012	<0.00029	0.0003%	0.0001%	54%	< 13%	< 25%
Quesnel Lake - Reference	55.1	0.00064	0.00057	<0.00029	0.0012%	0.0010%	90%	< 46%	< 51%

Iron in Sediment and Water

Sampling Area	Sediment mg/kg	Water			RATIOS				
		Total mg/L	Dissolved mg/L	DGT-Labile mg/L	T / S ¹	D / S ²	D / T ³	DGT / T ⁴	DGT / D ⁵
Hazeltine Creek	50,580	0.068	<0.030	<0.0027	0.0001%	< 0.0001%	< 44%	< 4%	-
Polley Lake	29,760	<0.030	<0.030	<0.0027	-	-	-	-	-
Bootjack Lake	30,067	1.2	1.1	0.32	0.0040%	0.0037%	92%	27%	29%
Quesnel Lake - Exposed	40,620	<0.030	<0.030	<0.013	-	-	-	-	-
Quesnel Lake - Reference	31,300	<0.030	<0.030	<0.0027	-	-	-	-	-

Manganese in Sediment and Water

Sampling Area	Sediment mg/kg	Water			RATIOS				
		Total mg/L	Dissolved mg/L	DGT-Labile mg/L	T / S ¹	D / S ²	D / T ³	DGT / T ⁴	DGT / D ⁵
Hazeltine Creek	725	0.00507	0.00294	0.0021	0.0007%	0.0004%	58%	41%	71%
Polley Lake	2,574	0.2135	0.0046	0.0090	0.0083%	0.0002%	2%	4%	195%
Bootjack Lake	3,327	1.113	1.106	0.069	0.0335%	0.0332%	99%	6%	6%
Quesnel Lake - Exposed	1,033	0.0098	0.006385	0.0043	0.0009%	0.0006%	65%	44%	67%
Quesnel Lake - Reference	491	0.00384	0.002895	0.0048	0.0008%	0.0006%	75%	125%	166%

Molybdenum in Sediment and Water

Sampling Area	Sediment mg/kg	Water			RATIOS				
		Total mg/L	Dissolved mg/L	DGT-Labile mg/L	T / S ¹	D / S ²	D / T ³	DGT / T ⁴	DGT / D ⁵
Hazeltine Creek	2.47	0.0130	0.0120	<0.0003	0.5263%	0.4858%	92%	< 2%	< 3%
Polley Lake	10.1	0.011	0.010	0.0030	0.1059%	0.0960%	91%	28%	31%
Bootjack Lake	4.32	0.0013	0.0013	0.0005	0.0301%	0.0301%	100%	38%	38%
Quesnel Lake - Exposed	4.05	0.0010	0.0009	<0.0003	0.0237%	0.0215%	91%	< 31%	< 34%
Quesnel Lake - Reference	1.08	0.00035	0.00032	<0.0003	0.0324%	0.0296%	91%	< 86%	< 94%

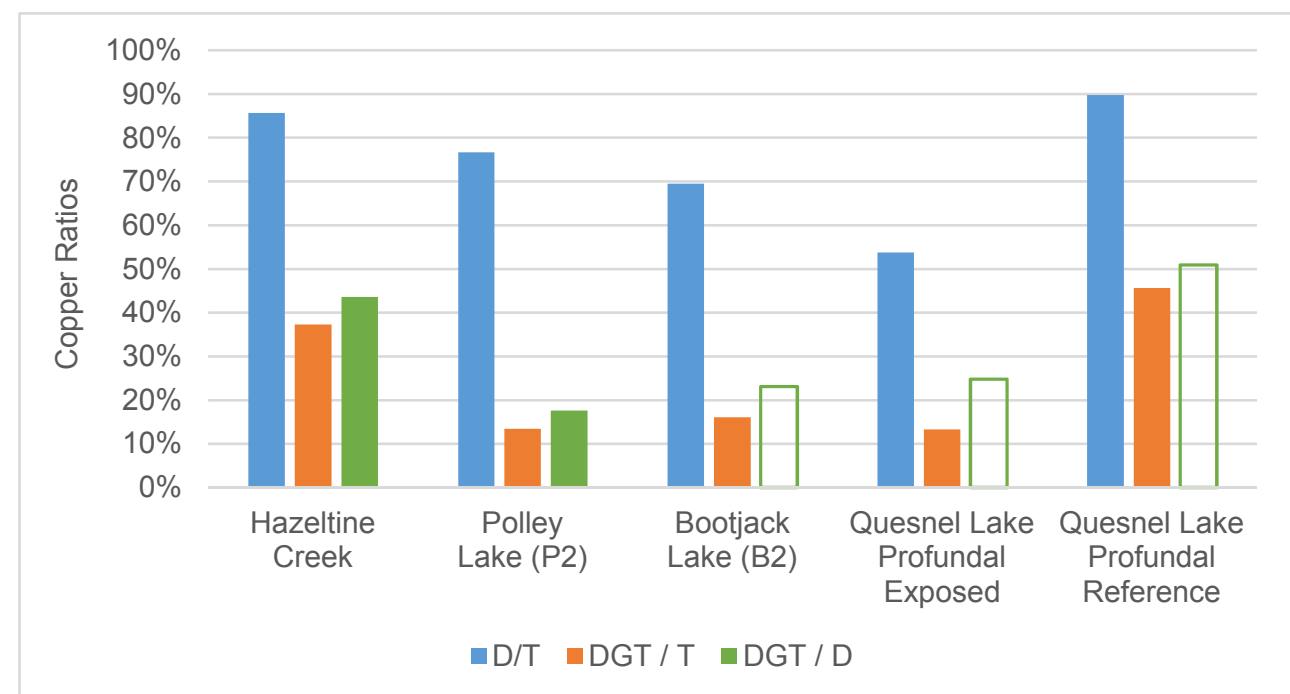
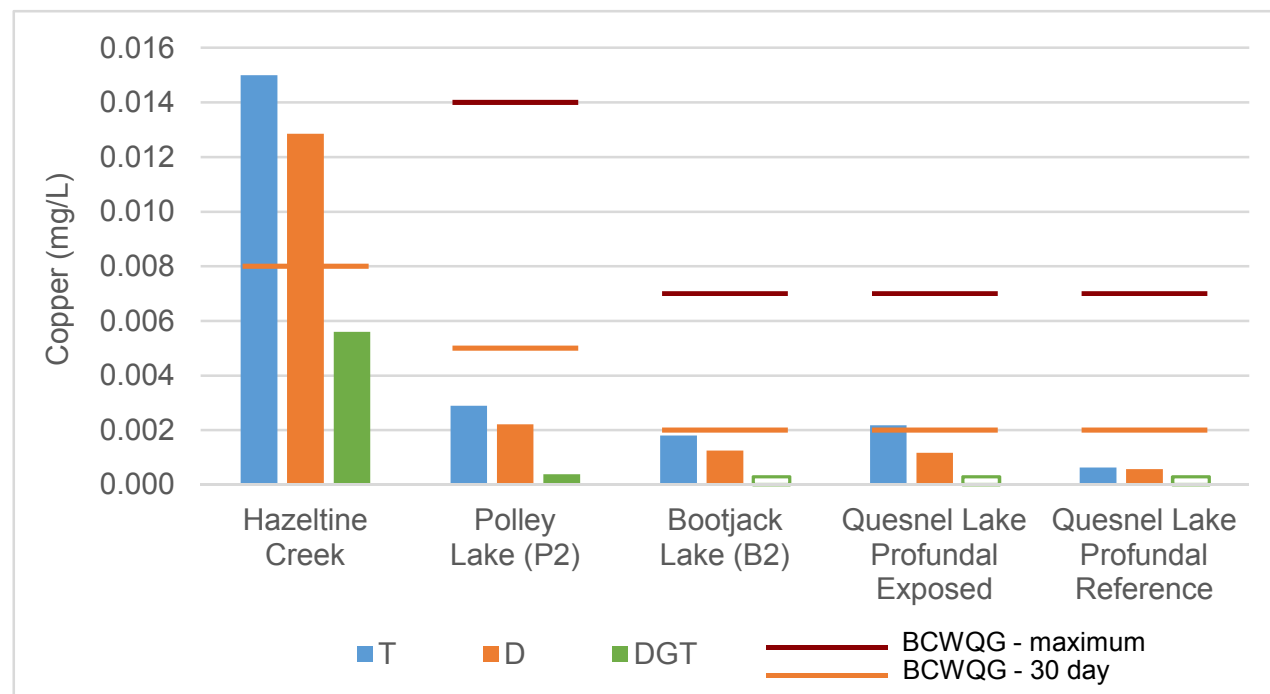
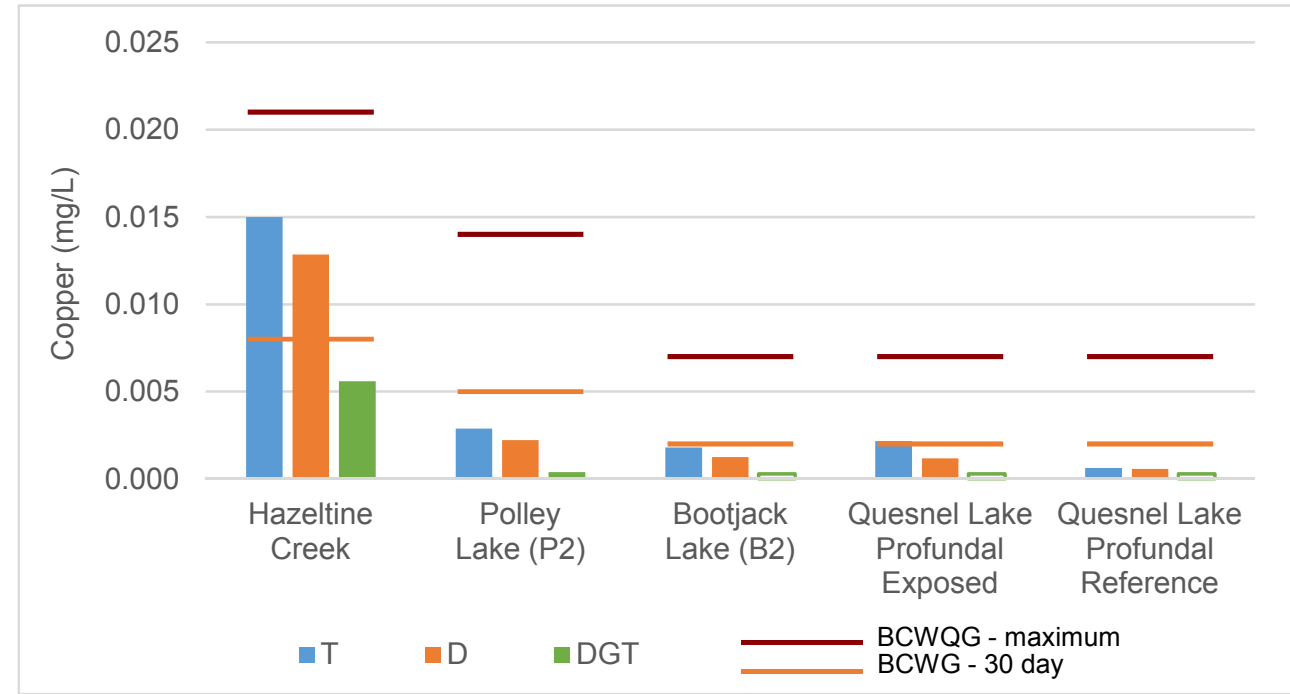
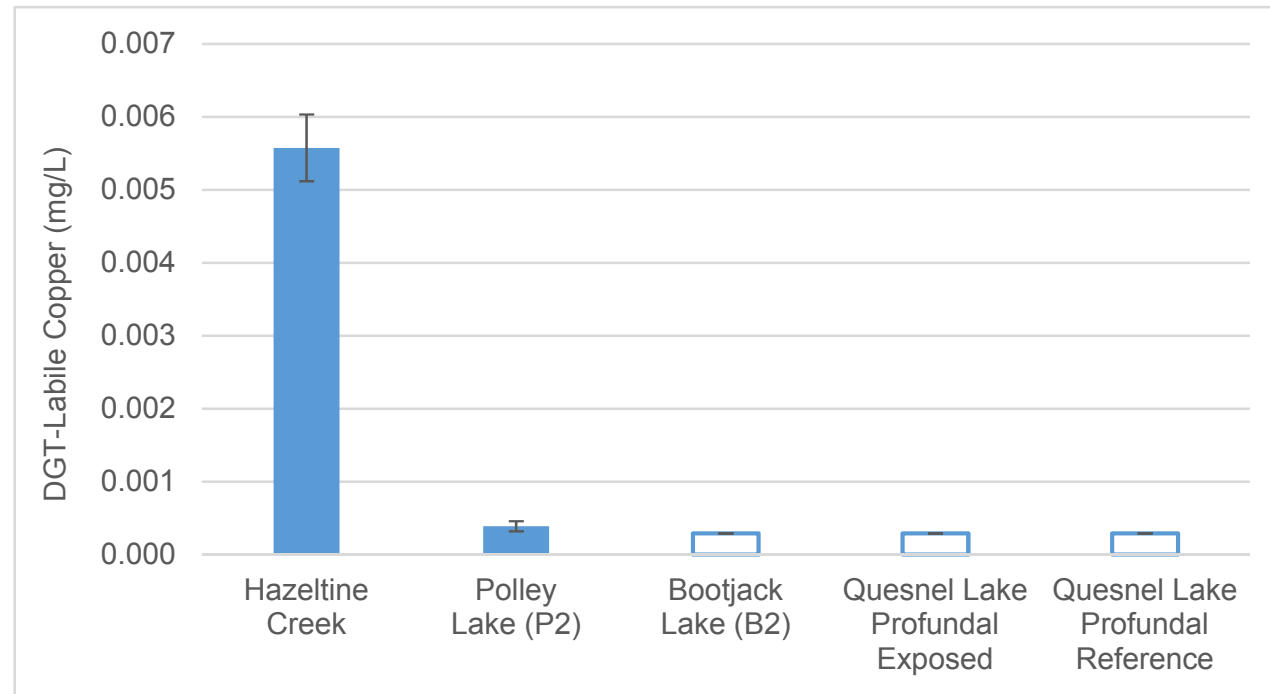
Phosphorus in Sediment and Water

Sampling Area	Sediment mg/kg	Water			RATIOS				
		Total mg/L	Dissolved mg/L	DGT-Labile mg/L	T / S ¹	D / S ²	D / T ³	DGT / T ⁴	DGT / D ⁵
Hazeltine Creek	1,558	0.0101	0.0079	<0.0027	0.0006%	0.0005%	78%	< 27%	< 34%
Polley Lake	1,200	0.0840	0.0890	<0.013	0.0070%	0.0074%	106%	< 15%	< 15%
Bootjack Lake	2,537	0.153	0.105	0.036	0.0060%	0.0041%	69%	24%	34%
Quesnel Lake - Exposed	1,352	0.0036	0.0026	<0.0027	0.0003%	0.0002%	72%	< 75%	< 104%
Quesnel Lake - Reference	1,180	0.0022	0.0025	<0.0027	< 0.0002%	0.0002%	114%	< 123%	< 108%

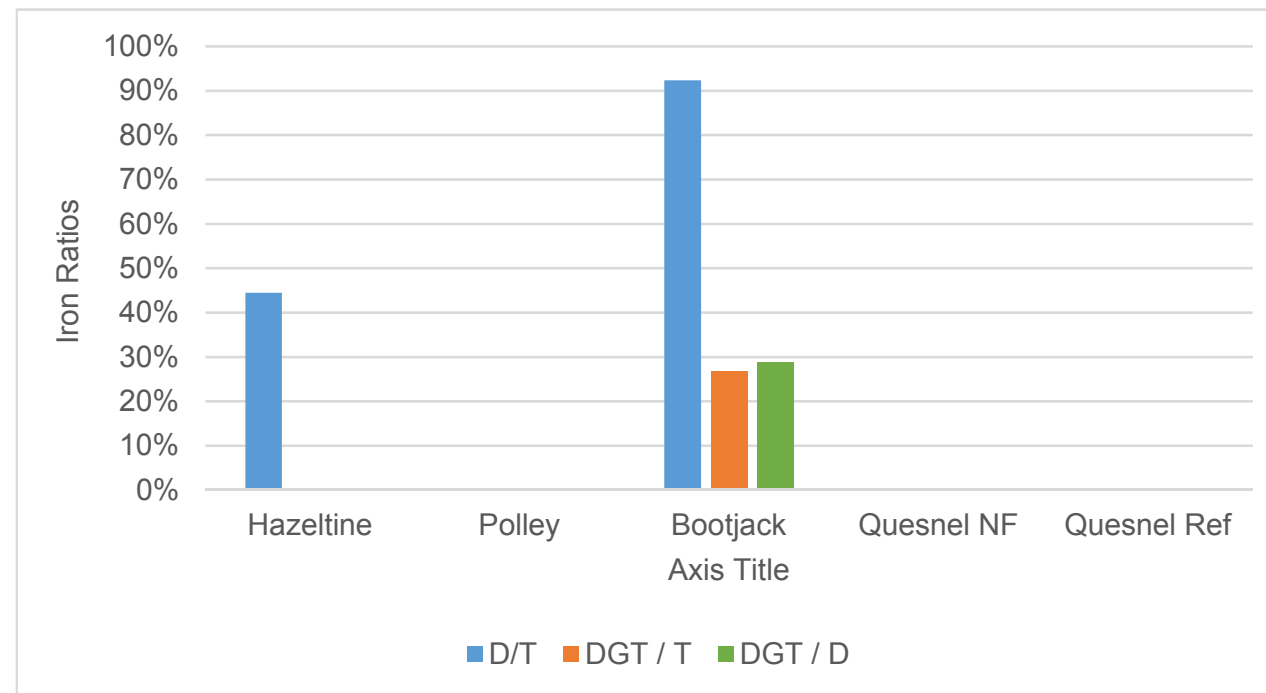
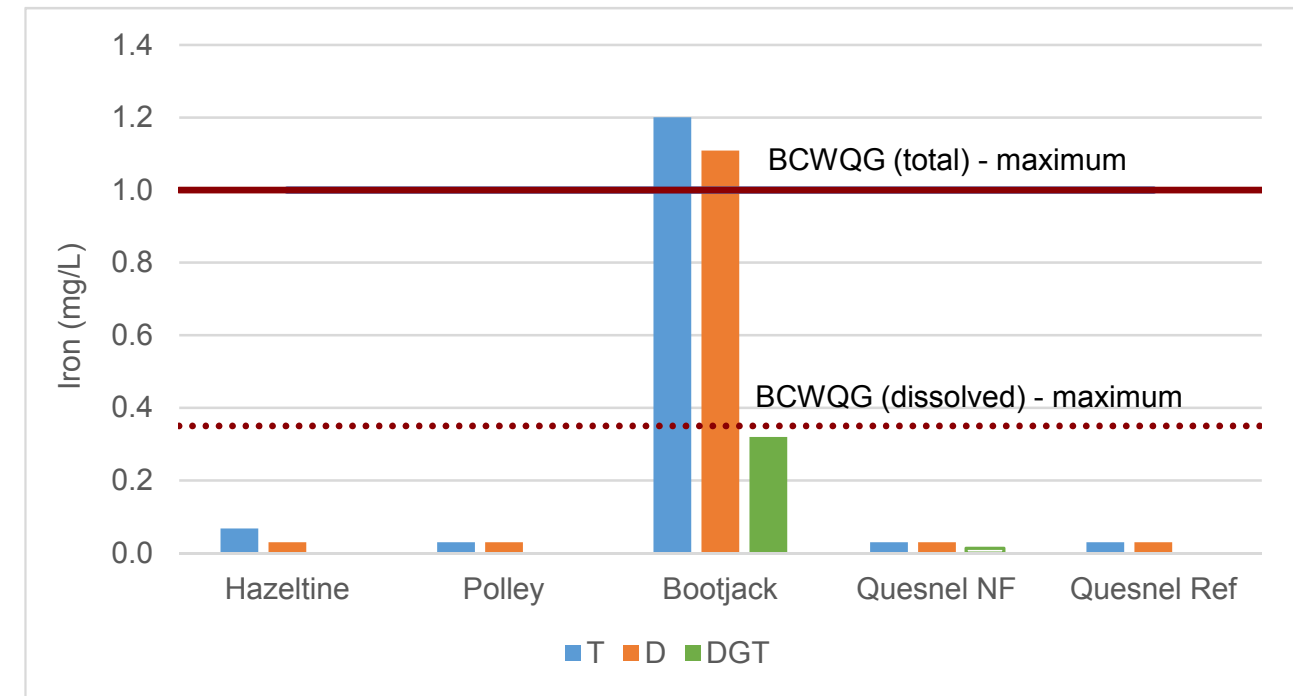
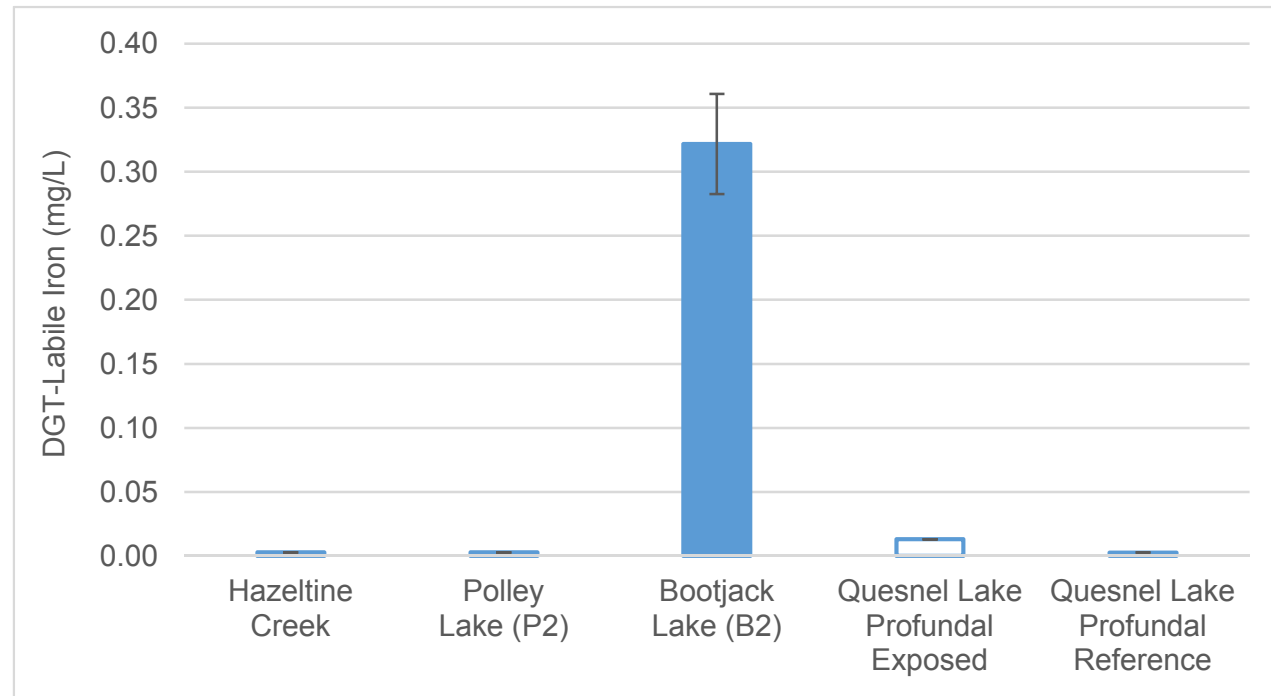
Zinc in Sediment and Water

Sampling Area	Sediment mg/kg	Water			RATIOS				
		Total mg/L	Dissolved mg/L	DGT-Labile mg/L	T / S ¹	D / S ²	D / T ³	DGT / T ⁴	DGT / D ⁵
Hazeltine Creek	73.9	<0.0030	<0.0030	<0.0002	-	-	-	-	-
Polley Lake	86.4	0.0035	0.0046	<0.0002	0.0040%	0.0053%	132%	< 6%	< 4%
Bootjack Lake	82.8	0.010	0.019	<0.0002	0.0121%	0.0224%	185%	< 2%	< 1%
Quesnel Lake - Exposed	96.0	0.0052	<0.0030	0.0039	0.0054%	< 0.0031%	< 58%	76%	> 100%
Quesnel Lake - Reference	79.8	<0.0030	<0.0030	<0.0002	< 0.0038%	< 0.0038%	-	-	-

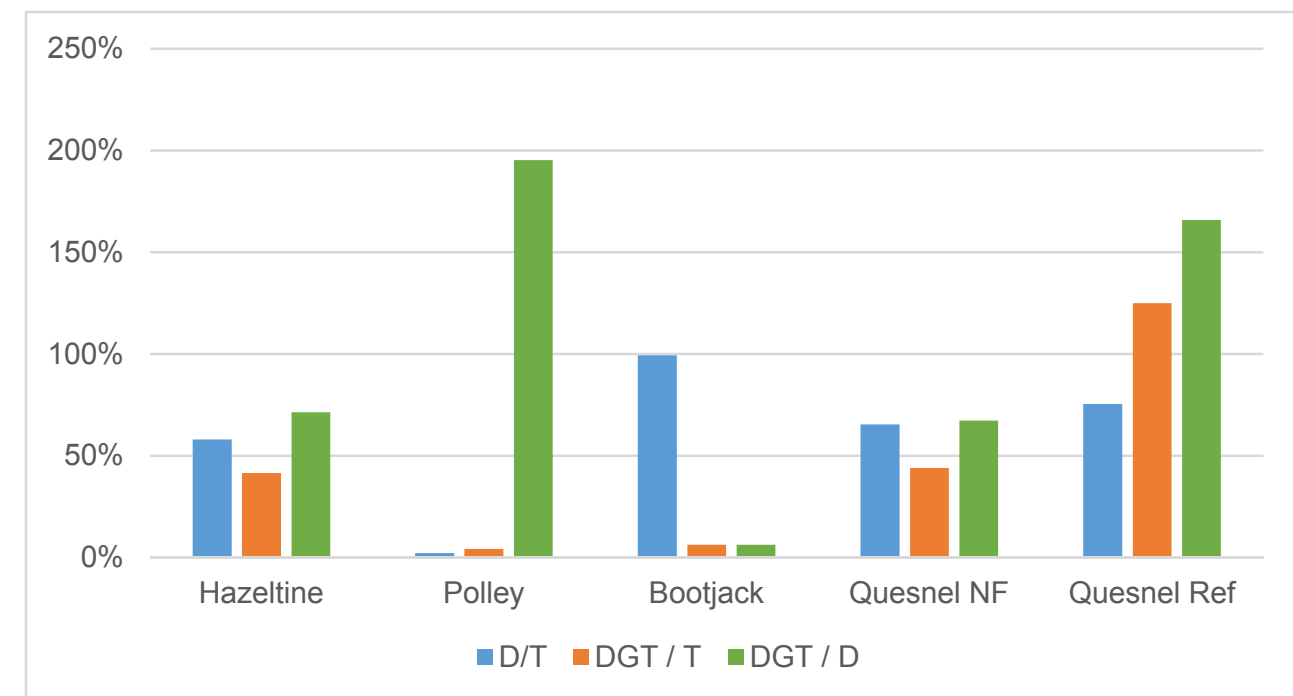
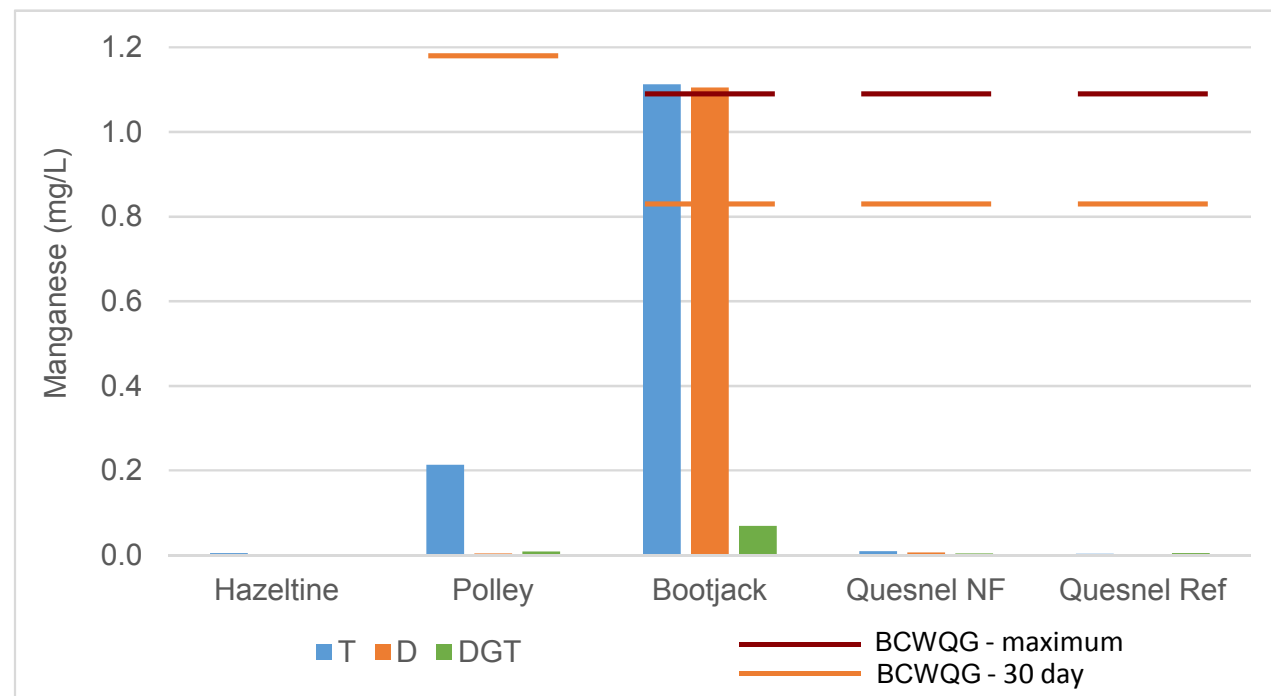
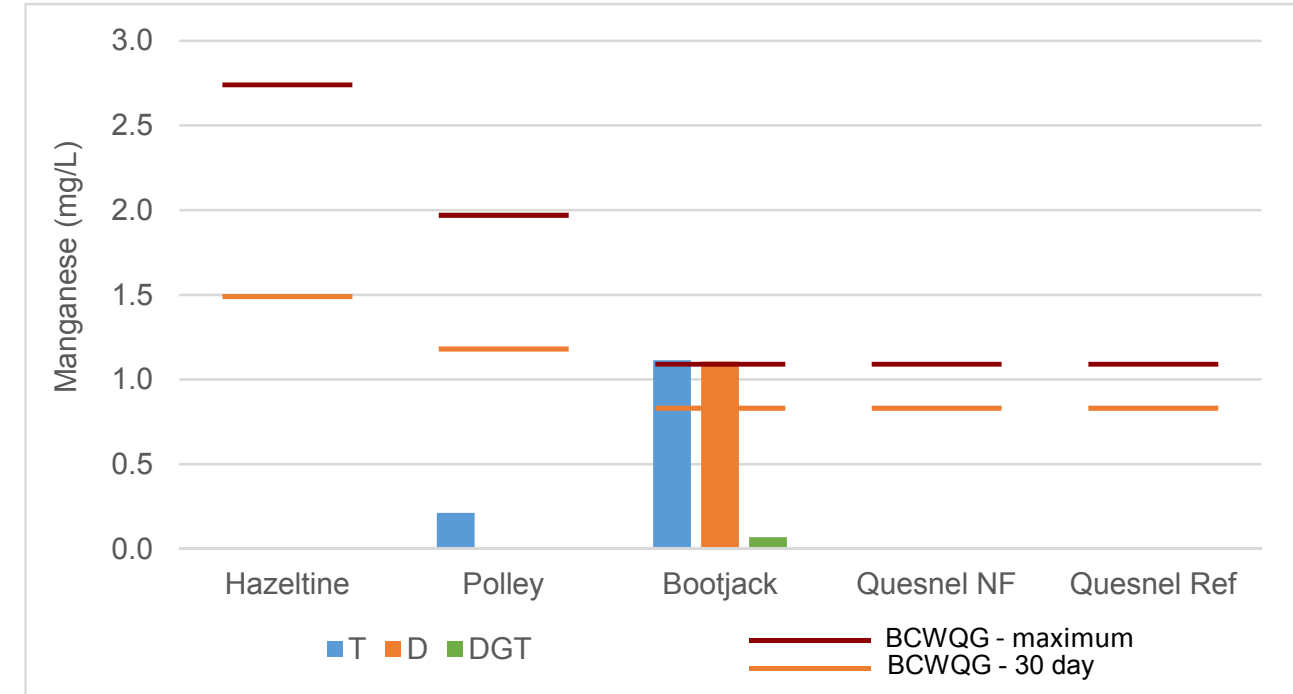
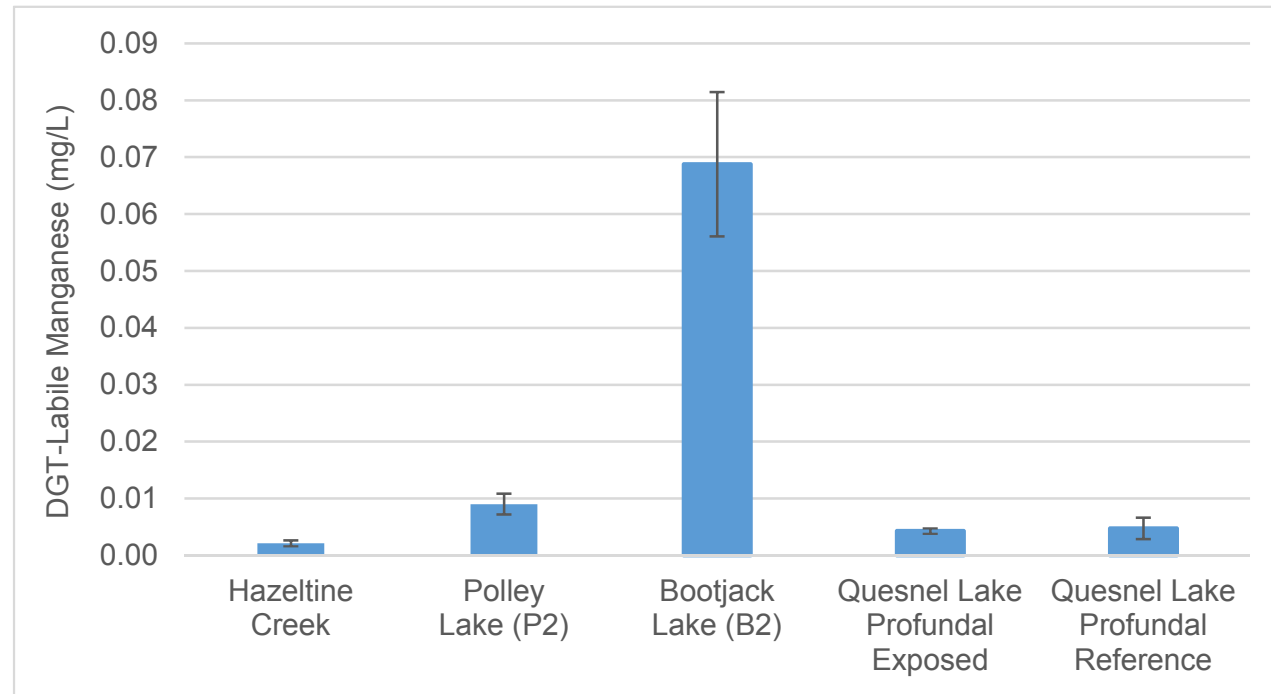
¹ total water / sediment; ² dissolved water / sediment; ³ dissolved water / total water; ⁴ DGT-labile water / total water; ⁵ DGT-labile water / dissolved water



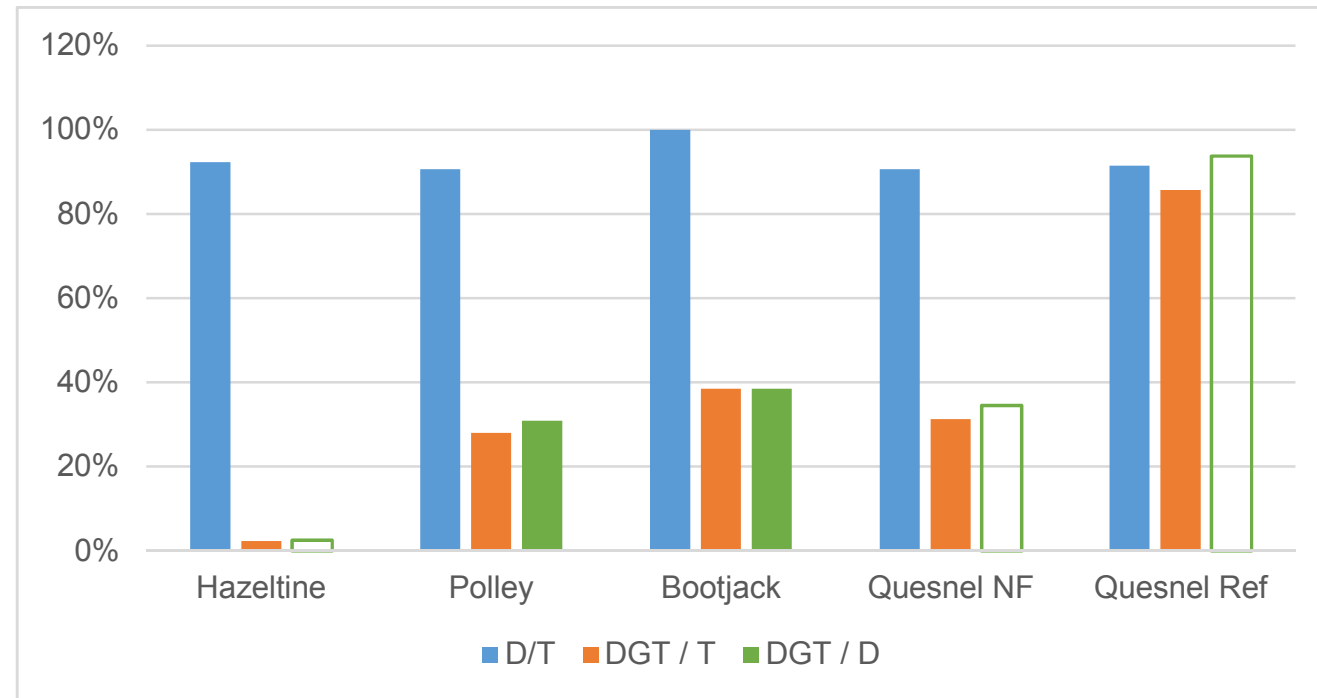
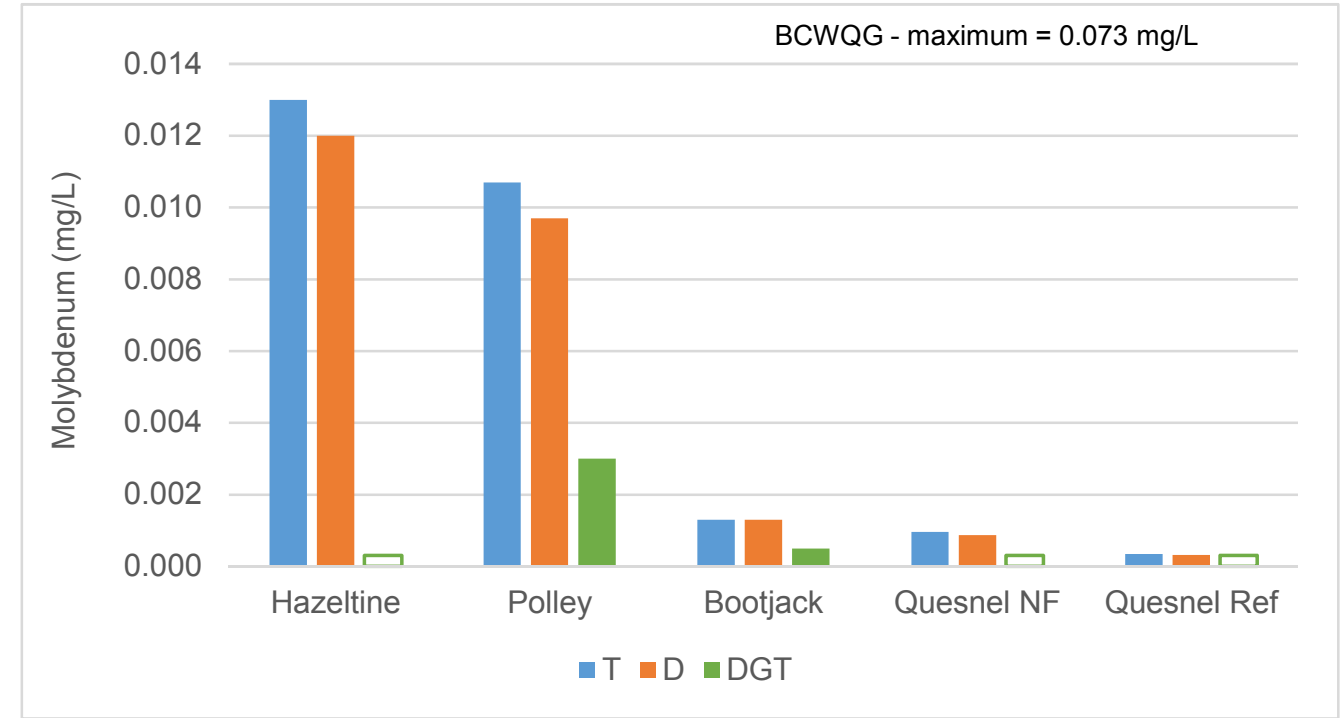
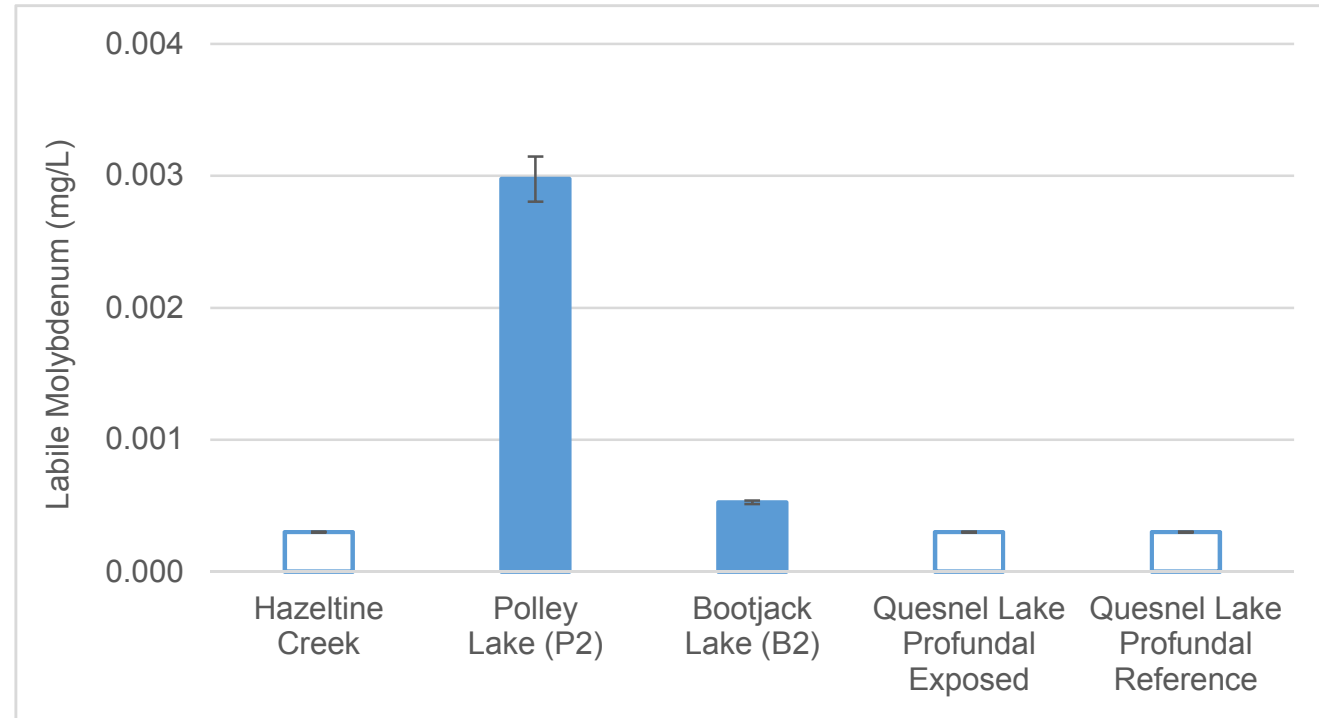
Appendix Figure D.1: Copper concentrations measured in water, Mount Polley 2015. a) DGT-labile; b) total, dissolved and DGT-labile (full y-axis); c) total, dissolved and DGT-labile (truncated y-axis); d) proportions (dissolved/total, DGT-labile/total and DGT-labile/dissolved)



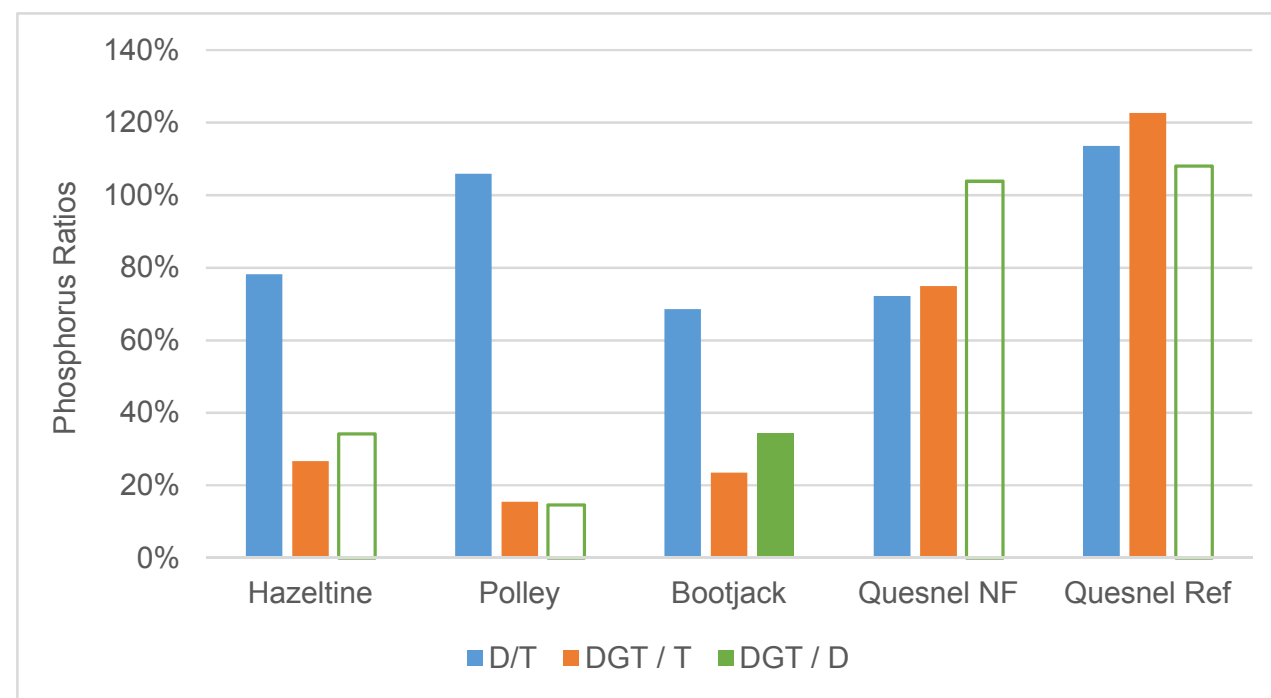
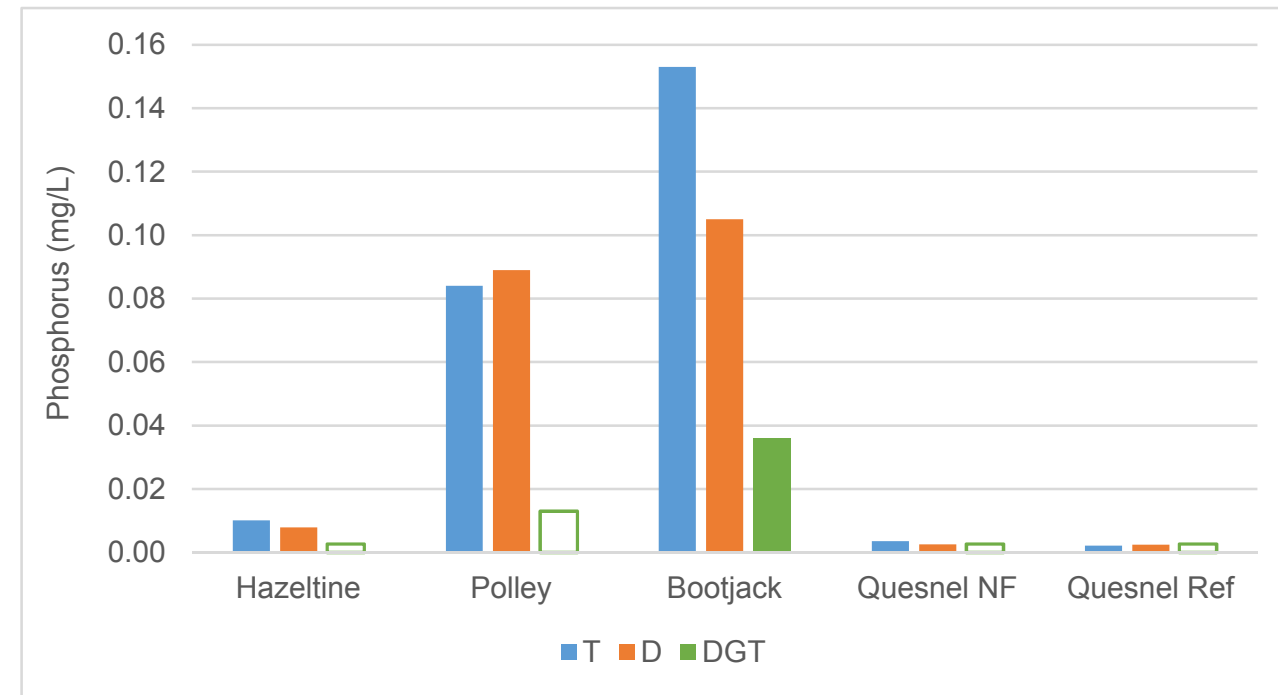
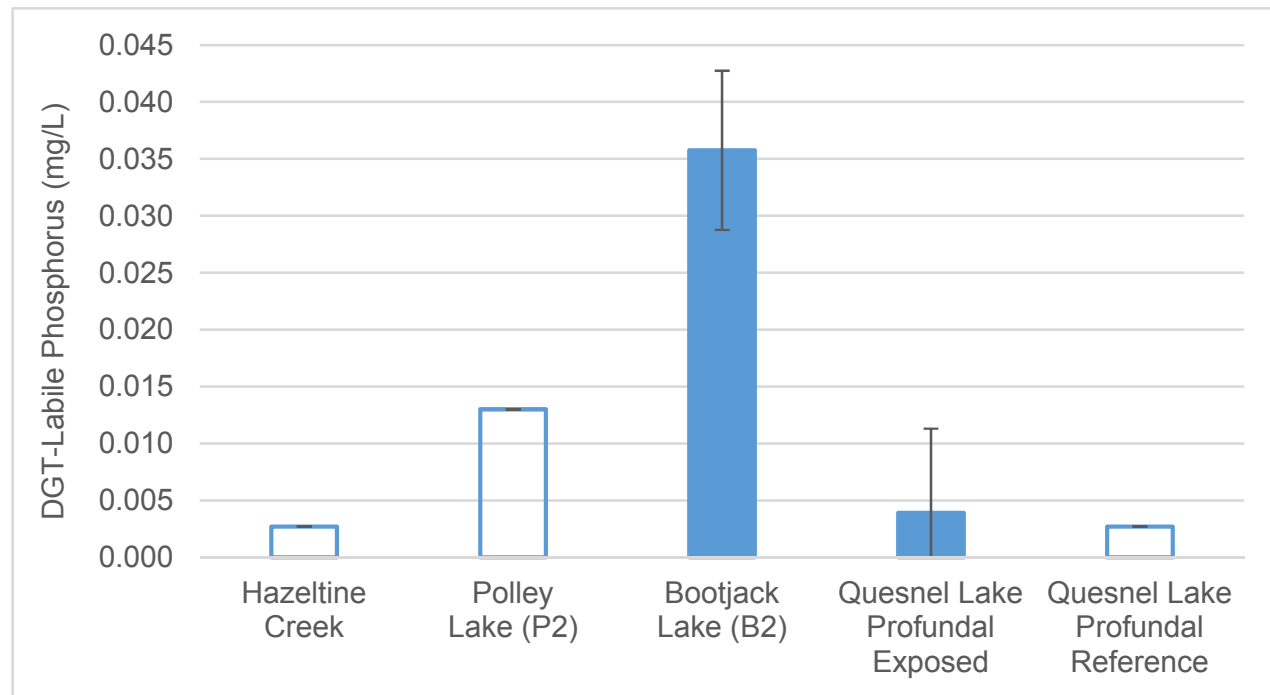
Appendix Figure D.2: Iron concentrations measured in water, Mount Polley 2015. a) DGT-labile; b) total, dissolved and DGT-labile; c) proportions (dissolved/total, DGT-labile/total and DGT-labile/dissolved)



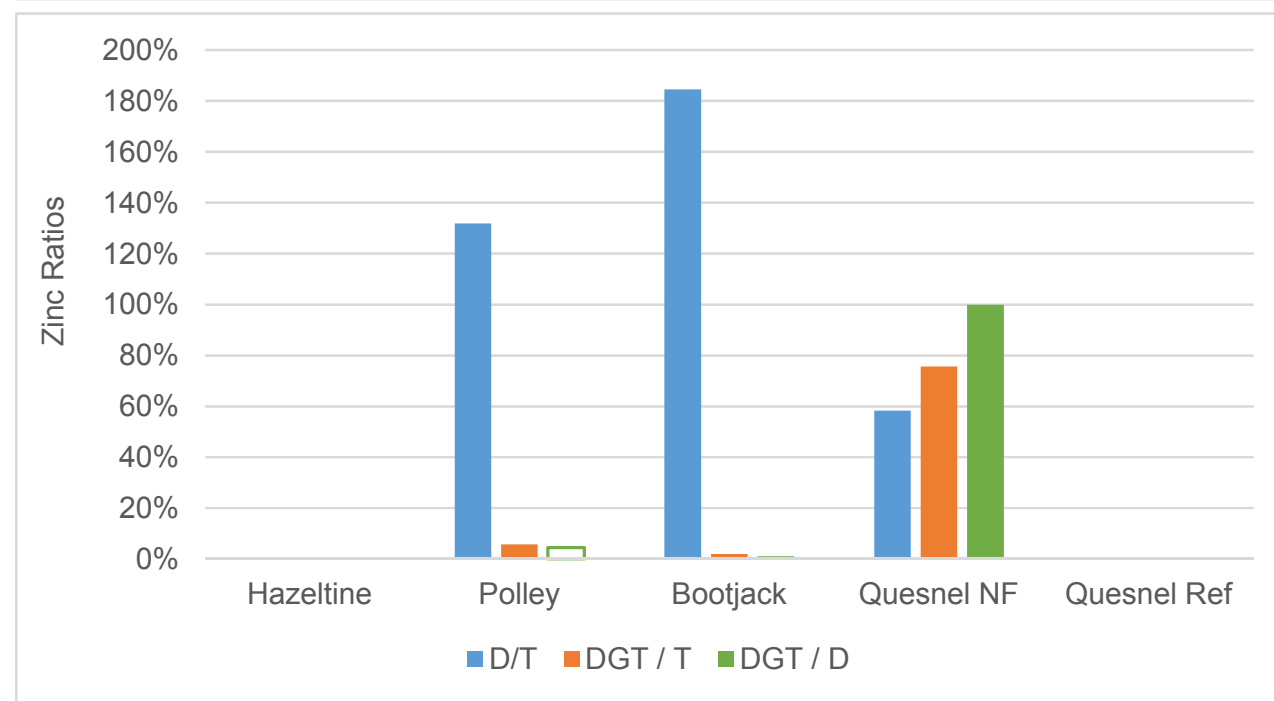
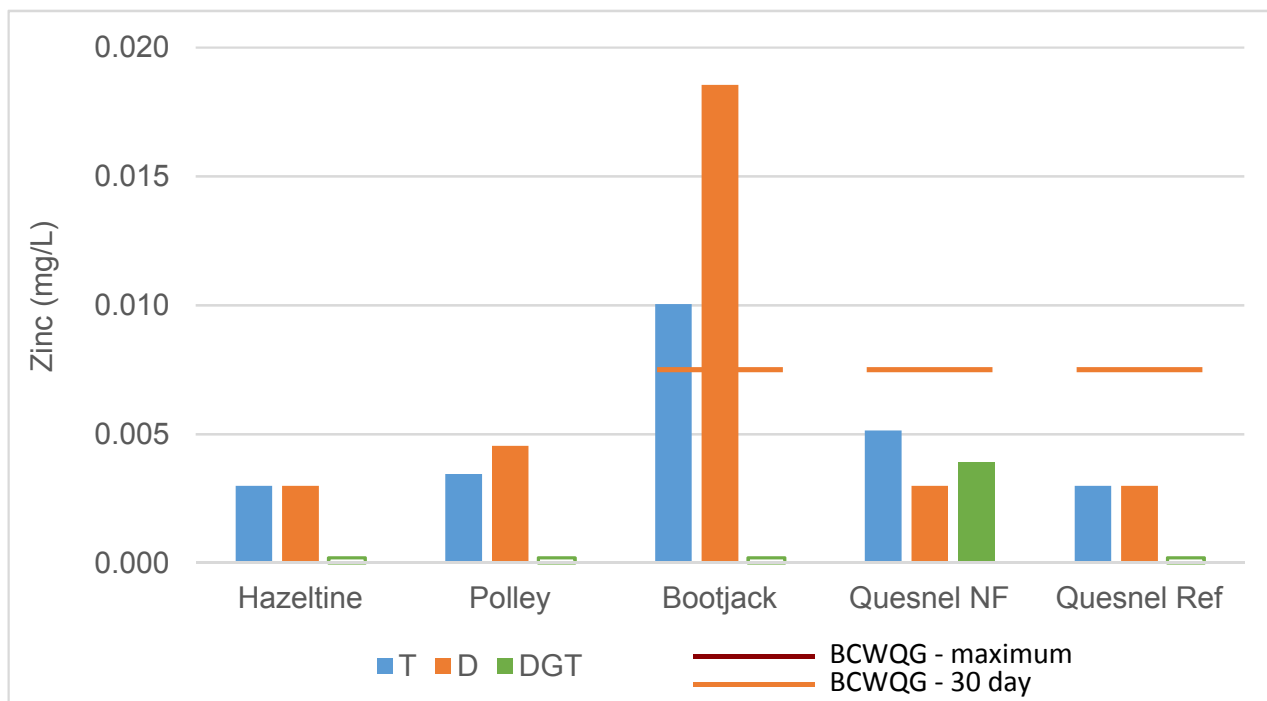
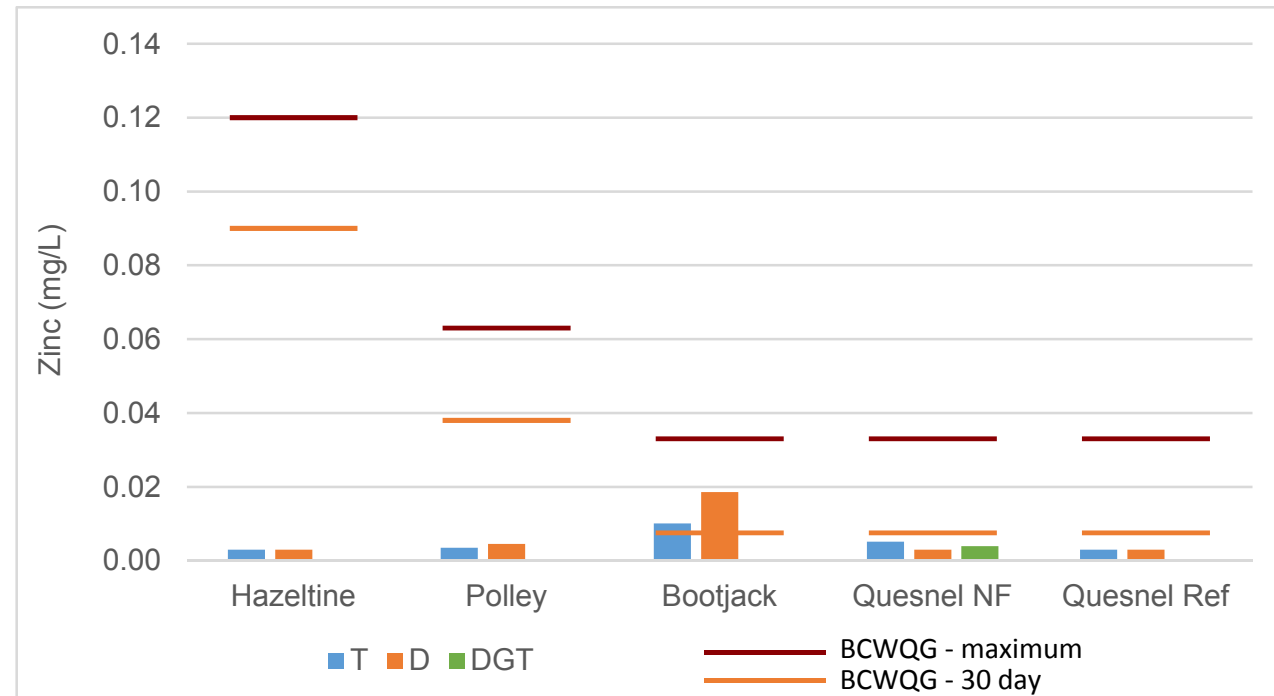
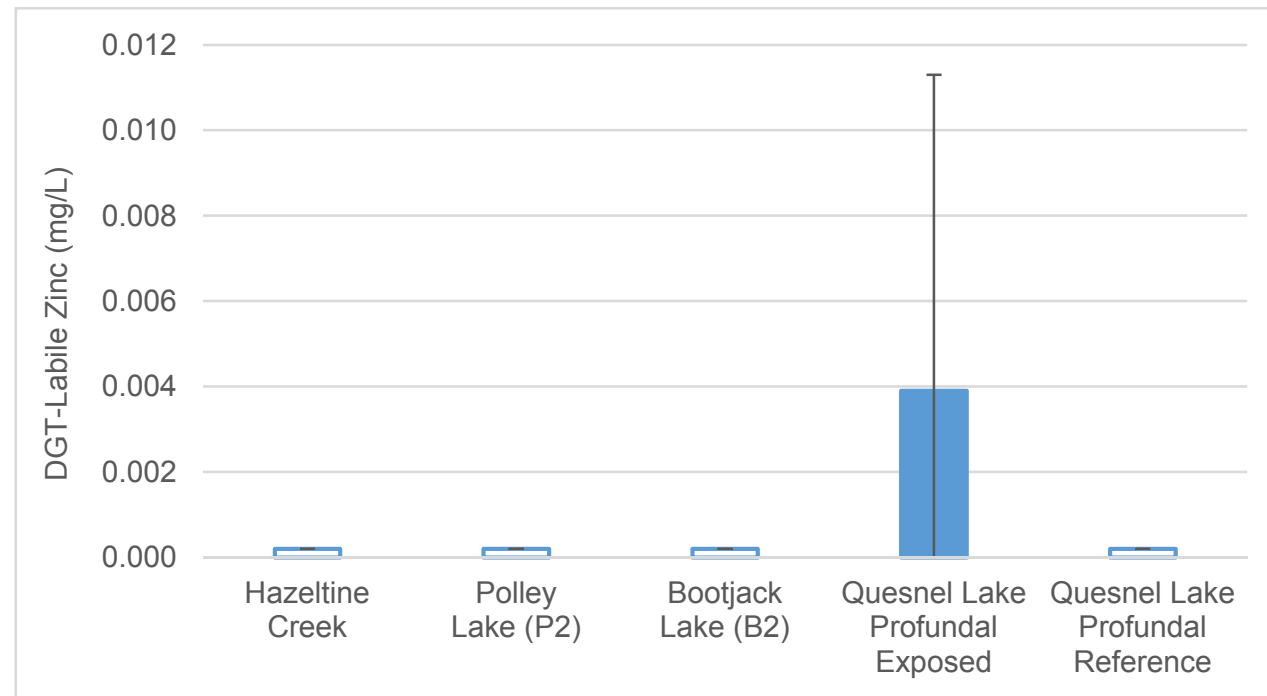
Appendix Figure D.3: Manganese concentrations measured in water, Mount Polley 2015. a) DGT-labile; b) total, dissolved and DGT-labile (full y-axis); c) total, dissolved and DGT-labile (truncated y-axis); d) proportions (dissolved/total, DGT-labile/total and DGT-labile/dissolved)



Appendix Figure D.4: Molybdenum concentrations measured in water, Mount Polley 2015. a) DGT-labile; b) total, dissolved and DGT-labile; c) proportions (dissolved/total, DGT-labile/total and DGT-labile/dissolved)



Appendix Figure D.5: Phosphorus concentrations measured in water, Mount Polley 2015. a) DGT-labile (mean \pm standard deviation); b) mean total, dissolved and DGT-labile; c) mean proportions (dissolved/total, DGT-labile/total and DGT-labile/dissolved)



Appendix Figure D.6: Zinc concentrations measured in water, Mount Polley 2015. a) DGT-labile; b) total, dissolved and DGT-labile (full y-axis); c) total, dissolved and DGT-labile (truncated y-axis); d) proportions (dissolved/total, DGT-labile/total and DGT-labile/dissolved)



Project #: 2574

Attention: Pierre Stecko
Minnow Environmental
#101 - 1025 Hillside Avenue
Victoria, BC
V8T 2A2

Report Date: 2015/11/13
Revision Date: 2015/11/27

DGT MASS ANALYSIS REPORT

MAXXAM JOB #: B5K6077 (C.O.C. #08412522, #08412523, #08412524)

Maxxam (Burnaby) Job #: B588897

Received: 2015/10/09, 08:30 AM

Sample Matrix: SOLID (DGT)
Samples Received: 23

Analyses	Quantity	Instrumental Analysis	Primary Reference
Free metals in DGT units	23	CAM SOP-00447	DGT Research, Technical Document

Remarks:

DGT water samplers loaded with Chelex-Metsorb resin gel were purchased from Griffith University (Brisbane, Australia). Samplers were received by Maxxam and were shipped to the client as received, on ice.

Upon receipt after deployment, DGTs were digested along with 3 fabrication controls, 4 blanks and 4 spikes for quality control purposes. The procedures for instrumental analyses were based on CAM SOP-00447/16 with some deviations due to the different nature of the matrix. The sample preparation and digestion procedures were in line with the practices recommended by the DGT Supplier^{1, 2} and with the additional method optimization by Maxxam.

¹DGT – for measurements in waters, soils and sediments. Technical Documentation published by DGT Research Ltd. <http://www.dgtresearch.com/dgtresearch/dgtresearch.pdf>

²Panther, J., Bennett, W., Welsh, D. and Teasdale, P. (2014). Simultaneous measurement of trace metals and oxyanion concentrations in water using Diffusive Gradients in Thin Films with a Chelex-Metsorb mixed binding layer. *Analytical Chemistry*, 86, 427-434.

Due to the extent of the deviations taken from the stated SOP, this analysis is not considered as accredited. This analysis has not been fully validated. A detailed description of the DGT preparation, digestion, analysis, and calculation of metal detection limits is available upon request.

The Chelex-Metsorb resin is selective towards di- and tri-valent cationic metal species and oxyanionic species; as a result, monovalent metal species including Lithium (Li), Sodium (Na), Potassium (K), and Silver (Ag) have extremely low affinity and data for these metals should be interpreted with caution. Similarly Calcium (Ca),

despite being divalent is known to have a low affinity for this resin. Titanium cannot be reported because the Chelex-Metsorb is a titanium-based resin.

We trust this report is sufficient for your purposes. If you have any questions or concerns, please do not hesitate to contact the undersigned.

Sincerely,

A handwritten signature in blue ink that reads "Heather Lord." The signature is written in a cursive, flowing style.

Heather Lord, Ph.D.
Manager, Environmental R&D
Maxxam Analytics Corporation

Metals Extracted by Diffusive Gradient Thin Films (DGT)

Maxxam ID	BDF184-01	BDF185-01	BDF186-01	BDF187-01	
Client ID	HAC-1 N14265	HAC-2 N14266	HAC-3 N14267	HAC-4 N14268	
Deployment time	38.2 days	38.2 days	38.2 days	38.1 days	QC
Temperature	10.9 °C	11.1 °C	11.2 °C	11.2 °C	BATCH

Note	Metal Name	MDL	RDL	Units	Mass Extracted by DGT				
3	Aluminum (Al)	0.59	1.96	µg	2.19	5.49	2.35	<RDL	4226452
	Antimony (Sb)	0.025	0.13	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Arsenic (As)	0.025	0.13	µg	<RDL	<RDL	<RDL	<RDL	4226452
	Barium (Ba)	0.063	0.25	µg	6.87	9.60	5.01	4.81	4226452
	Beryllium (Be)	0.013	0.063	µg	<MDL	<MDL	<MDL	<MDL	4226452
3	Bismuth (Bi)	0.077	0.26	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Boron (B)	0.25	1.3	µg	<MDL	<MDL	<MDL	<RDL	4226452
	Cadmium (Cd)	0.0025	0.013	µg	<MDL	<MDL	<MDL	<RDL	4226452
1, 3	Calcium (Ca)	20	66	µg	167.91	209.62	152.20	157.53	4226452
	Chromium (Cr)	0.125	0.63	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Cobalt (Co)	0.013	0.063	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Copper (Cu)	0.025	0.13	µg	2.34	2.64	2.37	2.18	4226452
	Iron (Fe)	1.25	6.3	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Lead (Pb)	0.013	0.063	µg	<MDL	<MDL	<MDL	<MDL	4226452
1	Lithium (Li)	0.125	0.63	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Magnesium (Mg)	1.25	6.3	µg	7.78	9.30	7.50	<RDL	4226452
	Manganese (Mn)	0.05	0.25	µg	0.68	1.05	0.68	0.65	4226452
3	Molybdenum (Mo)	0.044	0.15	µg	<RDL	<RDL	<RDL	<MDL	4226452
3	Nickel (Ni)	0.095	0.32	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Phosphorus (P)	1.25	6.3	µg	<MDL	<MDL	<MDL	<MDL	4226452
1	Potassium (K)	5	25	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Selenium (Se)	0.05	0.25	µg	<MDL	<MDL	<MDL	<MDL	4226452
3	Strontium (Sr)	0.082	0.27	µg	1.97	3.22	1.28	1.28	4226452
1	Silver (Ag)	0.0025	0.013	µg	<RDL	<MDL	<MDL	<MDL	4226452
1, 3	Sodium (Na)	94000	31000	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Thallium (Tl)	0.0013	0.013	µg	<MDL	<MDL	<MDL	<MDL	4226452
3	Tin (Sn)	0.092	0.31	µg	<MDL	<MDL	<MDL	<MDL	4226452
2	Titanium (Ti)	n/a	n/a	µg	n/a	n/a	n/a	n/a	4226452
	Uranium (U)	0.0025	0.013	µg	0.02	0.034	<RDL	<RDL	4226452
	Vanadium (V)	0.025	0.063	µg	0.29	0.36	0.36	0.30	4226452
	Zinc (Zn)	0.125	0.63	µg	<MDL	<MDL	<MDL	<MDL	4226452

- 1 – Metal has very low affinity for the resin
- 2 – Metal cannot be reported when using Chelex-Metsorb resin (titanium based resin)
- 3 – MDL and RDL were raised due to presence in the fabrication controls and/or blanks (see QA report)

Notes:

- a. The data presented here have not been rounded due to the wide range of concentrations reported and to facilitate further data manipulation. In any final data presentation, only two significant figures should be reported.
- b. <MDL: Target compound not detected (below Method Detection Limit).
- c. <RDL: Target compound detected above MDL but below Reporting Detection Limit.

Metals Extracted by Diffusive Gradient Thin Films (DGT)

Maxxam ID	BDF188-01	BDF189-01	BDF190-01	BDF191-01	
Client ID	P2-1 N14269	P2-2 N14270	P2-3 N14271	P2-4 N14272	
Deployment time	38.2 days	38.2 days	38.2 days	38.2 days	QC
Temperature	6.05 °C	6.05 °C	6.05 °C	6.05 °C	BATCH

Note	Metal Name	MDL	RDL	Units	Mass Extracted by DGT				
3	Aluminum (Al)	0.59	1.96	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Antimony (Sb)	0.025	0.13	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Arsenic (As)	0.025	0.13	µg	<RDL	<RDL	<RDL	<RDL	4226452
	Barium (Ba)	0.063	0.25	µg	1.76	1.86	1.99	1.84	4226452
	Beryllium (Be)	0.013	0.063	µg	<MDL	<MDL	<MDL	<MDL	4226452
3	Bismuth (Bi)	0.077	0.26	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Boron (B)	0.25	1.3	µg	<MDL	<RDL	<RDL	<RDL	4226452
	Cadmium (Cd)	0.0025	0.013	µg	<MDL	<MDL	<MDL	<MDL	4226452
1, 3	Calcium (Ca)	20	66	µg	112.32	113.97	133.52	103.02	4226452
	Chromium (Cr)	0.125	0.63	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Cobalt (Co)	0.013	0.063	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Copper (Cu)	0.025	0.13	µg	0.15	<RDL	0.14	0.16	4226452
	Iron (Fe)	1.25	6.3	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Lead (Pb)	0.013	0.063	µg	<MDL	<MDL	<MDL	<MDL	4226452
1	Lithium (Li)	0.125	0.63	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Magnesium (Mg)	1.25	6.3	µg	<MDL	<MDL	<RDL	<MDL	4226452
	Manganese (Mn)	0.05	0.25	µg	3.18	2.71	2.00	2.87	4226452
3	Molybdenum (Mo)	0.044	0.15	µg	1.16	1.20	1.30	1.24	4226452
3	Nickel (Ni)	0.095	0.32	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Phosphorus (P)	1.25	6.3	µg	<RDL	<RDL	<RDL	<RDL	4226452
1	Potassium (K)	5	25	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Selenium (Se)	0.05	0.25	µg	<MDL	<MDL	<MDL	<MDL	4226452
3	Strontium (Sr)	0.082	0.27	µg	0.88	0.94	1.15	0.97	4226452
1	Silver (Ag)	0.0025	0.013	µg	<MDL	<MDL	<MDL	<MDL	4226452
1, 3	Sodium (Na)	94000	310000	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Thallium (Tl)	0.0013	0.013	µg	<MDL	<MDL	<MDL	<MDL	4226452
3	Tin (Sn)	0.092	0.31	µg	<MDL	<MDL	<MDL	<MDL	4226452
2	Titanium (Ti)	n/a	n/a	µg	n/a	n/a	n/a	n/a	4226452
	Uranium (U)	0.0025	0.013	µg	0.04	0.04	0.04	0.04	4226452
	Vanadium (V)	0.025	0.063	µg	0.15	0.14	0.16	0.16	4226452
	Zinc (Zn)	0.125	0.63	µg	<MDL	<MDL	<MDL	<MDL	4226452

- 1 – Metal has very low affinity for the resin
- 2 – Metal cannot be reported when using Chelex-Metsorb resin (titanium based resin)
- 3 – MDL and RDL were raised due to presence in the fabrication controls and/or blanks (see QA report)

Notes:

- a. The data presented here have not been rounded due to the wide range of concentrations reported and to facilitate further data manipulation. In any final data presentation, only two significant figures should be reported.
- b. <MDL: Target compound not detected (below Method Detection Limit).
- c. <RDL: Target compound detected above MDL but below Reporting Detection Limit.

Metals Extracted by Diffusive Gradient Thin Films (DGT)

Maxxam ID	BDF192-01	BDF193-01	BDF194-01	BDF195-01	
Client ID	B2-1 N14273	B2-2 N14274	B2-3 N14275	B2-4 N14276	
Deployment time	37.9 days	37.9 days	37.8 days	37.8 days	QC
Temperature	8.65 °C	8.65 °C	8.65 °C	8.65 °C	BATCH

Note	Metal Name	MDL	RDL	Units	Mass Extracted by DGT				
3	Aluminum (Al)	0.59	1.96	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Antimony (Sb)	0.025	0.13	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Arsenic (As)	0.025	0.13	µg	<RDL	<RDL	<RDL	<RDL	4226452
	Barium (Ba)	0.063	0.25	µg	2.70	3.14	3.43	3.98	4226452
	Beryllium (Be)	0.013	0.063	µg	<MDL	<MDL	<MDL	<MDL	4226452
3	Bismuth (Bi)	0.077	0.26	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Boron (B)	0.25	1.3	µg	<RDL	<RDL	<MDL	<RDL	4226452
	Cadmium (Cd)	0.0025	0.013	µg	<MDL	<MDL	<MDL	<MDL	4226452
1, 3	Calcium (Ca)	20	66	µg	<RDL	<RDL	<RDL	<RDL	4226452
	Chromium (Cr)	0.125	0.63	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Cobalt (Co)	0.013	0.063	µg	<RDL	<RDL	<RDL	<RDL	4226452
	Copper (Cu)	0.025	0.13	µg	<RDL	<RDL	<RDL	<RDL	4226452
	Iron (Fe)	1.25	6.3	µg	144.89	147.38	112.57	142.27	4226452
	Lead (Pb)	0.013	0.063	µg	<MDL	<MDL	<MDL	<MDL	4226452
1	Lithium (Li)	0.125	0.63	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Magnesium (Mg)	1.25	6.3	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Manganese (Mn)	0.05	0.25	µg	18.41	20.83	22.61	28.22	4226452
3	Molybdenum (Mo)	0.044	0.15	µg	0.22	0.23	0.23	0.24	4226452
3	Nickel (Ni)	0.095	0.32	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Phosphorus (P)	1.25	6.3	µg	11.46	14.73	15.77	18.50	4226452
1	Potassium (K)	5	25	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Selenium (Se)	0.05	0.25	µg	<MDL	<MDL	<MDL	<MDL	4226452
3	Strontium (Sr)	0.082	0.27	µg	0.62	0.70	0.69	0.82	4226452
1	Silver (Ag)	0.0025	0.013	µg	<MDL	<MDL	<MDL	<MDL	4226452
1, 3	Sodium (Na)	94000	310000	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Thallium (Tl)	0.0013	0.013	µg	<MDL	<MDL	<MDL	<MDL	4226452
3	Tin (Sn)	0.092	0.31	µg	<MDL	<MDL	<MDL	<MDL	4226452
2	Titanium (Ti)	n/a	n/a	µg	n/a	n/a	n/a	n/a	4226452
	Uranium (U)	0.0025	0.013	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Vanadium (V)	0.025	0.063	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Zinc (Zn)	0.125	0.63	µg	<MDL	<MDL	<MDL	<MDL	4226452

- 1 – Metal has very low affinity for the resin
- 2 – Metal cannot be reported when using Chelex-Metsorb resin (titanium based resin)
- 3 – MDL and RDL were raised due to presence in the fabrication controls and/or blanks (see QA report)

Notes:

- a. The data presented here have not been rounded due to the wide range of concentrations reported and to facilitate further data manipulation. In any final data presentation, only two significant figures should be reported.
- b. <MDL: Target compound not detected (below Method Detection Limit).
- c. <RDL: Target compound detected above MDL but below Reporting Detection Limit.

Metals Extracted by Diffusive Gradient Thin Films (DGT)

Maxxam ID	BDF196-01	BDF197-01	BDF198-01	BDF199-01	
Client ID	PNF-1 N14277	PNF-2 N14278	PNF-3 N14279	PNF-4 N14280	
Deployment time	35.6 days	35.6 days	35.6 days	35.6 days	QC
Temperature	4.55 °C	4.55 °C	4.55 °C	4.55 °C	BATCH

Note	Metal Name	MDL	RDL	Units	Mass Extracted by DGT				
3	Aluminum (Al)	0.59	1.96	µg	<RDL	3.36	<RDL	<RDL	4226452
	Antimony (Sb)	0.025	0.13	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Arsenic (As)	0.025	0.13	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Barium (Ba)	0.063	0.25	µg	1.88	1.73	1.42	1.98	4226452
	Beryllium (Be)	0.013	0.063	µg	<MDL	<MDL	<MDL	<MDL	4226452
3	Bismuth (Bi)	0.077	0.26	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Boron (B)	0.25	1.3	µg	<MDL	<MDL	<RDL	<RDL	4226452
	Cadmium (Cd)	0.0025	0.013	µg	<MDL	<MDL	<MDL	<MDL	4226452
1, 3	Calcium (Ca)	20	66	µg	138.96	124.76	118.51	118.45	4226452
	Chromium (Cr)	0.125	0.63	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Cobalt (Co)	0.013	0.063	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Copper (Cu)	0.025	0.13	µg	<RDL	<RDL	<RDL	<RDL	4226452
	Iron (Fe)	1.25	6.3	µg	<MDL	<RDL	<MDL	<MDL	4226452
	Lead (Pb)	0.013	0.063	µg	<MDL	<MDL	<MDL	<MDL	4226452
1	Lithium (Li)	0.125	0.63	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Magnesium (Mg)	1.25	6.3	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Manganese (Mn)	0.05	0.25	µg	1.05	1.30	1.03	1.17	4226452
3	Molybdenum (Mo)	0.044	0.15	µg	<RDL	<RDL	<RDL	<RDL	4226452
3	Nickel (Ni)	0.095	0.32	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Phosphorus (P)	1.25	6.3	µg	<MDL	<MDL	<MDL	<MDL	4226452
1	Potassium (K)	5	25	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Selenium (Se)	0.05	0.25	µg	<MDL	<MDL	<MDL	<MDL	4226452
3	Strontium (Sr)	0.082	0.27	µg	0.98	0.83	0.65	0.89	4226452
1	Silver (Ag)	0.0025	0.013	µg	<MDL	<MDL	<MDL	<MDL	4226452
1, 3	Sodium (Na)	94000	310000	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Thallium (Tl)	0.0013	0.013	µg	<MDL	<MDL	<MDL	<MDL	4226452
3	Tin (Sn)	0.092	0.31	µg	<MDL	<RDL	<MDL	<MDL	4226452
2	Titanium (Ti)	n/a	n/a	µg	n/a	n/a	n/a	n/a	4226452
	Uranium (U)	0.0025	0.013	µg	0.03	0.03	0.03	0.03	4226452
	Vanadium (V)	0.025	0.063	µg	<RDL	<RDL	<MDL	<RDL	4226452
	Zinc (Zn)	0.125	0.63	µg	<MDL	6.73	<MDL	<MDL	4226452

- 1 – Metal has very low affinity for the resin
- 2 – Metal cannot be reported when using Chelex-Metsorb resin (titanium based resin)
- 3 – MDL and RDL were raised due to presence in the fabrication controls and/or blanks (see QA report)

Notes:

- a. The data presented here have not been rounded due to the wide range of concentrations reported and to facilitate further data manipulation. In any final data presentation, only two significant figures should be reported.
- b. <MDL: Target compound not detected (below Method Detection Limit).
- c. <RDL: Target compound detected above MDL but below Reporting Detection Limit.

Metals Extracted by Diffusive Gradient Thin Films (DGT)

Maxxam ID	BDF200-01	BDF201-01	BDF202-01	BDF203-01	
Client ID	PRef1-1 N14281	PRef1-2 N14282	PRef1-3 N14283	PRef1-4 N14284	
Deployment time	34.3 days	34.3 days	34.3 days	34.2 days	QC
Temperature	3.9 °C	3.9 °C	3.9 °C	3.9 °C	BATCH

Note	Metal Name	MDL	RDL	Units	Mass Extracted by DGT				
3	Aluminum (Al)	0.59	1.96	µg	<RDL	<RDL	3.08	<RDL	4226452
	Antimony (Sb)	0.025	0.13	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Arsenic (As)	0.025	0.13	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Barium (Ba)	0.063	0.25	µg	1.49	1.44	1.60	1.49	4226452
	Beryllium (Be)	0.013	0.063	µg	<MDL	<MDL	<MDL	<MDL	4226452
3	Bismuth (Bi)	0.077	0.26	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Boron (B)	0.25	1.3	µg	<RDL	<MDL	<RDL	<MDL	4226452
	Cadmium (Cd)	0.0025	0.013	µg	<MDL	<MDL	<MDL	<MDL	4226452
1, 3	Calcium (Ca)	20	66	µg	83.08	121.31	131.30	132.49	4226452
	Chromium (Cr)	0.125	0.63	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Cobalt (Co)	0.013	0.063	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Copper (Cu)	0.025	0.13	µg	<RDL	<RDL	<RDL	<MDL	4226452
	Iron (Fe)	1.25	6.3	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Lead (Pb)	0.013	0.063	µg	<MDL	<MDL	<MDL	<MDL	4226452
1	Lithium (Li)	0.125	0.63	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Magnesium (Mg)	1.25	6.3	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Manganese (Mn)	0.05	0.25	µg	1.13	0.60	1.28	1.74	4226452
3	Molybdenum (Mo)	0.044	0.15	µg	<MDL	<MDL	<MDL	<RDL	4226452
3	Nickel (Ni)	0.095	0.32	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Phosphorus (P)	1.25	6.3	µg	<MDL	<MDL	<MDL	<MDL	4226452
1	Potassium (K)	5	25	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Selenium (Se)	0.05	0.25	µg	<MDL	<MDL	<MDL	<MDL	4226452
3	Strontium (Sr)	0.082	0.27	µg	0.68	0.92	0.93	0.92	4226452
1	Silver (Ag)	0.0025	0.013	µg	<MDL	<MDL	<MDL	<MDL	4226452
1, 3	Sodium (Na)	94000	310000	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Thallium (Tl)	0.0013	0.013	µg	<MDL	<MDL	<MDL	<MDL	4226452
3	Tin (Sn)	0.092	0.31	µg	<MDL	<MDL	<MDL	<MDL	4226452
2	Titanium (Ti)	n/a	n/a	µg	n/a	n/a	n/a	n/a	4226452
	Uranium (U)	0.0025	0.013	µg	0.03	0.02	0.02	0.02	4226452
	Vanadium (V)	0.025	0.063	µg	<MDL	<MDL	<MDL	<MDL	4226452
	Zinc (Zn)	0.125	0.63	µg	<MDL	<MDL	<MDL	<MDL	4226452

- 1 – Metal has very low affinity for the resin
- 2 – Metal cannot be reported when using Chelex-Metsorb resin (titanium based resin)
- 3 – MDL and RDL were raised due to presence in the fabrication controls and/or blanks (see QA report)

Notes:

- a. The data presented here have not been rounded due to the wide range of concentrations reported and to facilitate further data manipulation. In any final data presentation, only two significant figures should be reported.
- b. <MDL: Target compound not detected (below Method Detection Limit).
- c. <RDL: Target compound detected above MDL but below Reporting Detection Limit.

Metals Extracted by Diffusive Gradient Thin Films (DGT)

Maxxam ID	BDF204-01	BDF205-01	BDF206-01	
Client ID	Field Blank 1 N14289	Field Blank 2 N14282	Trip Blank N14283	
Deployment time	n/a	n/a	n/a	QC
Temperature	n/a	n/a	n/a	BATCH

Note	Metal Name	MDL	RDL	Units	Mass Extracted by DGT			
3	Aluminum (Al)	0.59	1.96	µg	<MDL	<MDL	<MDL	4226497
	Antimony (Sb)	0.025	0.13	µg	<MDL	<MDL	<MDL	4226497
	Arsenic (As)	0.025	0.13	µg	<MDL	<MDL	<MDL	4226497
	Barium (Ba)	0.063	0.25	µg	<MDL	<MDL	<MDL	4226497
	Beryllium (Be)	0.013	0.063	µg	<MDL	<MDL	<MDL	4226497
3	Bismuth (Bi)	0.077	0.26	µg	<MDL	<MDL	<MDL	4226497
	Boron (B)	0.25	1.3	µg	<MDL	<MDL	<MDL	4226497
	Cadmium (Cd)	0.0025	0.013	µg	<MDL	<MDL	<MDL	4226497
1, 3	Calcium (Ca)	20	66	µg	<MDL	<MDL	<MDL	4226497
	Chromium (Cr)	0.125	0.63	µg	<MDL	<MDL	<MDL	4226497
	Cobalt (Co)	0.013	0.063	µg	<MDL	<MDL	<MDL	4226497
	Copper (Cu)	0.025	0.13	µg	<MDL	<MDL	1.06	4226497
	Iron (Fe)	1.25	6.3	µg	<MDL	<MDL	<MDL	4226497
	Lead (Pb)	0.013	0.063	µg	<MDL	<MDL	<MDL	4226497
1	Lithium (Li)	0.125	0.63	µg	<MDL	<MDL	<MDL	4226497
	Magnesium (Mg)	1.25	6.3	µg	<MDL	<MDL	<MDL	4226497
	Manganese (Mn)	0.05	0.25	µg	<MDL	<MDL	<MDL	4226497
3	Molybdenum (Mo)	0.044	0.15	µg	<MDL	<MDL	<MDL	4226497
3	Nickel (Ni)	0.095	0.32	µg	<MDL	<MDL	<MDL	4226497
	Phosphorus (P)	1.25	6.3	µg	<MDL	<MDL	<MDL	4226497
1	Potassium (K)	5	25	µg	<MDL	<MDL	<MDL	4226497
	Selenium (Se)	0.05	0.25	µg	<MDL	<MDL	<MDL	4226497
3	Strontium (Sr)	0.082	0.27	µg	<MDL	<MDL	<MDL	4226497
1	Silver (Ag)	0.0025	0.013	µg	<MDL	<MDL	<MDL	4226497
1, 3	Sodium (Na)	94000	310000	µg	<MDL	<MDL	<MDL	4226497
	Thallium (Tl)	0.0013	0.013	µg	<MDL	<MDL	<MDL	4226497
3	Tin (Sn)	0.092	0.31	µg	<MDL	<MDL	<MDL	4226497
2	Titanium (Ti)	n/a	n/a	µg	n/a	n/a	n/a	4226497
	Uranium (U)	0.0025	0.013	µg	<MDL	<MDL	<MDL	4226497
	Vanadium (V)	0.025	0.063	µg	<MDL	<MDL	<MDL	4226497
	Zinc (Zn)	0.125	0.63	µg	<MDL	<MDL	<MDL	4226497

- 1 – Metal has very low affinity for the resin
- 2 – Metal cannot be reported when using Chelex-Metsorb resin (titanium based resin)
- 3 – MDL and RDL were raised due to presence in the fabrication controls and/or blanks (see QA report)

Notes:

- a. The data presented here have not been rounded due to the wide range of concentrations reported and to facilitate further data manipulation. In any final data presentation, only two significant figures should be reported.
- b. <MDL: Target compound not detected (below Method Detection Limit).
- c. <RDL: Target compound detected above MDL but below Reporting Detection Limit.

Quality Assurance Report

Maxxam Job # B5K6077

Test Summary

Maxxam ID BDF184-01 **Collected** 2015/10/06
Sample ID HAC-1 N14265 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226452	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF185-01 **Collected** 2015/10/06
Sample ID HAC-2 N14266 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226452	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF186-01 **Collected** 2015/10/06
Sample ID HAC-3 N14267 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226452	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF187-01 **Collected** 2015/10/06
Sample ID HAC-4 N14268 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226452	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF188-01 **Collected** 2015/10/05
Sample ID P2-1 N14269 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226452	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF189-01 **Collected** 2015/10/05
Sample ID P2-2 N14270 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226452	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF190-01 **Collected** 2015/10/05
Sample ID P2-3 N14271 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226452	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF191-01 **Collected** 2015/10/05
Sample ID P2-4 N14272 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226452	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF192-01 **Collected** 2015/10/05
Sample ID B2-1 N14273 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226452	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF193-01 **Collected** 2015/10/05
Sample ID B2-2 N14274 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226452	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF194-01 **Collected** 2015/10/05
Sample ID B2-3 N14275 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226452	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF195-01 **Collected** 2015/10/05
Sample ID B2-4 N14276 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226452	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF196-01 **Collected** 2015/10/06
Sample ID PNF-1 N14277 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226452	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF197-01 **Collected** 2015/10/06
Sample ID PNF-2 N14278 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226452	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF198-01 **Collected** 2015/10/06
Sample ID PNF-3 N14279 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226452	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF199-01 **Collected** 2015/10/06
Sample ID PNF-4 N14280 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226452	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF200-01 **Collected** 2015/10/06
Sample ID PRef1-1 N14281 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226452	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF201-01 **Collected** 2015/10/06
Sample ID PRef1-2 N14282 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226452	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF202-01 **Collected** 2015/10/06
Sample ID PRef1-3 N14283 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226452	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF203-01 **Collected** 2015/10/06
Sample ID PRef1-4 N14284 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226452	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF204-01 **Collected** n/a
Sample ID Field Blank 1 N14289 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226497	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF205-01 **Collected** n/a
Sample ID Field Blank 2 N14290 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226497	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Maxxam ID BDF206-01 **Collected** n/a
Sample ID Trip Blank N14291 **Relinquished** 2015/10/07
Matrix DGT sampler **Received** 2015/10/09

Test Description	Instrumentation	Batch	Digested	Analyzed	Analysts
Free Metals in DGT	CAM SOP-00447/16	4226497	2015/10/13-16	2015/10/22	Christopher Atkinson Prempal Bhatti

Quality Assurance Report Blanks and Fabrication Controls

Maxxam Job # B5K6077 – QC Batch 4226452

Maxxam ID			BDK223-01	BDK220-01	RDL	MDL
QC Parameter			Water Blank	Method Blank		
Matrix			RODI water	Digest		
Note	Analysis Date	Metal name	(µg)	(µg)	(µg)	(µg)
	2015/10/22	Aluminum (Al)	<RDL	<RDL	0.63	0.13
	2015/10/22	Antimony (Sb)	<MDL	<MDL	0.13	0.025
	2015/10/22	Arsenic (As)	<MDL	<MDL	0.13	0.025
	2015/10/22	Barium (Ba)	<MDL	<MDL	0.25	0.063
	2015/10/22	Beryllium (Be)	<MDL	<MDL	0.063	0.013
	2015/10/22	Bismuth (Bi)	<MDL	<RDL	0.13	0.025
	2015/10/22	Boron (B)	<MDL	<MDL	1.3	0.25
	2015/10/22	Cadmium (Cd)	<MDL	<MDL	0.013	0.003
	2015/10/22	Calcium (Ca)	<MDL	<MDL	25	5.0
	2015/10/22	Chromium (Cr)	<MDL	<MDL	0.63	0.125
	2015/10/22	Cobalt (Co)	<MDL	<MDL	0.063	0.013
	2015/10/22	Copper (Cu)	<MDL	<MDL	0.13	0.025
	2015/10/22	Iron (Fe)	<MDL	<MDL	6.3	1.25
	2015/10/22	Lead (Pb)	<MDL	<MDL	0.06	0.013
	2015/10/22	Lithium (Li)	<MDL	<MDL	0.63	0.13
	2015/10/22	Magnesium (Mg)	<MDL	<MDL	6.3	1.25
	2015/10/22	Manganese (Mn)	<MDL	<MDL	0.25	0.050
	2015/10/22	Molybdenum (Mo)	<MDL	<RDL	0.063	0.0025
	2015/10/22	Nickel (Ni)	<MDL	<MDL	0.13	0.025
	2015/10/22	Phosphorus (P)	<MDL	<MDL	6.3	1.25
	2015/10/22	Potassium (K)	<MDL	<MDL	25	5.0
	2015/10/22	Selenium (Se)	<MDL	<MDL	0.25	0.050
	2015/10/22	Strontium (Sr)	<MDL	<MDL	0.13	0.025
	2015/10/22	Silver (Ag)	<MDL	<MDL	0.013	0.0025
1	2015/10/22	Sodium (Na)	44.94	33152	13	2.5
	2015/10/22	Thallium (Tl)	<MDL	<MDL	0.013	0.0013
	2015/10/22	Tin (Sn)	<MDL	<MDL	0.13	0.025
	2015/10/22	Titanium (Ti)	n/a	n/a	n/a	n/a
	2015/10/22	Uranium (U)	<MDL	<MDL	0.013	0.0025
	2015/10/22	Vanadium (V)	<MDL	<MDL	0.063	0.025
	2015/10/22	Zinc (Zn)	<MDL	<MDL	0.63	0.13

1 – Digestion solution is 1M NaOH

Notes:

Water Blank: RODI water used during sample processing of the samples
 Method Blank: Digestion tube, to which no DGT resin is added, digested and analyzed, used to identify lab contamination
 Fabrication Control: Blank DGT resin digested and analyzed, accounts for interferences or contamination incurred from the passive sampler components, storage, processing and analysis

Quality Assurance Report Blanks and Fabrication Controls

Maxxam Job # B5K6077 – QC Batch 4226497

Maxxam ID			BDK226-01	BDK227-01	RDL	MDL
QC Parameter			Water Blank	Method Blank		
Matrix			RODI water	Digest		
Note	Analysis Date	Metal name	(µg)	(µg)	(µg)	(µg)
	2015/10/22	Aluminum (Al)	<RDL	<RDL	0.63	0.13
	2015/10/22	Antimony (Sb)	<MDL	<MDL	0.13	0.025
	2015/10/22	Arsenic (As)	<MDL	<MDL	0.13	0.025
	2015/10/22	Barium (Ba)	<MDL	<MDL	0.25	0.063
	2015/10/22	Beryllium (Be)	<MDL	<MDL	0.063	0.013
	2015/10/22	Bismuth (Bi)	<MDL	<MDL	0.13	0.025
	2015/10/22	Boron (B)	<MDL	<MDL	1.3	0.25
	2015/10/22	Cadmium (Cd)	<MDL	<MDL	0.013	0.003
	2015/10/22	Calcium (Ca)	<MDL	<MDL	25	5.0
	2015/10/22	Chromium (Cr)	<MDL	<MDL	0.63	0.125
	2015/10/22	Cobalt (Co)	<MDL	<MDL	0.063	0.013
	2015/10/22	Copper (Cu)	<MDL	<MDL	0.13	0.025
	2015/10/22	Iron (Fe)	<MDL	<MDL	6.3	1.25
	2015/10/22	Lead (Pb)	<MDL	<MDL	0.06	0.013
	2015/10/22	Lithium (Li)	<MDL	<MDL	0.63	0.13
	2015/10/22	Magnesium (Mg)	<MDL	<MDL	6.3	1.25
	2015/10/22	Manganese (Mn)	<MDL	<MDL	0.25	0.050
	2015/10/22	Molybdenum (Mo)	<MDL	<MDL	0.063	0.0025
	2015/10/22	Nickel (Ni)	<MDL	<MDL	0.13	0.025
	2015/10/22	Phosphorus (P)	<MDL	<MDL	6.3	1.25
	2015/10/22	Potassium (K)	<MDL	<MDL	25	5.0
	2015/10/22	Selenium (Se)	<MDL	<MDL	0.25	0.050
	2015/10/22	Strontium (Sr)	<MDL	<MDL	0.13	0.025
	2015/10/22	Silver (Ag)	<MDL	<MDL	0.013	0.0025
1	2015/10/22	Sodium (Na)	21.83	31999	13	2.5
	2015/10/22	Thallium (Tl)	<MDL	<MDL	0.013	0.0013
	2015/10/22	Tin (Sn)	<MDL	<MDL	0.13	0.025
	2015/10/22	Titanium (Ti)	n/a	n/a	n/a	n/a
	2015/10/22	Uranium (U)	<MDL	<MDL	0.013	0.0025
	2015/10/22	Vanadium (V)	<MDL	<MDL	0.063	0.025
	2015/10/22	Zinc (Zn)	<MDL	<MDL	0.63	0.13

1 – Digestion solution is 1M NaOH

Notes:

Water Blank: RODI water used during sample processing of the samples
 Method Blank: Digestion tube, to which no DGT resin is added, digested and analyzed, used to identify lab contamination
 Fabrication Control: Blank DGT resin digested and analyzed, accounts for interferences or contamination incurred from the passive sampler components, storage, processing and analysis

Quality Assurance Report Blanks and Fabrication Controls

Maxxam Job # B5K6077 – QC Batch 4226497

Maxxam ID			BDK230-01	BDK242-01	BDK243-01	RDL	MDL
QC Parameter			Fabrication Control 1	Fabrication Control 2	Fabrication Control 3		
Matrix			DGT	DGT	DGT		
Note	Analysis Date	Metal name	(µg)	(µg)	(µg)	(µg)	(µg)
	2015/10/22	Aluminum (Al)	<RDL	<RDL	<RDL	0.63	0.13
	2015/10/22	Antimony (Sb)	<MDL	<MDL	<MDL	0.13	0.025
	2015/10/22	Arsenic (As)	<MDL	<MDL	<MDL	0.13	0.025
	2015/10/22	Barium (Ba)	<MDL	<MDL	<MDL	0.25	0.063
	2015/10/22	Beryllium (Be)	<MDL	<MDL	<MDL	0.063	0.013
	2015/10/22	Bismuth (Bi)	<MDL	<MDL	<MDL	0.13	0.025
	2015/10/22	Boron (B)	<MDL	<MDL	<MDL	1.3	0.25
	2015/10/22	Cadmium (Cd)	<MDL	<MDL	<MDL	0.013	0.003
	2015/10/22	Calcium (Ca)	<RDL	<MDL	<MDL	25	5.0
	2015/10/22	Chromium (Cr)	<MDL	<MDL	<MDL	0.63	0.125
	2015/10/22	Cobalt (Co)	<MDL	<MDL	<MDL	0.063	0.013
	2015/10/22	Copper (Cu)	<MDL	<MDL	<MDL	0.13	0.025
	2015/10/22	Iron (Fe)	<MDL	<MDL	<MDL	6.3	1.25
	2015/10/22	Lead (Pb)	<MDL	<MDL	<MDL	0.06	0.013
	2015/10/22	Lithium (Li)	<MDL	<MDL	<MDL	0.63	0.13
	2015/10/22	Magnesium (Mg)	<MDL	<MDL	<MDL	6.3	1.25
	2015/10/22	Manganese (Mn)	<MDL	<MDL	<MDL	0.25	0.050
	2015/10/22	Molybdenum (Mo)	<MDL	<MDL	<MDL	0.063	0.0025
	2015/10/22	Nickel (Ni)	<RDL	<MDL	<MDL	0.13	0.025
	2015/10/22	Phosphorus (P)	<MDL	<MDL	<MDL	6.3	1.25
	2015/10/22	Potassium (K)	<MDL	<MDL	<MDL	25	5.0
	2015/10/22	Selenium (Se)	<MDL	<MDL	<MDL	0.25	0.050
	2015/10/22	Strontium (Sr)	<RDL	<RDL	<MDL	0.13	0.025
	2015/10/22	Silver (Ag)	<MDL	<MDL	<MDL	0.013	0.0025
1	2015/10/22	Sodium (Na)	31617	31154	31398	13	2.5
	2015/10/22	Thallium (Tl)	<MDL	<MDL	<MDL	0.013	0.0013
	2015/10/22	Tin (Sn)	<RDL	<RDL	<MDL	0.13	0.025
	2015/10/22	Titanium (Ti)	n/a	n/a	n/a	n/a	n/a
	2015/10/22	Uranium (U)	<MDL	<MDL	<MDL	0.013	0.0025
	2015/10/22	Vanadium (V)	<MDL	<MDL	<MDL	0.063	0.025
	2015/10/22	Zinc (Zn)	<MDL	<MDL	<MDL	0.63	0.13

1 – Digestion solution is 1M NaOH

Notes:

Water Blank: RODI water used during sample processing of the samples
 Method Blank: Digestion tube, to which no DGT resin is added, digested and analyzed, used to identify lab contamination
 Fabrication Control: Blank DGT resin digested and analyzed, accounts for interferences or contamination incurred from the passive sampler components, storage, processing and analysis

Quality Assurance Report Spikes

Maxxam Job # B5K6077 – QC Batch 4226452

Maxxam ID			BDK222-01	BDK221-01	QC Limits	QC Batch
QC Parameter			Resin Spike	Method Spike		
Matrix			DGT	Digest		
Note	Analysis Date	Metal	(% Recovery)	(% Recovery)	%	4226452
	2015/10/22	Cadmium	108	92	70-130	4226452
	2015/10/22	Thallium	83	99	70-130	4226452
	2015/10/22	Uranium	83	102	70-130	4226452

Notes:

Resin Spike: Metal solution spiked directly onto DGT resin and digested, used to evaluate method accuracy

Method Spike: Digestion tube to which the metal solution is spiked without the presence of a DGT resin, sample is digested and analyzed, used to evaluate lab process accuracy

Quality Assurance Report Spikes

Maxxam Job # B5K6077 – QC Batch 4226497

Maxxam ID			BDK229-01	BDK228-01	QC Limits	QC Batch
QC Parameter			Resin Spike	Method Spike		
Matrix			DGT	Digest		
Note	Analysis Date	Metal	(% Recovery)	(% Recovery)	%	4226497
	2015/10/22	Cadmium	78	103	70-130	4226497
	2015/10/22	Thallium	73	97	70-130	4226497
	2015/10/22	Uranium	74	102	70-130	4226497

Notes:

Resin Spike: Metal solution spiked directly onto DGT resin and digested, used to evaluate method accuracy

Method Spike: Digestion tube to which the metal solution is spiked without the presence of a DGT resin, sample is digested and analyzed, used to evaluate lab process accuracy

Validation Signature Page

Maxxam Job #: B5K6077

Maxxam (Burnaby) Job #: B588897

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s):



Angel Rodriguez-Lafuente, Ph.D.
Senior Analyst, Environmental Research and Development
Maxxam Analytics Corporation



Heather Lynn Lord, Ph.D.
Manager, Environmental Research and Development
Maxxam Analytics Corporation

Attention: Pierre Stecko

Minnow Environmental
#101 - 1025 Hillside Avenue
Victoria, BC
V8T 2A2

Report Date: 2015/11/23

ESTIMATED AVERAGE WATER CONCENTRATION REPORT FROM DGT PASSIVE SAMPLERS

MAXXAM JOB #: B5K6077 (C.O.C. #08412522, #08412523, #08412524)

Maxxam (Burnaby) Job #: B588897

Received: 2015/10/09, 08:30 AM

Sample Matrix: Water Sampling Media (WSM)
Samples Received: 23

Analyses	Quantity	Lab Analyses	Primary Reference
Free metals in water by DGT	23	CAM SOP-00447	DGT Research, Technical Document

Remarks:

This report provides the estimated integrated water concentrations during the DGT sampler deployments. Accumulated masses of free metals in the DGT devices have been reported separately for the above-noted job number.

Water concentrations were estimated based on the masses of free metals accumulated in the DGT devices along with the reported average temperature and deployment time, known diffusion coefficients and physical properties of the DGT devices.

We trust this report is sufficient for your purposes. If you have any questions or concerns, please do not hesitate to contact the undersigned.

Sincerely,



Heather Lord, Ph.D.
Manager, Environmental R&D
Maxxam Analytics Corporation



Angel Rodriguez-Lafuente, Ph.D.
Senior Analyst, Environmental R&D
Maxxam Analytics Corporation

Time averaged concentrations of free metal ions in water

Maxxam ID		BDF184-01	BDF185-01	BDF186-01	BDF187-01				
Client ID		HAC-1 N14265	HAC-2 N14266	HAC-3 N14267	HAC-4 N14268				
Deployment time		38.2 days	38.2 days	38.2 days	38.1 days	QC			
Average temperature		10.9 °C	11.1 °C	11.2 °C	11.2 °C	BATCH			
Note	Metal Name	MDLw	RDLw	Units	Time-averaged concentration in water, C _w				
1	Aluminum (Al)	1.6	5.4	µg/L	6.1	15	6.5	<RDLw	4226452
	Antimony (Sb)	0.053	0.26	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
6	Arsenic (As)	0.054	0.27	µg/L	<RDLw	<RDLw	<RDLw	<RDLw	4226452
	Barium (Ba)	0.17	0.68	µg/L	19	26	14	13	4226452
	Beryllium (Be)	0.054	0.27	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
3	Bismuth (Bi)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	4226452
3	Boron (B)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	4226452
	Cadmium (Cd)	0.0059	0.029	µg/L	<MDLw	<MDLw	<MDLw	<RDLw	4226452
1, 4	Calcium (Ca)	33	109	µg/L	280	350	250	260	4226452
	Chromium (Cr)	0.32	1.6	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Cobalt (Co)	0.031	0.15	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Copper (Cu)	0.058	0.29	µg/L	5.5	6.2	5.5	5.1	4226452
	Iron (Fe)	2.7	13	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Lead (Pb)	0.020	0.10	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
4	Lithium (Li)	0.16	0.79	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Magnesium (Mg)	2.3	12	µg/L	15	17	14	<RDLw	4226452
	Manganese (Mn)	0.14	0.70	µg/L	1.9	2.9	1.9	1.8	4226452
1, 6	Molybdenum (Mo)	0.091	0.30	µg/L	<RDLw	<RDLw	<RDLw	<MDLw	4226452
1	Nickel (Ni)	0.24	0.81	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
6	Phosphorus (P)	2.7	13	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
4	Potassium (K)	3.3	17	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
6	Selenium (Se)	0.073	0.37	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
4	Silver (Ag)	0.0023	0.012	µg/L	<RDLw	<MDLw	<MDLw	<MDLw	4226452
1, 4	Sodium (Na)	93000	310000	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
1	Strontium (Sr)	0.13	0.45	µg/L	3.3	5.3	2.1	2.1	4226452
	Thallium (Tl)	0.00081	0.0041	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
3	Tin (Sn)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	4226452
5	Titanium (Ti)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	4226452
6	Uranium (U)	0.0047	0.024	µg/L	0.041	0.064	<RDLw	<RDLw	4226452
6	Vanadium (V)	0.059	0.15	µg/L	0.70	0.85	0.85	0.69	4226452
	Zinc (Zn)	0.20	1.0	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452

- 1 DLs increased due to presence in the fabrication control or in the method blanks
- 2 DLs increased due to presence in the trip blank or in the field blanks
- 3 No gel or water diffusion coefficient reported, water concentrations cannot be calculated
- 4 Metal has low affinity for the resin; reported values should be interpreted with caution
- 5 Metal cannot be reported when using a Chelex-Metsorb resin
- 6 Metal present as oxyanion

MDLw – Method Detection Limit in water
 RDLw – Reporting Detection Limit in water
 C_w – Estimated concentration in water

Time averaged concentrations of free metal ions in water

Maxxam ID		BDF188-01	BDF189-01	BDF190-01	BDF191-01				
Client ID		P2-1 N14269	P2-2 N14270	P2-3 N14271	P2-4 N14272				
Deployment time		38.2 days	38.2 days	38.2 days	38.2 days	QC			
Average temperature		6.0 °C	6.0 °C	6.0 °C	6.0 °C	BATCH			
Note	Metal Name	MDLw	RDLw	Units	Time-averaged concentration in water, C _w				
1	Aluminum (Al)	1.9	6.4	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Antimony (Sb)	0.062	0.31	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
6	Arsenic (As)	0.064	0.32	µg/L	<RDLw	<RDLw	<RDLw	<RDLw	4226452
	Barium (Ba)	0.20	0.81	µg/L	5.7	6.0	6.4	5.9	4226452
	Beryllium (Be)	0.065	0.32	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
3	Bismuth (Bi)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	4226452
3	Boron (B)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	4226452
	Cadmium (Cd)	0.0070	0.035	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
1, 4	Calcium (Ca)	39	130	µg/L	220	220	260	200	4226452
	Chromium (Cr)	0.38	1.9	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Cobalt (Co)	0.037	0.18	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Copper (Cu)	0.069	0.35	µg/L	0.42	<RDLw	0.39	0.45	4226452
	Iron (Fe)	3.2	16	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Lead (Pb)	0.024	0.12	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
4	Lithium (Li)	0.19	0.94	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Magnesium (Mg)	2.7	14	µg/L	<MDLw	<MDLw	<RDLw	<MDLw	4226452
	Manganese (Mn)	0.17	0.83	µg/L	11	9.0	6.6	9.5	4226452
1, 6	Molybdenum (Mo)	0.11	0.36	µg/L	2.8	2.9	3.2	3.0	4226452
1	Nickel (Ni)	0.29	0.96	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
6	Phosphorus (P)	3.2	16	µg/L	<RDLw	<RDLw	<RDLw	<RDLw	4226452
4	Potassium (K)	4.0	20	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
6	Selenium (Se)	0.087	0.44	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
4	Silver (Ag)	0.0027	0.014	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
1, 4	Sodium (Na)	110000	370000	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
1	Strontium (Sr)	0.16	0.53	µg/L	1.7	1.8	2.2	1.9	4226452
	Thallium (Tl)	0.0010	0.0048	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
3	Tin (Sn)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	4226452
5	Titanium (Ti)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	4226452
6	Uranium (U)	0.0056	0.028	µg/L	0.086	0.093	0.091	0.094	4226452
6	Vanadium (V)	0.070	0.17	µg/L	0.43	0.39	0.46	0.44	4226452
	Zinc (Zn)	0.24	1.2	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452

- 1 DLs increased due to presence in the fabrication control or in the method blanks
- 2 DLs increased due to presence in the trip blank or in the field blanks
- 3 No gel or water diffusion coefficient reported, water concentrations cannot be calculated
- 4 Metal has low affinity for the resin; reported values should be interpreted with caution
- 5 Metal cannot be reported when using a Chelex-Metsorb resin
- 6 Metal present as oxyanion

MDLw – Method Detection Limit in water
 RDLw – Reporting Detection Limit in water
 C_w – Estimated concentration in water

Time averaged concentrations of free metal ions in water

Maxxam ID		BDF192-01	BDF193-01	BDF194-01	BDF195-01				
Client ID		B2-1 N14273	B2-2 N14274	B2-3 N14275	B2-4 N14276				
Deployment time		37.9 days	37.9 days	37.8 days	37.8 days	QC			
Average temperature		8.6 °C	8.6 °C	8.6 °C	8.6 °C	BATCH			
Note	Metal Name	MDLw	RDLw	Units	Time-averaged concentration in water, C _w				
1	Aluminum (Al)	1.8	5.9	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Antimony (Sb)	0.058	0.29	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
6	Arsenic (As)	0.059	0.30	µg/L	<RDLw	<RDLw	<RDLw	<RDLw	4226452
	Barium (Ba)	0.19	0.75	µg/L	8.1	9.4	10	12	4226452
	Beryllium (Be)	0.060	0.30	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
3	Bismuth (Bi)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	4226452
3	Boron (B)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	4226452
	Cadmium (Cd)	0.0064	0.032	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
1, 4	Calcium (Ca)	36	120	µg/L	<RDLw	<RDLw	<RDLw	<RDLw	4226452
	Chromium (Cr)	0.35	1.8	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Cobalt (Co)	0.034	0.17	µg/L	<RDLw	<RDLw	<RDLw	<RDLw	4226452
	Copper (Cu)	0.064	0.32	µg/L	<RDLw	<RDLw	<RDLw	<RDLw	4226452
	Iron (Fe)	2.9	15	µg/L	340	350	264	333	4226452
	Lead (Pb)	0.022	0.11	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
4	Lithium (Li)	0.17	0.87	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Magnesium (Mg)	2.5	13	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Manganese (Mn)	0.15	0.77	µg/L	56	64	69	86	4226452
1, 6	Molybdenum (Mo)	0.10	0.33	µg/L	0.51	0.53	0.52	0.54	4226452
1	Nickel (Ni)	0.26	0.88	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
6	Phosphorus (P)	3.0	15	µg/L	27	35	37	44	4226452
4	Potassium (K)	3.7	18	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
6	Selenium (Se)	0.080	0.40	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
4	Silver (Ag)	0.0025	0.013	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
1, 4	Sodium (Na)	100000	340000	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
1	Strontium (Sr)	0.15	0.49	µg/L	1.1	1.3	1.2	1.5	4226452
	Thallium (Tl)	0.00089	0.0045	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
3	Tin (Sn)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	4226452
5	Titanium (Ti)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	4226452
6	Uranium (U)	0.0052	0.026	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
6	Vanadium (V)	0.064	0.16	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Zinc (Zn)	0.22	1.1	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452

- 1 DLs increased due to presence in the fabrication control or in the method blanks
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- 4 Metal has low affinity for the resin; reported values should be interpreted with caution
- 5 Metal cannot be reported when using a Chelex-Metsorb resin
- 6 Metal present as oxyanion

MDLw – Method Detection Limit in water
 RDLw – Reporting Detection Limit in water
 C_w – Estimated concentration in water

Time averaged concentrations of free metal ions in water

Maxxam ID		BDF196-01	BDF197-01	BDF198-01	BDF199-01				
Client ID		PNF-1 N14277	PNF-2 N14278	PNF-3 N14279	PNF-4 N14280				
Deployment time		35.6 days	35.6 days	35.6 days	35.6 days	QC			
Average temperature		4.5 °C	4.5 °C	4.5 °C	4.5 °C	BATCH			
Note	Metal Name	MDLw	RDLw	Units	Time-averaged concentration in water, C _w				
1	Aluminum (Al)	2.2	7.2	µg/L	<RDLw	12	<RDLw	<RDLw	4226452
	Antimony (Sb)	0.071	0.35	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
6	Arsenic (As)	0.073	0.36	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Barium (Ba)	0.23	0.91	µg/L	6.9	6.3	5.2	7.2	4226452
	Beryllium (Be)	0.073	0.37	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
3	Bismuth (Bi)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	4226452
3	Boron (B)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	4226452
	Cadmium (Cd)	0.0079	0.039	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
1, 4	Calcium (Ca)	44	150	µg/L	310	280	260	260	4226452
	Chromium (Cr)	0.43	2.2	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Cobalt (Co)	0.041	0.21	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Copper (Cu)	0.078	0.39	µg/L	<RDLw	<RDLw	<RDLw	<RDLw	4226452
	Iron (Fe)	3.6	18	µg/L	<MDLw	<RDLw	<MDLw	<MDLw	4226452
	Lead (Pb)	0.027	0.14	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
4	Lithium (Li)	0.21	1.1	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Magnesium (Mg)	3.1	16	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Manganese (Mn)	0.19	0.94	µg/L	3.9	4.9	3.9	4.4	4226452
1, 6	Molybdenum (Mo)	0.12	0.41	µg/L	<RDLw	<RDLw	<RDLw	<RDLw	4226452
1	Nickel (Ni)	0.32	1.1	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
6	Phosphorus (P)	3.6	18	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
4	Potassium (K)	4.5	22	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
6	Selenium (Se)	0.10	0.49	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
4	Silver (Ag)	0.0031	0.016	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
1, 4	Sodium (Na)	120000	410000	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
1	Strontium (Sr)	0.18	0.60	µg/L	2.2	1.8	1.4	2.0	4226452
	Thallium (Tl)	0.0011	0.0055	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
3	Tin (Sn)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	4226452
5	Titanium (Ti)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	4226452
6	Uranium (U)	0.0064	0.032	µg/L	0.072	0.078	0.075	0.086	4226452
6	Vanadium (V)	0.079	0.20	µg/L	<RDLw	<RDLw	<MDLw	<RDLw	4226452
	Zinc (Zn)	0.27	1.4	µg/L	<MDLw	15	<MDLw	<MDLw	4226452

- 1 DLs increased due to presence in the fabrication control or in the method blanks
- 2 DLs increased due to presence in the trip blank or in the field blanks
- 3 No gel or water diffusion coefficient reported, water concentrations cannot be calculated
- 4 Metal has low affinity for the resin; reported values should be interpreted with caution
- 5 Metal cannot be reported when using a Chelex-Metsorb resin
- 6 Metal present as oxyanion

MDLw – Method Detection Limit in water
 RDLw – Reporting Detection Limit in water
 C_w – Estimated concentration in water

Time averaged concentrations of free metal ions in water

Maxxam ID		BDF200-01	BDF201-01	BDF202-01	BDF203-01				
Client ID		PRef1-1 N14281	PRef1-2 N14282	PRef1-3 N14283	PRef1-4 N14284				
Deployment time		34.3 days	34.3 days	34.3 days	34.2 days	QC			
Average temperature		3.9 °C	3.9 °C	3.9 °C	3.9 °C	BATCH			
Note	Metal Name	MDLw	RDLw	Units	Time-averaged concentration in water, C _w				
1	Aluminum (Al)	2.3	7.7	µg/L	<RDLw	<RDLw	12	<RDLw	4226452
	Antimony (Sb)	0.075	0.38	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
6	Arsenic (As)	0.078	0.39	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Barium (Ba)	0.24	0.97	µg/L	5.8	5.6	6.2	5.8	4226452
	Beryllium (Be)	0.078	0.39	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
3	Bismuth (Bi)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	4226452
3	Boron (B)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	4226452
	Cadmium (Cd)	0.0084	0.042	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
1, 4	Calcium (Ca)	47	155	µg/L	200	290	310	310	4226452
	Chromium (Cr)	0.46	2.3	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Cobalt (Co)	0.044	0.22	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Copper (Cu)	0.083	0.42	µg/L	<RDLw	<RDLw	<RDLw	<MDLw	4226452
	Iron (Fe)	3.8	19	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Lead (Pb)	0.029	0.15	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
4	Lithium (Li)	0.23	1.1	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Magnesium (Mg)	3.3	17	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Manganese (Mn)	0.20	1.0	µg/L	4.5	2.4	5.1	7.0	4226452
1, 6	Molybdenum (Mo)	0.13	0.43	µg/L	<MDLw	<MDLw	<MDLw	<RDLw	4226452
1	Nickel (Ni)	0.35	1.2	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
6	Phosphorus (P)	3.9	19	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
4	Potassium (K)	4.8	24	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
6	Selenium (Se)	0.10	0.52	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
4	Silver (Ag)	0.0033	0.017	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
1, 4	Sodium (Na)	130000	440000	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
1	Strontium (Sr)	0.19	0.64	µg/L	1.6	2.2	2.2	2.2	4226452
	Thallium (Tl)	0.0012	0.0058	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
3	Tin (Sn)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	4226452
5	Titanium (Ti)	n/a	n/a	µg/L	n/a	n/a	n/a	n/a	4226452
6	Uranium (U)	0.0068	0.034	µg/L	0.070	0.054	0.061	0.058	4226452
6	Vanadium (V)	0.084	0.21	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452
	Zinc (Zn)	0.29	1.5	µg/L	<MDLw	<MDLw	<MDLw	<MDLw	4226452

- 1 DLs increased due to presence in the fabrication control or in the method blanks
- 2 DLs increased due to presence in the trip blank or in the field blanks
- 3 No gel or water diffusion coefficient reported, water concentrations cannot be calculated
- 4 Metal has low affinity for the resin; reported values should be interpreted with caution
- 5 Metal cannot be reported when using a Chelex-Metsorb resin
- 6 Metal present as oxyanion

MDLw – Method Detection Limit in water
 RDLw – Reporting Detection Limit in water
 C_w – Estimated concentration in water

Quality Assurance Notes

1. Estimated water concentrations (C_w), Method Detection Limits (MDL_w) and Reporting Detection Limits (RDL_w) were calculated using the average temperature and DGT deployment times reported by the client.
2. A single average Detection Limit is reported for samples from the same site as the temperature and deployment time variability was considered to be not significant compared with analytical variance.
3. The following DGT specifications, provided by the supplier, were used for the water concentration estimations:
 - Diffusive layer thickness, gel plus membrane, (Δg) = 0.90 mm
 - Area of exposed diffusive layer = 3.14 cm²
 - Volume of resin = 0.2 mL
4. Diffusion coefficients in diffusive gel at 25 °C were taken from the Technical Documentation published by DGT Research LTD and other published literature values. Where diffusion coefficients in the diffusion gel were not available, water diffusion coefficients at 25°C were used. Diffusion coefficients at 25 °C were, in turn, used to calculate the diffusion coefficients at the average temperature of deployment.
5. Diffusion coefficients for Bi, B and Sn were not reported in the available sources and therefore water concentration estimates for these metals have not been included in this report. These can be calculated in the future if appropriate diffusion coefficients become available.
6. The Chelex-Metsorb resin is selective towards di- and tri-valent cationic metal species and oxyanionic species; as a result, monovalent metal species including Lithium (Li), Sodium (Na), Potassium (K), and Silver (Ag) have extremely low affinity and data for these metals should be interpreted with caution. Calcium (Ca), despite being divalent, is also known to have a low affinity for this resin.
7. Titanium (Ti) cannot be reported when using a Chelex-Metsorb mixed binding layer because Metsorb is a titanium-based resin.
8. All results have been rounded to two significant figures.
9. All DGTS, including fabrication controls, trip blanks and field blanks were from the same lot of DGTS, obtained from the supplier at the same time. Trip blanks and field blanks were shipped to accompany the deployed DGTS while the fabrication controls were retained in the lab for QC purposes. Copper was detected in the trip blank DGT (N14283), which was shipped to the field, double sealed in zip-lock bags and stored by the client along with the field blanks during the deployment. We note that copper was not detected in the laboratory method blank prepared from the same reagents that were used for all of the resin digests. Copper was also not detected in any of the fabrication controls or most importantly, any of the field blanks. Because of this we suggest the presence of copper in the trip blank may be considered as spurious and we determined that it was not necessary to increase the copper Detection Limits of estimated water concentrations.

Quality Assurance Report

Metals Extracted by Field Blanks and Trip Blanks

Maxxam ID	BDF204-01	BDF205-01	BDF206-01	
Client ID	Field Blank 1 N14289	Field Blank 2 N14282	Trip Blank N14283	
Deployment time	n/a	n/a	n/a	QC BATCH
Temperature	n/a	n/a	n/a	

Note	Metal Name	MDL	RDL	Units	Mass Extracted by DGT			
3	Aluminum (Al)	0.59	1.96	µg	<MDL	<MDL	<MDL	4226497
	Antimony (Sb)	0.025	0.13	µg	<MDL	<MDL	<MDL	4226497
	Arsenic (As)	0.025	0.13	µg	<MDL	<MDL	<MDL	4226497
	Barium (Ba)	0.063	0.25	µg	<MDL	<MDL	<MDL	4226497
	Beryllium (Be)	0.013	0.063	µg	<MDL	<MDL	<MDL	4226497
3	Bismuth (Bi)	0.077	0.26	µg	<MDL	<MDL	<MDL	4226497
	Boron (B)	0.25	1.3	µg	<MDL	<MDL	<MDL	4226497
	Cadmium (Cd)	0.0025	0.013	µg	<MDL	<MDL	<MDL	4226497
1, 3	Calcium (Ca)	20	66	µg	<MDL	<MDL	<MDL	4226497
	Chromium (Cr)	0.125	0.63	µg	<MDL	<MDL	<MDL	4226497
	Cobalt (Co)	0.013	0.063	µg	<MDL	<MDL	<MDL	4226497
	Copper (Cu)	0.025	0.13	µg	<MDL	<MDL	1.06	4226497
	Iron (Fe)	1.25	6.3	µg	<MDL	<MDL	<MDL	4226497
	Lead (Pb)	0.013	0.063	µg	<MDL	<MDL	<MDL	4226497
1	Lithium (Li)	0.125	0.63	µg	<MDL	<MDL	<MDL	4226497
	Magnesium (Mg)	1.25	6.3	µg	<MDL	<MDL	<MDL	4226497
	Manganese (Mn)	0.05	0.25	µg	<MDL	<MDL	<MDL	4226497
3	Molybdenum (Mo)	0.044	0.15	µg	<MDL	<MDL	<MDL	4226497
3	Nickel (Ni)	0.095	0.32	µg	<MDL	<MDL	<MDL	4226497
	Phosphorus (P)	1.25	6.3	µg	<MDL	<MDL	<MDL	4226497
1	Potassium (K)	5	25	µg	<MDL	<MDL	<MDL	4226497
	Selenium (Se)	0.05	0.25	µg	<MDL	<MDL	<MDL	4226497
3	Strontium (Sr)	0.082	0.27	µg	<MDL	<MDL	<MDL	4226497
1	Silver (Ag)	0.0025	0.013	µg	<MDL	<MDL	<MDL	4226497
1, 3	Sodium (Na)	94000	310000	µg	<MDL	<MDL	<MDL	4226497
	Thallium (Tl)	0.0013	0.013	µg	<MDL	<MDL	<MDL	4226497
3	Tin (Sn)	0.092	0.31	µg	<MDL	<MDL	<MDL	4226497
2	Titanium (Ti)	n/a	n/a	µg	n/a	n/a	n/a	4226497
	Uranium (U)	0.0025	0.013	µg	<MDL	<MDL	<MDL	4226497
	Vanadium (V)	0.025	0.063	µg	<MDL	<MDL	<MDL	4226497
	Zinc (Zn)	0.125	0.63	µg	<MDL	<MDL	<MDL	4226497

- 1 – Metal has very low affinity for the resin
- 2 – Metal cannot be reported when using Chelex-Metsorb resin (titanium based resin)
- 3 – MDL and RDL were raised due to presence in the fabrication controls and/or blanks (see QA report)

Notes:

- a. The data presented here have not been rounded due to the wide range of concentrations reported and to facilitate further data manipulation. In any final data presentation, only two significant figures should be reported.
- b. <MDL: Target compound not detected (below Method Detection Limit).
- c. <RDL: Target compound detected above MDL but below Reporting Detection Limit.

Background information

Diffusion coefficients at 25 °C

Metal Name	D ₂₅	Units
Aluminum (Al)	4.75	10 ⁻⁶ cm ² /s
Antimony (Sb)	6.22	10 ⁻⁶ cm ² /s
Arsenic (As)	6.02	10 ⁻⁶ cm ² /s
Barium (Ba)	4.80	10 ⁻⁶ cm ² /s
Beryllium (Be)	3.00	10 ⁻⁶ cm ² /s
Cadmium (Cd)	6.09	10 ⁻⁶ cm ² /s
Calcium (Ca)	7.93	10 ⁻⁶ cm ² /s
Chromium (Cr)	5.05	10 ⁻⁶ cm ² /s
Cobalt (Co)	5.94	10 ⁻⁶ cm ² /s
Copper (Cu)	6.23	10 ⁻⁶ cm ² /s
Iron (Fe)	6.11	10 ⁻⁶ cm ² /s
Lead (Pb)	8.03	10 ⁻⁶ cm ² /s
Lithium (Li)	10.3	10 ⁻⁶ cm ² /s
Magnesium (Mg)	7.05	10 ⁻⁶ cm ² /s
Manganese (Mn)	5.85	10 ⁻⁶ cm ² /s
Molybdenum (Mo)	6.33	10 ⁻⁶ cm ² /s
Nickel (Ni)	5.77	10 ⁻⁶ cm ² /s
Phosphorus (P)	6.05	10 ⁻⁶ cm ² /s
Potassium (K)	19.6	10 ⁻⁶ cm ² /s
Selenium (Se)	8.91	10 ⁻⁶ cm ² /s
Silver (Ag)	14.1	10 ⁻⁶ cm ² /s
Sodium (Na)	13.3	10 ⁻⁶ cm ² /s
Strontium (Sr)	14.1	10 ⁻⁶ cm ² /s
Thallium (Tl)	13.3	10 ⁻⁶ cm ² /s
Uranium (U)	5.56	10 ⁻⁶ cm ² /s
Vanadium (V)	7.98	10 ⁻⁶ cm ² /s
Zinc (Zn)	6.08	10 ⁻⁶ cm ² /s



APPENDIX E

Sediment Quality

Sediment Quality Data Report – August 2015 Collections

Application of the SEM-AVS Method and Selective Extraction Analysis in Evaluating Sediments Collected in the Vicinity of Mount Polley Mine – August 2015.

Prepared by:

Pierre Stecko, M.Sc., EP, R.P.Bio. and Katharina Batchelar

Minnow Environmental Inc.

Memorandum

Date: October 29, 2015

To: Dale Reimer, Mount Polley Mining Corporation

From: Pierre Stecko, Katharina Batchelar, Minnow Environmental Inc.

Cc: Colleen Hughes, Katie McMahan, Mount Polley Mining Corporation

Lyn Anglin, Imperial Metals Corporation

Trish Miller, Golder Associates

Re: Sediment Quality Data Report - August 2015 Collections

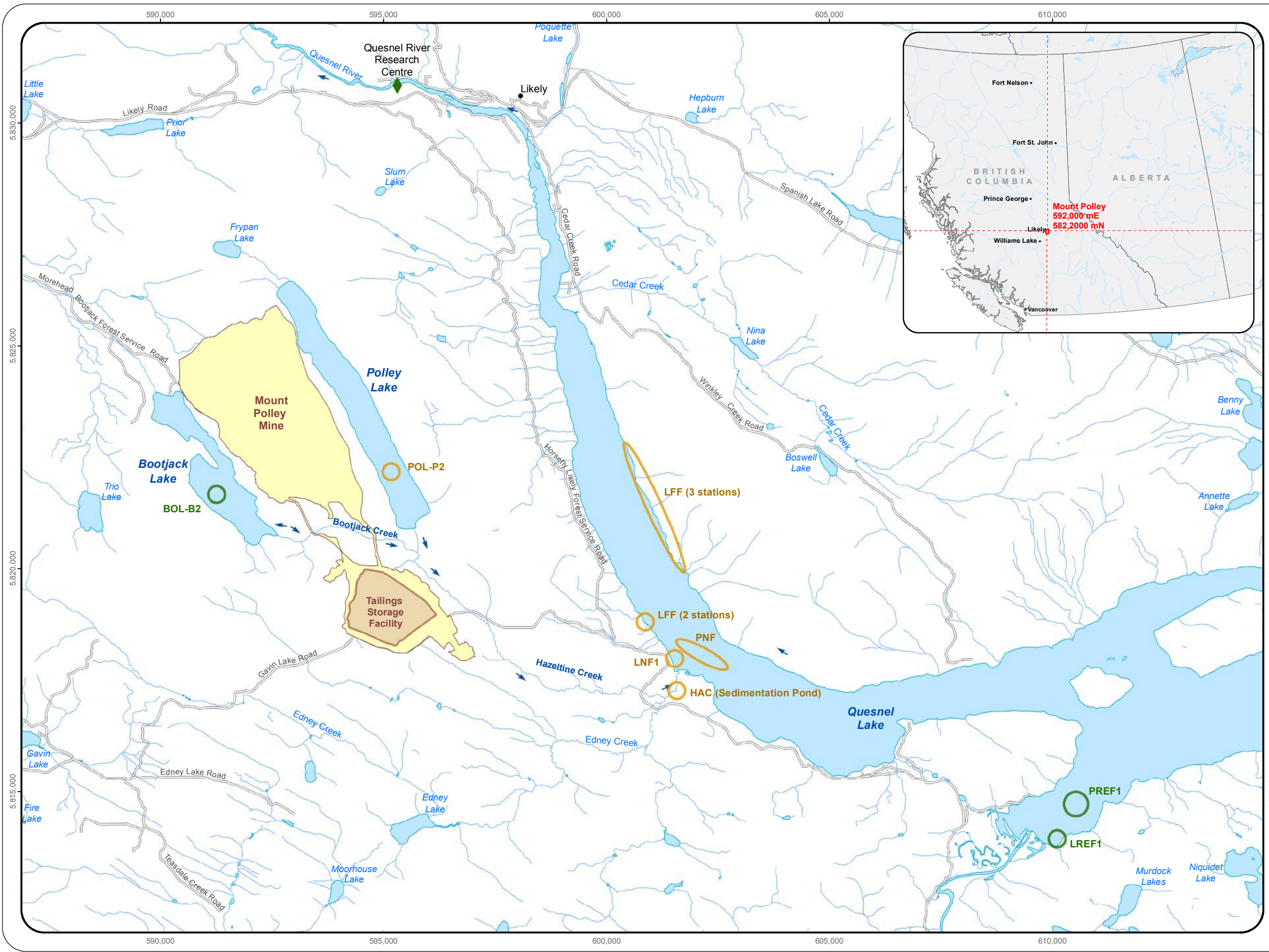
This memorandum provides a brief summary of sediment quality data collected by Minnow Environmental Inc. on behalf of the Mount Polley Mining Corporation (MPMC) in the vicinity of the Mount Polley Mine (Figure 1). Sediment samples were collected in August 2015 from three waterbodies (Polley Lake, Hazeltine Creek and Quesnel Lake) affected by the August 4th 2014 failure of the Mount Polley Tailings Dam and from corresponding reference areas. The purpose of this memorandum is to provide data to be used by Golder Associates in a Detailed Site Investigation Report required under the British Columbia Contaminated Sites Regulation (Government of British Columbia 1996).

Methods

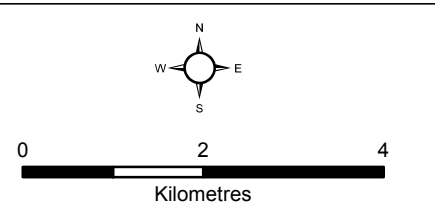
Sediment samples were collected between August 13th and 26th 2015 at stations in Polley Lake, Bootjack Lake, the Hazeltine Creek Sedimentation Pond and Quesnel Lake (Figure 1; Appendix Table A.1). Where possible, samples were collected from the same locations and using the same methods as in 2014 (Minnow 2015).

Sampling

Briefly, in Polley and Bootjack lakes, sediments for the analysis of metals and total organic carbon (TOC) were collected using a Kajak-Brinkhurst (KB) corer in accordance with technical guidance for gravity coring outlined in the British Columbia Field Sampling Manual (BCWLAP 2003) and the federal Technical Guidance Manual for Environmental Effects Monitoring (EEM; Environment Canada 2012). Sediment samples for particle size distribution were collected using a petite ponar grab sampler (15.24 cm x 15.24 cm; 0.023 m² sampling area). Five replicate stations were sampled to represent each area (Appendix Table A.1). All core samples were extruded into a core collar and then cut using a core knife to collect the top 3 cm of sediment, which was then transferred into a



- Sediment Sampling Area**
- Exposed
 - Reference
 - ◆ Quesnel River Research Centre (QRRC)
 - Towns
 - Tailings Storage Facility
 - Active Mine Operation
 - Waterbody
 - Watercourse
 - Road
 - ➔ Water Flow Direction



Datum: NAD 83 Map Projection: UTM Zone 10U
 Data Source: Department of Natural Resources Canada.
 Creation Date: October 2015
 Project No.: 2574

Figure 1: Mount Polley Sediment Quality Monitoring Areas, August 2015.



250 mL glass sampling jar labeled with the project number, sample location and collection date. The procedure was then repeated to provide a composite sample of sufficient volume for the required analyses. All sampling equipment was rinsed between stations using site water

In Quesnel Lake, sediment samples from littoral habitats were collected using a stainless steel petite ponar grab sampler and sediment samples from profundal habitats were collected using a stainless steel petite or standard ponar grab sampler (22.86 cm x 22.86 cm; 0.052 m² sampling area) in accordance with technical guidance outlined in the British Columbia Field Sampling Manual (BCWLAP 2003) and the federal Technical Guidance Manual for EEM (Environment Canada 2012). Profundal grab samples (mean depth approximately 100 meters) were collected with the assistance of a commercial line hauler (Ace Line Hauler - Brutus Plus 40). Three to five replicate stations were sampled to represent each sampling area (Appendix Table A.1). At each station, composite samples of the top three centimeters of surficial sediment of three to ten acceptable grabs (i.e., full to each edge of the sampler) were collected. Each grab was collected into a plastic tote and observed for completeness and any unusual characteristics. If the sample was deemed acceptable, surficial material to a depth of 3 centimeters was transferred to a second tote using a stainless steel spoon. Remaining sediment was discarded. The procedure was then repeated for all subsequent grabs. The material within the tote was homogenized using a stainless steel spoon and transferred into 250 mL glass sampling jars labeled with the project number, sample location and collection date. All sampling equipment was rinsed between stations using site water.

In the Hazeltine Creek Sedimentation Pond, sediment samples were collected using a stainless steel spoon. Five replicate stations were sampled to represent each sampling area (Appendix Table A.1). At each sampling station, a composite sediment sample was prepared from ten spoons of sediment. Surficial sediment was carefully collected to ensure the capture of a uniform depth (top 3 cm) and to limit disturbance that could result in loss of fines. Each spoonful was placed into a plastic tote. After ten scoops were collected, the material within the tote was homogenized using a stainless steel spoon and transferred into 250 mL glass sampling jars labeled with the project number, sample location and collection date. All sampling equipment was rinsed between stations using site water.

Field duplicate (split) sediment samples were collected at a frequency of 10% for quality assurance/quality control (QA/QC) purposes. Supporting information collected at each

sampling site included GPS (Geographic Positioning System) coordinates, sampling depth, Secchi depth (lakes only), field meter measurements of temperature, specific conductance, dissolved oxygen and pH (using a YSI EXO™ handheld portable field meter equipped with YSI EXO2™ Sonde), site photographs (including photographs of sediment samples), and notes of the presence or absence of aquatic vegetation, and other physical observations (sediment texture, colour, density, etc.). Immediately after collection, samples were placed into a cooler with ice packs, where they were maintained cool prior to transport to the field laboratory where they were placed in a refrigerator and held until shipment to the analytical laboratory. Sediment samples were shipped to the analytical laboratory (ALS Environmental, Burnaby BC) at minimum frequency of weekly. Prior to shipment, samples were placed in a cooler with frozen ice packs and a chain-of custody form was prepared and packed with the samples. Coolers were shipped overnight for next day delivery to ALS Environmental.

Laboratory Analysis

Upon receipt, ALS Environmental opened the coolers, measured temperature to verify the maintenance of cold samples, removed each sample from the coolers, logged the sample, and assigned each sample a unique sample identification code. A sample receipt confirmation was then sent to MPMC and Minnow for verification.

Laboratory analysis included moisture content, pH, particle size distribution, total organic carbon content, total nitrogen concentration, and metal concentrations. Total organic carbon content and metal concentrations were determined in the silt/clay fraction (<63 µm diameter) in accordance with recent recommendations by the British Columbia Ministry of Environment (BCMoE 2012) and because sediment quality characterization conducted in 2014 indicated similar results in <63 µm and <2 mm sediments (Minnow 2015). Upon completion of the analyses, data reports were provided by ALS Environmental to MPMC and Minnow electronically in Adobe Acrobat Portable Document Format (PDF) and as MSEXcel files.

Data Analysis

Upon receipt of the analytical data, a Data Quality Assessment (DQA) was completed, including an examination of data completeness, method detection limits achieved, laboratory precision, laboratory accuracy, and field precision. Following the completion of DQA, sediment quality data were summarized by area, by calculating mean, median, standard deviation, standard error, 95% confidence limits, minimum and maximum. Data

were then evaluated in comparison to Contaminated Sites Regulation (CSR) criteria (Government of British Columbia 1996) and reference concentrations.

Environmental matters pertaining to contaminated sites in British Columbia generally fall under the jurisdiction of the BC Ministry of the Environment pursuant to the *Environmental Management Act (EMA)* (Government of British Columbia 2003). The key regulations under the *EMA* relating to the assessment and remediation of contaminated sites are the Contaminated Sites Regulation (Government of British Columbia 1996) and the Hazardous Waste Regulation (HWR; Government of British Columbia 1988). Within the CSR, numeric criteria for sediment listed in Schedule 9 (Government of British Columbia 1996) are used to determine if sediments are contaminated. CSR criteria have been defined for a limited number of analytes for sensitive and typical sediment environments. Sensitive sediment is defined as sediment at a site with sensitive aquatic habitat (e.g., spawning habitat) and for which sensitive management objectives apply, and typically apply to the ecologically active zone (top one meter) of sediments in an aquatic receiving environment (BCMoE 2013). Typical sediment is defined as any sediment that is not sensitive sediment (BCMoE 2013).

Reference values contained within this memorandum fall into two categories - pre-event data and data collected at reference sites in 2014 and 2015. Pre-event and reference data were compiled and used to calculate reference screening values. For each pre-event or reference dataset, 95th percentile values were calculated and compared. The highest pre-event or reference 95th percentile value was then used to screen the data from the exposed areas to identify analytes present at impacted areas at concentrations greater than pre-event and/or reference.

Results

Data Quality Assessment indicated good sediment data quality, meaning that data can be used with a high level of confidence for interpretation and the derivation of conclusions (Appendix C).

Polley Lake

Sediment collected from Polley Lake in 2015 (from the south side of the lake at Station POL-P2; Figure 1) was predominantly silt and clay, and was similar in particle size distribution to sediments collected in 2014 and from the reference lake (Bootjack Lake; Table 1; Appendix Table D.1). As observed in 2014, total organic carbon (TOC) content was lower in Polley Lake than reference (Table 1).

Table 1: Summary sediment quality data for Polley Lake and Bootjack Lake sampling areas, Mount Polley Mine, 2014 and 2015. Metals and total organic carbon data are based on the < 63µm fraction of sediment ¹.

Parameter	Units	Contaminated Sites Regulation Criteria ²		Reference 95th Percentile ³			Reference				Exposed			
							Bootjack (BOL-B2)				Polley (POL-P2)			
							2014		2015		2014		2015	
							Mean	t*SE ⁴	Mean	t*SE ⁴	Mean	t*SE ⁴	Mean	t*SE ⁴
		Sensitive	Typical	Historical Polley Lake (POL-P1 and POL-P2)	Bootjack Lake 2014 (BOL-B1 and BOL-B2)	Bootjack Lake 2015 (BOL-B2)								
Physical Tests														
Moisture	%	-	-	-	93.8	96.1	93.4	1.3	95.3	2.6	73.9	50.4	87.0	2.9
pH (1:2 soil:water) ¹	pH	-	-	-	5.98	6.46	6.01	0.14	6.58	0.34	7.93	1.41	7.47	0.23
Particle Size														
% Gravel (>2mm)	%	-	-	-	<0.10	<0.10	<0.10	0	<0.10	0	<0.10	0	<0.10	0
% Sand (2.0mm - 0.063mm)	%	-	-	-	21.4	0.21	0.49	0.23	0.26	0.26	0.74	0.82	0.16	0.11
% Silt (0.063mm - 4µm)	%	-	-	-	84.2	83.7	83.5	2.50	82.6	1.76	79.1	3.39	78.8	9.26
% Clay (<4µm)	%	-	-	-	16.7	19.2	16.0	2.25	17.2	1.78	20.1	4.19	21.1	9.27
Organic / Inorganic Carbon (<63µm)														
Total Organic Carbon (TOC)	%	-	-	20.8	16.5	15.5	15.7	2.6	15.1	0.9	7.7	7.2	7.4	2.9
Nutrients (Bulk sediment)														
Total Nitrogen by LECO	%	-	-	-	1.68	1.67	1.54	0.14	1.64	0.09	0.58	1.61	0.94	0.22
Metals (<63µm)														
Aluminum	mg/kg	-	-	20,620	18,525	19,600	17,700	1,972	18,667	2,610	24,100	6,726	28,220	1,636
Antimony	mg/kg	-	-	1.22	0.86	1.04	0.80	0.15	0.96	0.19	0.55	0.29	1.09	0.20
Arsenic	mg/kg	11	20	8.94	6.36	8.38	6.09	0.45	7.72	1.65	12.6	3.94	14.0	0.95
Barium	mg/kg	-	-	227	248	308	243	17	289	47	254	90	329	22
Beryllium	mg/kg	-	-	0.63	0.70	0.71	0.69	0.02	0.70	0.01	0.86	0.18	1.02	0.05
Bismuth	mg/kg	-	-	0.37	0.15	0.14	0.13	0.05	0.14	0.01	0.12	0.05	0.12	0.01
Boron	mg/kg	-	-	17	17	16	13	1.4	15	3	14	13	14	1.1
Cadmium	mg/kg	2.2	4.2	0.690	0.404	0.591	0.394	0.032	0.529	0.157	0.234	0.277	0.218	0.021
Calcium	mg/kg	-	-	15,890	10,925	9,040	7,420	1,006	8,417	1,571	29,467	16,573	24,500	4,099
Chromium	mg/kg	56	110	67.6	98.5	47.3	61.9	119	45.0	6.6	45.4	126	26.1	6.0
Cobalt	mg/kg	-	-	16.4	11.7	13.9	11.0	2.1	13.3	1.7	21.3	8.4	23.1	2.7
Copper	mg/kg	120	240	380	380	406	340	95.5	382	59	689	393	823	57
Iron	mg/kg	-	-	39,230	28,300	32,990	26,600	5,170	30,067	7,512	32,700	9,467	29,760	2,270
Lead	mg/kg	57	110	17.7	10.4	11.7	10.1	1.0	10.9	1.9	6.9	3.3	9.3	0.5
Lithium	mg/kg	-	-	17.8	12.1	10.8	11.1	0.25	10.6	0.5	24.0	10.0	25.4	2.5
Magnesium	mg/kg	-	-	12,548	5,538	5,383	4,823	892	5,273	277	14,333	8,375	15,920	1,914
Manganese	mg/kg	-	-	3,310	1,498	3,789	1,303	632	3,327	1,207	855	359	2,574	787
Mercury	mg/kg	0.30	0.58	0.286	0.279	0.326	0.255	0.079	0.302	0.061	0.104	0.082	0.110	0.008
Molybdenum	mg/kg	-	-	6.05	4.32	4.79	3.62	2.24	4.32	1.22	5.63	4.93	10.1	1.56
Nickel	mg/kg	-	-	42.6	74.6	34.6	47.6	90.1	33.3	3.2	34.2	81.4	22.0	3.6
Phosphorus	mg/kg	-	-	3,405	2,605	3,402	2,240	1,205	2,537	2,182	1,317	846	1,200	86
Potassium	mg/kg	-	-	1,591	1,368	1,759	1,253	28.7	1,693	266	2,110	693	2,766	109
Selenium	mg/kg	-	-	5.37	2.60	2.90	2.37	0.43	2.75	0.40	2.14	3.06	4.43	1.07
Silver	mg/kg	-	-	0.415	0.379	0.389	0.355	0.080	0.377	0.031	0.338	0.087	0.348	0.013
Sodium	mg/kg	-	-	560	245	1,065	190	24.8	900	418	1,143	621	1,828	127
Strontium	mg/kg	-	-	125	134	105	89	20	99	14	214	79	289	19
Sulfur (S)-Total	mg/kg	-	-	-	-	7,640	-	-	7,000	1,876	-	-	8,420	2,209
Thallium	mg/kg	-	-	0.112	0.127	0.141	0.115	0.038	0.132	0.029	0.065	0.066	0.058	0.008
Tin	mg/kg	-	-	0.80	1.41	0.77	1.03	1.42	0.70	0.18	2.01	0.45	2.10	0.20
Titanium	mg/kg	-	-	787	784	505	407	69.5	461	157	1,653	1,032	1,832	238
Uranium	mg/kg	-	-	1.47	2.06	2.37	1.93	0.19	2.20	0.43	1.49	0.91	1.46	0.07
Vanadium	mg/kg	-	-	111	66.9	83.6	63.7	0.9	80.3	10.5	120	51.7	115	7.5
Zinc	mg/kg	200	380	99.0	98.5	86.4	80.8	58.7	82.8	9.4	91.0	63.5	86.4	6.5

Value is > Contaminated Sites Regulation (CSR) Sensitive Criterion. Values shown in bold text also exceed all Reference 95th Percentile values.

Value is > Contaminated Sites Regulation (CSR) Typical Criterion. Values shown in bold text also exceed all Reference 95th Percentile values.

¹ Reported 2015 moisture, pH, and total nitrogen data are based on bulk sediment. Reported 2014 pH data are based on < 63 µm sediment. Data reported as less than the method detection limit (MDL) were used at the MDL for the calculation of summary statistics. Summary statistics are reported as < MDL if all the data used in their calculation were < MDL.

² Contaminated Sites Regulation (Government of British Columbia 1996).

³ Reference 95th percentiles for 2015 data were calculated using data displayed in Appendix Table D.1. For calculation of 2014 and Historical Reference 95th percentiles see Minnow (2015). The 5th percentile is reported for pH.

⁴ t*SE = [T distribution critical value]*[Standard error]. The t*SE value, when added or subtracted from the mean, results in the upper and lower 95% confidence limits of the mean, respectively.

Sediment metal and nitrogen concentrations at Polley Lake (sampling area POL-P2) in 2015 were also very similar to those observed in 2014. Arsenic and copper were the only analytes with concentrations greater than the CSR “sensitive” criteria and reference (Table 1; Appendix Table D.1).

Copper was the only analyte with concentrations greater than the CSR “typical” criterion and reference (Table 1; Appendix Table D.1). However, copper in reference Bootjack Lake and in Polley Lake prior to the dam failure also exceeded the CSR “typical” criterion (Table 1). In 2015, the mean copper concentration in Polley Lake sediment exceeded reference by approximately 2.2-times and the CSR “typical” criterion by approximately 3.4-times (Table 1).

Hazeltine Creek Sedimentation Pond

Sediment collected from the upper Hazeltine Creek Sedimentation Pond in 2015 (Figure 1) was primarily silt and clay (92.5%), and had lower sand content than sediment collected from lower Hazeltine Creek in 2014 (Table 2; Appendix Table D.2). The high fines (silt and clay) content of this sediment was noted during 2015 field collections. Similar to 2014, the TOC content of sediment collected in 2015 was lower than observed in Hazeltine Creek pre-event (Table 2).

Metal concentrations in sediments collected in 2015 were similar to those observed in 2014, as was the nitrogen content. Arsenic and copper were the only analytes to exceed the CSR “sensitive” criteria and pre-event concentrations in Hazeltine Creek in 2015 (Table 2; Appendix Table D.2). In 2014, concentrations of both arsenic and copper exceeded the CSR “sensitive” criteria, but arsenic did not exceed pre-event concentrations (Table 2). The higher arsenic concentrations observed in 2015 are likely due to the finer particle sizes encountered in 2015.

As observed in 2014, concentrations of copper exceeded the CSR “typical” criterion as well as pre-event concentrations (Table 2; Appendix Table D.2). Copper was the only analyte to exceed the “typical” CSR criterion, with the 2015 mean copper concentration exceeding this criterion by approximately 2.0 times on average, and exceeding pre-event concentrations (in lower Hazeltine Creek) by 11.2 times on average (Table 2).

Quesnel Lake Littoral

Sediment collected from the littoral near-field area of Quesnel Lake in 2015 (LNF; Figure 1) was predominantly sand (82.4%), and had a higher sand content than sediment

Table 2: Summary sediment quality data for samples collected in lower Hazeltine Creek in 2014 and collected in the Hazeltine Creek Sedimentation Pond in 2015, Mount Polley Mine. Metals and total organic carbon data are based on the < 63µm fraction of sediment ¹.

Parameter	Units	Contaminated Sites Regulation Criteria ²		Historic Hazeltine Creek 95th Percentile ³		Exposed			
						Lower Hazeltine Creek (ST02) 2014		Hazeltine Creek Sedimentation Pond 2015	
						Sensitive	Typical	Lower Creek	Upper Creek
Physical Tests									
Moisture	%	-	-	-	-	28.8	5.25	41.4	9.5
pH (1:2 soil:water) ¹	pH	-	-	-	-	8.55	0.18	8.43	0.28
Particle Size									
% Gravel (>2mm)	%	-	-	-	33.1	0.1	0.1	0.3	0.5
% Sand (2.0mm - 0.063mm)	%	-	-	-	64.7	30.4	18.9	7.3	12.2
% Silt (0.063mm - 4µm)	%	-	-	-	76.2	60.6	15.6	75.1	6.6
% Clay (<4µm)	%	-	-	-	13.9	8.9	4.5	17.4	10.2
Organic / Inorganic Carbon (<63 µm)									
Total Organic Carbon (TOC)	%	-	-	9.03	12.8	0.12	0.03	0.30	0.05
Nutrients (Bulk sediment)									
Total Nitrogen by LECO	%	-	-	-	-	<0.020	0	0.052	0.009
Metals (<63 µm)									
Aluminum	mg/kg	-	-	12,550	18,000	16,720	3,498	17,900	4,655
Antimony	mg/kg	-	-	1.33	0.37	0.40	0.07	0.52	0.05
Arsenic	mg/kg	11	20	12.1	8.2	11.7	3.0	14.8	1.9
Barium	mg/kg	-	-	104	136	166	73	196	42
Beryllium	mg/kg	-	-	0.30	0.46	0.49	0.17	0.62	0.12
Bismuth	mg/kg	-	-	20	16	0.11	0.01	0.13	0.02
Boron	mg/kg	-	-	3.0	5.4	10	0.6	<10	0
Cadmium	mg/kg	2.2	4.2	0.235	0.354	0.191	0.042	0.209	0.024
Calcium	mg/kg	-	-	7,030	13,400	27,880	3,438	29,380	2,115
Chromium	mg/kg	56	110	33.1	40.1	28.4	10.2	28.4	2.1
Cobalt	mg/kg	-	-	11.0	10.4	18.4	3.9	18.3	3.3
Copper	mg/kg	120	240	42	95	449	318	469	141
Iron	mg/kg	-	-	35,400	29,900	65,980	19,810	50,580	5,970
Lead	mg/kg	57	110	5.6	6.7	7.5	0.6	8.8	1.6
Lithium	mg/kg	-	-	12.9	14.8	16.3	3.7	19.6	5.1
Magnesium	mg/kg	-	-	6,160	6,430	10,428	2,603	10,346	3,051
Manganese	mg/kg	-	-	1,120	1,350	676	137	725	160
Mercury	mg/kg	0.30	0.58	0.140	0.145	0.065	0.017	0.101	0.012
Molybdenum	mg/kg	-	-	0.75	1.50	2.44	1.35	2.47	0.29
Nickel	mg/kg	-	-	24.0	24.4	22.5	9.4	22.5	4.2
Phosphorus	mg/kg	-	-	729	1,380	1,530	317	1,558	112
Potassium	mg/kg	-	-	910	1,450	1,534	457	1,732	477
Selenium	mg/kg	-	-	1.30	3.32	0.89	0.31	0.88	0.14
Silver	mg/kg	-	-	0.100	0.160	0.244	0.119	0.259	0.026
Sodium	mg/kg	-	-	253	350	718	479	718	179
Strontium	mg/kg	-	-	67	118	145	17	165	16
Sulfur (S)-Total	mg/kg	-	-	-	-	-	-	1,260	142
Thallium	mg/kg	-	-	0.051	0.094	0.060	0.017	0.070	0.013
Tin	mg/kg	-	-	1.10	0.70	1.09	0.60	1.33	0.23
Titanium	mg/kg	-	-	701	776	1,309	403	1,502	266
Uranium	mg/kg	-	-	0.73	1.26	1.05	0.20	1.18	0.10
Vanadium	mg/kg	-	-	74.5	65.3	229	96.2	181	24.9
Zinc	mg/kg	200	380	60.2	67.6	68.2	5.3	73.9	15.6

Value is > Contaminated Sites Regulation (CSR) Sensitive Criterion. Values shown in bold text also exceed all Reference 95th Percentile values.

Value is > Contaminated Sites Regulation (CSR) Typical Criterion. Values shown in bold text also exceed all Reference 95th Percentile values.

¹ Reported 2015 moisture, pH, and total nitrogen data are based on bulk sediment. Reported 2014 pH data are based on < 63 µm sediment. Data reported as less than the method detection limit (MDL) were used at the MDL for the calculation of summary statistics. Summary statistics are reported as < MDL if all the data used in their calculation were < MDL.

² Contaminated Sites Regulation (Government of British Columbia 1996).

³ For calculation of Historic Hazeltine Creek 95th percentiles see Minnow (2015).

⁴ t*SE = [T distribution critical value][Standard error]. The t*SE value, when added or subtracted from the mean, results in the upper and lower 95% confidence limits of the mean, respectively.

collected from this location in 2014 (49.2%; Table 3; Appendix Table D.3). This difference in sediment composition was evident during sample collection in the field, and the decrease in the fines (silt and clay) content of sediment (49.7% in 2014, and 15.6% in 2015) may be a result of washing of fine sediment from these locations between August 2014 and August 2015. The particle size distribution of sediment collected in the littoral far-field area (Figure 1) was similar in 2014 and 2015, and was also similar to sediment collected in the Quesnel littoral reference area. As observed in 2014, the TOC content of sediment in 2015 was lower in the near-field area than in the far-field or reference areas (Table 3; Appendix Table D.3).

Concentrations of nitrogen and metals in the <63 µm (silt and clay) fraction of sediment collected from the near-field area were similar in 2014 and 2015 despite the differences in particle size distribution (Table 3). This similarity in sediment chemistry suggests that fines remaining in the near-field area were event-affected. However, aquatic organisms inhabiting this sediment would be exposed to the whole sediment, not solely the fines (<63 µm) fraction. In the far-field area, sediment concentrations of nitrogen and metals were also similar in 2014 and 2015.

As in 2014, arsenic and copper were the only analytes to exceed the CSR “sensitive” criteria as well as reference concentrations in the near-field area (Table 3; Appendix Table D.3). Copper was the only analyte in the near-field area with concentrations exceeding the CSR “typical” criterion and reference concentrations, as was also observed in 2014. The mean copper concentration of Quesnel Lake near-field area sediment exceeded the CSR “typical” criterion by approximately 2.7 times on average, and exceeded reference by approximately 13.2 times on average (Table 3). The concentrations of metals in sediment from the far-field area did not exceed CSR criteria or reference concentrations, and were generally lower than those observed in the near-field area. For instance, mean sediment arsenic and copper concentrations observed in the far-field area were approximately 3.7 and 9.8 times lower, respectively, than in the near-field area in 2015 (Table 3).

Quesnel Lake Profundal

Sediment collected from the Quesnel Lake profundal near-field area (Figure 1) was composed primarily of silt and clay (93%), with a particle size distribution similar to that observed in 2014, but which had a higher clay content (35.5%) and lower sand content (7.0%) than observed in the Quesnel Lake profundal reference area (Table 4; Appendix Table D.4). The TOC content of sediment from the near-field area was lower than that observed at the reference area, as was also observed in 2014 (Table 4).

Table 3: Summary of sediment quality data for Quesnel Lake littoral sampling areas, Mount Polley Mine, 2014 and 2015. Metals and total organic carbon data are based on the < 63µm fraction of sediment ¹.

Parameter	Units	Contaminated Sites Regulation Criteria ²		Reference 95th Percentile ³			Reference				Exposed							
							LREF1				LNF1				LFF			
				LRef1		LRef2 ⁴ (2014)	2014		2015		2014		2015		2014		2015	
				Sensitive	Typical		2014	2015	Mean	t*SE ⁵	Mean	t*SE ⁵	Mean	t*SE ⁵	Mean	t*SE ⁵	Mean	t*SE ⁵
Physical Tests																		
Moisture	%	-	-	43.7	43.4	53.4	40.7	3.4	40.8	9.4	32.6	6.0	25.4	7.7	48.0	11.4	44.7	12.1
pH (1:2 soil:water) ¹	pH	-	-	6.32	6.74	6.40	6.54	0.26	6.97	0.58	8.57	0.37	7.95	0.87	6.55	0.38	7.09	0.42
Particle Size																		
% Gravel (>2mm)	%	-	-	1.83	2.05	0.13	1.02	0.80	1.49	1.94	1.15	2.91	2.02	3.72	1.47	1.70	0.76	0.61
% Sand (2.0mm - 0.063mm)	%	-	-	65.8	64.6	59.0	59.7	7.91	60.0	11.5	49.2	2.65	82.4	22.0	65.5	10.3	60.3	17.0
% Silt (0.063mm - 4µm)	%	-	-	42.2	36.3	76.4	35.1	8.04	33.9	9.27	41.7	2.49	14.8	18.2	30.2	9.96	36.5	16.7
% Clay (<4µm)	%	-	-	4.9	6.1	6.3	4.2	0.7	4.6	4.1	8.1	2.3	0.8	0.5	2.9	1.5	2.5	1.9
Organic / Inorganic Carbon (<63 µm)																		
Total Organic Carbon (TOC)	%	-	-	1.35	1.63	1.92	1.12	0.23	1.47	0.53	0.21	0.09	0.35	0.25	1.78	1.50	2.29	2.20
Nutrients (Bulk sediment)																		
Total Nitrogen by LECO	%	-	-	0.071	0.114	0.138	0.066	0.006	0.104	0.023	<0.020	0	0.032	0.007	0.102	0.088	0.112	0.064
Metals (<63 µm)																		
Aluminum	mg/kg	-	-	14,760	13,590	25,540	13,260	1,717	13,133	1,797	17,920	1,101	12,314	2,812	12,440	1,822	13,340	3,313
Antimony	mg/kg	-	-	0.36	0.33	<0.10	0.30	0.06	0.31	0.04	0.43	0.03	0.43	0.06	0.23	0.06	0.26	0.03
Arsenic	mg/kg	11	20	4.92	5.28	2.54	4.08	0.96	4.54	1.94	13.0	0.61	15.0	1.66	3.09	1.21	4.04	2.21
Barium	mg/kg	-	-	133	122	77	124	10	115	19	195	16	105	26	55	10	69	25
Beryllium	mg/kg	-	-	0.39	0.40	0.69	0.35	0.04	0.37	0.09	0.68	0.06	0.52	0.08	0.30	0.03	0.35	0.06
Bismuth	mg/kg	-	-	0.14	0.12	0.47	0.11	0.02	0.11	0.02	<0.10	0	0.10	0.01	0.10	0.01	0.10	0.01
Boron	mg/kg	-	-	<10	<10	<10	<10	0	<10	0	<10	0	<10	0	<10	0	<10	0
Cadmium	mg/kg	2.2	4.2	0.351	0.357	0.114	0.313	0.042	0.330	0.094	0.133	0.017	0.218	0.058	0.173	0.108	0.194	0.108
Calcium	mg/kg	-	-	7,736	8,077	14,400	7,136	662	7,483	1,498	28,300	2,112	20,300	1,487	8,712	1,368	10,622	2,157
Chromium	mg/kg	56	110	54.2	52.1	58.1	49.5	5.1	49.7	9.1	15.5	2.0	34.7	9.7	43.8	11.4	41.9	10.0
Cobalt	mg/kg	-	-	11.9	11.5	24.2	10.3	1.7	10.8	2.3	20.3	1.1	23.5	7.5	9.3	1.8	10.9	3.4
Copper	mg/kg	120	240	35	34	49	30	4.6	32	8.0	652	65	648	173	30	4.2	66	52
Iron	mg/kg	-	-	26,180	24,660	48,160	23,680	2,715	23,200	4,245	62,740	9,079	119,880	67,269	23,240	5,315	27,280	8,966
Lead	mg/kg	57	110	6.01	6.26	14.64	5.27	0.76	5.78	1.63	5.76	0.25	6.40	0.82	5.31	1.29	5.50	1.30
Lithium	mg/kg	-	-	13.2	11.7	45.8	11.5	1.8	11.0	2.1	18.2	1.5	13.2	1.9	11.8	2.5	12.3	2.1
Magnesium	mg/kg	-	-	6,950	6,780	12,320	6,360	621	6,420	1,230	11,320	862	6,924	1,387	6,356	1,600	6,752	2,482
Manganese	mg/kg	-	-	365	363	529	309	66	322	103	695	48	750	124	274	60	308	88
Mercury	mg/kg	0.30	0.58	0.0457	0.0480	0.0171	0.0377	0.0076	0.0438	0.0164	0.0773	0.0046	0.101	0.0188	0.0463	0.0188	0.0657	0.0343
Molybdenum	mg/kg	-	-	0.86	0.97	0.44	0.78	0.10	0.83	0.37	3.75	0.25	3.38	0.52	0.73	0.60	0.67	0.35
Nickel	mg/kg	-	-	33.1	32.3	69.1	29.3	4.2	30.7	6.8	12.2	0.6	18.8	3.1	26.1	5.6	26.2	5.7
Phosphorus	mg/kg	-	-	1,230	1,184	1,114	1,136	110	1,143	103	1,660	176	1,946	354	863	311	971	343
Potassium	mg/kg	-	-	1,312	1,297	4,328	1,120	211	1,213	311	1,786	109	920	286	762	165	1,006	294
Selenium	mg/kg	-	-	0.70	0.71	0.32	0.58	0.13	0.64	0.23	1.02	0.04	1.16	0.21	0.53	0.48	0.52	0.37
Silver	mg/kg	-	-	0.166	0.157	0.124	0.144	0.024	0.148	0.030	0.325	0.030	0.368	0.041	0.083	0.051	0.099	0.025
Sodium	mg/kg	-	-	406	478	424	386	21	460	50	1,160	58	526	150	274	122	386	219
Strontium	mg/kg	-	-	70.4	75.1	114	63.3	8.2	68.9	15.7	193	14.3	106	26.1	60.3	14.0	79.3	34.6
Sulfur - Total	mg/kg	-	-	-	<500	-	-	-	<500	0	-	-	1,220	321	-	-	920	821
Thallium	mg/kg	-	-	0.148	0.133	0.310	0.123	0.025	0.120	0.036	<0.050	0	0.050	0	0.056	0.012	0.060	0.017
Tin	mg/kg	-	-	0.40	0.39	0.56	0.35	0.06	0.38	0.02	1.63	0.12	1.31	0.11	0.33	0.11	0.44	0.18
Titanium	mg/kg	-	-	1,084	963	1,071	990	107	936	87	1,690	94.1	1,326	163	956	302	1,085	387
Uranium	mg/kg	-	-	1.15	1.24	1.95	0.99	0.18	1.14	0.34	1.21	0.13	1.08	0.10	0.93	0.25	1.06	0.26
Vanadium	mg/kg	-	-	61.5	59.4	39.9	56.9	5.1	57.0	9.3	235	31.9	461	273	67.9	29.0	85.3	46.6
Zinc	mg/kg	200	380	68.2	65.2	87.6	60.8	8.0	62.3	11.0	63.1	5.4	70.8	11.7	45.1	4.3	49.1	9.8

Value is > Contaminated Sites Regulation (CSR) Sensitive Criterion. Values shown in bold text also exceed all Reference 95th Percentile values.

Value is > Contaminated Sites Regulation (CSR) Typical Criterion. Values shown in bold text also exceed all Reference 95th Percentile values.

¹ Reported 2015 moisture, pH, and total nitrogen data are based on bulk sediment. Reported 2014 pH data are based on < 63 µm sediment. Data reported as less than the method detection limit (MDL) were used at the MDL for the calculation of summary statistics. Summary statistics are reported as < MDL if all the data used in their calculation were < MDL.

² Contaminated Sites Regulation (Government of British Columbia 1996).

³ Reference 95th percentiles for 2015 data were calculated using data displayed in Appendix Table D.3. For calculation of 2014 Reference 95th percentiles see Minnow (2015). The 5th percentile is reported for pH.

⁴ Summary statistics for reference area LRef2 are based only on data from replicates LRef2-01 to LRef2-03 due to high sand content in replicates LRef2-04 and LRef2-52-05 (> 90%).

⁵ t*SE = [T distribution critical value][Standard error]. The t*SE value, when added or subtracted from the mean, results in the upper and lower 95% confidence limits of the mean, respectively.

Table 4: Summary of sediment quality for Quesnel Lake profundal sampling areas, Mount Polley Mine, 2014 and 2015. Metals and total organic carbon data are based on the < 63µm fraction of sediment ¹.

Parameter	Units	Contaminated Sites Regulation Criteria ²		Reference 95th Percentile ³			Reference				Exposed			
							PRef1				PNF			
							PRef1		PRef2 (2014)		2014		2015	
Sensitive	Typical	2014	2015	Mean	t*SE ⁴	Mean	t*SE ⁴	Mean	t*SE ⁴	Mean	t*SE ⁴			
Physical Tests														
Moisture	%	-	-	54.1	54.1	70.5	51.8	3.2	53.4	2.0	37.7	9.2	49.2	20.8
pH (1:2 soil:water) ¹	pH	-	-	6.83	6.72	7.21	6.94	0.11	7.02	0.83	8.68	0.08	8.45	0.15
Particle Size														
% Gravel (>2mm)	%	-	-	<0.10	<0.10	<0.10	<0.10	0	<0.10	0	0.10	0.01	<0.10	0
% Sand (2.0mm - 0.063mm)	%	-	-	31.5	26.7	13.2	23.5	9.0	19.5	6.9	7.8	15.7	7.0	14.7
% Silt (0.063mm - 4µm)	%	-	-	74.1	74.0	74.3	67.4	9.0	69.8	5.9	69.6	13.4	57.5	18.2
% Clay (<4µm)	%	-	-	10.4	11.7	27.2	9.1	1.5	10.7	1.4	22.6	14.7	35.5	24.0
Organic / Inorganic Carbon (<63 µm)														
Total Organic Carbon	%	-	-	1.72	1.96	1.93	1.68	0.06	1.82	0.36	0.17	0.08	0.29	0.21
Nutrients (Bulk sediment)														
Total Nitrogen by LECO	%	-	-	0.148	0.181	0.176	0.140	0.010	0.170	0.030	0.023	0.006	0.043	0.020
Metals (<63 µm)														
Aluminum	mg/kg	-	-	15,380	17,260	25,380	14,780	943	16,567	2,348	20,800	4,903	26,520	10,013
Antimony	mg/kg	-	-	0.44	0.47	0.40	0.42	0.02	0.44	0.08	0.52	0.09	0.55	0.11
Arsenic	mg/kg	11	20	8.51	9.02	20.9	7.75	0.86	8.88	0.52	15.4	2.5	15.4	1.9
Barium	mg/kg	-	-	151	151	220	144	8.07	147	10	225	44	255	72
Beryllium	mg/kg	-	-	0.44	0.52	0.90	0.41	0.03	0.49	0.09	0.79	0.20	0.96	0.31
Bismuth	mg/kg	-	-	0.15	0.17	0.51	0.14	0.01	0.16	0.03	0.10	0.01	0.13	0.04
Boron	mg/kg	-	-	<10	<10	<10	<10	0	<10	0	11	0.7	11	1.7
Cadmium	mg/kg	2.2	4.2	0.414	0.470	0.315	0.384	0.036	0.420	0.138	0.164	0.034	0.197	0.055
Calcium	mg/kg	-	-	8,034	8,834	7,392	7,742	368	8,747	283	33,340	5,031	31,160	3,467
Chromium	mg/kg	56	110	55.8	60.0	52.2	52.0	4.0	57.7	8.9	14.3	3.8	20.9	5.3
Cobalt	mg/kg	-	-	14.0	15.2	25.7	13.3	0.8	14.5	2.5	19.4	3.6	25.5	10.6
Copper	mg/kg	120	240	46.2	59.0	48.3	42.2	4.1	55.1	11.8	714	138	859	378
Iron	mg/kg	-	-	29,820	32,660	102,460	28,580	1,664	31,300	5,187	37,240	21,694	40,620	6,727
Lead	mg/kg	57	110	7.24	8.01	22.1	7.00	0.29	7.65	0.89	7.09	1.82	9.90	3.70
Lithium	mg/kg	-	-	13.8	15.5	37.4	13.1	0.6	14.4	4.0	20.5	5.2	29.8	13.5
Magnesium	mg/kg	-	-	8,036	8,635	9,344	7,666	475	8,150	1,686	12,958	3,178	17,320	8,586
Manganese	mg/kg	-	-	496	512	7,814	470	39.5	491	55	797	147	1,033	329
Mercury	mg/kg	0.30	0.58	0.0515	0.0624	0.0593	0.0486	0.0030	0.0579	0.0143	0.0697	0.0093	0.0954	0.0239
Molybdenum	mg/kg	-	-	0.96	1.18	2.72	0.91	0.06	1.08	0.27	3.76	0.34	4.05	0.89
Nickel	mg/kg	-	-	37.9	41.1	60.7	35.6	2.57	39.1	6.67	12.9	2.81	20.2	6.84
Phosphorus	mg/kg	-	-	1,126	1,199	1,776	1,094	41	1,180	66	1,706	155	1,352	297
Potassium	mg/kg	-	-	1,370	1,568	3,704	1,312	88	1,517	188	1,942	438	2,640	885
Selenium	mg/kg	-	-	0.94	1.08	0.91	0.86	0.09	0.97	0.29	1.07	0.22	1.23	0.46
Silver	mg/kg	-	-	0.203	0.236	0.189	0.188	0.017	0.214	0.061	0.332	0.050	0.369	0.106
Sodium	mg/kg	-	-	420	518	374	396	29	497	63	1,118	256	1,396	411
Strontium	mg/kg	-	-	78.1	88.5	94.3	74.6	3.9	85.1	8.7	188	36.5	212	45.2
Sulfur (S)-Total	mg/kg	-	-	-	1,390	-	-	-	1,167	799	-	-	1,560	226
Thallium	mg/kg	-	-	0.166	0.192	0.293	0.157	0.011	0.174	0.045	<0.050	0	0.060	0.011
Tin	mg/kg	-	-	0.47	0.49	0.61	0.41	0.07	0.45	0.10	2.05	0.48	1.99	0.53
Titanium	mg/kg	-	-	1,084	1,187	923	1,036	58	1,130	197	1,946	344	1,996	509
Uranium	mg/kg	-	-	1.35	1.56	3.16	1.30	0.06	1.46	0.23	1.43	0.35	1.39	0.24
Vanadium	mg/kg	-	-	66.3	72.9	46.6	62.2	4.4	70.1	11.2	145	84.6	142	32.6
Zinc	mg/kg	200	380	77.1	84.9	95.3	73.7	3.7	79.8	17.8	69.0	13.8	96.0	41.2

Value is > Contaminated Sites Regulation (CSR) Sensitive Criterion. Values shown in bold text also exceed all Reference 95th Percentile values.

Value is > Contaminated Sites Regulation (CSR) Typical Criterion. Values shown in bold text also exceed all Reference 95th Percentile values.

¹ Reported 2015 moisture, pH, and total nitrogen data are based on bulk sediment. Reported 2014 pH data are based on < 63 µm sediment. Data reported as less than the method detection limit (MDL) were used at the MDL for the calculation of summary statistics. Summary statistics are reported as < MDL if all the data used in their calculation were < MDL.

² Contaminated Sites Regulation (Government of British Columbia 1996).

³ Reference 95th percentiles for 2015 data were calculated using data displayed in Appendix Table D.4. For calculation of 2014 Reference 95th percentiles see Minnow (2015). The 5th percentile is reported for pH.

⁴ t*SE = [T distribution critical value]*[Standard error]. The t*SE value, when added or subtracted from the mean, results in the upper and lower 95% confidence limits of the mean, respectively.

Sediment concentrations of nitrogen and metals observed in the profundal near-field area in 2015 were very similar to those observed in 2014, with arsenic and copper being the only analytes with concentrations whose concentrations exceeded the CSR “sensitive” criteria (Table 4; Appendix Table D.4). Sediment arsenic concentrations exceeded one of the two reference area concentrations (PRef1), but not both, the greater of which exceeded the CSR “typical” criterion (reference area PRef2).

Copper was the only analyte observed in the profundal near-field area to exceed the CSR “typical” criterion, as was also observed in 2014 (Table 4; Appendix Table D.4). In 2015, the mean copper sediment concentration exceeded the CSR “typical” criterion by approximately 3.6 times on average, and exceeded reference concentrations by approximately 14.5 times on average (Table 4).

Summary

Copper was the only analyte observed to exceed the CSR “typical” criterion in sediment from the three waterbodies affected by the Mount Polley Tailings Dam failure (Polley Lake, Hazeltine Creek and Quesnel Lake). Copper also exceeded reference or pre-event concentrations within all three of these waterbodies. Sediment arsenic concentrations exceeded the CSR “sensitive” (but not “typical”) criterion in all 2015 sampling areas except the Quesnel Lake littoral far-field area. These “sensitive” criteria apply to the top one meter of sediments in aquatic receiving environments (BCMoE 2013). Overall, there was little difference in the chemistry of sediment from the three waterbodies affected by the Mount Polley Tailings Dam failure between the 2014 and 2015 sampling events.

References

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BCMoE (British Columbia Ministry of Environment). 2012. Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators. October 10, 2012.

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APPENDIX A

**SAMPLE LOCATIONS
AND SUPPORTING DATA**

Table A.1: Mount Polley sediment quality monitoring - sample locations, August 2015

Location	Area Code	Type	Replicate	GPS Coordinates		Metals and TOC ¹		Particle Size	
				Easting	Northing	Sampling Method	Grabs per Composite	Sampling Method	Grabs per Composite
Polley Lake - South Basin	POL-P2	Exposed	1	595166	5822178	KB corer	3	petite ponar	3
			2	595137	5822146	KB corer	3	petite ponar	3
			3	595191	5822207	KB corer	3	petite ponar	3
			4	595158	5822228	KB corer	3	petite ponar	3
			5	595134	5822204	KB corer	3	petite ponar	3
Bootjack Lake - South Basin	BOL-B2	Reference	1	591265	5821636	KB corer	5	petite ponar	3
			2	591300	5821652	KB corer	5	petite ponar	3
			3	591241	5821684	KB corer	5	petite ponar	3
			4	591287	5821593	KB corer	6	petite ponar	3
			5	591213	5821639	KB corer	6	petite ponar	2
Location	Area Code	Type	Replicate	GPS Coordinates		Metals, TOC ¹ and Particle Size			
				Easting	Northing	Sampling Method	Grabs per Composite		
Hazeltime Creek Sediment Pond	HAC	Exposed	1	601547	5817200	stainless steel spoon	10		
			2	601569	5817262	stainless steel spoon	10		
			3	601591	5817297	stainless steel spoon	10		
			4	601584	5817298	stainless steel spoon	10		
			5	601584	5817298	stainless steel spoon	10		
Quesnel Lake - Littoral Near-Field	LNF1	Exposed	1	601524	5817990	petite ponar	5		
			2	601457	5818033	petite ponar	5		
			3	601451	5818067	petite ponar	5		
			4	601555	5817927	petite ponar	5		
			5	601479	5818047	petite ponar	5		
Quesnel Lake - Littoral Far-Field	LFF	Exposed	1	601680	5820049	petite ponar	5		
			2	600441	5822695	petite ponar	6		
			3	600932	5818778	petite ponar	5		
			4	600861	5818809	petite ponar	5		
			5	601035	5821268	petite ponar	6		
Quesnel Lake - Littoral Reference	LREF1	Reference	1	610136	5813949	petite ponar	10		
			3	610097	5813939	petite ponar	10		
			4	610164	5813960	petite ponar	5		
Quesnel Lake - Profundal Near-Field	PNF	Exposed	1	601814	5818205	standard ponar	6 ²		
			2	601672	5818297	petite ponar	5		
			3	601914	5818113	standard ponar	3		
			4	602623	5817818	standard ponar	3		
			5	602272	5817946	standard ponar	3		
Quesnel Lake - Profundal Reference	PREF1	Reference	1	610434	5814754	standard ponar	3		
			2	610294	5814639	standard ponar	3		
			3	610613	5814885	standard ponar	5 ²		
			4	610526	5814608	standard ponar	3		
			5	610714	5814799	standard ponar	3		

¹ Total organic carbon

² Additional grabs per composite collected to achieve volume for quality control duplicate

Table A.2: Mount Polley sediment quality monitoring - supporting measures, August 2015

Location	Area Code	Type	Replicate	Station Depth (m)	Secchi Depth (m)	Surface						Bottom					
						Temp. °C	DO mg/L	DO %	SpC µS/cm	pH pH	ORP mV	Temp. °C	DO mg/L	DO %	SpC µS/cm	pH pH	ORP mV
Polley Lake - South Basin	POL-P2	Exposed	1	28	7.18	19.9	8.17	89.7	282	8.03	150	6.0	3.00	24.1	288	7.14	157
			2	28	6.36	19.4	8.16	88.6	282	8.28	147	5.9	3.12	24.9	288	7.22	162
			3	29	6.34	19.4	8.17	88.8	282	7.94	170	5.9	3.10	24.7	288	7.08	168
			4	28	6.23	19.4	8.17	88.8	282	8.32	152	5.9	3.03	24.4	288	7.22	165
			5	28	6.96	19.4	8.22	89.4	282	8.21	160	5.9	3.26	25.4	288	7.18	173
Bootjack Lake - South Basin	BOL-B2	Reference	1	18	6.84	19.6	8.53	93.1	97	7.73	156	8.6	0.16	1.4	102	6.71	154
			2	16	7.15	19.1	8.43	91.1	97	7.59	179	8.5	0.15	1.3	103	6.54	84.6
			3	17	7.53	19.6	8.43	91.9	97	7.62	172	8.6	0.37	3.2	101	6.67	175
			4	15	7.27	19.7	8.40	91.7	97	7.75	169	8.7	0.24	2.2	101	6.67	175
			5	17	6.47	20.0	8.39	92.0	97	7.82	163	8.7	0.30	2.7	101	6.67	175
Hazeltine Creek Sediment Pond	HAC	Exposed	1	0.5	-	17.6	9.34	98.1	393	7.93	168	-	-	-	-	-	-
			2	0.5	-	16.4	9.52	97.6	391	7.71	173	-	-	-	-	-	-
			3	0.5	-	15.6	9.39	94.7	391	7.67	177	-	-	-	-	-	-
			4	0.5	-							-	-	-	-	-	
			5	0.3	-							-	-	-	-	-	
Quesnel Lake - Littoral Far-Field	LFF	Exposed	1	1.5	> depth	17.4	9.47	99.2	108	8.16	227	17.8	9.46	99.6	109	8.20	225
			2	1.3	> depth	17.2	9.31	96.7	108	8.19	255	17.2	9.3	96.6	108	8.21	255
			3	1.6	> depth	17.9	9.10	95.8	109	8.03	206	17.7	9.15	95.9	108	8.03	205
			4	1.3	> depth	18.2	9.46	100	108	8.16	190	17.8	9.29	97.7	108	8.10	198
			5	1.5	> depth	16.9	9.47	98.1	108	8.20	240	17.4	9.39	97.7	108	8.22	239
Quesnel Lake - Littoral Reference	LREF1	Reference	1	1.4	> depth	18.5	10.5	112	108	8.77	144	18.7	10.55	113	108	8.81	148
			2	1.1	> depth	20.0	11.9	131	105	8.95	197	19.9	13.19	145	104	9.08	195
			3	1.2	> depth	19.7	10.9	119	105	8.31	205	19.4	10.93	119	105	8.31	204
			4	1.3	> depth	20.1	9.28	102	107	8.54	201	19.4	11.56	125	105	9.27	186
			5	1.4	> depth	19.6	10.7	116	106	8.69	209	19.4	15.46	168	103	9.30	193
Quesnel Lake - Profundal Near-Field	PNF	Exposed	1	112	9.10	19.0	8.83	95.1	105	7.79	159	4.4	10.97	83.4	115	7.46	173
			2	111	9.32	17.9	8.80	92.8	137	7.82	140	4.4	10.32	79.4	146	7.41	166
			3	104	9.96	17.9	8.78	92.6	138	7.93	141	4.3	10.28	79.1	146	7.46	145
			4	97	8.54	17.9	8.79	92.8	138	7.95	154	4.3	10.10	77.8	147	7.51	148
			5	106	10.84	19.6	8.70	95.0	141	8.20	147	4.3	10.15	78.2	151	7.57	148
Quesnel Lake - Profundal Reference	PREF1	Reference	1	115	7.85	19.0	8.90	95.1	106	8.04	160	3.8	11.14	84.5	110	7.51	176
			2	103	7.02	19.2	8.93	96.7	108	7.66	169	3.8	10.98	83.4	110	7.35	169
			3	120	9.94	18.2	9.10	96.5	118	8.09	188	4.5	10.43	81.0	110	7.50	215
			4	102	11.26	18.7	9.16	98.0	111	8.21	206	4.1	10.29	80.0	113	7.66	227
			5	103	11.13	18.7	9.07	97.2	109	8.18	232	4.3	10.40	79.8	112	7.40	251

¹ Total organic carbon



Photo 1: Sediment core from Polley Lake Station P2, Replicate 3, August 14, 2015.



Photo 2: Sediment grab from Polley Lake Station P2, Replicate 3, August 14, 2015.



Photo 3: Sediment core from Bootjack Lake Station B2, Replicate 3, August 16, 2015.



Photo 4: Sediment grab from Bootjack Lake Station B2, Replicate 3, August 16, 2015.



Photo 5: Sediment collected from Hazeltine Creek Sediment Pond, Replicate 5, August 20, 2015.



Photo 6: Silt/clay substrate at Hazeltine Creek Sediment Pond, August 20, 2015.



Photo 7: Sandy/rocky substrate at Quesnel Lake littoral near-field, August 17, 2015.



Photo 8: Sediment grab from Quesnel Lake littoral far-field, Replicate 2, August 25, 2015.



Photo 9: Sediment grab from Quesnel Lake littoral reference, Replicate 3, August 25, 2015.



Photo 10: Sediment grab from Quesnel Lake profundal near-field, Replicate 2, August 14, 2015.



Photo 11: Sediment grab from Quesnel Lake profundal reference, Replicate 1, August 18, 2015.

APPENDIX B

ANALYTICAL REPORTS



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 21-AUG-15
Report Date: 02-OCT-15 12:45 (MT)
Version: FINAL REV. 3

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1661656
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

Comments:

Tessier sequential extraction and AVS/SEM analyses are not included in this report.
23-SEP-2015 Revision 2: The report to company has been modified.

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1661656-1	L1661656-2	L1661656-3	L1661656-4	L1661656-5
		Description	Sediment	Sediment	Sediment	Sediment	Sediment
		Sampled Date	17-AUG-15	17-AUG-15	14-AUG-15	15-AUG-15	15-AUG-15
		Sampled Time					
		Client ID	PNF-01	PNF-01X	PNF-02	PNF-03	PNF-04
Grouping	Analyte						
SOIL							
Physical Tests	Moisture (%)		63.5	64.5	64.7	55.0	33.9
	pH (1:2 soil:water) (pH)		8.26	8.31	8.38	8.51	8.55
Particle Size	% Gravel (>2mm) (%)		<0.10	<0.10	<0.10	<0.10	<0.10
	% Sand (2.0mm - 0.063mm) (%)		1.41	1.29	1.67	1.83	1.90
	% Silt (0.063mm - 4um) (%)		44.1	46.4	48.5	54.7	81.7
	% Clay (<4um) (%)		54.5	52.3	49.9	43.5	16.4
	Texture		Silty clay	Silty clay	Silty clay	Silty clay loam	Silt
Anions and Nutrients	Total Nitrogen by LECO (%)		0.064	0.055	0.055	0.043	0.027
Organic / Inorganic Carbon	Total Organic Carbon (%)		0.42	0.50	0.52	0.25	<0.10
Metals	Aluminum (Al) (mg/kg)		33300	33500	34500	28800	17700
	Antimony (Sb) (mg/kg)		0.61	0.63	0.66	0.57	0.43
	Arsenic (As) (mg/kg)		16.2	16.4	17.0	16.1	13.4
	Barium (Ba) (mg/kg)		298	296	306	286	193
	Beryllium (Be) (mg/kg)		1.17	1.18	1.22	1.02	0.69
	Bismuth (Bi) (mg/kg)		0.16	0.16	0.17	0.14	<0.10
	Boron (B) (mg/kg)		12	12	13	12	<10
	Cadmium (Cd) (mg/kg)		0.230	0.242	0.244	0.210	0.144
	Calcium (Ca) (mg/kg)		33000	33400	34900	30700	28100
	Chromium (Cr) (mg/kg)		23.5	23.7	25.0	22.5	14.3
	Cobalt (Co) (mg/kg)		32.7	33.0	35.0	26.1	15.9
	Copper (Cu) (mg/kg)		1110	1130	1190	904	536
	Iron (Fe) (mg/kg)		38700	39100	41200	38600	35100
	Lead (Pb) (mg/kg)		12.3	12.5	12.7	11.1	6.47
	Lithium (Li) (mg/kg)		39.7	40.3	41.2	30.5	18.2
	Magnesium (Mg) (mg/kg)		23100	23800	25000	17900	10200
	Manganese (Mn) (mg/kg)		1250	1280	1310	1090	716
	Mercury (Hg) (mg/kg)		0.116	0.116	0.114	0.0935	0.0751
	Molybdenum (Mo) (mg/kg)		4.64	4.63	4.82	4.15	3.17
	Nickel (Ni) (mg/kg)		24.6	24.9	25.5	22.1	13.4
	Phosphorus (P) (mg/kg)		1080	1130	1180	1310	1650
	Potassium (K) (mg/kg)		3190	3120	3140	3150	1890
	Selenium (Se) (mg/kg)		1.54	1.59	1.61	1.29	0.82
	Silver (Ag) (mg/kg)		0.441	0.447	0.462	0.378	0.269
Sodium (Na) (mg/kg)		1590	1620	1650	1670	1050	
Strontium (Sr) (mg/kg)		241	240	242	231	172	
Sulfur (S)-Total (mg/kg)		1800	1800	1700	1500	1400	

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1661656-6 Sediment 16-AUG-15 PNF-05	L1661656-7 Sediment 18-AUG-15 PREFI-01	L1661656-8 Sediment 19-AUG-15 PREFI-03	L1661656-9 Sediment 19-AUG-15 PREFI-03X	L1661656-10 Sediment 17-AUG-15 LNFI-1
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	29.0	52.6	53.3	51.6	21.9
	pH (1:2 soil:water) (pH)	8.53	7.36	6.69	6.72	6.70
Particle Size	% Gravel (>2mm) (%)	<0.10	<0.10	<0.10	<0.10	0.84
	% Sand (2.0mm - 0.063mm) (%)	28.2	21.1	15.2	11.2	95.9
	% Silt (0.063mm - 4um) (%)	58.7	67.7	73.0	76.9	2.87
	% Clay (<4um) (%)	13.1	11.2	11.8	11.9	0.40
	Texture	Silt loam	Silt loam	Silt loam	Silt loam	Sand
Anions and Nutrients	Total Nitrogen by LECO (%)	0.028	0.169	0.158	0.156	0.027
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.18	1.76	1.71	1.66	0.65
Metals	Aluminum (Al) (mg/kg)	18300	16900	17300	16700	14500
	Antimony (Sb) (mg/kg)	0.50	0.47	0.43	0.42	0.46
	Arsenic (As) (mg/kg)	14.1	8.64	8.98	9.28	14.3
	Barium (Ba) (mg/kg)	190	147	151	150	128
	Beryllium (Be) (mg/kg)	0.70	0.52	0.50	0.50	0.56
	Bismuth (Bi) (mg/kg)	<0.10	0.17	0.15	0.15	0.10
	Boron (B) (mg/kg)	<10	<10	<10	<10	<10
	Cadmium (Cd) (mg/kg)	0.156	0.475	0.422	0.416	0.261
	Calcium (Ca) (mg/kg)	29100	8780	8840	8760	20000
	Chromium (Cr) (mg/kg)	19.1	60.1	59.5	58.5	33.0
	Cobalt (Co) (mg/kg)	17.8	15.2	15.0	14.7	20.4
	Copper (Cu) (mg/kg)	557	59.4	55.8	54.6	890
	Iron (Fe) (mg/kg)	49500	32300	32700	31900	83000
	Lead (Pb) (mg/kg)	6.94	8.06	7.51	7.44	7.16
	Lithium (Li) (mg/kg)	19.2	15.5	15.2	15.0	15.1
	Magnesium (Mg) (mg/kg)	10400	8410	8660	8370	8230
	Manganese (Mn) (mg/kg)	801	477	479	467	852
	Mercury (Hg) (mg/kg)	0.0783	0.0627	0.0515	0.0545	0.123
	Molybdenum (Mo) (mg/kg)	3.47	1.20	1.02	1.05	3.26
	Nickel (Ni) (mg/kg)	15.3	41.2	40.1	39.2	20.5
	Phosphorus (P) (mg/kg)	1540	1150	1190	1200	1730
	Potassium (K) (mg/kg)	1830	1550	1570	1520	1140
	Selenium (Se) (mg/kg)	0.87	1.10	0.93	0.90	1.15
	Silver (Ag) (mg/kg)	0.295	0.238	0.216	0.209	0.405
	Sodium (Na) (mg/kg)	1020	470	520	530	630
Strontium (Sr) (mg/kg)	172	82.0	84.5	82.8	122	
Sulfur (S)-Total (mg/kg)	1400	1400	1300	1200	1000	

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1661656-11 Sediment 17-AUG-15 LNFI-2	L1661656-12 Sediment 17-AUG-15 LNFI-3	L1661656-13 Sediment 17-AUG-15 LNFI-4	L1661656-14 Sediment 17-AUG-15 LNFI-5	L1661656-15 Sediment 13-AUG-15 POL-P2-1
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	20.8	26.6	35.7	21.9	86.3
	pH (1:2 soil:water) (pH)	8.21	8.28	8.16	8.39	7.18
Particle Size	% Gravel (>2mm) (%)	0.48	<0.10	7.32	1.37	
	% Sand (2.0mm - 0.063mm) (%)	91.7	82.8	51.9	89.9	
	% Silt (0.063mm - 4um) (%)	7.00	16.7	39.4	7.93	
	% Clay (<4um) (%)	0.85	0.47	1.42	0.79	
	Texture	Sand	Sand	Sandy loam	Sand	
Anions and Nutrients	Total Nitrogen by LECO (%)	0.029	0.031	0.042	0.029	0.702
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.21	0.14	0.35	0.40	3.80
Metals	Aluminum (Al) (mg/kg)	12900	8470	13000	12700	28400
	Antimony (Sb) (mg/kg)	0.46	0.37	0.39	0.47	1.06
	Arsenic (As) (mg/kg)	16.1	16.3	13.1	15.4	14.7
	Barium (Ba) (mg/kg)	105	71.8	113	107	317
	Beryllium (Be) (mg/kg)	0.56	0.41	0.54	0.52	1.05
	Bismuth (Bi) (mg/kg)	<0.10	0.11	<0.10	0.10	0.11
	Boron (B) (mg/kg)	<10	<10	<10	<10	14
	Cadmium (Cd) (mg/kg)	0.268	0.180	0.165	0.214	0.201
	Calcium (Ca) (mg/kg)	22300	19500	20400	19300	28200
	Chromium (Cr) (mg/kg)	33.9	44.0	23.1	39.3	22.0
	Cobalt (Co) (mg/kg)	20.1	33.9	19.4	23.9	24.3
	Copper (Cu) (mg/kg)	634	593	539	583	851
	Iron (Fe) (mg/kg)	92300	213000	89100	122000	32400
	Lead (Pb) (mg/kg)	6.68	6.01	5.47	6.66	9.06
	Lithium (Li) (mg/kg)	13.3	10.8	13.6	13.0	27.1
	Magnesium (Mg) (mg/kg)	7010	5190	7420	6770	16900
	Manganese (Mn) (mg/kg)	756	671	628	842	2400
	Mercury (Hg) (mg/kg)	0.102	0.0940	0.0819	0.105	0.102
	Molybdenum (Mo) (mg/kg)	3.64	3.97	3.04	3.00	8.86
	Nickel (Ni) (mg/kg)	19.2	18.6	14.6	20.9	19.9
	Phosphorus (P) (mg/kg)	2030	2410	1810	1750	1220
	Potassium (K) (mg/kg)	960	530	1020	950	2700
	Selenium (Se) (mg/kg)	1.07	1.44	1.01	1.12	3.94
	Silver (Ag) (mg/kg)	0.360	0.392	0.320	0.361	0.361
Sodium (Na) (mg/kg)	540	330	620	510	1730	
Strontium (Sr) (mg/kg)	110	69.7	119	110	292	
Sulfur (S)-Total (mg/kg)	1000	1500	1500	1100	6700	

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1661656-16 Sediment 13-AUG-15 POL-P2-1 (PS)	L1661656-17 Sediment 14-AUG-15 POL-P2-2	L1661656-18 Sediment 14-AUG-15 POL-P2-2 (PS)	L1661656-19 Sediment 14-AUG-15 POL-P2-3	L1661656-20 Sediment 14-AUG-15 POL-P2-3 (PS)
Grouping	Analyte				
SOIL					
Physical Tests	Moisture (%)		84.1		86.0
	pH (1:2 soil:water) (pH)		7.50		7.49
Particle Size	% Gravel (>2mm) (%)	<0.10		<0.10	<0.10
	% Sand (2.0mm - 0.063mm) (%)	<0.10		0.30	<0.10
	% Silt (0.063mm - 4um) (%)	69.6		85.4	87.1
	% Clay (<4um) (%)	30.3		14.3	12.9
	Texture	Silt loam		Silt	Silt
Anions and Nutrients	Total Nitrogen by LECO (%)		1.19		0.858
Organic / Inorganic Carbon	Total Organic Carbon (%)		10.1		7.37
Metals	Aluminum (Al) (mg/kg)		28900		27700
	Antimony (Sb) (mg/kg)		1.12		1.06
	Arsenic (As) (mg/kg)		14.1		13.4
	Barium (Ba) (mg/kg)		346		308
	Beryllium (Be) (mg/kg)		1.06		0.97
	Bismuth (Bi) (mg/kg)		0.12		0.12
	Boron (B) (mg/kg)		13		15
	Cadmium (Cd) (mg/kg)		0.201		0.226
	Calcium (Ca) (mg/kg)		24800		22000
	Chromium (Cr) (mg/kg)		21.6		27.8
	Cobalt (Co) (mg/kg)		23.4		22.5
	Copper (Cu) (mg/kg)		855		774
	Iron (Fe) (mg/kg)		29800		30500
	Lead (Pb) (mg/kg)		9.70		9.30
	Lithium (Li) (mg/kg)		26.1		25.1
	Magnesium (Mg) (mg/kg)		16400		15400
	Manganese (Mn) (mg/kg)		3160		2050
	Mercury (Hg) (mg/kg)		0.105		0.115
	Molybdenum (Mo) (mg/kg)		9.09		10.4
	Nickel (Ni) (mg/kg)		19.3		23.0
	Phosphorus (P) (mg/kg)		1160		1180
	Potassium (K) (mg/kg)		2820		2680
	Selenium (Se) (mg/kg)		4.47		4.52
	Silver (Ag) (mg/kg)		0.351		0.353
	Sodium (Na) (mg/kg)		1880		1720
	Strontium (Sr) (mg/kg)		304		265
	Sulfur (S)-Total (mg/kg)		11200		7500

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1661656-21 Sediment 14-AUG-15 POL-P2-4	L1661656-22 Sediment 14-AUG-15 POL-P2-4 (PS)	L1661656-23 Sediment 15-AUG-15 POL-P2-5	L1661656-24 Sediment 15-AUG-15 POL-P2-5 (PS)	L1661656-25 Sediment 16-AUG-15 BOL-B2-1
Grouping	Analyte				
SOIL					
Physical Tests	Moisture (%)	89.7		89.1	94.1
	pH (1:2 soil:water) (pH)	7.47		7.70	6.44
Particle Size	% Gravel (>2mm) (%)		<0.10	<0.10	
	% Sand (2.0mm - 0.063mm) (%)		0.21	<0.10	
	% Silt (0.063mm - 4um) (%)		73.8	78.0	
	% Clay (<4um) (%)		26.0	22.0	
	Texture		Silt loam	Silt loam	
Anions and Nutrients	Total Nitrogen by LECO (%)	0.977		0.988	1.60
Organic / Inorganic Carbon	Total Organic Carbon (%)	7.51		8.32	14.8
Metals	Aluminum (Al) (mg/kg)	26300		29800	18700
	Antimony (Sb) (mg/kg)	1.33		0.87	0.93
	Arsenic (As) (mg/kg)	13.0		14.7	7.46
	Barium (Ba) (mg/kg)	349		327	311
	Beryllium (Be) (mg/kg)	0.98		1.02	0.70
	Bismuth (Bi) (mg/kg)	0.12		0.12	0.14
	Boron (B) (mg/kg)	13		13	16
	Cadmium (Cd) (mg/kg)	0.224		0.239	0.492
	Calcium (Ca) (mg/kg)	20400		27100	7970
	Chromium (Cr) (mg/kg)	25.8		33.5	45.4
	Cobalt (Co) (mg/kg)	19.9		25.6	13.1
	Copper (Cu) (mg/kg)	772		864	375
	Iron (Fe) (mg/kg)	28100		28000	33400
	Lead (Pb) (mg/kg)	9.76		8.92	10.6
	Lithium (Li) (mg/kg)	22.1		26.7	10.6
	Magnesium (Mg) (mg/kg)	13500		17400	5230
	Manganese (Mn) (mg/kg)	3320		1940	3850
	Mercury (Hg) (mg/kg)	0.116		0.114	0.291
	Molybdenum (Mo) (mg/kg)	12.0		10.3	3.88
	Nickel (Ni) (mg/kg)	21.3		26.6	32.7
	Phosphorus (P) (mg/kg)	1130		1310	3550
	Potassium (K) (mg/kg)	2740		2890	1760
	Selenium (Se) (mg/kg)	5.75		3.45	2.91
	Silver (Ag) (mg/kg)	0.341		0.334	0.367
	Sodium (Na) (mg/kg)	1960		1850	770
	Strontium (Sr) (mg/kg)	298		285	97.4
	Sulfur (S)-Total (mg/kg)	7600		9100	6200

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1661656-26	L1661656-27	L1661656-28	L1661656-29	L1661656-30
		Description	Sediment	Sediment	Sediment	Sediment	Sediment
		Sampled Date	16-AUG-15	16-AUG-15	16-AUG-15	16-AUG-15	16-AUG-15
		Sampled Time					
		Client ID	BOL-B2-1 (PS)	BOL-B2-2	BOL-B2-2 (PS)	BOL-B2-3	BOL-B2-3 (PS)
Grouping	Analyte						
SOIL							
Physical Tests	Moisture (%)			96.1		95.7	
	pH (1:2 soil:water) (pH)			6.71		6.60	
Particle Size	% Gravel (>2mm) (%)	<0.10			<0.10		<0.10
	% Sand (2.0mm - 0.063mm) (%)	0.12			0.15		0.22
	% Silt (0.063mm - 4um) (%)	80.6			83.9		81.8
	% Clay (<4um) (%)	19.3			16.0		17.9
	Texture	Silt loam			Silt		Silt loam
Anions and Nutrients	Total Nitrogen by LECO (%)			1.67		1.65	
Organic / Inorganic Carbon	Total Organic Carbon (%)			15.5		15.1	
Metals	Aluminum (Al) (mg/kg)			19700		17600	
	Antimony (Sb) (mg/kg)			1.05		0.91	
	Arsenic (As) (mg/kg)			8.48		7.23	
	Barium (Ba) (mg/kg)			277		280	
	Beryllium (Be) (mg/kg)			0.71		0.70	
	Bismuth (Bi) (mg/kg)			0.14		0.13	
	Boron (B) (mg/kg)			16		14	
	Cadmium (Cd) (mg/kg)			0.602		0.493	
	Calcium (Ca) (mg/kg)			9140		8140	
	Chromium (Cr) (mg/kg)			47.5		42.2	
	Cobalt (Co) (mg/kg)			14.0		12.7	
	Copper (Cu) (mg/kg)			409		363	
	Iron (Fe) (mg/kg)			29300		27500	
	Lead (Pb) (mg/kg)			11.8		10.4	
	Lithium (Li) (mg/kg)			10.8		10.4	
	Magnesium (Mg) (mg/kg)			5400		5190	
	Manganese (Mn) (mg/kg)			2890		3240	
	Mercury (Hg) (mg/kg)			0.330		0.285	
	Molybdenum (Mo) (mg/kg)			4.85		4.23	
	Nickel (Ni) (mg/kg)			34.8		32.4	
	Phosphorus (P) (mg/kg)			1990		2070	
	Potassium (K) (mg/kg)			1750		1570	
	Selenium (Se) (mg/kg)			2.76		2.59	
	Silver (Ag) (mg/kg)			0.391		0.372	
Sodium (Na) (mg/kg)			1090		840		
Strontium (Sr) (mg/kg)			106		94.9		
Sulfur (S)-Total (mg/kg)			7700		7100		

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID				
	L1661656-31 Sediment 16-AUG-15 BOL-B2-4 (PS)	L1661656-32 Sediment 16-AUG-15 BOL-B2-5 (PS)	L1661656-33 Sediment 16-AUG-15 BOL-BX		
Grouping	Analyte				
SOIL					
Physical Tests	Moisture (%)			94.8	
	pH (1:2 soil:water) (pH)			6.39	
Particle Size	% Gravel (>2mm) (%)	<0.10	<0.10		
	% Sand (2.0mm - 0.063mm) (%)	0.16	0.63		
	% Silt (0.063mm - 4um) (%)	83.9	82.6		
	% Clay (<4um) (%)	15.9	16.8		
	Texture	Silt loam	Silt loam		
Anions and Nutrients	Total Nitrogen by LECO (%)			1.67	
Organic / Inorganic Carbon	Total Organic Carbon (%)			15.5	
Metals	Aluminum (Al) (mg/kg)			18900	
	Antimony (Sb) (mg/kg)			0.76	
	Arsenic (As) (mg/kg)			6.89	
	Barium (Ba) (mg/kg)			286	
	Beryllium (Be) (mg/kg)			0.60	
	Bismuth (Bi) (mg/kg)			0.11	
	Boron (B) (mg/kg)			13	
	Cadmium (Cd) (mg/kg)			0.483	
	Calcium (Ca) (mg/kg)			6830	
	Chromium (Cr) (mg/kg)			40.4	
	Cobalt (Co) (mg/kg)			12.8	
	Copper (Cu) (mg/kg)			371	
	Iron (Fe) (mg/kg)			28300	
	Lead (Pb) (mg/kg)			8.87	
	Lithium (Li) (mg/kg)			9.3	
	Magnesium (Mg) (mg/kg)			5210	
	Manganese (Mn) (mg/kg)			2990	
	Mercury (Hg) (mg/kg)			0.307	
	Molybdenum (Mo) (mg/kg)			3.25	
	Nickel (Ni) (mg/kg)			31.8	
	Phosphorus (P) (mg/kg)			2270	
	Potassium (K) (mg/kg)			1730	
	Selenium (Se) (mg/kg)			2.60	
	Silver (Ag) (mg/kg)			0.303	
	Sodium (Na) (mg/kg)			1040	
	Strontium (Sr) (mg/kg)			81.3	
	Sulfur (S)-Total (mg/kg)			6700	

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1661656-1	L1661656-2	L1661656-3	L1661656-4	L1661656-5
		Description	Sediment	Sediment	Sediment	Sediment	Sediment
		Sampled Date	17-AUG-15	17-AUG-15	14-AUG-15	15-AUG-15	15-AUG-15
		Sampled Time					
		Client ID	PNF-01	PNF-01X	PNF-02	PNF-03	PNF-04
Grouping	Analyte						
SOIL							
Metals	Thallium (Tl) (mg/kg)		0.067	0.068	0.065	0.066	<0.050
	Tin (Sn) (mg/kg)		2.31	2.32	2.47	2.01	1.41
	Titanium (Ti) (mg/kg)		2310	2310	2420	2070	1420
	Uranium (U) (mg/kg)		1.54	1.56	1.59	1.42	1.13
	Vanadium (V) (mg/kg)		128	130	136	132	127
	Zinc (Zn) (mg/kg)		125	126	131	100	58.9

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1661656-6	L1661656-7	L1661656-8	L1661656-9	L1661656-10
		Description	Sediment	Sediment	Sediment	Sediment	Sediment
		Sampled Date	16-AUG-15	18-AUG-15	19-AUG-15	19-AUG-15	17-AUG-15
		Sampled Time					
		Client ID	PNF-05	PREFI-01	PREFI-03	PREFI-03X	LNFI-1
Grouping	Analyte						
SOIL							
Metals	Thallium (Tl) (mg/kg)	<0.050	0.194	0.171	0.168	<0.050	
	Tin (Sn) (mg/kg)	1.76	0.49	0.46	0.45	1.46	
	Titanium (Ti) (mg/kg)	1760	1160	1190	1140	1430	
	Uranium (U) (mg/kg)	1.27	1.57	1.43	1.41	0.999	
	Vanadium (V) (mg/kg)	189	73.0	72.3	70.7	310	
	Zinc (Zn) (mg/kg)	65.2	85.1	82.6	81.3	68.5	

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1661656-11	L1661656-12	L1661656-13	L1661656-14	L1661656-15
		Description	Sediment	Sediment	Sediment	Sediment	Sediment
		Sampled Date	17-AUG-15	17-AUG-15	17-AUG-15	17-AUG-15	13-AUG-15
		Sampled Time					
		Client ID	LNFI-2	LNFI-3	LNFI-4	LNFI-5	POL-P2-1
Grouping	Analyte						
SOIL							
Metals	Thallium (Tl) (mg/kg)	<0.050	<0.050	<0.050	0.050	0.051	
	Tin (Sn) (mg/kg)	1.23	1.25	1.34	1.29	2.29	
	Titanium (Ti) (mg/kg)	1270	1150	1300	1480	2050	
	Uranium (U) (mg/kg)	1.05	1.08	1.07	1.21	1.49	
	Vanadium (V) (mg/kg)	350	839	335	470	122	
	Zinc (Zn) (mg/kg)	65.8	86.0	61.3	72.5	88.0	

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1661656-16	L1661656-17	L1661656-18	L1661656-19	L1661656-20
		Description	Sediment	Sediment	Sediment	Sediment	Sediment
		Sampled Date	13-AUG-15	14-AUG-15	14-AUG-15	14-AUG-15	14-AUG-15
		Sampled Time					
		Client ID	POL-P2-1 (PS)	POL-P2-2	POL-P2-2 (PS)	POL-P2-3	POL-P2-3 (PS)
Grouping	Analyte						
SOIL							
Metals	Thallium (Tl) (mg/kg)			0.057		0.067	
	Tin (Sn) (mg/kg)			2.18		1.98	
	Titanium (Ti) (mg/kg)			1940		1750	
	Uranium (U) (mg/kg)			1.45		1.53	
	Vanadium (V) (mg/kg)			113		113	
	Zinc (Zn) (mg/kg)			86.1		86.9	

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1661656-21	L1661656-22	L1661656-23	L1661656-24	L1661656-25
		Description	Sediment	Sediment	Sediment	Sediment	Sediment
		Sampled Date	14-AUG-15	14-AUG-15	15-AUG-15	15-AUG-15	16-AUG-15
		Sampled Time					
		Client ID	POL-P2-4	POL-P2-4 (PS)	POL-P2-5	POL-P2-5 (PS)	BOL-B2-1
Grouping	Analyte						
SOIL							
Metals	Thallium (Tl) (mg/kg)		0.062		0.053		0.134
	Tin (Sn) (mg/kg)		1.89		2.14		0.78
	Titanium (Ti) (mg/kg)		1550		1870		487
	Uranium (U) (mg/kg)		1.40		1.42		2.14
	Vanadium (V) (mg/kg)		107		120		81.4
	Zinc (Zn) (mg/kg)		78.2		92.8		82.2

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1661656-26	L1661656-27	L1661656-28	L1661656-29	L1661656-30
		Description	Sediment	Sediment	Sediment	Sediment	Sediment
		Sampled Date	16-AUG-15	16-AUG-15	16-AUG-15	16-AUG-15	16-AUG-15
		Sampled Time					
		Client ID	BOL-B2-1 (PS)	BOL-B2-2	BOL-B2-2 (PS)	BOL-B2-3	BOL-B2-3 (PS)
Grouping	Analyte						
SOIL							
Metals	Thallium (Tl) (mg/kg)			0.142		0.119	
	Tin (Sn) (mg/kg)			0.67		0.64	
	Titanium (Ti) (mg/kg)			507		389	
	Uranium (U) (mg/kg)			2.40		2.07	
	Vanadium (V) (mg/kg)			83.8		75.6	
	Zinc (Zn) (mg/kg)			86.9		79.4	

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1661656-31 Sediment 16-AUG-15 BOL-B2-4 (PS)	L1661656-32 Sediment 16-AUG-15 BOL-B2-5 (PS)	L1661656-33 Sediment 16-AUG-15 BOL-BX		
Grouping	Analyte					
SOIL						
Metals	Thallium (Tl) (mg/kg)			0.104		
	Tin (Sn) (mg/kg)			0.52		
	Titanium (Ti) (mg/kg)			461		
	Uranium (U) (mg/kg)			1.77		
	Vanadium (V) (mg/kg)			76.7		
	Zinc (Zn) (mg/kg)			79.7		

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
AVS-COL-VA	Soil	Acid volatile sulphide by colourimetric	EPA 821/R-91-100
<p>This analysis was carried out in accordance with the method described in EPA 821/R-91-100. In summary, hydrochloric acid is added to the sediment samples within a purge and trap system. The evolved hydrogen sulphide (H₂S) is carried into a basic zinc acetate (ZnAc) solution by argon gas. The acid volatile sulfide is then determined colourimetrically.</p>			
C-TOT-63UM-LECO-SK	Soil	Total Carbon by combustion method (63um)	SSSA (1996) P. 973-974
<p>The sample is ignited in a combustion analyzer where carbon in the reduced CO₂ gas is determined using a thermal conductivity detector.</p>			
C-TOT-ORG-63UM-SK	Soil	Organic Carbon by combustion method(63um)	SSSA (1996) p. 973
<p>Total Organic Carbon (C-TOT-ORG-LECO-SK, C-TOT-ORG-SK)</p> <p>Total C and inorganic C are determined on separate samples. The total C is determined by combustion and thermal conductivity detection, while inorganic C is determined by weight loss after addition of hydrochloric acid. Organic C is calculated by the difference between these two determinations.</p> <p>Reference for Total C: Nelson, D.W. and Sommers, L.E. 1996. Total Carbon, organic carbon and organic matter. P. 961-1010 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5</p> <p>Reference for Inorganic C: Loeppert, R.H. and Suarez, D.L. 1996. Gravimetric Method for Loss of Carbon Dioxide. P. 455-456 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5</p>			
HG-63UM-CVAF-VA	Soil	Hg in Soil by CVAFS	EPA 200.2/245.7
<p>This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 63 um (230 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).</p> <p>Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.</p> <p>Deviation from Reference Method: This procedure deviates from the BC CSR SALM method, which specifies sieving to 2 mm (10 mesh).</p>			
HG-SEM-CVAFS-VA	Soil	Simultaneously Extracted Metals in Soil	EPA 821/R-91-100; EPA245.7
<p>This analysis was carried out in accordance with the method described in EPA 821/R-91-100. In summary, hydrochloric acid is added to the sediment samples within a purge and trap system. The extract produced from the addition of the acid is then analyzed for simultaneously extracted metals (SEM) using atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA 245.7).</p>			
MET-63UM-CCMS-VA	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A
<p>This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 63 um (230 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.</p>			
MET-SEM-ICP-VA	Soil	Simultaneously Extracted Metals (ICPOES)	EPA 821/R-91-100; EPA 6010B
<p>This analysis was carried out in accordance with the method described in EPA 821/R-91-100. In summary, hydrochloric acid is added to the sediment samples within a purge and trap system. The extract produced from the addition of the acid is then analyzed for simultaneously extracted metals (SEM) using inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).</p>			
MET-TESS-CM-CCMS-VA	Soil	METALS BY CCMS (TESSIER EXTRACTION #2)	Tessier Extraction 1979/EPA 6020A
<p>This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Note: For Extraction #2, the extraction solution is 1M Sodium Acetate adjusted to pH 5 and is intended to extract the "Carbonate" metals.</p>			
MET-TESS-EA-CCMS-VA	Soil	METALS BY CCMS (TESSIER EXTRACTION #1)	Tessier Extraction 1979/EPA 6020A

Reference Information

This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For Extraction #1, the extraction solution is 1M Magnesium Chloride and is intended to extract the "Exchangeable and Adsorbed" metals.

MET-TESS-FEO-CCMS-VA Soil METALS BY CCMS (TESSIER EXTRACTION #3) Tessier Extraction 1979/EPA 6020A

This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For Extraction #3, the extraction solution is 0.1 M Hydroxylamine Hydrochloride in 25% v/v Acetic Acid and is intended to extract the Easily Reducible Metals and Iron Oxides .

MET-TESS-OB-CCMS-VA Soil METALS BY CCMS (TESSIER EXTRACTION #4) Tessier Extraction 1979/EPA 6020A

"This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For Extraction #4, the extraction solution is 0.02 M Nitric Acid followed by 3.2M Ammonium Acetate and is intended to extract the Organic Bound metals.

MET-TESS-RM-CCMS-VA Soil METALS BY CCMS (TESSIER RM EXTRACTION) Tessier Extraction 1979/EPA 6020A

"This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with up to 6 different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For the Tessier "RM" Extraction, the extraction solution is 50/50 mix of 1:1 Nitric Acid along with 1:1 Hydrochloric Acid, and is hot block digested as per the BC SALM procedure. This is intended to extract the Residual metals.

MOISTURE-VA Soil Moisture content ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

N-TOT-LECO-SK Soil Total Nitrogen by combustion method SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

PSA-PIPET+GRAVEL-SK Soil Particle size - Sieve and Pipette SSIR-51 METHOD 3.2.1

Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

S-TOT-LECO-SK Soil Total Sulphur by combustion method ISO 15178:2000

The sample is ignited in a combustion analyzer where sulfur in the reduced SO₂ gas is determined using a thermal conductivity detector.

Reference Information

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1661656

Report Date: 02-OCT-15

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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-63UM-SK								
	Soil							
Batch	R3279466							
WG2181422-1	DUP	L1661656-10						
Total Organic Carbon		0.65	0.69		%	6.9	30	30-SEP-15
WG2181422-4	DUP	L1661656-27						
Total Organic Carbon		15.5	15.5		%	0.3	30	30-SEP-15
WG2181422-2	IRM	08-109_SOIL						
Total Organic Carbon			0.99		%		0.77-1.43	30-SEP-15
WG2181422-5	IRM	08-109_SOIL						
Total Organic Carbon			1.04		%		0.77-1.43	30-SEP-15
WG2181422-3	MB							
Total Organic Carbon			<0.10		%		0.1	30-SEP-15
WG2181422-6	MB							
Total Organic Carbon			<0.10		%		0.1	30-SEP-15
HG-63UM-CVAF-VA								
	Soil							
Batch	R3258839							
WG2160206-4	CRM	VA-NRC-STSD1						
Mercury (Hg)			103.0		%		70-130	02-SEP-15
WG2160206-5	CRM	VA-NRC-PACS3						
Mercury (Hg)			104.8		%		70-130	02-SEP-15
WG2160206-2	DUP	L1661656-8						
Mercury (Hg)		0.0515	0.0539		mg/kg	4.5	40	02-SEP-15
WG2160206-1	MB							
Mercury (Hg)			<0.0050		mg/kg		0.005	02-SEP-15
Batch	R3259486							
WG2160221-4	CRM	VA-NRC-STSD1						
Mercury (Hg)			108.0		%		70-130	03-SEP-15
WG2160221-5	CRM	VA-NRC-PACS3						
Mercury (Hg)			112.2		%		70-130	03-SEP-15
WG2160221-2	DUP	L1661656-25						
Mercury (Hg)		0.291	0.287		mg/kg	1.5	40	03-SEP-15
WG2160221-3	LCS							
Mercury (Hg)			100.9		%		70-130	03-SEP-15
WG2160221-1	MB							
Mercury (Hg)			<0.0050		mg/kg		0.005	03-SEP-15
MET-63UM-CCMS-VA								
	Soil							
Batch	R3259411							
WG2160206-4	CRM	VA-NRC-STSD1						
Aluminum (Al)			108.1		%		70-130	02-SEP-15



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC VOL 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-63UM-CCMS-VA		Soil						
Batch	R3259411							
WG2160206-4	CRM	VA-NRC-STSD1						
Antimony (Sb)			112.0		%		70-130	02-SEP-15
Arsenic (As)			106.7		%		70-130	02-SEP-15
Barium (Ba)			95.6		%		70-130	02-SEP-15
Beryllium (Be)			113.8		%		70-130	02-SEP-15
Bismuth (Bi)			103.5		%		70-130	02-SEP-15
Cadmium (Cd)			103.6		%		70-130	02-SEP-15
Calcium (Ca)			106.9		%		70-130	02-SEP-15
Chromium (Cr)			107.0		%		70-130	02-SEP-15
Cobalt (Co)			107.3		%		70-130	02-SEP-15
Copper (Cu)			106.0		%		70-130	02-SEP-15
Iron (Fe)			106.3		%		70-130	02-SEP-15
Lead (Pb)			103.9		%		70-130	02-SEP-15
Lithium (Li)			111.7		%		70-130	02-SEP-15
Magnesium (Mg)			104.9		%		70-130	02-SEP-15
Manganese (Mn)			104.9		%		70-130	02-SEP-15
Molybdenum (Mo)			109.3		%		70-130	02-SEP-15
Nickel (Ni)			107.1		%		70-130	02-SEP-15
Phosphorus (P)			104.4		%		70-130	02-SEP-15
Potassium (K)			115.6		%		70-130	02-SEP-15
Selenium (Se)			104.1		%		70-130	02-SEP-15
Silver (Ag)			108.4		%		70-130	02-SEP-15
Sodium (Na)			117.2		%		70-130	02-SEP-15
Strontium (Sr)			108.4		%		70-130	02-SEP-15
Thallium (Tl)			106.8		%		70-130	02-SEP-15
Tin (Sn)			102.9		%		70-130	02-SEP-15
Titanium (Ti)			125.0		%		70-130	02-SEP-15
Vanadium (V)			111.7		%		70-130	02-SEP-15
Zinc (Zn)			108.3		%		70-130	02-SEP-15
WG2160206-5	CRM	VA-NRC-PACS3						
Aluminum (Al)			100.6		%		70-130	02-SEP-15
Antimony (Sb)			102.2		%		70-130	02-SEP-15
Arsenic (As)			96.5		%		70-130	02-SEP-15
Barium (Ba)			94.2		%		70-130	02-SEP-15
Beryllium (Be)			102.0		%		70-130	02-SEP-15



Quality Control Report

Workorder: L1661656

Report Date: 02-OCT-15

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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC VOL 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-63UM-CCMS-VA								
Soil								
Batch	R3259411							
WG2160206-5	CRM	VA-NRC-PACS3						
Boron (B)			102.3		%		70-130	02-SEP-15
Cadmium (Cd)			108.5		%		70-130	02-SEP-15
Calcium (Ca)			103.0		%		70-130	02-SEP-15
Chromium (Cr)			98.1		%		70-130	02-SEP-15
Cobalt (Co)			99.8		%		70-130	02-SEP-15
Copper (Cu)			101.3		%		70-130	02-SEP-15
Iron (Fe)			101.4		%		70-130	02-SEP-15
Lead (Pb)			98.6		%		70-130	02-SEP-15
Lithium (Li)			100.0		%		70-130	02-SEP-15
Magnesium (Mg)			105.1		%		70-130	02-SEP-15
Manganese (Mn)			96.8		%		70-130	02-SEP-15
Molybdenum (Mo)			96.4		%		70-130	02-SEP-15
Nickel (Ni)			101.2		%		70-130	02-SEP-15
Phosphorus (P)			97.3		%		70-130	02-SEP-15
Potassium (K)			100.4		%		70-130	02-SEP-15
Selenium (Se)			101.6		%		70-130	02-SEP-15
Silver (Ag)			104.9		%		70-130	02-SEP-15
Sodium (Na)			99.6		%		70-130	02-SEP-15
Strontium (Sr)			101.5		%		70-130	02-SEP-15
Thallium (Tl)			101.9		%		70-130	02-SEP-15
Tin (Sn)			89.7		%		70-130	02-SEP-15
Titanium (Ti)			98.3		%		70-130	02-SEP-15
Uranium (U)			101.7		%		70-130	02-SEP-15
Vanadium (V)			100.7		%		70-130	02-SEP-15
Zinc (Zn)			105.2		%		70-130	02-SEP-15
WG2160206-2	DUP	L1661656-8						
Aluminum (Al)		17300	16800		mg/kg	3.0	40	02-SEP-15
Antimony (Sb)		0.43	0.43		mg/kg	1.4	30	02-SEP-15
Arsenic (As)		8.98	9.14		mg/kg	1.8	30	02-SEP-15
Barium (Ba)		151	148		mg/kg	2.3	40	02-SEP-15
Beryllium (Be)		0.50	0.50		mg/kg	0.1	30	02-SEP-15
Bismuth (Bi)		0.15	0.15		mg/kg	0.4	30	02-SEP-15
Boron (B)		<10	<10	RPD-NA	mg/kg	N/A	30	02-SEP-15



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC VOL 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-63UM-CCMS-VA								
	Soil							
Batch	R3259411							
WG2160206-2	DUP	L1661656-8						
Cadmium (Cd)		0.422	0.396		mg/kg	6.3	30	02-SEP-15
Calcium (Ca)		8840	8880		mg/kg	0.4	30	02-SEP-15
Chromium (Cr)		59.5	56.9		mg/kg	4.5	30	02-SEP-15
Cobalt (Co)		15.0	14.5		mg/kg	3.1	30	02-SEP-15
Copper (Cu)		55.8	54.0		mg/kg	3.2	30	02-SEP-15
Iron (Fe)		32700	31700		mg/kg	3.1	30	02-SEP-15
Lead (Pb)		7.51	7.44		mg/kg	1.1	40	02-SEP-15
Lithium (Li)		15.2	14.9		mg/kg	2.4	30	02-SEP-15
Magnesium (Mg)		8660	8420		mg/kg	2.9	30	02-SEP-15
Manganese (Mn)		479	471		mg/kg	1.6	30	02-SEP-15
Molybdenum (Mo)		1.02	1.01		mg/kg	0.9	40	02-SEP-15
Nickel (Ni)		40.1	38.7		mg/kg	3.7	30	02-SEP-15
Phosphorus (P)		1190	1210		mg/kg	1.9	30	02-SEP-15
Potassium (K)		1570	1510		mg/kg	4.1	40	02-SEP-15
Selenium (Se)		0.93	0.90		mg/kg	2.4	30	02-SEP-15
Silver (Ag)		0.216	0.213		mg/kg	1.2	40	02-SEP-15
Sodium (Na)		520	520		mg/kg	0.3	40	02-SEP-15
Strontium (Sr)		84.5	84.2		mg/kg	0.4	40	02-SEP-15
Thallium (Tl)		0.171	0.168		mg/kg	1.8	30	02-SEP-15
Tin (Sn)		0.46	0.43		mg/kg	7.2	40	02-SEP-15
Titanium (Ti)		1190	1160		mg/kg	2.9	40	02-SEP-15
Uranium (U)		1.43	1.44		mg/kg	0.7	30	02-SEP-15
Vanadium (V)		72.3	70.5		mg/kg	2.6	30	02-SEP-15
Zinc (Zn)		82.6	79.4		mg/kg	3.9	30	02-SEP-15
WG2160206-1	MB							
Aluminum (Al)			<50		mg/kg		50	02-SEP-15
Antimony (Sb)			<0.10		mg/kg		0.1	02-SEP-15
Arsenic (As)			<0.050		mg/kg		0.05	02-SEP-15
Barium (Ba)			<0.50		mg/kg		0.5	02-SEP-15
Beryllium (Be)			<0.10		mg/kg		0.1	02-SEP-15
Bismuth (Bi)			<0.10		mg/kg		0.1	02-SEP-15
Boron (B)			<5.0		mg/kg		5	02-SEP-15
Cadmium (Cd)			<0.050		mg/kg		0.05	02-SEP-15



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Workorder: L1661656

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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-63UM-CCMS-VA								
Soil								
Batch R3259411								
WG2160206-1 MB								
Calcium (Ca)			<50		mg/kg		50	02-SEP-15
Chromium (Cr)			<0.50		mg/kg		0.5	02-SEP-15
Cobalt (Co)			<0.10		mg/kg		0.1	02-SEP-15
Copper (Cu)			<0.50		mg/kg		0.5	02-SEP-15
Iron (Fe)			<50		mg/kg		50	02-SEP-15
Lead (Pb)			<0.10		mg/kg		0.1	02-SEP-15
Lithium (Li)			<5.0		mg/kg		5	02-SEP-15
Magnesium (Mg)			<10		mg/kg		10	02-SEP-15
Manganese (Mn)			<0.20		mg/kg		0.2	02-SEP-15
Molybdenum (Mo)			<0.10		mg/kg		0.1	02-SEP-15
Nickel (Ni)			<0.50		mg/kg		0.5	02-SEP-15
Phosphorus (P)			<50		mg/kg		50	02-SEP-15
Potassium (K)			<100		mg/kg		100	02-SEP-15
Selenium (Se)			<0.10		mg/kg		0.1	02-SEP-15
Silver (Ag)			<0.050		mg/kg		0.05	02-SEP-15
Sodium (Na)			<100		mg/kg		100	02-SEP-15
Strontium (Sr)			<0.10		mg/kg		0.1	02-SEP-15
Thallium (Tl)			<0.050		mg/kg		0.05	02-SEP-15
Tin (Sn)			<0.20		mg/kg		0.2	02-SEP-15
Titanium (Ti)			<1.0		mg/kg		1	02-SEP-15
Uranium (U)			<0.050		mg/kg		0.05	02-SEP-15
Vanadium (V)			<0.20		mg/kg		0.2	02-SEP-15
Zinc (Zn)			<1.0		mg/kg		1	02-SEP-15
Batch R3260087								
WG2160221-3 LCS								
Aluminum (Al)			91.4		%		70-130	03-SEP-15
Antimony (Sb)			99.4		%		70-130	03-SEP-15
Arsenic (As)			96.7		%		70-130	03-SEP-15
Barium (Ba)			102.1		%		70-130	03-SEP-15
Beryllium (Be)			94.7		%		70-130	03-SEP-15
Bismuth (Bi)			100.7		%		70-130	03-SEP-15
Boron (B)			92.0		%		70-130	03-SEP-15
Cadmium (Cd)			95.5		%		70-130	03-SEP-15
Calcium (Ca)			97.2		%		70-130	03-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-63UM-CCMS-VA								
	Soil							
Batch	R3260087							
WG2160221-3	LCS							
Chromium (Cr)			93.1		%		70-130	03-SEP-15
Cobalt (Co)			95.6		%		70-130	03-SEP-15
Copper (Cu)			91.2		%		70-130	03-SEP-15
Iron (Fe)			104.4		%		70-130	03-SEP-15
Lead (Pb)			103.2		%		70-130	03-SEP-15
Lithium (Li)			93.4		%		70-130	03-SEP-15
Magnesium (Mg)			93.3		%		70-130	03-SEP-15
Manganese (Mn)			93.6		%		70-130	03-SEP-15
Molybdenum (Mo)			101.8		%		70-130	03-SEP-15
Nickel (Ni)			92.9		%		70-130	03-SEP-15
Phosphorus (P)			95.0		%		70-130	03-SEP-15
Potassium (K)			92.0		%		70-130	03-SEP-15
Selenium (Se)			97.8		%		70-130	03-SEP-15
Silver (Ag)			102.6		%		70-130	03-SEP-15
Sodium (Na)			88.8		%		70-130	03-SEP-15
Strontium (Sr)			104.2		%		70-130	03-SEP-15
Thallium (Tl)			101.2		%		70-130	03-SEP-15
Tin (Sn)			97.2		%		70-130	03-SEP-15
Titanium (Ti)			91.4		%		70-130	03-SEP-15
Uranium (U)			103.9		%		70-130	03-SEP-15
Vanadium (V)			96.1		%		70-130	03-SEP-15
Zinc (Zn)			90.2		%		70-130	03-SEP-15
Batch	R3262020							
WG2160221-4	CRM	VA-NRC-STSD1						
Aluminum (Al)			103.4		%		70-130	04-SEP-15
Antimony (Sb)			81.0		%		70-130	04-SEP-15
Arsenic (As)			111.3		%		70-130	04-SEP-15
Barium (Ba)			106.7		%		70-130	04-SEP-15
Beryllium (Be)			87.8		%		70-130	04-SEP-15
Bismuth (Bi)			77.6		%		70-130	04-SEP-15
Cadmium (Cd)			111.2		%		70-130	04-SEP-15
Calcium (Ca)			82.1		%		70-130	04-SEP-15
Chromium (Cr)			113.1		%		70-130	04-SEP-15
Cobalt (Co)			111.8		%		70-130	04-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-63UM-CCMS-VA Soil								
Batch R3262020								
WG2160221-4 CRM VA-NRC-STSD1								
Copper (Cu)			107.9		%		70-130	04-SEP-15
Iron (Fe)			100.7		%		70-130	04-SEP-15
Lead (Pb)			81.7		%		70-130	04-SEP-15
Lithium (Li)			83.8		%		70-130	04-SEP-15
Magnesium (Mg)			101.1		%		70-130	04-SEP-15
Manganese (Mn)			95.5		%		70-130	04-SEP-15
Molybdenum (Mo)			84.0		%		70-130	04-SEP-15
Nickel (Ni)			110.1		%		70-130	04-SEP-15
Phosphorus (P)			108.9		%		70-130	04-SEP-15
Potassium (K)			121.2		%		70-130	04-SEP-15
Selenium (Se)			102.2		%		70-130	04-SEP-15
Silver (Ag)			82.9		%		70-130	04-SEP-15
Sodium (Na)			124.5		%		70-130	04-SEP-15
Strontium (Sr)			89.2		%		70-130	04-SEP-15
Thallium (Tl)			79.5		%		70-130	04-SEP-15
Tin (Sn)			79.5		%		70-130	04-SEP-15
Titanium (Ti)			113.5		%		70-130	04-SEP-15
Vanadium (V)			115.5		%		70-130	04-SEP-15
Zinc (Zn)			108.7		%		70-130	04-SEP-15
WG2160221-5 CRM VA-NRC-PACS3								
Aluminum (Al)			90.5		%		70-130	04-SEP-15
Antimony (Sb)			92.6		%		70-130	04-SEP-15
Arsenic (As)			87.7		%		70-130	04-SEP-15
Barium (Ba)			97.8		%		70-130	04-SEP-15
Beryllium (Be)			100.8		%		70-130	04-SEP-15
Boron (B)			98.0		%		70-130	04-SEP-15
Cadmium (Cd)			99.0		%		70-130	04-SEP-15
Calcium (Ca)			102.5		%		70-130	04-SEP-15
Chromium (Cr)			92.7		%		70-130	04-SEP-15
Cobalt (Co)			93.3		%		70-130	04-SEP-15
Copper (Cu)			93.9		%		70-130	04-SEP-15
Iron (Fe)			90.5		%		70-130	04-SEP-15
Lead (Pb)			99.4		%		70-130	04-SEP-15
Lithium (Li)			91.2		%		70-130	04-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-63UM-CCMS-VA								
Soil								
Batch R3262020								
WG2160221-5 CRM								
VA-NRC-PACS3								
Magnesium (Mg)			90.9		%		70-130	04-SEP-15
Manganese (Mn)			80.2		%		70-130	04-SEP-15
Molybdenum (Mo)			93.5		%		70-130	04-SEP-15
Nickel (Ni)			99.4		%		70-130	04-SEP-15
Phosphorus (P)			93.5		%		70-130	04-SEP-15
Potassium (K)			95.1		%		70-130	04-SEP-15
Selenium (Se)			95.1		%		70-130	04-SEP-15
Silver (Ag)			115.5		%		70-130	04-SEP-15
Sodium (Na)			89.0		%		70-130	04-SEP-15
Strontium (Sr)			102.5		%		70-130	04-SEP-15
Thallium (Tl)			95.9		%		70-130	04-SEP-15
Tin (Sn)			86.2		%		70-130	04-SEP-15
Titanium (Ti)			87.8		%		70-130	04-SEP-15
Uranium (U)			96.6		%		70-130	04-SEP-15
Vanadium (V)			93.7		%		70-130	04-SEP-15
Zinc (Zn)			95.3		%		70-130	04-SEP-15
WG2160221-2 DUP								
L1661656-25								
Aluminum (Al)		18700	18900		mg/kg	0.8	40	04-SEP-15
Antimony (Sb)		0.93	0.92		mg/kg	1.0	30	04-SEP-15
Arsenic (As)		7.46	7.48		mg/kg	0.3	30	04-SEP-15
Barium (Ba)		311	296		mg/kg	5.1	40	04-SEP-15
Beryllium (Be)		0.70	0.72		mg/kg	3.5	30	04-SEP-15
Bismuth (Bi)		0.14	0.14		mg/kg	3.1	30	04-SEP-15
Boron (B)		16	16		mg/kg	3.2	30	04-SEP-15
Cadmium (Cd)		0.492	0.512		mg/kg	4.0	30	04-SEP-15
Calcium (Ca)		7970	7920		mg/kg	0.6	30	04-SEP-15
Chromium (Cr)		45.4	45.8		mg/kg	1.0	30	04-SEP-15
Cobalt (Co)		13.1	13.2		mg/kg	0.8	30	04-SEP-15
Copper (Cu)		375	380		mg/kg	1.4	30	04-SEP-15
Iron (Fe)		33400	32400		mg/kg	3.2	30	04-SEP-15
Lead (Pb)		10.6	10.7		mg/kg	0.8	40	04-SEP-15
Lithium (Li)		10.6	10.9		mg/kg	2.9	30	04-SEP-15
Magnesium (Mg)		5230	5360		mg/kg	2.5	30	04-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-63UM-CCMS-VA								
	Soil							
Batch	R3262020							
WG2160221-2	DUP	L1661656-25						
Manganese (Mn)		3850	4000		mg/kg	3.7	30	04-SEP-15
Molybdenum (Mo)		3.88	3.88		mg/kg	0.1	40	04-SEP-15
Nickel (Ni)		32.7	33.0		mg/kg	1.0	30	04-SEP-15
Phosphorus (P)		3550	3580		mg/kg	1.0	30	04-SEP-15
Potassium (K)		1760	1780		mg/kg	1.2	40	04-SEP-15
Selenium (Se)		2.91	2.80		mg/kg	4.1	30	04-SEP-15
Silver (Ag)		0.367	0.377		mg/kg	2.5	40	04-SEP-15
Sodium (Na)		770	990		mg/kg	25	40	04-SEP-15
Strontium (Sr)		97.4	96.1		mg/kg	1.3	40	04-SEP-15
Thallium (Tl)		0.134	0.141		mg/kg	5.2	30	04-SEP-15
Tin (Sn)		0.78	0.77		mg/kg	0.7	40	04-SEP-15
Titanium (Ti)		487	479		mg/kg	1.7	40	04-SEP-15
Uranium (U)		2.14	2.14		mg/kg	0.1	30	04-SEP-15
Vanadium (V)		81.4	82.2		mg/kg	0.9	30	04-SEP-15
Zinc (Zn)		82.2	83.4		mg/kg	1.4	30	04-SEP-15
WG2160221-1	MB							
Aluminum (Al)			<50		mg/kg		50	04-SEP-15
Antimony (Sb)			<0.10		mg/kg		0.1	04-SEP-15
Arsenic (As)			<0.050		mg/kg		0.05	04-SEP-15
Barium (Ba)			<0.50		mg/kg		0.5	04-SEP-15
Beryllium (Be)			<0.10		mg/kg		0.1	04-SEP-15
Bismuth (Bi)			<0.10		mg/kg		0.1	04-SEP-15
Boron (B)			<5.0		mg/kg		5	04-SEP-15
Cadmium (Cd)			<0.050		mg/kg		0.05	04-SEP-15
Calcium (Ca)			<50		mg/kg		50	04-SEP-15
Chromium (Cr)			<0.50		mg/kg		0.5	04-SEP-15
Cobalt (Co)			<0.10		mg/kg		0.1	04-SEP-15
Copper (Cu)			<0.50		mg/kg		0.5	04-SEP-15
Iron (Fe)			<50		mg/kg		50	04-SEP-15
Lead (Pb)			<0.10		mg/kg		0.1	04-SEP-15
Lithium (Li)			<5.0		mg/kg		5	04-SEP-15
Magnesium (Mg)			<10		mg/kg		10	04-SEP-15
Manganese (Mn)			<0.20		mg/kg		0.2	04-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-63UM-CCMS-VA								
	Soil							
Batch	R3262020							
WG2160221-1	MB							
Molybdenum (Mo)			<0.10		mg/kg		0.1	04-SEP-15
Nickel (Ni)			<0.50		mg/kg		0.5	04-SEP-15
Phosphorus (P)			<50		mg/kg		50	04-SEP-15
Potassium (K)			<100		mg/kg		100	04-SEP-15
Selenium (Se)			<0.10		mg/kg		0.1	04-SEP-15
Silver (Ag)			<0.050		mg/kg		0.05	04-SEP-15
Sodium (Na)			<100		mg/kg		100	04-SEP-15
Strontium (Sr)			<0.10		mg/kg		0.1	04-SEP-15
Thallium (Tl)			<0.050		mg/kg		0.05	04-SEP-15
Tin (Sn)			<0.20		mg/kg		0.2	04-SEP-15
Titanium (Ti)			<1.0		mg/kg		1	04-SEP-15
Uranium (U)			<0.050		mg/kg		0.05	04-SEP-15
Vanadium (V)			<0.20		mg/kg		0.2	04-SEP-15
Zinc (Zn)			<1.0		mg/kg		1	04-SEP-15
MOISTURE-VA								
	Soil							
Batch	R3252780							
WG2156408-3	DUP	L1660910-1						
Moisture		18.7	16.5		%	13	20	25-AUG-15
WG2156408-2	LCS							
Moisture			100.5		%		90-110	25-AUG-15
WG2156408-1	MB							
Moisture			<0.25		%		0.25	25-AUG-15
Batch	R3253576							
WG2157416-3	DUP	L1661656-2						
Moisture		64.5	63.6		%	1.4	20	26-AUG-15
WG2157416-2	LCS							
Moisture			98.2		%		90-110	26-AUG-15
WG2157416-1	MB							
Moisture			<0.25		%		0.25	26-AUG-15
Batch	R3253583							
WG2157415-3	DUP	L1662585-2						
Moisture		13.9	13.7		%	1.6	20	26-AUG-15
WG2157415-2	LCS							
Moisture			97.8		%		90-110	26-AUG-15
WG2157415-1	MB							



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-VA		Soil						
Batch	R3253583							
WG2157415-1	MB							
Moisture			<0.25		%		0.25	26-AUG-15
Batch	R3254449							
WG2158259-3	DUP	L1663552-1						
Moisture		9.59	9.65		%	0.7	20	27-AUG-15
WG2158259-2	LCS							
Moisture			99.9		%		90-110	27-AUG-15
WG2158259-1	MB							
Moisture			<0.25		%		0.25	27-AUG-15
Batch	R3255211							
WG2158880-4	DUP	L1661656-40						
Moisture		N/A	50.6		%	3.5	20	28-AUG-15
WG2158880-5	DUP	L1664041-1						
Moisture		20.7	20.9		%	1.3	20	28-AUG-15
WG2158880-2	LCS							
Moisture			99.9		%		90-110	28-AUG-15
WG2158880-1	MB							
Moisture			<0.25		%		0.25	28-AUG-15
Batch	R3255251							
WG2159322-7	DUP	L1661656-10						
Moisture		21.9	22.2		%	1.3	20	28-AUG-15
WG2159322-6	LCS							
Moisture			100.9		%		90-110	28-AUG-15
WG2159322-5	MB							
Moisture			<0.25		%		0.25	28-AUG-15
N-TOT-LECO-SK		Soil						
Batch	R3257801							
WG2157087-1	DUP	L1661656-10						
Total Nitrogen by LECO		0.027	0.022	J	%	0.005	0.04	31-AUG-15
WG2157087-5	DUP	L1661656-27						
Total Nitrogen by LECO		1.67	1.67		%	0.2	20	31-AUG-15
WG2157087-2	IRM	08-109_SOIL						
Total Nitrogen by LECO			0.116		%		0.085-0.135	31-AUG-15
WG2157087-6	IRM	08-109_SOIL						
Total Nitrogen by LECO			0.113		%		0.085-0.135	31-AUG-15
WG2157087-4	MB							
Total Nitrogen by LECO			<0.020		%		0.02	31-AUG-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed	
N-TOT-LECO-SK		Soil							
Batch	R3257801								
WG2157087-8	MB								
Total Nitrogen by LECO			<0.020		%		0.02	31-AUG-15	
PH-1:2-VA		Soil							
Batch	R3253920								
WG2156452-2	DUP	L1660910-1							
pH (1:2 soil:water)			6.89	6.87	J	pH	0.02	0.3	26-AUG-15
Batch	R3255016								
WG2157417-2	DUP	L1661763-6							
pH (1:2 soil:water)			7.36	7.38	J	pH	0.02	0.3	27-AUG-15
WG2157418-2	DUP	L1661656-2							
pH (1:2 soil:water)			8.31	8.38	J	pH	0.07	0.3	27-AUG-15
Batch	R3255558								
WG2158340-2	DUP	L1656882-64							
pH (1:2 soil:water)			8.26	8.33	J	pH	0.07	0.3	28-AUG-15
Batch	R3256467								
WG2159321-2	DUP	L1661656-29							
pH (1:2 soil:water)			6.60	6.56	J	pH	0.04	0.3	30-AUG-15
Batch	R3256489								
WG2159308-2	DUP	L1661656-11							
pH (1:2 soil:water)			8.21	8.40	J	pH	0.19	0.3	30-AUG-15
PSA-PIPET+GRAVEL-SK		Soil							
Batch	R3259542								
WG2157165-1	DUP	L1661656-7							
% Gravel (>2mm)			<0.10	<0.10	RPD-NA	%	N/A	25	02-SEP-15
% Sand (2.0mm - 0.063mm)			21.1	23.5	J	%	2.36	5	02-SEP-15
% Silt (0.063mm - 4um)			67.7	68.0	J	%	0.30	5	02-SEP-15
% Clay (<4um)			11.2	8.53	J	%	2.66	5	02-SEP-15
WG2157165-2	IRM	FARM2010							
% Sand (2.0mm - 0.063mm)				35.7		%	29-39		02-SEP-15
% Silt (0.063mm - 4um)				41.4		%	34-44		02-SEP-15
% Clay (<4um)				22.9		%	22-32		02-SEP-15



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PSA-PIPET+GRAVEL-SK Soil								
Batch R3261842								
WG2157171-1 DUP		L1664212-1						
% Gravel (>2mm)		<0.10	<0.10	RPD-NA	%	N/A	25	03-SEP-15
% Sand (2.0mm - 0.063mm)		1.66	2.27	J	%	0.61	5	03-SEP-15
% Silt (0.063mm - 4um)		78.2	77.5	J	%	0.70	5	03-SEP-15
% Clay (<4um)		20.2	20.3	J	%	0.09	5	03-SEP-15
WG2157171-2 IRM		FARM2010						
% Sand (2.0mm - 0.063mm)			33.3		%		29-39	03-SEP-15
% Silt (0.063mm - 4um)			40.6		%		34-44	03-SEP-15
% Clay (<4um)			26.1		%		22-32	03-SEP-15
S-TOT-LECO-SK Soil								
Batch R3257801								
WG2157087-1 DUP		L1661656-10						
Sulfur (S)-Total		1000	1400		mg/kg	29	30	31-AUG-15
WG2157087-5 DUP		L1661656-27						
Sulfur (S)-Total		7700	7600		mg/kg	0.8	30	31-AUG-15
WG2157087-3 IRM		1646A_SOIL						
Sulfur (S)-Total			3700		mg/kg		2500-4600	31-AUG-15
WG2157087-7 IRM		1646A_SOIL						
Sulfur (S)-Total			3200		mg/kg		2500-4600	31-AUG-15
WG2157087-4 MB								
Sulfur (S)-Total			<500		mg/kg		500	31-AUG-15
WG2157087-8 MB								
Sulfur (S)-Total			<500		mg/kg		500	31-AUG-15

Quality Control Report

Workorder: L1661656

Report Date: 02-OCT-15

Client: MOUNT POLLEY MINING CORP.

PO Box 12

Likely BC VOL 1N0

Page 14 of 14

Contact: Colleen Hughes

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Report To		Report Format / Distribution			Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)																																												
Company: MOUNT POLLEY MINING CORP.		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)			R <input checked="" type="checkbox"/> Regular (Standard TAT if received by 3 pm - business days)																																												
Contact: Colleen Hughes		Quality Control (QC) Report with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			P <input type="checkbox"/> Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT																																												
Address: PO Box 12, Likely, BC, V0L 1N0		<input type="checkbox"/> Criteria on Report - provide details below if box checked			E <input type="checkbox"/> Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT																																												
Phone: 250-790-2617		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			E2 <input type="checkbox"/> Same day or weekend emergency - contact ALS to confirm TAT and surcharge																																												
		Email 1 or Fax: chughes@mountpolley.com; pstecko@minnow.ca			Specify Date Required for E2, E or P:																																												
		Email 2			Analysis Request																																												
Invoice To		Invoice Distribution			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below																																												
Same as Report To <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX																																															
Copy of Invoice with Report <input type="checkbox"/> Yes <input type="checkbox"/> No		Email 1 or Fax: chughes@mountpolley.com																																															
Company:		Email 2																																															
Contact:																																																	
Project Information		Oil and Gas Required Fields (client use)																																															
ALS Quote #: Q51555		Approver ID:			MET-63UM-SED-VA (CCME Metals < 63um)			HG-63UM-CVAF-CA (Hg < 63um)			C-TOT-ORG-LECO-SK (TOC) <i>463um</i>			pH-1.2-VA (pH)			N-TOT-LECO-SK (Total nitrogen)			S-TOT-LECO-SK (Total Sulphur)			PSA-PIPE+GRAVEL-SK (Particle Size)			MOISTURE-VA (Moisture)			MET-TESS-STD-VA (Tessier Extractions)			MET-SEM-ICP-VA (SEM analysis)			HG-SEM-CVAFS-VA (Hg SEM analysis)			AVS-COL-VA (AVS analysis)			Number of Containers								
Job #:		GL Account																																															
PO / A/E:		Activity Code:																																															
LSD:		Location:																																															
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang			Sampler: <i>Steve Stecko</i>																																												
ALS Sample # (lab use only)		Sample Identification and/or Coordinates (This descriptor will appear on the report)			Date (dd-mm-yy)		Time (hh:mm)		Sample Type																																								
		PNF-01			17-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			X			5								
		PNF-01X			17-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			X			4								
		PNF-02			14-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			X			4								
		PNF-03			15-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			X			4								
		PNF-04			15-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			X			4								
		PNF-05			16-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			X			4								
		PRef1-01			18-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			X			4								
		PRef1-03			19-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			X			4								
		PRef1-03X			19-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			X			3								
		LNFI-1			17-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			X			2								
		LNFI-2			17-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			X			2								
		LNFI-3			17-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			X			2								
Drinking Water (DW) Samples¹ (client use)		Special Instructions / Specify Criteria to add on report (client use)			SAMPLE CONDITION AS RECEIVED (lab use only)																																												
Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input type="checkbox"/> No					Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>																																												
Are samples for human drinking water use? <input type="checkbox"/> Yes <input type="checkbox"/> No					Ice packs Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>																																												
					Cooling Initiated <input type="checkbox"/>																																												
					INITIAL COOLER TEMPERATURES °C					FINAL COOLER TEMPERATURES °C																																							
										6.7, 4, 5, 7, 7.9																																							
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)																																												
Released by: <i>Katharina Batdolor</i>		Date: <i>Aug 20/15</i>		Time: <i>13:00</i>		Received by:		Date:		Time:		Received by: <i>Jean</i>		Date: <i>21 Aug</i>		Time: <i>9 AM</i>																																	



Report To		Report Format / Distribution			Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)														
Company: MOUNT POLLEY MINING CORP.		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EOD (DIGITAL)			R <input checked="" type="checkbox"/> Regular (Standard TAT if received by 3 pm - business days)														
Contact: Colleen Hughes		Quality Control (QC) Report with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			P <input type="checkbox"/> Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT														
Address: PO Box 12, Lkely, BC, V0L 1N0		<input type="checkbox"/> Criteria on Report - provide details below if box checked			E <input type="checkbox"/> Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT														
Phone: 250-790-2617		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			E2 <input type="checkbox"/> Same day or weekend emergency - contact ALS to confirm TAT and surcharge														
		Email 1 or Fax: chughes@mountpolley.com; pstecko@minnow.ca			Specify Date Required for E2, E or P:														
		Email 2			Analysis Request														
Invoice To Same as Report To <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Invoice Distribution			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below														
Copy of Invoice with Report <input type="checkbox"/> Yes <input type="checkbox"/> No		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX																	
Company:		Email 1 or Fax: chughes@mountpolley.com																	
Contact:		Email 2																	
Project Information		Oil and Gas Required Fields (client use)																	
ALS Quote #: Q51555		Approver ID:																	
Job #:		GL Account:																	
PO / AFE:		Activity Code:																	
LSD:		Location:																	
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang			Sample: Pierre Stecko Katharina Bachelar														
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)			Date (dd-mm-yy)	Time (hh:mm)	Sample Type	MET-63UM-SED-VA (CCME Metals < 63um)	HG-63UM-CVAF-CA (Hg < 63um)	C-TOT-ORG-LECO-SK (TOC) 463UM	pH-1.2-VA (pH)	N-TOT-LECO-SK (Total nitrogen)	S-TOT-LECO-SK (Total Sulphur)	PSA-PIPET+GRAVEL-SK (Particle Size)	MOISTURE-VA (Moisture)	MET-TESS-STD-VA (Tessier Extractions)	MET-SEM-ICP-VA (SEM analysis)	HG-SEM-CVAFS-VA (Hg SEM analysis)	AVS-COL-VA (AVS analysis)	Number of Containers
	LNFI-4		17-08-15	-	-	Sediment	X	X	X	X	X	X	X	X					2
	LNFI-5		17-08-15	-	-	Sediment	X	X	X	X	X	X	X	X					2
	POL-P2-1		13-08-15	-	-	Sediment	X	X	X	X	X	X	X	X					2
	POL-P2-1 (PS)		13-08-15	-	-	Sediment							X						1
	POL-P2-2		14-08-15	-	-	Sediment	X	X	X	X	X	X	X	X					2
	POL-P2-2 (PS)		14-08-15	-	-	Sediment							X						1
	POL-P2-3		14-08-15	-	-	Sediment	X	X	X	X	X	X	X	X					2
	POL-P2-3 (PS)		14-08-15	-	-	Sediment							X						1
	POL-P2-4		14-08-15	-	-	Sediment	X	X	X	X	X	X	X	X					2
	POL-P2-4 (PS)		14-08-15	-	-	Sediment							X						1
	POL-P2-5		15-08-15	-	-	Sediment	X	X	X	X	X	X	X	X					2
	POL-P2-5 (PS)		15-08-15	-	-	Sediment							X						1
Drinking Water (DW) Samples ¹ (client use)		Special Instructions / Specify Criteria to add on report (client use)			SAMPLE CONDITION AS RECEIVED (lab use only)														
Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input type="checkbox"/> No					Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>														
Are samples for human drinking water use? <input type="checkbox"/> Yes <input type="checkbox"/> No					Ice packs Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>														
					Cooling Initiated <input type="checkbox"/>														
					INITIAL COOLER TEMPERATURES °C: FINAL COOLER TEMPERATURES °C														
					67.4 5.7 79														
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)														
Released by: Katharina Bachelar		Received by: Jean			Received by: Jean														
Date: Aug 20/15		Date: 21 Aug			Date: 21 Aug														
Time: 13:00		Time: 9AM			Time: 9AM														

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ALS Form 001-001 Rev 04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.


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Report To		Report Format / Distribution			Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)															
Company: MOUNT POLLEY MINING CORP.		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)			<input checked="" type="checkbox"/> Regular (Standard TAT if received by 3 pm - business days) <input type="checkbox"/> Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT <input type="checkbox"/> Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT <input type="checkbox"/> E2 Same day or weekend emergency - contact ALS to confirm TAT and surcharge															
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Address: PO Box 12, Likely, BC, V0L 1N0		<input type="checkbox"/> Criteria on Report - provide details below if box checked																		
Phone: 250-790-2817		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			Specify Date Required for E2, E or P:															
		Email 1 or Fax chughes@mountpolley.com; pstecko@minnow.ca																		
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Invoice To Same as Report To <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Invoice Distribution			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below															
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Project Information		Oil and Gas Required Fields (client use)																		
ALS Quote #: Q51555		Approver ID:																		
Job #:		Cost Center:																		
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LSD:		Routing Code:																		
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang			Sampler:															
ALS Sample # (lab use only)		Sample Identification and/or Coordinates (This description will appear on the report)			Date (dd-mm-yy)		Time (hh:mm)		Sample Type											
		BOL-B2-1			16-08-15		-		Sediment											
		BOL-B2-1 (PS)			16-08-15		-		Sediment											
		BOL-B2-2			16-08-15		-		Sediment											
		BOL-B2-2 (PS)			16-08-15		-		Sediment											
		BOL-B2-3			16-08-15		-		Sediment											
		BOL-B2-3 (PS)			16-08-15		-		Sediment											
		BOL-B2-4 (PS)			16-08-15		-		Sediment											
		BOL-B2-5 (PS)			16-08-15		-		Sediment											
		BOL-BX			16-08-15		-		Sediment											
		PNF-01 (SEM/AVS)			17-08-15		-		Sediment											
		PNF-01X (SEM/AVS)			17-08-15		-		Sediment											
		PNF-02 (SEM/AVS)			14-08-15		-		Sediment											
Drinking Water (DW) Samples¹ (client use)		Special Instructions / Specify Criteria to add on report (client Use)			SAMPLE CONDITION AS RECEIVED (lab use only)															
Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input type="checkbox"/> No					Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/> Ice packs Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Coating Initiated <input type="checkbox"/>															
Are samples for human drinking water use? <input type="checkbox"/> Yes <input type="checkbox"/> No					INITIAL COOLER TEMPERATURES °C: _____ FINAL COOLER TEMPERATURES °C: _____ _____ 67.4 5.7 7.9															
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (tab use only)															
Released by: Katherine Bachlor		Date: August 15			Time: 13:00		Received by: Jean			Date: 21 Aug			Time: 9AM							

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Report To Company: MOUNT POLLEY MINING CORP. Contact: Colleen Hughes Address: PO Box 12, Likely, BC, V0L 1N0 Phone: 250-790-2817		Report Format / Distribution Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL) Quality Control (QC) Report with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Criteria on Report - provide details below if box checked Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX Email 1 or Fax: chughes@mountpolley.com; pstecko@minnow.ca Email 2:		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests) R <input checked="" type="checkbox"/> Regular (Standard TAT if received by 3 pm - business days) P <input type="checkbox"/> Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT E <input type="checkbox"/> Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT E2 <input type="checkbox"/> Same day or weekend emergency - contact ALS to confirm TAT and surcharge Specify Date Required for E2, E or P:																											
Invoice To Same as Report To <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Copy of Invoice with Report <input type="checkbox"/> Yes <input type="checkbox"/> No Company: Contact:		Invoice Distribution Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX Email 1 or Fax: chughes@mountpolley.com Email 2:		Analysis Request Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below																											
Project Information ALS Quote #: Q51555 Job #: PO / AFE: LSD:		Oil and Gas Required Fields (client use) Approver ID: Cost Center: GL Account: Routing Code: Activity Code: Location:		<table border="1"> <tr> <td>MET-63UM-SED-VA (CCME Metals < 63um)</td> <td>HG-63UM-CVAF-CA (Hg < 63um)</td> <td>C-TOT-ORG-LECO-SK (TOC) <u>63um</u></td> <td>pH-1.2-VA (pH)</td> <td>N-TOT-LECO-SK (Total nitrogen)</td> <td>S-TOT-LECO-SK (Total Sulphur)</td> <td>PSA-PIPET-GRAVEL-SK (Particle Size)</td> <td>MOISTURE-VA (Moisture)</td> <td>MET-TESS-STD-VA (Tessier Extractions)</td> <td>MET-SEM-ICP-VA (SEM analysis)</td> <td>HG-SEM-CVAFS-VA (Hg SEM analysis)</td> <td>AVS-COL-VA (AVS analysis)</td> <td rowspan="10">Number of Containers</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>		MET-63UM-SED-VA (CCME Metals < 63um)	HG-63UM-CVAF-CA (Hg < 63um)	C-TOT-ORG-LECO-SK (TOC) <u>63um</u>	pH-1.2-VA (pH)	N-TOT-LECO-SK (Total nitrogen)	S-TOT-LECO-SK (Total Sulphur)	PSA-PIPET-GRAVEL-SK (Particle Size)	MOISTURE-VA (Moisture)	MET-TESS-STD-VA (Tessier Extractions)	MET-SEM-ICP-VA (SEM analysis)	HG-SEM-CVAFS-VA (Hg SEM analysis)	AVS-COL-VA (AVS analysis)	Number of Containers													
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ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang		Sampler:																											
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type																											
	PNF-03 (SEM/AVS)	15-08-15	-	Sediment						X	X		X	1																	
	PNF-04 (SEM/AVS)	15-08-15	-	Sediment						X	X		X	1																	
	PNF-05 (SEM/AVS)	16-08-15	-	Sediment						X	X		X	1																	
	PRef1-01 (SEM/AVS)	18-08-15	-	Sediment						X	X		X	1																	
	PRef1-02 (SEM/AVS)	18-08-15	-	Sediment						X	X		X	1																	
	PRef1-03 (SEM/AVS)	19-08-15	-	Sediment						X	X		X	1																	
	POL-P2-1 (SEM/AVS)	13-08-15	-	Sediment						X	X	X	1																		
	POL-P2-2 (SEM/AVS)	14-08-15	-	Sediment						X	X	X	1																		
	POL-P2-3 (SEM/AVS)	14-08-15	-	Sediment						X	X	X	1																		
	POL-P2-4 (SEM/AVS)	14-08-15	-	Sediment						X	X	X	1																		
	POL-P2-5 (SEM/AVS)	15-08-15	-	Sediment						X	X	X	1																		
	BOL-B2-1 (SEM/AVS)	16-08-15	-	Sediment						X	X	X	1																		
Drinking Water (DW) Samples (client use) Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input type="checkbox"/> No Are samples for human drinking water use? <input type="checkbox"/> Yes <input type="checkbox"/> No		Special Instructions / Specify Criteria to add on report (client Use) SEM/AVS samples enclosed in nitrogen lined ziploc. Extra sample can be used for metals analyses for the same sampling station.		SAMPLE CONDITION AS RECEIVED (lab use only) Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/> Ice packs: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Cooling Initiated: <input type="checkbox"/>																											
SHIPMENT RELEASE (client use) Released by: <u>Katherine Batchelor</u> Date: <u>Aug 2015</u> Time: <u>13:00</u>		INITIAL SHIPMENT RECEPTION (lab use only) Received by: _____ Date: _____ Time: _____		FINAL SHIPMENT RECEPTION (lab use only) Received by: <u>Jean</u> Date: <u>2 Aug</u> Time: <u>9 AM</u> INITIAL COOLER TEMPERATURES °C: _____ FINAL COOLER TEMPERATURES °C: <u>6.7, 4</u> <u>5.7</u> <u>7.9</u>																											



ALS Environmental

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Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 658 9878



L1661656-COFC

COC Number: 14 -

Page 5 of 5

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)													
Company: MOUNT POLLEY MINING CORP.		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)		R <input checked="" type="checkbox"/> Regular (Standard TAT if received by 3 pm - business days)													
Contact: Colleen Hughes		Quality Control (QC) Report with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		P <input type="checkbox"/> Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT													
Address: PO Box 12, Likely, BC, V0L 1N0		<input type="checkbox"/> Criteria on Report - provide details below if box checked		E <input type="checkbox"/> Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT													
Phone: 250-790-2617		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX		E2 <input type="checkbox"/> Same day or weekend emergency - contact ALS to confirm TAT and surcharge													
Invoice To Same as Report To <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Email 1 or Fax chughes@mountpolley.com; pstecko@minnow.ca		Specify Date Required for E2, E or P:													
Copy of invoice with Report <input type="checkbox"/> Yes <input type="checkbox"/> No		Email 2		Analysis Request													
Company:		Invoice Distribution		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below													
Contact:		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX															
Project Information		Email 1 or Fax chughes@mountpolley.com															
ALS Quote #: Q51555		Email 2															
Job #:		Oil and Gas Required Fields (client use)															
PO / AFE:		Approver ID:															
LSD:		GL Account:															
		Routing Code:															
ALS Lab Work Order # (lab use only)		Activity Code:															
		Location:															
		ALS Contact: Can Dang															
		Sampler:															
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-63UM-SED-VA (CCME Metals < 63um)	HG-63UM-CVAF-CA (Hg < 63um)	C-TOT-ORG-LECO-SK (TOC) < 3um	pH-1.2-VA (pH)	N-TOT-LECO-SK (Total Nitrogen)	S-TOT-LECO-SK (Total Sulphur)	PSA-PIPET+GRAVEL-SK (Particle Size)	MOISTURE-VA (Moisture)	MET-TESS-STD-VA (Tessier Extractions)	MET-SEM-ICP-VA (SEM analysis)	HG-SEM-CVAF-S-VA (Hg SEM analysis)	AVS-COL-VA (AVS analysis)	Number of Containers
	BOL-B2-2 (SEM/AVS)	16/08/15	-	Sediment										X	X	X	1
	BOL-B2-3 (SEM/AVS)	16/08/15	-	Sediment										X	X	X	1
	BOL-B2-4 (SEM/AVS)	16/08/15	-	Sediment										X	X	X	1
	BOL-B2-5 (SEM/AVS)	16/08/15	-	Sediment										X	X	X	1
	BOL-BX (SEM/AVS)	16/08/15	-	Sediment										X	X	X	1
				Sediment													
				Sediment													
				Sediment													
				Sediment													
Drinking Water (DW) Samples ¹ (client use)		Special Instructions / Specify Criteria to add on report (client use)		SAMPLE CONDITION AS RECEIVED (lab use only)													
Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input type="checkbox"/> No				Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>													
Are samples for human drinking water use? <input type="checkbox"/> Yes <input type="checkbox"/> No				Ice packs Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>													
				Cooling Initiated <input type="checkbox"/>													
				INITIAL COOLER TEMPERATURES °C FINAL COOLER TEMPERATURES °C													
				6.7.4 5.7 7.9													
SHIPMENT RELEASE (client use)				INITIAL SHIPMENT RECEPTION (lab use only)				FINAL SHIPMENT RECEPTION (lab use only)									
Released by: Katherine Batchelor		Date: Aug 2015		Time: 13:00		Received by: Sean		Date: 21		Time: 9 AM							

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

HS Form 6326a v09 Rev 04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1 If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 28-AUG-15
Report Date: 02-OCT-15 12:30 (MT)
Version: FINAL REV. 3

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1664712
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: 1, 2
Legal Site Desc:

Comments: ADDITIONAL 29-SEP-15 10:20
Tessier sequential extraction and AVS/SEM analyses are not included in this report.
24-SEP-2015 Revision 2: This revision includes the Quality Control Reports.
2-OCT-2015 Revision 3: This revision includes Total Organic Carbon analysis.

Can Dang
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1664712-1 Sediment 20-AUG-15 HAC-SED1	L1664712-2 Sediment 20-AUG-15 HAC-SED2	L1664712-3 Sediment 20-AUG-15 HAC-SED3	L1664712-4 Sediment 20-AUG-15 HAC-SED4	L1664712-5 Sediment 20-AUG-15 HAC-SED5
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	30.9	39.5	44.3	40.4	51.9
	pH (1:2 soil:water) (pH)	8.45	8.27	8.57	8.14	8.70
Particle Size	% Gravel (>2mm) (%)	0.11	1.06	<0.10	<0.10	<0.10
	% Sand (2.0mm - 0.063mm) (%)	23.9	8.40	1.48	2.19	0.29
	% Silt (0.063mm - 4um) (%)	68.3	78.4	76.8	81.1	71.1
	% Clay (<4um) (%)	7.68	12.2	21.7	16.7	28.7
	Texture	Silt loam	Silt	Silt loam	Silt	Silt loam
Anions and Nutrients	Total Nitrogen by LECO (%)	0.046	0.052	0.059	0.044	0.061
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.24	0.34	0.30	0.27	0.34
Metals	Aluminum (Al) (mg/kg)	13300	15100	20700	18100	22300
	Antimony (Sb) (mg/kg)	0.46	0.52	0.54	0.52	0.58
	Arsenic (As) (mg/kg)	12.9	13.6	15.5	15.5	16.6
	Barium (Ba) (mg/kg)	152	172	217	204	235
	Beryllium (Be) (mg/kg)	0.53	0.52	0.70	0.60	0.74
	Bismuth (Bi) (mg/kg)	0.10	0.13	0.13	0.12	0.15
	Boron (B) (mg/kg)	<10	<10	<10	<10	<10
	Cadmium (Cd) (mg/kg)	0.185	0.193	0.232	0.215	0.221
	Calcium (Ca) (mg/kg)	27700	27800	29600	30000	31800
	Chromium (Cr) (mg/kg)	26.8	26.9	30.5	28.2	29.8
	Cobalt (Co) (mg/kg)	15.7	15.7	19.9	18.3	21.8
	Copper (Cu) (mg/kg)	383	347	524	460	630
	Iron (Fe) (mg/kg)	57600	51400	46000	51800	46100
	Lead (Pb) (mg/kg)	7.24	8.35	9.20	8.43	10.7
	Lithium (Li) (mg/kg)	15.3	16.5	22.6	18.6	25.1
	Magnesium (Mg) (mg/kg)	7470	8560	12000	10200	13500
	Manganese (Mn) (mg/kg)	562	655	780	727	903
	Mercury (Hg) (mg/kg)	0.114	0.0932	0.0966	0.0928	0.109
	Molybdenum (Mo) (mg/kg)	2.52	2.17	2.34	2.51	2.79
	Nickel (Ni) (mg/kg)	18.0	20.8	25.4	22.0	26.2
	Phosphorus (P) (mg/kg)	1620	1440	1550	1670	1510
	Potassium (K) (mg/kg)	1310	1360	2040	1800	2150
	Selenium (Se) (mg/kg)	0.80	0.79	0.92	0.83	1.06
	Silver (Ag) (mg/kg)	0.258	0.237	0.259	0.248	0.293
Sodium (Na) (mg/kg)	580	560	830	740	880	
Strontium (Sr) (mg/kg)	145	161	171	168	179	
Sulfur (S)-Total (mg/kg)	1400	1100	1300	1300	1200	

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1664712-6 Sediment 25-AUG-15 LFF-01	L1664712-7 Sediment 25-AUG-15 LFF-02	L1664712-8 Sediment 26-AUG-15 LFF-03	L1664712-9 Sediment 26-AUG-15 LFF-04	L1664712-10 Sediment 25-AUG-15 LFF-05
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	59.7	35.9	37.0	42.6	48.3
	pH (1:2 soil:water) (pH)	7.14	6.68	6.87	7.57	7.19
Particle Size	% Gravel (>2mm) (%)	0.47	0.81	1.36	<0.10	1.05
	% Sand (2.0mm - 0.063mm) (%)	59.5	79.6	64.9	42.0	55.6
	% Silt (0.063mm - 4um) (%)	37.2	18.6	32.1	56.0	38.4
	% Clay (<4um) (%)	2.84	0.97	1.56	1.95	4.93
	Texture	Sandy loam	Sand	Loamy sand	Silt loam	Sandy loam
Anions and Nutrients	Total Nitrogen by LECO (%)	0.171	0.074	0.062	0.091	0.164
Organic / Inorganic Carbon	Total Organic Carbon (%)	5.03	2.04	0.78	0.75	2.87
Metals	Aluminum (Al) (mg/kg)	10300	16600	11400	15500	12900
	Antimony (Sb) (mg/kg)	0.30	0.24	0.24	0.27	0.25
	Arsenic (As) (mg/kg)	3.02	2.75	4.82	6.83	2.77
	Barium (Ba) (mg/kg)	58.1	54.5	65.3	104	61.1
	Beryllium (Be) (mg/kg)	0.29	0.38	0.36	0.41	0.31
	Bismuth (Bi) (mg/kg)	<0.10	<0.10	<0.10	<0.10	0.11
	Boron (B) (mg/kg)	<10	<10	<10	<10	<10
	Cadmium (Cd) (mg/kg)	0.318	0.239	0.107	0.123	0.183
	Calcium (Ca) (mg/kg)	10200	12000	9470	12800	8640
	Chromium (Cr) (mg/kg)	31.4	47.8	46.5	48.7	35.2
	Cobalt (Co) (mg/kg)	7.74	14.7	9.32	12.6	10.1
	Copper (Cu) (mg/kg)	39.0	51.8	69.0	136	32.7
	Iron (Fe) (mg/kg)	18400	29900	28900	37000	22200
	Lead (Pb) (mg/kg)	5.23	7.02	4.44	4.74	6.06
	Lithium (Li) (mg/kg)	10.9	12.8	10.5	12.7	14.8
	Magnesium (Mg) (mg/kg)	4900	9800	5490	7700	5870
	Manganese (Mn) (mg/kg)	227	351	298	405	260
	Mercury (Hg) (mg/kg)	0.0669	0.0601	0.0454	0.112	0.0443
	Molybdenum (Mo) (mg/kg)	0.49	0.68	0.84	1.02	0.31
	Nickel (Ni) (mg/kg)	23.9	33.5	21.2	25.7	26.8
	Phosphorus (P) (mg/kg)	711	869	1180	1340	755
	Potassium (K) (mg/kg)	830	760	940	1320	1180
	Selenium (Se) (mg/kg)	0.98	0.59	0.23	0.30	0.50
	Silver (Ag) (mg/kg)	0.125	0.099	0.073	0.110	0.087
Sodium (Na) (mg/kg)	260	330	410	680	250	
Strontium (Sr) (mg/kg)	55.9	76.5	88.2	122	53.9	
Sulfur (S)-Total (mg/kg)	2100	600	600	700	600	

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1664712-11 Sediment 24-AUG-15 PREF1-02 (PS)	L1664712-12 Sediment 24-AUG-15 PREF1-04 (PS)	L1664712-13 Sediment 24-AUG-15 PREF1-05	L1664712-16 Sediment 24-AUG-15 LREF1-01	L1664712-17 Sediment 25-AUG-15 LREF1-03
Grouping	Analyte				
SOIL					
Physical Tests	Moisture (%)				
	pH (1:2 soil:water) (pH)				
Particle Size	% Gravel (>2mm) (%)				
	% Sand (2.0mm - 0.063mm) (%)				
	% Silt (0.063mm - 4um) (%)				
	% Clay (<4um) (%)				
	Texture				
Anions and Nutrients	Total Nitrogen by LECO (%)				
Organic / Inorganic Carbon	Total Organic Carbon (%)				
Metals	Aluminum (Al) (mg/kg)				
	Antimony (Sb) (mg/kg)				
	Arsenic (As) (mg/kg)				
	Barium (Ba) (mg/kg)				
	Beryllium (Be) (mg/kg)				
	Bismuth (Bi) (mg/kg)				
	Boron (B) (mg/kg)				
	Cadmium (Cd) (mg/kg)				
	Calcium (Ca) (mg/kg)				
	Chromium (Cr) (mg/kg)				
	Cobalt (Co) (mg/kg)				
	Copper (Cu) (mg/kg)				
	Iron (Fe) (mg/kg)				
	Lead (Pb) (mg/kg)				
	Lithium (Li) (mg/kg)				
	Magnesium (Mg) (mg/kg)				
	Manganese (Mn) (mg/kg)				
	Mercury (Hg) (mg/kg)				
	Molybdenum (Mo) (mg/kg)				
	Nickel (Ni) (mg/kg)				
	Phosphorus (P) (mg/kg)				
	Potassium (K) (mg/kg)				
	Selenium (Se) (mg/kg)				
	Silver (Ag) (mg/kg)				
	Sodium (Na) (mg/kg)				
	Strontium (Sr) (mg/kg)				
	Sulfur (S)-Total (mg/kg)				
	<0.10	<0.10	<0.10	1.78	0.60
	28.1	18.7	14.3	57.8	56.8
	62.5	71.7	74.3	35.8	36.3
	9.34	9.64	11.4	4.62	6.30
	Silt loam	Silt loam	Silt loam	Sandy loam	Sandy loam
			0.182	0.115	0.101
			1.98	1.64	1.23
			15500	13600	12300
			0.41	0.33	0.30
			9.02	5.37	3.82
			143	117	107
			0.45	0.40	0.33
			0.15	0.12	<0.10
			<10	<10	<10
			0.364	0.345	0.287
			8620	8170	7040
			53.6	51.4	45.5
			13.4	11.6	9.78
			50.0	33.8	27.9
			28900	24800	21400
			7.39	6.29	5.04
			12.6	11.8	10.1
			7380	6800	5860
			516	370	299
			0.0594	0.0481	0.0362
			1.01	0.99	0.69
			36.1	32.2	27.5
			1200	1110	1130
			1430	1300	1070
			0.88	0.71	0.53
			0.189	0.158	0.135
			500	480	440
			88.9	76.0	63.9
			800	<500	<500

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1664712-18 Sediment 25-AUG-15 LREF1-03X	L1664712-19 Sediment 25-AUG-15 LREF1-04		
Grouping	Analyte				
SOIL					
Physical Tests	Moisture (%)	41.3	36.5		
	pH (1:2 soil:water) (pH)	7.12	6.71		
Particle Size	% Gravel (>2mm) (%)	0.65	2.08		
	% Sand (2.0mm - 0.063mm) (%)	53.3	65.3		
	% Silt (0.063mm - 4um) (%)	42.6	29.6		
	% Clay (<4um) (%)	3.49	2.99		
	Texture	Sandy loam	Sandy loam		
Anions and Nutrients	Total Nitrogen by LECO (%)	0.099	0.097		
Organic / Inorganic Carbon	Total Organic Carbon (%)	1.27	1.54		
Metals	Aluminum (Al) (mg/kg)	12300	13500		
	Antimony (Sb) (mg/kg)	0.26	0.30		
	Arsenic (As) (mg/kg)	3.75	4.43		
	Barium (Ba) (mg/kg)	107	122		
	Beryllium (Be) (mg/kg)	0.33	0.37		
	Bismuth (Bi) (mg/kg)	<0.10	0.11		
	Boron (B) (mg/kg)	<10	<10		
	Cadmium (Cd) (mg/kg)	0.314	0.358		
	Calcium (Ca) (mg/kg)	7210	7240		
	Chromium (Cr) (mg/kg)	45.8	52.2		
	Cobalt (Co) (mg/kg)	10.1	11.0		
	Copper (Cu) (mg/kg)	28.6	33.0		
	Iron (Fe) (mg/kg)	21700	23400		
	Lead (Pb) (mg/kg)	5.07	6.02		
	Lithium (Li) (mg/kg)	10.0	11.0		
	Magnesium (Mg) (mg/kg)	5900	6600		
	Manganese (Mn) (mg/kg)	300	298		
	Mercury (Hg) (mg/kg)	0.0376	0.0471		
	Molybdenum (Mo) (mg/kg)	0.75	0.82		
	Nickel (Ni) (mg/kg)	28.4	32.3		
	Phosphorus (P) (mg/kg)	1170	1190		
	Potassium (K) (mg/kg)	1060	1270		
	Selenium (Se) (mg/kg)	0.51	0.67		
	Silver (Ag) (mg/kg)	0.132	0.152		
	Sodium (Na) (mg/kg)	430	460		
	Strontium (Sr) (mg/kg)	64.9	66.9		
	Sulfur (S)-Total (mg/kg)	<500	<500		

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1664712-1	L1664712-2	L1664712-3	L1664712-4	L1664712-5
		Description	Sediment	Sediment	Sediment	Sediment	Sediment
		Sampled Date	20-AUG-15	20-AUG-15	20-AUG-15	20-AUG-15	20-AUG-15
		Sampled Time					
		Client ID	HAC-SED1	HAC-SED2	HAC-SED3	HAC-SED4	HAC-SED5
Grouping	Analyte						
SOIL							
Metals	Thallium (Tl) (mg/kg)		0.054	0.080	0.076	0.065	0.076
	Tin (Sn) (mg/kg)		1.15	1.15	1.40	1.37	1.59
	Titanium (Ti) (mg/kg)		1250	1320	1610	1560	1770
	Uranium (U) (mg/kg)		1.06	1.21	1.15	1.20	1.27
	Vanadium (V) (mg/kg)		212	181	169	185	159
	Zinc (Zn) (mg/kg)		59.4	65.0	82.4	72.6	90.2

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1664712-6	L1664712-7	L1664712-8	L1664712-9	L1664712-10
		Description	Sediment	Sediment	Sediment	Sediment	Sediment
		Sampled Date	25-AUG-15	25-AUG-15	26-AUG-15	26-AUG-15	25-AUG-15
		Sampled Time					
		Client ID	LFF-01	LFF-02	LFF-03	LFF-04	LFF-05
Grouping	Analyte						
SOIL							
Metals	Thallium (Tl) (mg/kg)		0.060	0.057	<0.050	<0.050	0.083
	Tin (Sn) (mg/kg)		0.32	0.43	0.46	0.67	0.32
	Titanium (Ti) (mg/kg)		786	1490	1020	1320	808
	Uranium (U) (mg/kg)		1.42	1.02	0.903	1.04	0.901
	Vanadium (V) (mg/kg)		45.6	98.5	107	129	46.5
	Zinc (Zn) (mg/kg)		41.5	61.2	43.6	52.2	46.9

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1664712-11	L1664712-12	L1664712-13	L1664712-16	L1664712-17
		Description	Sediment	Sediment	Sediment	Sediment	Sediment
		Sampled Date	24-AUG-15	24-AUG-15	24-AUG-15	24-AUG-15	25-AUG-15
		Sampled Time					
		Client ID	PREF1-02 (PS)	PREF1-04 (PS)	PREF1-05	LREF1-01	LREF1-03
Grouping	Analyte						
SOIL							
Metals	Thallium (Tl) (mg/kg)				0.158	0.135	0.106
	Tin (Sn) (mg/kg)				0.41	0.38	0.37
	Titanium (Ti) (mg/kg)				1040	945	897
	Uranium (U) (mg/kg)				1.39	1.25	0.985
	Vanadium (V) (mg/kg)				64.9	59.0	52.7
	Zinc (Zn) (mg/kg)				71.6	64.3	57.2

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1664712-18	L1664712-19			
		Description	Sediment	Sediment			
		Sampled Date	25-AUG-15	25-AUG-15			
		Sampled Time					
		Client ID	LREF1-03X	LREF1-04			
Grouping	Analyte						
SOIL							
Metals	Thallium (Tl) (mg/kg)	0.104	0.118				
	Tin (Sn) (mg/kg)	0.33	0.39				
	Titanium (Ti) (mg/kg)	891	965				
	Uranium (U) (mg/kg)	0.958	1.18				
	Vanadium (V) (mg/kg)	53.1	59.4				
	Zinc (Zn) (mg/kg)	58.1	65.3				

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
AVS-COL-VA	Soil	Acid volatile sulphide by colourimetric	EPA 821/R-91-100
<p>This analysis was carried out in accordance with the method described in EPA 821/R-91-100. In summary, hydrochloric acid is added to the sediment samples within a purge and trap system. The evolved hydrogen sulphide (H₂S) is carried into a basic zinc acetate (ZnAc) solution by argon gas. The acid volatile sulfide is then determined colourimetrically.</p>			
C-TOT-63UM-LECO-SK	Soil	Total Carbon by combustion method (63um)	SSSA (1996) P. 973-974
<p>The sample is ignited in a combustion analyzer where carbon in the reduced CO₂ gas is determined using a thermal conductivity detector.</p>			
C-TOT-ORG-63UM-SK	Soil	Organic Carbon by combustion method(63um)	SSSA (1996) p. 973
<p>Total Organic Carbon (C-TOT-ORG-LECO-SK, C-TOT-ORG-SK)</p> <p>Total C and inorganic C are determined on separate samples. The total C is determined by combustion and thermal conductivity detection, while inorganic C is determined by weight loss after addition of hydrochloric acid. Organic C is calculated by the difference between these two determinations.</p> <p>Reference for Total C: Nelson, D.W. and Sommers, L.E. 1996. Total Carbon, organic carbon and organic matter. P. 961-1010 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5</p> <p>Reference for Inorganic C: Loeppert, R.H. and Suarez, D.L. 1996. Gravimetric Method for Loss of Carbon Dioxide. P. 455-456 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5</p>			
HG-63UM-CVAF-VA	Soil	Hg in Soil by CVAFS	EPA 200.2/245.7
<p>This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 63 um (230 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).</p> <p>Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.</p> <p>Deviation from Reference Method: This procedure deviates from the BC CSR SALM method, which specifies sieving to 2 mm (10 mesh).</p>			
HG-SEM-CVAFS-VA	Soil	Simultaneously Extracted Metals in Soil	EPA 821/R-91-100; EPA245.7
<p>This analysis was carried out in accordance with the method described in EPA 821/R-91-100. In summary, hydrochloric acid is added to the sediment samples within a purge and trap system. The extract produced from the addition of the acid is then analyzed for simultaneously extracted metals (SEM) using atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA 245.7).</p>			
MET-63UM-CCMS-VA	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A
<p>This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 63 um (230 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.</p>			
MET-SEM-ICP-VA	Soil	Simultaneously Extracted Metals (ICPOES)	EPA 821/R-91-100; EPA 6010B
<p>This analysis was carried out in accordance with the method described in EPA 821/R-91-100. In summary, hydrochloric acid is added to the sediment samples within a purge and trap system. The extract produced from the addition of the acid is then analyzed for simultaneously extracted metals (SEM) using inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).</p>			
MET-TESS-CM-CCMS-VA	Soil	METALS BY CCMS (TESSIER EXTRACTION #2)	Tessier Extraction 1979/EPA 6020A
<p>This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Note: For Extraction #2, the extraction solution is 1M Sodium Acetate adjusted to pH 5 and is intended to extract the "Carbonate" metals.</p>			
MET-TESS-EA-CCMS-VA	Soil	METALS BY CCMS (TESSIER EXTRACTION #1)	Tessier Extraction 1979/EPA 6020A

Reference Information

This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For Extraction #1, the extraction solution is 1M Magnesium Chloride and is intended to extract the "Exchangeable and Adsorbed" metals.

MET-TESS-FEO-CCMS-VA Soil METALS BY CCMS (TESSIER EXTRACTION #3) Tessier Extraction 1979/EPA 6020A

This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For Extraction #3, the extraction solution is 0.1 M Hydroxylamine Hydrochloride in 25% v/v Acetic Acid and is intended to extract the Easily Reducible Metals and Iron Oxides .

MET-TESS-OB-CCMS-VA Soil METALS BY CCMS (TESSIER EXTRACTION #4) Tessier Extraction 1979/EPA 6020A

"This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For Extraction #4, the extraction solution is 0.02 M Nitric Acid followed by 3.2M Ammonium Acetate and is intended to extract the Organic Bound metals.

MET-TESS-RM-CCMS-VA Soil METALS BY CCMS (TESSIER RM EXTRACTION) Tessier Extraction 1979/EPA 6020A

"This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with up to 6 different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For the Tessier "RM" Extraction, the extraction solution is 50/50 mix of 1:1 Nitric Acid along with 1:1 Hydrochloric Acid, and is hot block digested as per the BC SALM procedure. This is intended to extract the Residual metals.

MOISTURE-VA Soil Moisture content ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

N-TOT-LECO-SK Soil Total Nitrogen by combustion method SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

PSA-PIPET+GRAVEL-SK Soil Particle size - Sieve and Pipette SSIR-51 METHOD 3.2.1

Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

S-TOT-LECO-SK Soil Total Sulphur by combustion method ISO 15178:2000

The sample is ignited in a combustion analyzer where sulfur in the reduced SO₂ gas is determined using a thermal conductivity detector.

Reference Information

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

1 2

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1664712

Report Date: 02-OCT-15

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Client: MOUNT POLLEY MINING CORP.

PO Box 12
Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-63UM-SK								
	Soil							
Batch	R3279463							
WG2181419-1	DUP	L1664712-10						
Total Organic Carbon		2.87	2.95		%	2.7	30	30-SEP-15
WG2181419-2	IRM	08-109_SOIL						
Total Organic Carbon			1.04		%		0.77-1.43	30-SEP-15
WG2181419-3	MB							
Total Organic Carbon			<0.10		%		0.1	30-SEP-15
HG-63UM-CVAF-VA								
	Soil							
Batch	R3259486							
WG2160221-4	CRM	VA-NRC-STSD1						
Mercury (Hg)			108.0		%		70-130	03-SEP-15
WG2160221-5	CRM	VA-NRC-PACS3						
Mercury (Hg)			112.2		%		70-130	03-SEP-15
WG2160221-3	LCS							
Mercury (Hg)			100.9		%		70-130	03-SEP-15
WG2160221-1	MB							
Mercury (Hg)			<0.0050		mg/kg		0.005	03-SEP-15
MET-63UM-CCMS-VA								
	Soil							
Batch	R3260087							
WG2160221-3	LCS							
Aluminum (Al)			91.4		%		70-130	03-SEP-15
Antimony (Sb)			99.4		%		70-130	03-SEP-15
Arsenic (As)			96.7		%		70-130	03-SEP-15
Barium (Ba)			102.1		%		70-130	03-SEP-15
Beryllium (Be)			94.7		%		70-130	03-SEP-15
Bismuth (Bi)			100.7		%		70-130	03-SEP-15
Boron (B)			92.0		%		70-130	03-SEP-15
Cadmium (Cd)			95.5		%		70-130	03-SEP-15
Calcium (Ca)			97.2		%		70-130	03-SEP-15
Chromium (Cr)			93.1		%		70-130	03-SEP-15
Cobalt (Co)			95.6		%		70-130	03-SEP-15
Copper (Cu)			91.2		%		70-130	03-SEP-15
Iron (Fe)			104.4		%		70-130	03-SEP-15
Lead (Pb)			103.2		%		70-130	03-SEP-15
Lithium (Li)			93.4		%		70-130	03-SEP-15
Magnesium (Mg)			93.3		%		70-130	03-SEP-15
Manganese (Mn)			93.6		%		70-130	03-SEP-15



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Workorder: L1664712

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-63UM-CCMS-VA		Soil						
Batch	R3260087							
WG2160221-3	LCS							
Molybdenum (Mo)			101.8		%		70-130	03-SEP-15
Nickel (Ni)			92.9		%		70-130	03-SEP-15
Phosphorus (P)			95.0		%		70-130	03-SEP-15
Potassium (K)			92.0		%		70-130	03-SEP-15
Selenium (Se)			97.8		%		70-130	03-SEP-15
Silver (Ag)			102.6		%		70-130	03-SEP-15
Sodium (Na)			88.8		%		70-130	03-SEP-15
Strontium (Sr)			104.2		%		70-130	03-SEP-15
Thallium (Tl)			101.2		%		70-130	03-SEP-15
Tin (Sn)			97.2		%		70-130	03-SEP-15
Titanium (Ti)			91.4		%		70-130	03-SEP-15
Uranium (U)			103.9		%		70-130	03-SEP-15
Vanadium (V)			96.1		%		70-130	03-SEP-15
Zinc (Zn)			90.2		%		70-130	03-SEP-15
Batch	R3262020							
WG2160221-4	CRM	VA-NRC-STSD1						
Aluminum (Al)			103.4		%		70-130	04-SEP-15
Antimony (Sb)			81.0		%		70-130	04-SEP-15
Arsenic (As)			111.3		%		70-130	04-SEP-15
Barium (Ba)			106.7		%		70-130	04-SEP-15
Beryllium (Be)			87.8		%		70-130	04-SEP-15
Bismuth (Bi)			77.6		%		70-130	04-SEP-15
Cadmium (Cd)			111.2		%		70-130	04-SEP-15
Calcium (Ca)			82.1		%		70-130	04-SEP-15
Chromium (Cr)			113.1		%		70-130	04-SEP-15
Cobalt (Co)			111.8		%		70-130	04-SEP-15
Copper (Cu)			107.9		%		70-130	04-SEP-15
Iron (Fe)			100.7		%		70-130	04-SEP-15
Lead (Pb)			81.7		%		70-130	04-SEP-15
Lithium (Li)			83.8		%		70-130	04-SEP-15
Magnesium (Mg)			101.1		%		70-130	04-SEP-15
Manganese (Mn)			95.5		%		70-130	04-SEP-15
Molybdenum (Mo)			84.0		%		70-130	04-SEP-15
Nickel (Ni)			110.1		%		70-130	04-SEP-15



Quality Control Report

Workorder: L1664712

Report Date: 02-OCT-15

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-63UM-CCMS-VA								
	Soil							
Batch	R3262020							
WG2160221-4	CRM	VA-NRC-STSD1						
Phosphorus (P)			108.9		%		70-130	04-SEP-15
Potassium (K)			121.2		%		70-130	04-SEP-15
Selenium (Se)			102.2		%		70-130	04-SEP-15
Silver (Ag)			82.9		%		70-130	04-SEP-15
Sodium (Na)			124.5		%		70-130	04-SEP-15
Strontium (Sr)			89.2		%		70-130	04-SEP-15
Thallium (Tl)			79.5		%		70-130	04-SEP-15
Tin (Sn)			79.5		%		70-130	04-SEP-15
Titanium (Ti)			113.5		%		70-130	04-SEP-15
Vanadium (V)			115.5		%		70-130	04-SEP-15
Zinc (Zn)			108.7		%		70-130	04-SEP-15
WG2160221-5	CRM	VA-NRC-PACS3						
Aluminum (Al)			90.5		%		70-130	04-SEP-15
Antimony (Sb)			92.6		%		70-130	04-SEP-15
Arsenic (As)			87.7		%		70-130	04-SEP-15
Barium (Ba)			97.8		%		70-130	04-SEP-15
Beryllium (Be)			100.8		%		70-130	04-SEP-15
Boron (B)			98.0		%		70-130	04-SEP-15
Cadmium (Cd)			99.0		%		70-130	04-SEP-15
Calcium (Ca)			102.5		%		70-130	04-SEP-15
Chromium (Cr)			92.7		%		70-130	04-SEP-15
Cobalt (Co)			93.3		%		70-130	04-SEP-15
Copper (Cu)			93.9		%		70-130	04-SEP-15
Iron (Fe)			90.5		%		70-130	04-SEP-15
Lead (Pb)			99.4		%		70-130	04-SEP-15
Lithium (Li)			91.2		%		70-130	04-SEP-15
Magnesium (Mg)			90.9		%		70-130	04-SEP-15
Manganese (Mn)			80.2		%		70-130	04-SEP-15
Molybdenum (Mo)			93.5		%		70-130	04-SEP-15
Nickel (Ni)			99.4		%		70-130	04-SEP-15
Phosphorus (P)			93.5		%		70-130	04-SEP-15
Potassium (K)			95.1		%		70-130	04-SEP-15
Selenium (Se)			95.1		%		70-130	04-SEP-15
Silver (Ag)			115.5		%		70-130	04-SEP-15



Quality Control Report

Workorder: L1664712

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-63UM-CCMS-VA		Soil						
Batch	R3262020							
WG2160221-5	CRM	VA-NRC-PACS3						
Sodium (Na)			89.0		%		70-130	04-SEP-15
Strontium (Sr)			102.5		%		70-130	04-SEP-15
Thallium (Tl)			95.9		%		70-130	04-SEP-15
Tin (Sn)			86.2		%		70-130	04-SEP-15
Titanium (Ti)			87.8		%		70-130	04-SEP-15
Uranium (U)			96.6		%		70-130	04-SEP-15
Vanadium (V)			93.7		%		70-130	04-SEP-15
Zinc (Zn)			95.3		%		70-130	04-SEP-15
WG2160221-1	MB							
Aluminum (Al)			<50		mg/kg		50	04-SEP-15
Antimony (Sb)			<0.10		mg/kg		0.1	04-SEP-15
Arsenic (As)			<0.050		mg/kg		0.05	04-SEP-15
Barium (Ba)			<0.50		mg/kg		0.5	04-SEP-15
Beryllium (Be)			<0.10		mg/kg		0.1	04-SEP-15
Bismuth (Bi)			<0.10		mg/kg		0.1	04-SEP-15
Boron (B)			<5.0		mg/kg		5	04-SEP-15
Cadmium (Cd)			<0.050		mg/kg		0.05	04-SEP-15
Calcium (Ca)			<50		mg/kg		50	04-SEP-15
Chromium (Cr)			<0.50		mg/kg		0.5	04-SEP-15
Cobalt (Co)			<0.10		mg/kg		0.1	04-SEP-15
Copper (Cu)			<0.50		mg/kg		0.5	04-SEP-15
Iron (Fe)			<50		mg/kg		50	04-SEP-15
Lead (Pb)			<0.10		mg/kg		0.1	04-SEP-15
Lithium (Li)			<5.0		mg/kg		5	04-SEP-15
Magnesium (Mg)			<10		mg/kg		10	04-SEP-15
Manganese (Mn)			<0.20		mg/kg		0.2	04-SEP-15
Molybdenum (Mo)			<0.10		mg/kg		0.1	04-SEP-15
Nickel (Ni)			<0.50		mg/kg		0.5	04-SEP-15
Phosphorus (P)			<50		mg/kg		50	04-SEP-15
Potassium (K)			<100		mg/kg		100	04-SEP-15
Selenium (Se)			<0.10		mg/kg		0.1	04-SEP-15
Silver (Ag)			<0.050		mg/kg		0.05	04-SEP-15
Sodium (Na)			<100		mg/kg		100	04-SEP-15
Strontium (Sr)			<0.10		mg/kg		0.1	04-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-63UM-CCMS-VA								
	Soil							
Batch	R3262020							
WG2160221-1	MB							
Thallium (Tl)			<0.050		mg/kg		0.05	04-SEP-15
Tin (Sn)			<0.20		mg/kg		0.2	04-SEP-15
Titanium (Ti)			<1.0		mg/kg		1	04-SEP-15
Uranium (U)			<0.050		mg/kg		0.05	04-SEP-15
Vanadium (V)			<0.20		mg/kg		0.2	04-SEP-15
Zinc (Zn)			<1.0		mg/kg		1	04-SEP-15
MOISTURE-VA								
	Soil							
Batch	R3256094							
WG2160213-2	LCS							
Moisture			99.6		%		90-110	29-AUG-15
WG2160213-1	MB							
Moisture			<0.25		%		0.25	29-AUG-15
Batch	R3257998							
WG2161944-2	LCS							
Moisture			100.4		%		90-110	02-SEP-15
WG2161944-1	MB							
Moisture			<0.25		%		0.25	02-SEP-15
N-TOT-LECO-SK								
	Soil							
Batch	R3259135							
WG2162266-1	DUP	L1664712-8						
Total Nitrogen by LECO		0.062	0.070		%	11	20	02-SEP-15
WG2162266-2	IRM	08-109_SOIL						
Total Nitrogen by LECO			0.123		%		0.085-0.135	02-SEP-15
WG2162266-4	MB							
Total Nitrogen by LECO			<0.020		%		0.02	02-SEP-15
PSA-PIPET+GRAVEL-SK								
	Soil							
Batch	R3272014							
WG2162269-1	DUP	L1664712-7						
% Gravel (>2mm)		0.81	0.81		%	0.0	25	21-SEP-15
% Sand (2.0mm - 0.063mm)		79.6	80.3	J	%	0.67	5	21-SEP-15
% Silt (0.063mm - 4um)		18.6	18.0	J	%	0.62	5	21-SEP-15
% Clay (<4um)		0.97	0.92	J	%	0.05	5	21-SEP-15
WG2162269-2	IRM	FARM2010						
% Sand (2.0mm - 0.063mm)			33.3		%		29-39	21-SEP-15
% Silt (0.063mm - 4um)			39.2		%		34-44	21-SEP-15
% Clay (<4um)			27.5		%		22-32	21-SEP-15



Quality Control Report

Workorder: L1664712

Report Date: 02-OCT-15

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
S-TOT-LECO-SK	Soil							
Batch	R3259135							
WG2162266-1	DUP	L1664712-8						
Sulfur (S)-Total		600	600		mg/kg	9.0	30	02-SEP-15
WG2162266-3	IRM	1646A_SOIL						
Sulfur (S)-Total			3400		mg/kg		2500-4600	02-SEP-15
WG2162266-4	MB							
Sulfur (S)-Total			<500		mg/kg		500	02-SEP-15

Quality Control Report

Workorder: L1664712

Report Date: 02-OCT-15

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



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Contact: Colleen Hughes		Quality Control (QC) Report with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			P <input type="checkbox"/> Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT														
Address: PO Box 12, Likely, BC, V0L 1N0		<input type="checkbox"/> Criteria on Report - provide details below if box checked			E <input type="checkbox"/> Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT														
Phone: 250-790-2617		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			E2 <input type="checkbox"/> Same day or weekend emergency - contact ALS to confirm TAT and surcharge														
		Email 1 or Fax chughes@mountpolley.com; pstecko@minnow.ca			Specify Date Required for E2, E or P:														
		Email 2			Analysis Request														
Invoice To		Invoice Distribution			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below														
Same as Report To <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX																	
Copy of Invoice with Report <input type="checkbox"/> Yes <input type="checkbox"/> No		Email 1 or Fax chughes@mountpolley.com																	
Company:		Email 2																	
Contact:																			
Project Information		Oil and Gas Required Fields (client use)																	
ALS Quote #: Q51555		Approver ID: _____ Cost Center: _____																	
Job #:		GL Account: _____ Routing Code: _____																	
PO / AFE:		Activity Code: _____																	
LSD:		Location: _____																	
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang			Sampler: KB														
L1664712																			
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)			Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-63UM-SED-VA (CCME Metals < 63um)	HG-63UM-CVAF-CA (Hg < 63um)	C-TOT-ORG-LECO-SK (TOC) < 63um	pH-1.2-VA (pH)	N-TOT-LECO-SK (Total nitrogen)	S-TOT-LECO-SK (Total Sulphur)	PSA-PIPET-GRAVEL-SK (Particle Size)	MOISTURE-VA (Moisture)	MET-TSS-STD-VA (Tessier Extractions)	MET-SEM-ICP-VA (SEM analysis)	HG-SEM-CVAFS-VA (Hg SEM analysis)	AVS-COL-VA (AVS analysis)	Number of Containers
	HAC-SED1			20 Aug 15	—	Sediment	X	X	X	X	X	X	X	X					2
	HAC-SED2			20 Aug 15	—	Sediment	X	X	X	X	X	X	X	X					2
	HAC-SED3			20 Aug 15	—	Sediment	X	X	X	X	X	X	X	X					2
	HAC-SED4			20 Aug 15	—	Sediment	X	X	X	X	X	X	X	X					2
	HAC-SEDS			20 Aug 15	—	Sediment	X	X	X	X	X	X	X	X					2
	LFF-01			25 Aug 15	—	Sediment	X	X	X	X	X	X	X	X					2
	LFF-02			25 Aug 15	—	Sediment	X	X	X	X	X	X	X	X					2
	LFF-03			26 Aug 15	—	Sediment	X	X	X	X	X	X	X	X					2
	LFF-04			26 Aug 15	—	Sediment	X	X	X	X	X	X	X	X					2
	LFF-05			25 Aug 15	—	Sediment	X	X	X	X	X	X	X	X					2
	Pref1-02 (PS)			24 Aug 15	—	Sediment							X						1
	Pref1-04 (PS)			24 Aug 15	—	Sediment							X						1
Drinking Water (DW) Samples (client use)		Special Instructions / Specify Criteria to add on report (client use)			SAMPLE CONDITION AS RECEIVED (lab use only)														
Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input type="checkbox"/> No		Analyse for <63um TOC if sample volume allows. SEM/AVS samples are in nitrogen-filled bags.			Frozen: <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>														
Are samples for human drinking water use? <input type="checkbox"/> Yes <input type="checkbox"/> No					Ice packs Yes <input type="checkbox"/> No <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>														
					Cooling Initiated <input type="checkbox"/>														
					INITIAL COOLER TEMPERATURES °C					FINAL COOLER TEMPERATURES °C									
					8.4					9.5									
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)														
Released by: Kassandra Bartelet		Received by: MIKE			Received by:														
Date: Aug 27 15		Date: 8/28			Date:														
Time: 8:35		Time: 8:50			Time:														

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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10/2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.



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Contact: Colleen Hughes		Quality Control (QC) Report with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				P <input type="checkbox"/> Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT													
Address: PO Box 12, Lively, BC, V0L 1N0		<input type="checkbox"/> Criteria on Report - provide details below if box checked				E <input type="checkbox"/> Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT													
Phone: 250-790-2817		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX				E2 <input type="checkbox"/> Same day or weekend emergency - contact ALS to confirm TAT and surcharge													
		Email 1 or Fax: chughes@mountpolley.com; pstecko@minnow.ca				Specify Date Required for E2, E or P:													
		Email 2				Analysis Request													
Invoice To: Same as Report To <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Invoice Distribution				Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below													
Copy of Invoice with Report <input type="checkbox"/> Yes <input type="checkbox"/> No		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX																	
Company:		Email 1 or Fax: chughes@mountpolley.com																	
Contact:		Email 2																	
Project Information		Oil and Gas Required Fields (client use)				Number of Containers													
ALS Quote #: Q51555		Approver ID:		Cost Center:															
Job #:		GL Account:		Routing Code:															
PO / AFE:		Activity Code:																	
LSD:		Location:																	
ALS Lab Work Order # (lab use only): <u>L1664712</u>		ALS Contact: <u>Can Dang</u>		Sampler:															
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)			Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-63UM-SED-VA (COC Metals < 63um)	HG-63UM-CVAF-CA (Hg < 63um)	C-101-ORG-LECO-SK (TOC < 63um)	pH-1.2-VA (pH)	N-TOT-LECO-SK (Total nitrogen)	S-TOT-LECO-SK (Total Sulphur)	PSA-PIPET+GRAVEL-SK (Particle Size)	MOISTURE-VA (Moisture)	MET-TESS-STD-VA (Tessier Extractions)	MET-SEM-ICP-VA (SEM analysis)	HG-SEM-CVAFS-VA (Hg SEM analysis)	AVS-COL-VA (AVS analysis)	
	PRef1-05			24 Aug 15	-	Sediment	X	X	X	X	X	X	X	X	X				4
	PRef1-04 (SEM/AVS)			24 Aug 15	-	Sediment										X	X	X	1
	PRef1-05 (SEM/AVS)			24 Aug 15	-	Sediment										X	X	X	1
	LRef1-01			24 Aug 15	-	Sediment	X	X	X	X	X	X	X	X					2
	LRef1-03			25 Aug 15	-	Sediment	X	X	X	X	X	X	X	X					2
	LRef1-03X			25 Aug 15	-	Sediment	X	X	X	X	X	X	X	X					2
	LRef1-04			25 Aug 15	-	Sediment	X	X	X	X	X	X	X	X					2
						Sediment													
						Sediment													
						Sediment													
						Sediment													
						Sediment													
Drinking Water (DW) Samples (client use)		Special Instructions / Specify Criteria to add on report (client use)				SAMPLE CONDITION AS RECEIVED (lab use only)													
Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input type="checkbox"/> No		SEM/AVS samples in nitrogen-filled bags. Extra sample can be used for other analyses if needed.				Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>													
Are samples for human drinking water use? <input type="checkbox"/> Yes <input type="checkbox"/> No						Ice packs: Yes <input type="checkbox"/> No <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>													
						Cooling initiated <input type="checkbox"/>													
						INITIAL COOLER TEMPERATURES °C							FINAL COOLER TEMPERATURES °C						
						8.4							9.5						
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)				FINAL SHIPMENT RECEPTION (lab use only)													
Released by: <u>Katharina Butcher</u>		Date: <u>Aug 27 15</u>		Time: <u>8:35</u>		Received by: <u>MIKE</u>		Date: <u>8/28</u>		Time: <u>8:50</u>		Received by:		Date:		Time:			

APPENDIX C
DATA QUALITY ASSESSMENT

APPENDIX C: DATA QUALITY ASSESSMENT

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C1.0 INTRODUCTION

Data Quality Assessment (DQA) was conducted on data collected as part of the Mount Polley Mining Corporation (MPMC) Sediment Quality Data Report. The objective of DQA is to define the overall quality of the data presented in the report, and, by extension, the confidence with which the data can be used to derive conclusions.

C1.1 Background

A variety of factors can influence the physical, chemical and biological measurements made in an environmental study and thus affect the accuracy and/or precision of the data. Depending on the magnitude of the problem, inaccuracy or imprecision have the potential to affect the reliability of any conclusions made from the data. Therefore, it is important to ensure that programs incorporate appropriate steps to control the non-natural sources of data variability (i.e., minimize the variability that does not reflect natural spatial and temporal variability in the environment) and thus assure the quality of the data.

Data quality as a concept is meaningful only when it relates to the intended use of the data. That is, one must know the context in which the data will be interpreted in order to establish a relevant basis for judging whether or not the data set is adequate. DQA involves comparison of actual field and laboratory measurement performance to data quality objectives (DQOs) established for a particular study, such as evaluation of method detection limits, blank sample data, data precision (based on field and laboratory duplicate samples), and data accuracy (based on matrix spike recoveries and/or analysis of standards or certified reference materials). A trusted analytical laboratory certified by Canadian Association for Laboratory Accreditation (CALA) with a rigorous internal quality assurance program was selected to ensure the highest possible quality.

DQOs were established a-priori to reflect reasonable and achievable performance expectations. Programs involving a large number of samples and analytes usually yield some results that exceed the DQOs. This is particularly so for multi-element scans since the analytical conditions are not necessarily optimal for every element included in the scan. Generally, scan results may be considered acceptable if no more than 20% of the parameters fail to meet the DQOs. Overall, the intent of DQA is not to reject any measurement that did not meet a DQO, but to ensure that any questionable data received more scrutiny to determine what effect, if any, this had on interpretation of results within the context of this project.

C1.2 Types of Quality Control Samples

Several types of quality control (QC) samples were assessed based on samples collected (or prepared) in the field and laboratory. These samples include the following:

- **Blanks** are samples of de-ionized water and/or appropriate reagent(s) that are handled and analyzed the same way as regular samples. These samples will reflect any contamination that occurred in the field (in the case of field or trip blanks) or the laboratory (in the case of laboratory or method blanks). Analyte concentrations should be non-detectable, although a data quality objective of twice the method detection limit allows for slight “noise” around the detection limit.
- **Field Duplicates** are sub-sample pairs collected from a randomly selected field station using identical collection and handling methods that are then analyzed separately in the laboratory. The duplicate samples are handled and analyzed in an identical manner in the laboratory. The data from field duplicate samples reflect natural variability, as well as the variability associated with sample collection methods, and therefore provide a measure of field precision.
- **Laboratory Duplicates** are sub-sample pairs created in the laboratory from randomly selected field samples which are sub-sampled and then analyzed independently using identical analytical methods. The laboratory duplicate sample results reflect any variability introduced during laboratory sample handling and analysis and thus provide a measure of laboratory precision.
- **Certified Reference Materials and QC Standards** are samples containing known chemical concentrations that are processed and analyzed along with batches of environmental samples. The sample results are then compared to target results to provide a measure of analytical accuracy. The results are reported as the percent of the known amount that was recovered in the analysis.

C2.0 SEDIMENT SAMPLES

C2.1 Holding Time and General Laboratory Flags

All sediment analyses were conducted within ALS Environmental's recommended hold times. There were no general laboratory flags associated with either analytical report (i.e., ALS Environmental Report L1661656 and L1664712; Appendix B).

C2.2 Method Detection Limits

Analytical laboratory reports (Appendix B) were examined to provide an inventory of analytes for which sample results were less than the method detection limit (MDL). Only seven analytes – percent gravel, percent sand, total organic carbon, bismuth, boron, total sulphur and thallium - had results reported as less than MDL. None of these analytes have applicable CSR criteria (Table C.1), and therefore the achieved MDLs were appropriate for the study and the rare instances of results reported as <MDL did not adversely affect data interpretability.

C2.3 Laboratory Blank Sample Analysis

All of the reported method blank results were non-detectable (Appendix B). Thus, the method blank results for this study suggest no inadvertent sample contamination within the laboratory.

C2.4 Data Precision

Field Duplicate Samples

Four field duplicate samples were collected for quality assurance (Table C.2). Evaluation of precision associated with sediment physical and chemical characteristics indicated excellent precision. The only occurrence of a relative percent difference (RPD) between duplicates of greater than the DQO of 40% was for percent clay in a sample from the littoral reference area (Table C.2). These duplicate samples had a low proportion of clay sized particles (6.3% and 3.5%). Consequently, although the absolute difference was small (2.8%), the relative percent difference was 57.4% (Table C.2). Overall, the precision associated with sediment quality analyses is suitable.

Laboratory Duplicate Samples

Two laboratory duplicate samples were evaluated for metals; and another ten laboratory duplicate samples were evaluated for a combination of moisture, pH, particle size, total

Table C.1: Laboratory method detection limit (MDL) evaluation for basic sediment chemistry analyses relative to generic numerical sediment criteria. Only analytes with <MDL values are reported.

Analyte		Units	BC CSR Criteria ^{1,2}		Maximum Method Detection Limit Achieved
			Sensitive	Typical	
Non-metals	% Gravel	%	-	-	0.1
	% Sand	%	-	-	0.1
Organic / Inorganic Carbon	Total Organic Carbon	%	-	-	0.1
Metals	Bismuth	mg/kg	-	-	0.2
	Boron	mg/kg	-	-	10
	Sulphur	mg/kg	-	-	0.05
	Thallium	mg/kg	-	-	0.05

¹ British Columbia Contaminated Sites Regulation - Generic Sediment Quality Criteria for Freshwater Sediment (BCMOE 1996)

² Dash indicates there is no BC CSR criterion for the specified analyte

Table C.2: Field duplicate results. Highlighted values did not meet the data quality objective of ≤ 40% Relative Percent Difference (RPD).

Client Sample ID:	Units	Lab Report L1661656									Lab Report L1664712		
		PNF-01	PNF-01X	RPD (%)	PREFI-03	PREFI-03X	RPD (%)	BOL-B2-3	BOL-BX	RPD (%)	LREF1-03	LREF1-03X	RPD (%)
		17-Aug-2015	17-Aug-2015		19-Aug-2015	19-Aug-2015		16-Aug-2015	16-Aug-2015		25-Aug-2015	25-Aug-2015	
ALS Sample ID:		L1661656-1	L1661656-2		L1661656-8	L1661656-9		L1661656-29	L1661656-33		L1664712-17	L1664712-18	
Physical Tests													
Moisture	%	63.5	64.5	1.6	53.3	51.6	3.2	95.7	94.8	0.9	42.4	41.3	2.6
pH (1:2 soil:water)	pH	8.26	8.31	0.6	6.69	6.72	0.4	6.60	6.39	3.2	7.17	7.12	0.7
Particle Size													
% Gravel (>2mm)	%	<0.10	<0.10	0.0	<0.10	<0.10	0.0			-	0.60	0.65	0.0
% Sand (2.0mm - 0.063mm)	%	1.41	1.29	8.9	15.2	11.2	30.3			-	56.8	53.3	6.4
% Silt (0.063mm - 4um)	%	44.1	46.4	5.1	73.0	76.9	5.2			-	36.3	42.6	16.0
% Clay (<4um)	%	54.5	52.3	4.1	11.8	11.9	0.8			-	6.30	3.49	57.4
Texture	-	Silty clay	Silty clay	-	Silt loam	Silt loam	-			-	Sandy loam	Sandy loam	-
Anions and Nutrients													
Total Nitrogen by LECO	%	0.064	0.055	15.1	0.158	0.156	1.3	1.65	1.67	1.2	0.101	0.099	2.0
Organic / Inorganic Carbon													
Total Organic Carbon	%	0.42	0.50	17.4	1.71	1.66	3.0	15.1	15.5	2.6	1.23	1.27	3.2
Metals													
Aluminum	mg/kg	33,300	33,500	0.6	17,300	16,700	3.5	17,600	18,900	7.1	12,300	12,300	0.0
Antimony	mg/kg	0.61	0.63	3.2	0.43	0.42	2.4	0.91	0.76	18.0	0.30	0.26	14.3
Arsenic	mg/kg	16.2	16.4	1.2	8.98	9.28	3.3	7.23	6.89	4.8	3.82	3.75	1.8
Barium	mg/kg	298	296	0.7	151	150	0.7	280	286	2.1	107	107	0.0
Beryllium	mg/kg	1.17	1.18	0.9	0.50	0.50	0.0	0.70	0.60	15.4	0.33	0.33	0.0
Bismuth	mg/kg	0.16	0.16	0.0	0.15	0.15	0.0	0.13	0.11	16.7	<0.10	<0.10	0.0
Boron	mg/kg	12	12	0.0	<10	<10	0.0	14	13	7.4	<10	<10	0.0
Cadmium	mg/kg	0.230	0.242	5.1	0.422	0.416	1.4	0.493	0.483	2.0	0.287	0.314	9.0
Calcium	mg/kg	33,000	33,400	1.2	8,840	8,760	0.9	8,140	6,830	17.5	7,040	7,210	2.4
Chromium	mg/kg	23.5	23.7	0.8	59.5	58.5	1.7	42.2	40.4	4.4	45.5	45.8	0.7
Cobalt	mg/kg	32.7	33.0	0.9	15.0	14.7	2.0	12.7	12.8	0.8	9.78	10.1	3.2
Copper	mg/kg	1110	1130	1.8	55.8	54.6	2.2	363	371	2.2	27.9	28.6	2.5
Iron	mg/kg	38,700	39,100	1.0	32,700	31,900	2.5	27,500	28,300	2.9	21,400	21,700	1.4
Lead	mg/kg	12.3	12.5	1.6	7.51	7.44	0.9	10.4	8.87	15.9	5.04	5.07	0.6
Lithium	mg/kg	39.7	40.3	1.5	15.2	15.0	1.3	10.4	9.3	11.2	10.1	10.0	1.0
Magnesium	mg/kg	23,100	23,800	3.0	8,660	8,370	3.4	5,190	5,210	0.4	5,860	5,900	0.7
Manganese	mg/kg	1,250	1,280	2.4	479	467	2.5	3,240	2,990	8.0	299	300	0.3
Mercury	mg/kg	0.116	0.116	0.0	0.0515	0.0545	5.7	0.285	0.307	7.4	0.0362	0.0376	3.8
Molybdenum	mg/kg	4.64	4.63	0.2	1.02	1.05	2.9	4.23	3.25	26.2	0.69	0.75	8.3
Nickel	mg/kg	24.6	24.9	1.2	40.1	39.2	2.3	32.4	31.8	1.9	27.5	28.4	3.2
Phosphorus	mg/kg	1,080	1,130	4.5	1,190	1,200	0.8	2,070	2,270	9.2	1,130	1,170	3.5
Potassium	mg/kg	3,190	3,120	2.2	1,570	1,520	3.2	1,570	1,730	9.7	1,070	1,060	0.9
Selenium	mg/kg	1.54	1.59	3.2	0.93	0.90	3.3	2.59	2.60	0.4	0.53	0.51	3.8
Silver	mg/kg	0.441	0.447	1.4	0.216	0.209	3.3	0.372	0.303	20.4	0.135	0.132	2.2
Sodium	mg/kg	1,590	1,620	1.9	520	530	1.9	840	1040	21.3	440	430	2.3
Strontium	mg/kg	241	240	0.4	84.5	82.8	2.0	94.9	81.3	15.4	63.9	64.9	1.6
Sulfur (S)-Total	mg/kg	1,800	1,800	0.0	1,300	1,200	8.0	7,100	6,700	5.8	<500	<500	0.0
Thallium	mg/kg	0.067	0.068	1.5	0.171	0.168	1.8	0.119	0.104	13.5	0.106	0.104	1.9
Tin	mg/kg	2.31	2.32	0.4	0.46	0.45	2.2	0.64	0.52	20.7	0.37	0.33	11.4
Titanium	mg/kg	2,310	2,310	0.0	1,190	1,140	4.3	389	461	16.9	897	891	0.7
Uranium	mg/kg	1.54	1.56	1.3	1.43	1.41	1.4	2.07	1.77	15.6	0.985	0.958	2.8
Vanadium	mg/kg	128	130	1.6	72.3	70.7	2.2	75.6	76.7	1.4	52.7	53.1	0.8
Zinc	mg/kg	125	126	0.8	82.6	81.3	1.6	79.4	79.7	0.4	57.2	58.1	1.6

nitrogen, total organic carbon, and total sulfur (Appendix B). All laboratory duplicate results (97 in total) met ALS Environmental's data quality objective of <30% RPD (Appendix B) and thus laboratory precision achieved in this study is considered good.

C2.5 Data Accuracy

Data accuracy was evaluated based on results of certified reference materials (CRM), internal reference materials (IRM) and laboratory control samples (LCS; Appendix B). Specifically, six CRM and two LCS samples were used to evaluate the accuracy of metal analyses, three IRM samples were used to evaluate the accuracy of particle size, total nitrogen, total organic carbon and Sulphur, and another eight LCS samples were evaluated for moisture and pH (Appendix B). All CRM, IRM and LCS results (274 in total) met ALS Environmental's data quality objectives for accuracy (Appendix B) and thus laboratory accuracy achieved in this study is considered good.

C3.0 DATA QUALITY STATEMENT

Data collected for the August 2015 sediment quality survey at the Mount Polley Mine was of good quality as characterized by good detectability, negligible analyte concentrations in method blanks, good field and laboratory precision, and good laboratory accuracy. Therefore, associated data can be used with a high level of confidence in the derivation of conclusions.

APPENDIX D
SEDIMENT QUALITY DATA

Table D.1: Raw sediment quality data for Polley Lake and Bootjack Lake sampling areas, Mount Polley Mine, 2015. Metals and total organic carbon data are based on the < 63µm fraction of sediment ¹.

Parameter	Units	Contaminated Sites Regulation Criteria ²		Reference 95th Percentile ³		Reference (Bootjack Lake - B2)												
						BOL-B2-1	BOL-B2-2	BOL-B2-3	BOL-B2-4	BOL-B2-5	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum	Lower 95th Confidence Limit	Upper 95th Confidence Limit
Date Sampled		Sensitive	Typical	2014 / Historic ⁴	2015 (B2)	16-Aug-15	16-Aug-15	16-Aug-15	16-Aug-15	16-Aug-15								
Physical Tests																		
Moisture	%	-	-	93.8	96.1	94.1	96.1	95.7	-	-	95.3	95.7	1.1	0.6	94.1	96.1	92.7	97.9
pH (1:2 soil:water)	pH	-	-	5.98	6.46	6.44	6.71	6.60	-	-	6.58	6.60	0.14	0.08	6.44	6.71	6.25	6.92
Particle Size																		
% Gravel (>2mm)	%	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0	0	<0.10	<0.10	<0.10	<0.10
% Sand (2.0mm - 0.063mm)	%	-	-	21.4	0.21	0.12	0.15	0.22	0.16	0.63	0.26	0.16	0.21	0.09	0.12	0.63	-0.01	0.52
% Silt (0.063mm - 4µm)	%	-	-	84.2	83.7	80.6	83.9	81.8	83.9	82.6	82.6	82.6	1.4	0.6	80.6	83.9	80.8	84.3
% Clay (<4µm)	%	-	-	16.7	19.2	19.3	16.0	17.9	15.9	16.8	17.2	16.8	1.4	0.6	15.9	19.3	15.4	19.0
Texture	-	-	-	-	-	Silt loam	Silt	Silt loam	Silt loam	Silt loam	-	-	-	-	-	-	-	-
Organic / Inorganic Carbon (<63 µm)																		
Total Organic Carbon	%	-	-	20.8	15.5	14.8	15.5	15.1	-	-	15.1	15.1	0.4	0.2	14.8	15.5	14.3	16.0
Nutrients (Bulk sediment)																		
Total Nitrogen by LECO	%	-	-	1.68	1.67	1.60	1.67	1.65	-	-	1.64	1.65	0.04	0.02	1.60	1.67	1.55	1.73
Metals (<63µm)																		
Aluminum	mg/kg	-	-	20,620	19,600	18,700	19,700	17,600	-	-	18,667	18,700	1,050	606	17,600	19,700	16,057	21,276
Antimony	mg/kg	-	-	1.22	1.04	0.93	1.05	0.91	-	-	0.96	0.93	0.08	0.04	0.91	1.05	0.78	1.15
Arsenic	mg/kg	11	20	8.94	8.38	7.46	8.48	7.23	-	-	7.72	7.46	0.67	0.38	7.23	8.48	6.07	9.38
Barium	mg/kg	-	-	247	308	311	277	280	-	-	289	280	19	11	277	311	243	336
Beryllium	mg/kg	-	-	0.70	0.71	0.70	0.71	0.70	-	-	0.70	0.70	0.01	0.00	0.70	0.71	0.69	0.72
Bismuth	mg/kg	-	-	0.37	0.14	0.14	0.14	0.13	-	-	0.14	0.14	0.01	0.003	0.13	0.14	0.12	0.15
Boron	mg/kg	-	-	17	16	16	16	14	-	-	15	16	1	1	14	16	12	18
Cadmium	mg/kg	2.2	4.2	0.690	0.591	0.492	0.602	0.493	-	-	0.529	0.493	0.063	0.037	0.492	0.602	0.372	0.686
Calcium	mg/kg	-	-	15,890	9,040	7,970	9,140	8,140	-	-	8,417	8,140	632	365	7,970	9,140	6,846	9,987
Chromium	mg/kg	56	110	98.5	47.3	45.4	47.5	42.2	-	-	45.0	45.4	2.7	1.5	42.2	47.5	38.4	51.7
Cobalt	mg/kg	-	-	16.4	13.9	13.1	14.0	12.7	-	-	13.3	13.1	0.7	0.4	12.7	14.0	11.6	14.9
Copper	mg/kg	120	240	380	406	375	409	363	-	-	382	375	24	14	363	409	323	442
Iron	mg/kg	-	-	39,230	32,990	33,400	29,300	27,500	-	-	30,067	29,300	3,024	1,746	27,500	33,400	22,555	37,579
Lead	mg/kg	57	110	17.7	11.7	10.6	11.8	10.4	-	-	10.9	10.6	0.8	0.4	10.4	11.8	9.1	12.8
Lithium	mg/kg	-	-	17.8	10.8	10.6	10.8	10.4	-	-	10.6	10.6	0.2	0.1	10.4	10.8	10.1	11.1
Magnesium	mg/kg	-	-	12,548	5,383	5,230	5,400	5,190	-	-	5,273	5,230	112	64	5,190	5,400	4,996	5,550
Manganese	mg/kg	-	-	3,310	3,789	3,850	2,890	3,240	-	-	3,327	3,240	486	280	2,890	3,850	2,120	4,534
Mercury	mg/kg	0.30	0.58	0.286	0.326	0.291	0.330	0.285	-	-	0.302	0.291	0.024	0.014	0.285	0.330	0.241	0.363
Molybdenum	mg/kg	-	-	6.05	4.79	3.88	4.85	4.23	-	-	4.32	4.23	0.49	0.28	3.88	4.85	3.10	5.54
Nickel	mg/kg	-	-	74.6	34.6	32.7	34.8	32.4	-	-	33.3	32.7	1.3	0.8	32.4	34.8	30.1	36.5
Phosphorus	mg/kg	-	-	3,405	3,402	3,550	1,990	2,070	-	-	2,537	2,070	878	507	1,990	3,550	354	4,719
Potassium	mg/kg	-	-	1,591	1,759	1,760	1,750	1,570	-	-	1,693	1,750	107	62	1,570	1,760	1,428	1,959
Selenium	mg/kg	-	-	5.37	2.90	2.91	2.76	2.59	-	-	2.75	2.76	0.16	0.09	2.59	2.91	2.36	3.15
Silver	mg/kg	-	-	0.415	0.389	0.367	0.391	0.372	-	-	0.377	0.372	0.013	0.007	0.367	0.391	0.345	0.408
Sodium	mg/kg	-	-	560	1,065	770	1,090	840	-	-	900	840	168	97	770	1,090	482	1,318
Strontium	mg/kg	-	-	134	105	97	106	95	-	-	99	97	5.8	3.4	95	106	85	114
Sulfur (S)-Total	mg/kg	-	-	-	7,640	6,200	7,700	7,100	-	-	7,000	7,100	755	436	6,200	7,700	5,124	8,876
Thallium	mg/kg	-	-	0.127	0.141	0.134	0.142	0.119	-	-	0.132	0.134	0.012	0.007	0.119	0.142	0.103	0.161
Tin	mg/kg	-	-	1.06	0.77	0.78	0.67	0.64	-	-	0.70	0.67	0.07	0.04	0.64	0.78	0.51	0.88
Titanium	mg/kg	-	-	787	505	487	507	389	-	-	461	487	63	36	389	507	304	618
Uranium	mg/kg	-	-	2.06	2.37	2.14	2.40	2.07	-	-	2.20	2.14	0.17	0.10	2.07	2.40	1.77	2.64
Vanadium	mg/kg	-	-	111	83.6	81.4	83.8	75.6	-	-	80.3	81.4	4.2	2.4	75.6	83.8	69.8	90.7
Zinc	mg/kg	200	380	99.0	86.4	82.2	86.9	79.4	-	-	82.8	82.2	3.8	2.2	79.4	86.9	73.4	92.2

 Value is > Contaminated Sites Regulation (CSR) Sensitive Criterion. Values for exposed sites shown in bold text also exceed all Reference 95th Percentile values.

 Value is > Contaminated Sites Regulation (CSR) Typical Criterion. Values for exposed sites shown in bold text also exceed all Reference 95th Percentile values.

¹ Reported moisture, pH, and total nitrogen data are based on bulk sediment. Data reported as less than the method detection limit (MDL) were used at the MDL for the calculation of summary statistics. Summary statistics are reported as < MDL if all the data used in their calculation were < MDL.

² Contaminated Sites Regulation (Government of British Columbia 1996)

³ 2015 Reference 95th percentiles were calculated using displayed data for BOL-B2. The 5th percentile is reported for pH.

⁴ The maximum 95th percentile value from among 2014 data for Bootjack Lake sampling areas B1 and B2, and Historic data for Polley Lake sampling areas P1 and P2, is displayed for each parameter for the 2014/Historic Reference 95th percentiles. Refer to Minnow (2015) for raw data.

Table D.1: Raw sediment quality data for Polley Lake and Bootjack Lake sampling areas, Mount Polley Mine, 2015. Metals and total organic carbon data are based on the < 63µm fraction of sediment ¹.

Parameter	Units	Contaminated Sites Regulation Criteria ²		Reference 95th Percentile ³		Exposed (Polley Lake - P2)												
						POL-P2-1	POL-P2-2	POL-P2-3	POL-P2-4	POL-P2-5	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum	Lower 95th Confidence Limit	Upper 95th Confidence Limit
						2014 / Historic ⁴	2015 (B2)	13-Aug-15	14-Aug-15	14-Aug-15								
Date Sampled		Sensitive	Typical															
Physical Tests																		
Moisture	%	-	-	93.8	96.1	86.3	84.1	86.0	89.7	89.1	87.0	86.3	2.3	1.0	84.1	89.7	84.2	89.9
pH (1:2 soil:water)	pH	-	-	5.98	6.46	7.18	7.50	7.49	7.47	7.70	7.47	7.49	0.19	0.08	7.18	7.70	7.24	7.70
Particle Size																		
% Gravel (>2mm)	%	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0	0	<0.10	<0.10	<0.10	<0.10
% Sand (2.0mm - 0.063mm)	%	-	-	21.4	0.21	<0.10	0.30	<0.10	0.21	<0.10	0.16	0.10	0.09	0.04	<0.10	0.30	0.05	0.27
% Silt (0.063mm - 4µm)	%	-	-	84.2	83.7	69.6	85.4	87.1	73.8	78.0	78.8	78.0	7.5	3.3	69.6	87.1	69.5	88.0
% Clay (<4µm)	%	-	-	16.7	19.2	30.3	14.3	12.9	26.0	22.0	21.1	22.0	7.5	3.3	12.9	30.3	11.8	30.4
Texture	-	-	-	-	-	Silt loam	Silt	Silt	Silt loam	Silt loam	-	-	-	-	-	-	-	-
Organic / Inorganic Carbon (<63 µm)																		
Total Organic Carbon	%	-	-	20.8	15.5	3.80	10.1	7.37	7.51	8.32	7.4	7.5	2.3	1.0	3.8	10.1	4.6	10.3
Nutrients (Bulk sediment)																		
Total Nitrogen by LECO	%	-	-	1.68	1.67	0.702	1.19	0.858	0.977	0.988	0.943	0.977	0.180	0.080	0.702	1.19	0.720	1.17
Metals (<63µm)																		
Aluminum	mg/kg	-	-	20,620	19,600	28,400	28,900	27,700	26,300	29,800	28,220	28,400	1,318	589	26,300	29,800	26,584	29,856
Antimony	mg/kg	-	-	1.22	1.04	1.06	1.12	1.06	1.33	0.87	1.09	1.06	0.16	0.07	0.87	1.33	0.88	1.29
Arsenic	mg/kg	11	20	8.94	8.38	14.7	14.1	13.4	13.0	14.7	14.0	14.1	0.8	0.3	13.0	14.7	13.0	14.9
Barium	mg/kg	-	-	247	308	317	346	308	349	327	329	327	18	8.0	308	349	307	352
Beryllium	mg/kg	-	-	0.70	0.71	1.05	1.06	0.97	0.98	1.02	1.02	1.02	0.04	0.02	0.97	1.06	0.97	1.07
Bismuth	mg/kg	-	-	0.37	0.14	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.004	0.002	0.11	0.12	0.11	0.12
Boron	mg/kg	-	-	17	16	14	13	15	13	13	14	13	0.9	0.4	13	15	12	15
Cadmium	mg/kg	2.2	4.2	0.690	0.591	0.201	0.201	0.226	0.224	0.239	0.218	0.224	0.017	0.007	0.201	0.239	0.197	0.239
Calcium	mg/kg	-	-	15,890	9,040	28,200	24,800	22,000	20,400	27,100	24,500	24,800	3,302	1,476	20,400	28,200	20,401	28,599
Chromium	mg/kg	56	110	98.5	47.3	22.0	21.6	27.8	25.8	33.5	26.1	25.8	4.9	2.2	21.6	33.5	20.1	32.2
Cobalt	mg/kg	-	-	16.4	13.9	24.3	23.4	22.5	19.9	25.6	23.1	23.4	2.1	1.0	19.9	25.6	20.5	25.8
Copper	mg/kg	120	240	380	406	851	855	774	772	864	823	851	46	21	772	864	766	880
Iron	mg/kg	-	-	39,230	32,990	32,400	29,800	30,500	28,100	28,000	29,760	29,800	1,828	818	28,000	32,400	27,490	32,030
Lead	mg/kg	57	110	17.7	11.7	9.06	9.70	9.30	9.76	8.92	9.35	9.30	0.37	0.17	8.92	9.76	8.88	9.81
Lithium	mg/kg	-	-	17.8	10.8	27.1	26.1	25.1	22.1	26.7	25.4	26.1	2.0	0.9	22.1	27.1	22.9	27.9
Magnesium	mg/kg	-	-	12,548	5,383	16,900	16,400	15,400	13,500	17,400	15,920	16,400	1,542	689	13,500	17,400	14,006	17,834
Manganese	mg/kg	-	-	3,310	3,789	2,400	3,160	2,050	3,320	1,940	2,574	2,400	634	283	1,940	3,320	1,787	3,361
Mercury	mg/kg	0.30	0.58	0.286	0.326	0.102	0.105	0.115	0.116	0.114	0.110	0.114	0.006	0.003	0.102	0.116	0.102	0.118
Molybdenum	mg/kg	-	-	6.05	4.79	8.86	9.09	10.4	12.0	10.3	10.1	10.3	1.25	0.56	8.86	12.0	8.57	11.7
Nickel	mg/kg	-	-	74.6	34.6	19.9	19.3	23.0	21.3	26.6	22.0	21.3	2.9	1.3	19.3	26.6	18.4	25.7
Phosphorus	mg/kg	-	-	3,405	3,402	1,220	1,160	1,180	1,130	1,310	1,200	1,180	70	31	1,130	1,310	1,114	1,286
Potassium	mg/kg	-	-	1,591	1,759	2,700	2,820	2,680	2,740	2,890	2,766	2,740	88	39	2,680	2,890	2,657	2,875
Selenium	mg/kg	-	-	5.37	2.90	3.94	4.47	4.52	5.75	3.45	4.43	4.47	0.86	0.38	3.45	5.75	3.36	5.49
Silver	mg/kg	-	-	0.415	0.389	0.361	0.351	0.353	0.341	0.334	0.348	0.351	0.011	0.005	0.334	0.361	0.335	0.361
Sodium	mg/kg	-	-	560	1,065	1,730	1,880	1,720	1,960	1,850	1,828	1,850	102	46	1,720	1,960	1,701	1,955
Strontium	mg/kg	-	-	134	105	292	304	265	298	285	289	292	15	7	265	304	270	307
Sulfur (S)-Total	mg/kg	-	-	-	7,640	6,700	11,200	7,500	7,600	9,100	8,420	7,600	1,780	796	6,700	11,200	6,211	10,629
Thallium	mg/kg	-	-	0.127	0.141	0.051	0.057	0.067	0.062	0.053	0.058	0.057	0	0	0.051	0.067	0.050	0.066
Tin	mg/kg	-	-	1.06	0.77	2.29	2.18	1.98	1.89	2.14	2.10	2.14	0.16	0.07	1.89	2.29	1.90	2.29
Titanium	mg/kg	-	-	787	505	2,050	1,940	1,750	1,550	1,870	1,832	1,870	192	86	1,550	2,050	1,594	2,070
Uranium	mg/kg	-	-	2.06	2.37	1.49	1.45	1.53	1.40	1.42	1.46	1.45	0.05	0.02	1.40	1.53	1.39	1.52
Vanadium	mg/kg	-	-	111	83.6	122	113	113	107	120	115	113	6.0	2.7	107	122	107	123
Zinc	mg/kg	200	380	99.0	86.4	88.0	86.1	86.9	78.2	92.8	86.4	86.9	5.3	2.4	78.2	92.8	79.9	92.9

 Value is > Contaminated Sites Regulation (CSR) Sensitive Criterion. Values for exposed sites shown in bold text also exceed all Reference 95th Percentile values.

 Value is > Contaminated Sites Regulation (CSR) Typical Criterion. Values for exposed sites shown in bold text also exceed all Reference 95th Percentile values.

¹ Reported TN, pH, and moisture data are based on bulk sediment. Data < method detection limit (< MDL) were used at the MDL for the calculation of summary statistics. Summary statistics are reported as < MDL if all the data used in their calculation were < MDL.

² Contaminated Sites Regulation (Government of British Columbia 1996)

³ 2015 Reference 95th percentiles were calculated using displayed data for BOL-B2. The 5th percentile is reported for pH.

⁴ The maximum 95th percentile value from among 2014 data for Bootjack Lake sampling areas B1 and B2, and Historic data for Polley Lake sampling areas P1 and P2, is displayed for each parameter for the 2014/Historic Reference 95th percentiles. Refer to Minnow (2015) for raw data.

Table D.2: Raw sediment quality data for Hazeltine Creek Settling Pond sampling areas, Mount Polley Mine, 2015. Metals and total organic carbon data are based on the < 63µm fraction of sediment ¹.

Parameter	Units	Contaminated Sites Regulation Criteria ²		Reference 95th Percentile ³	HAC-SED1	HAC-SED2	HAC-SED3	HAC-SED4	HAC-SED5	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum	Lower 95th Confidence Limit	Upper 95th Confidence Limit
		Sensitive	Typical	Historic	20-Aug-15	20-Aug-15	20-Aug-15	20-Aug-15	20-Aug-15								
Physical Tests																	
Moisture	%	-	-	-	30.9	39.5	44.3	40.4	51.9	41.4	40.4	7.6	3.4	30.9	51.9	31.9	50.9
pH (1:2 soil:water)	pH	-	-	-	8.45	8.27	8.57	8.14	8.70	8.43	8.45	0.23	0.10	8.14	8.70	8.15	8.71
Particle Size																	
% Gravel (>2mm)	%	-	-	33.1	0.11	1.06	<0.10	<0.10	<0.10	0.29	0.10	0	0	<0.10	1.06	-0.24	0.83
% Sand (2.0mm - 0.063mm)	%	-	-	64.7	23.9	8.40	1.48	2.19	0.29	7.25	2.19	9.82	4.39	0.29	23.9	-4.94	19.4
% Silt (0.063mm - 4µm)	%	-	-	76.2	68.3	78.4	76.8	81.1	71.1	75.1	76.8	5.3	2.4	68.3	81.1	68.6	81.7
% Clay (<4µm)	%	-	-	13.9	7.68	12.2	21.7	16.7	28.7	17.4	16.7	8.19	3.66	7.68	28.7	7.23	27.6
Texture	-	-	-	-	Silt loam	Silt	Silt loam	Silt	Silt loam	-	-	-	-	-	-	-	-
Organic / Inorganic Carbon (<63µm)																	
Total Organic Carbon	%	-	-	12.8	0.24	0.34	0.30	0.27	0.34	0.30	0.30	0.04	0.02	0.24	0.34	0.24	0.35
Nutrients (Bulk sediment)																	
Total Nitrogen by LECO	%	-	-	-	0.046	0.052	0.059	0.044	0.061	0.052	0.052	0.008	0.003	0.044	0.061	0.043	0.062
Metals (<63µm)																	
Aluminum	mg/kg	-	-	18,000	13,300	15,100	20,700	18,100	22,300	17,900	18,100	3,750	1,677	13,300	22,300	13,245	22,555
Antimony	mg/kg	-	-	1.33	0.46	0.52	0.54	0.52	0.58	0.52	0.52	0.04	0.02	0.46	0.58	0.47	0.58
Arsenic	mg/kg	11	20	12.1	12.9	13.6	15.5	15.5	16.6	14.8	15.5	1.5	0.7	12.9	16.6	12.9	16.7
Barium	mg/kg	-	-	136	152	172	217	204	235	196	204	34	15	152	235	154	238
Beryllium	mg/kg	-	-	0.46	0.53	0.52	0.70	0.60	0.74	0.62	0.60	0.10	0.04	0.52	0.74	0.49	0.74
Bismuth	mg/kg	-	-	20.0	0.10	0.13	0.13	0.12	0.15	0.13	0.13	0.02	0.01	0.10	0.15	0.10	0.15
Boron	mg/kg	-	-	5	<10	<10	<10	<10	<10	<10	<10	0	0	<10	<10	<10	<10
Cadmium	mg/kg	2.2	4.2	0.354	0.185	0.193	0.232	0.215	0.221	0.209	0.215	0.020	0.009	0.185	0.232	0.185	0.234
Calcium	mg/kg	-	-	13,400	27,700	27,800	29,600	30,000	31,800	29,380	29,600	1,704	762	27,700	31,800	27,265	31,495
Chromium	mg/kg	56	110	40.1	26.8	26.9	30.5	28.2	29.8	28.4	28.2	1.7	0.7	26.8	30.5	26.4	30.5
Cobalt	mg/kg	-	-	11.0	15.7	15.7	19.9	18.3	21.8	18.3	18.3	2.7	1.2	15.7	21.8	15.0	21.6
Copper	mg/kg	120	240	95	383	347	524	460	630	469	460	113	51	347	630	328	609
Iron	mg/kg	-	-	35,400	57,600	51,400	46,000	51,800	46,100	50,580	51,400	4,809	2,150	46,000	57,600	44,610	56,550
Lead	mg/kg	57	110	6.7	7.24	8.35	9.20	8.43	10.7	8.78	8.43	1.28	0.57	7.24	10.7	7.20	10.4
Lithium	mg/kg	-	-	14.8	15.3	16.5	22.6	18.6	25.1	19.6	18.6	4.1	1.8	15.3	25.1	14.5	24.8
Magnesium	mg/kg	-	-	6,430	7,470	8,560	12,000	10,200	13,500	10,346	10,200	2,458	1,099	7,470	13,500	7,295	13,397
Manganese	mg/kg	-	-	1,350	562	655	780	727	903	725	727	129	58	562	903	566	885
Mercury	mg/kg	0.30	0.58	0.145	0.114	0.093	0.097	0.093	0.109	0.101	0.097	0.010	0.004	0.093	0.114	0.089	0.113
Molybdenum	mg/kg	-	-	1.50	2.52	2.17	2.34	2.51	2.79	2.47	2.51	0.23	0.10	2.17	2.79	2.18	2.75
Nickel	mg/kg	-	-	24.4	18.0	20.8	25.4	22.0	26.2	22.5	22.0	3.4	1.5	18.0	26.2	18.3	26.7
Phosphorus	mg/kg	-	-	1,380	1,620	1,440	1,550	1,670	1,510	1,558	1,550	90	40	1,440	1,670	1,446	1,670
Potassium	mg/kg	-	-	1,450	1,310	1,360	2,040	1,800	2,150	1,732	1,800	384	172	1,310	2,150	1,255	2,209
Selenium	mg/kg	-	-	3.32	0.80	0.79	0.92	0.83	1.06	0.88	0.83	0.11	0.05	0.79	1.06	0.74	1.02
Silver	mg/kg	-	-	0.160	0.258	0.237	0.259	0.248	0.293	0.259	0.258	0.021	0.009	0.237	0.293	0.233	0.285
Sodium	mg/kg	-	-	350	580	560	830	740	880	718	740	144	65	560	880	539	897
Strontium	mg/kg	-	-	118	145	161	171	168	179	165	168	13	6	145	179	149	181
Sulfur (S)-Total	mg/kg	-	-	-	1,400	1,100	1,300	1,300	1,200	1,260	1,300	114	51	1,100	1,400	1,118	1,402
Thallium	mg/kg	-	-	0.094	0.054	0.080	0.076	0.065	0.076	0.070	0.076	0.011	0.005	0.054	0.080	0.057	0.083
Tin	mg/kg	-	-	1.10	1.15	1.15	1.40	1.37	1.59	1.33	1.37	0.19	0.08	1.15	1.59	1.10	1.56
Titanium	mg/kg	-	-	776	1,250	1,320	1,610	1,560	1,770	1,502	1,560	214	96	1,250	1,770	1,236	1,768
Uranium	mg/kg	-	-	1.26	1.06	1.21	1.15	1.20	1.27	1.18	1.20	0.08	0.04	1.06	1.27	1.08	1.28
Vanadium	mg/kg	-	-	75	212	181	169	185	159	181	181	20.0	9.0	159	212	156	206
Zinc	mg/kg	200	380	67.6	59.4	65.0	82.4	72.6	90.2	73.9	72.6	12.5	5.6	59.4	90.2	58.4	89.5

Value is > Contaminated Sites Regulation (CSR) Sensitive Criterion. Values for exposed sites shown in bold text also exceed all Reference 95th Percentile values.

Value is > Contaminated Sites Regulation (CSR) Typical Criterion. Values for exposed sites shown in bold text also exceed all Reference 95th Percentile values.


¹ Reported moisture, pH, and total nitrogen data are based on bulk sediment. Data reported as less than the method detection limit (MDL) were used at the MDL for the calculation of summary statistics. Summary statistics are reported as < MDL if all the data used in their calculation were < MDL.


² Contaminated Sites Regulation (Government of British Columbia 1996)

³ The maximum historic reference 95th percentile value from among upper and lower Hazeltine Creek is displayed for each parameter. For calculation of Historic Reference 95th percentiles see Minnow (2015).

Table D.3: Raw sediment quality data for Quesnel Lake littoral sampling areas, Mount Polley Mine, 2015. Metals and total organic carbon data are based on the < 63µm fraction of sediment ¹.

Parameter	Units	Contaminated Sites Regulation Criteria ²		Reference 95th Percentile ³		Reference (LRef1)										
						LREF1-01	LREF1-03	LREF1-04	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum	Lower 95th Confidence Limit	Upper 95th Confidence Limit
						2014 ⁴	2015	24-Aug-15	25-Aug-15	25-Aug-15						
Date Sampled		Sensitive	Typical													
Physical Tests																
Moisture	%	-	-	53.4	43.4	43.5	42.4	36.5	40.8	42.4	3.8	2.2	36.5	43.5	31.4	50.2
pH (1:2 soil:water)	pH	-	-	6.32	6.74	7.02	7.17	6.71	6.97	7.02	0.23	0.14	6.71	7.17	6.38	7.55
Particle Size																
% Gravel (>2mm)	%	-	-	1.83	2.05	1.78	0.60	2.08	1.49	1.78	0.78	0.45	0.60	2.08	-0.46	3.43
% Sand (2.0mm - 0.063mm)	%	-	-	65.8	64.6	57.8	56.8	65.3	60.0	57.8	4.65	2.68	56.8	65.3	48.4	71.5
% Silt (0.063mm - 4µm)	%	-	-	76.4	36.3	35.8	36.3	29.6	33.9	35.8	3.73	2.15	29.6	36.3	24.6	43.2
% Clay (<4µm)	%	-	-	6.33	6.13	4.62	6.30	2.99	4.64	4.62	1.66	0.96	2.99	6.30	0.52	8.75
Texture	-	-	-	-	-	Sandy loam	Sandy loam	Sandy loam	-	-	-	-	-	-	-	-
Organic / Inorganic Carbon (<63µm)																
Total Organic Carbon	%	-	-	1.92	1.63	1.64	1.23	1.54	1.47	1.54	0.21	0.12	1.23	1.64	0.94	2.00
Nutrients (Bulk sediment)																
Total Nitrogen by LECO	%	-	-	0.138	0.114	0.115	0.101	0.097	0.104	0.101	0.009	0.005	0.097	0.115	0.081	0.128
Metals (<63µm)																
Aluminum	mg/kg	-	-	25,540	13,590	13,600	12,300	13,500	13,133	13,500	723	418	12,300	13,600	11,336	14,931
Antimony	mg/kg	-	-	0.36	0.33	0.33	0.30	0.30	0.31	0.30	0.02	0.01	0.30	0.33	0.27	0.35
Arsenic	mg/kg	11	20	4.92	5.28	5.37	3.82	4.43	4.54	4.43	0.78	0.45	3.82	5.37	2.60	6.48
Barium	mg/kg	-	-	133	122	117	107	122	115	117	7.6	4.4	107	122	96	134
Beryllium	mg/kg	-	-	0.69	0.40	0.40	0.33	0.37	0.37	0.37	0.04	0.02	0.33	0.40	0.28	0.45
Bismuth	mg/kg	-	-	0.47	0.12	0.12	<0.10	0.11	0.11	0.11	0.01	0.01	<0.10	0.12	0.09	0.13
Boron	mg/kg	-	-	<10	<10	<10	<10	<10	<10	<10	0	0	<10	<10	<10	<10
Cadmium	mg/kg	2.2	4.2	0.351	0.357	0.345	0.287	0.358	0.330	0.345	0.038	0.022	0.287	0.358	0.236	0.424
Calcium	mg/kg	-	-	14,400	8,077	8,170	7,040	7,240	7,483	7,240	603	348	7,040	8,170	5,985	8,981
Chromium	mg/kg	56	110	58.1	52.1	51.4	45.5	52.2	49.7	51.4	3.7	2.1	45.5	52.2	40.6	58.8
Cobalt	mg/kg	-	-	24.2	11.5	11.6	9.78	11.0	10.8	11.0	0.9	0.5	9.8	11.6	8.5	13.1
Copper	mg/kg	120	240	49.4	33.7	33.8	27.9	33.0	31.6	33.0	3.2	1.8	27.9	33.8	23.6	39.5
Iron	mg/kg	-	-	48,160	24,660	24,800	21,400	23,400	23,200	23,400	1,709	987	21,400	24,800	18,955	27,445
Lead	mg/kg	57	110	14.6	6.26	6.29	5.04	6.02	5.78	6.02	0.66	0.38	5.04	6.29	4.15	7.42
Lithium	mg/kg	-	-	45.8	11.7	11.8	10.1	11.0	11.0	11.0	0.9	0.5	10.1	11.8	8.9	13.1
Magnesium	mg/kg	-	-	12,320	6,780	6,800	5,860	6,600	6,420	6,600	495	286	5,860	6,800	5,190	7,650
Manganese	mg/kg	-	-	529	363	370	299	298	322	299	41	24	298	370	220	425
Mercury	mg/kg	0.30	0.58	0.046	0.048	0.048	0.036	0.047	0.044	0.047	0.007	0.004	0.036	0.048	0.027	0.060
Molybdenum	mg/kg	-	-	0.86	0.97	0.99	0.69	0.82	0.83	0.82	0.15	0.09	0.69	0.99	0.46	1.21
Nickel	mg/kg	-	-	69.1	32.3	32.2	27.5	32.3	30.7	32.2	2.7	1.6	27.5	32.3	23.9	37.5
Phosphorus	mg/kg	-	-	1,230	1,184	1,110	1,130	1,190	1,143	1,130	42	24	1,110	1,190	1,040	1,247
Potassium	mg/kg	-	-	4,328	1,297	1,300	1,070	1,270	1,213	1,270	125	72	1,070	1,300	903	1,524
Selenium	mg/kg	-	-	0.70	0.71	0.71	0.53	0.67	0.64	0.67	0.09	0.05	0.53	0.71	0.40	0.87
Silver	mg/kg	-	-	0.166	0.157	0.158	0.135	0.152	0.148	0.152	0.012	0.007	0.135	0.158	0.119	0.178
Sodium	mg/kg	-	-	424	478	480	440	460	460	460	20	12	440	480	410	510
Strontium	mg/kg	-	-	114	75.1	76.0	63.9	66.9	68.9	66.9	6.3	3.6	63.9	76.0	53.3	84.6
Sulfur (S)-Total	mg/kg	-	-	-	<500	<500	<500	<500	<500	<500	0	0	<500	<500	<500	<500
Thallium	mg/kg	-	-	0.310	0.133	0.135	0.106	0.118	0.120	0.118	0.015	0.008	0.106	0.135	0.083	0.156
Tin	mg/kg	-	-	0.56	0.39	0.38	0.37	0.39	0.38	0.38	0.01	0.01	0.37	0.39	0.36	0.40
Titanium	mg/kg	-	-	1,084	963	945	897	965	936	945	35	20	897	965	849	1,022
Uranium	mg/kg	-	-	1.95	1.24	1.25	0.99	1.18	1.14	1.18	0.14	0.08	0.99	1.25	0.80	1.48
Vanadium	mg/kg	-	-	61.5	59.4	59.0	52.7	59.4	57.0	59.0	3.8	2.2	52.7	59.4	47.7	66.4
Zinc	mg/kg	200	380	87.6	65.2	64.3	57.2	65.3	62.3	64.3	4.4	2.5	57.2	65.3	51.3	73.2

 Value is > Contaminated Sites Regulation (CSR) Sensitive Criterion. Values for exposed sites shown in bold text also exceed all Reference 95th Percentile values.

 Value is > Contaminated Sites Regulation (CSR) Typical Criterion. Values for exposed sites shown in bold text also exceed all Reference 95th Percentile values.

¹ Reported moisture, pH, and total nitrogen data are based on bulk sediment. Data reported as less than the method detection limit (MDL) were used at the MDL for the calculation of summary statistics. Summary statistics are reported as < MDL if all the data used in their calculation were < MDL.

² Contaminated Sites Regulation (Government of British Columbia 1996)

³ 2015 Reference 95th percentiles were calculated using displayed data. For calculation of 2014 Reference 95th percentiles see Minnow (2015). The 5th percentile is reported for pH.

⁴ The maximum reference 95th percentile value from among reference areas sampled in 2014 (LREF1 and LREF2) is displayed for each parameter. Refer to Minnow (2015) for raw data.

Table D.3: Raw sediment quality data for Quesnel Lake littoral sampling areas, Mount Polley Mine, 2015. Metals and total organic carbon data are based on the < 63µm fraction of sediment ¹.

Parameter	Units	Contaminated Sites Regulation Criteria ²		Reference 95th Percentile ³		Exposed (LNF)												Lower 95th Confidence Limit	Upper 95th Confidence Limit
						LNF1-1	LNF1-2	LNF1-3	LNF1-4	LNF1-5	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum			
						17-Aug-15	17-Aug-15	17-Aug-15	17-Aug-15	17-Aug-15									
Date Sampled		Sensitive	Typical	2014 ⁴	2015														
Physical Tests																			
Moisture	%	-	-	53.4	43.4	21.9	20.8	26.6	35.7	21.9	25.4	21.9	6.2	2.8	20.8	35.7	17.7	33.1	
pH (1:2 soil:water)	pH	-	-	6.32	6.74	6.70	8.21	8.28	8.16	8.39	7.95	8.21	0.70	0.31	6.70	8.39	7.08	8.82	
Particle Size																			
% Gravel (>2mm)	%	-	-	1.83	2.05	0.84	0.48	<0.10	7.32	1.37	2.02	0.84	3.00	1.34	<0.10	7.32	-1.70	5.74	
% Sand (2.0mm - 0.063mm)	%	-	-	65.8	64.6	95.9	91.7	82.8	51.9	89.9	82.4	89.9	17.7	7.92	51.9	95.9	60.4	104	
% Silt (0.063mm - 4µm)	%	-	-	76.4	36.3	2.87	7.00	16.7	39.4	7.93	14.8	7.93	14.7	6.55	2.87	39.4	-3.41	33.0	
% Clay (<4µm)	%	-	-	6.33	6.13	0.40	0.85	0.47	1.42	0.79	0.79	0.79	0.40	0.18	0.40	1.42	0.28	1.29	
Texture	-	-	-	-	-	Sand	Sand	Sand	Sandy loam	Sand	-	-	-	-	-	-	-	-	
Organic / Inorganic Carbon (<63µm)																			
Total Organic Carbon	%	-	-	1.92	1.63	0.65	0.21	0.14	0.35	0.40	0.35	0.35	0.20	0.09	0.14	0.65	0.10	0.60	
Nutrients (Bulk sediment)																			
Total Nitrogen by LECO	%	-	-	0.138	0.114	0.027	0.029	0.031	0.042	0.029	0.032	0.029	0.006	0.003	0.027	0.042	0.024	0.039	
Metals (<63µm)																			
Aluminum	mg/kg	-	-	25,540	13,590	14,500	12,900	8,470	13,000	12,700	12,314	12,900	2,265	1,013	8,470	14,500	9,502	15,126	
Antimony	mg/kg	-	-	0.36	0.33	0.46	0.46	0.37	0.39	0.47	0.43	0.46	0.05	0.02	0.37	0.47	0.37	0.49	
Arsenic	mg/kg	11	20	4.92	5.28	14.3	16.1	16.3	13.1	15.4	15.0	15.4	1.3	0.6	13.1	16.3	13.4	16.7	
Barium	mg/kg	-	-	133	122	128	105	71.8	113	107	105	107	21	9	72	128	79	131	
Beryllium	mg/kg	-	-	0.69	0.40	0.56	0.56	0.41	0.54	0.52	0.52	0.54	0.06	0.03	0.41	0.56	0.44	0.60	
Bismuth	mg/kg	-	-	0.47	0.12	0.10	<0.10	0.11	<0.10	0.10	0.10	0.10	0	0	<0.10	0.11	0.10	0.11	
Boron	mg/kg	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	0	0	<10	<10	<10	<10	
Cadmium	mg/kg	2.2	4.2	0.351	0.357	0.261	0.268	0.180	0.165	0.214	0.218	0.214	0.046	0.021	0.165	0.268	0.160	0.275	
Calcium	mg/kg	-	-	14,400	8,077	20,000	22,300	19,500	20,400	19,300	20,300	20,000	1,198	536	19,300	22,300	18,813	21,787	
Chromium	mg/kg	56	110	58.1	52.1	33.0	33.9	44.0	23.1	39.3	34.7	33.9	7.8	3.5	23.1	44.0	24.9	44.4	
Cobalt	mg/kg	-	-	24.2	11.5	20.4	20.1	33.9	19.4	23.9	23.5	20.4	6.0	2.7	19.4	33.9	16.0	31.0	
Copper	mg/kg	120	240	49.4	33.7	890	634	593	539	583	648	593	140	62	539	890	475	821	
Iron	mg/kg	-	-	48,160	24,660	83,000	92,300	213,000	89,100	122,000	119,880	92,300	54,185	24,232	83,000	213,000	52,611	187,149	
Lead	mg/kg	57	110	14.6	6.26	7.16	6.68	6.01	5.47	6.66	6.40	6.66	0.66	0.30	5.47	7.16	5.58	7.21	
Lithium	mg/kg	-	-	45.8	11.7	15.1	13.3	10.8	13.6	13.0	13.2	13.3	1.5	0.7	10.8	15.1	11.2	15.1	
Magnesium	mg/kg	-	-	12,320	6,780	8,230	7,010	5,190	7,420	6,770	6,924	7,010	1,117	499	5,190	8,230	5,537	8,311	
Manganese	mg/kg	-	-	529	363	852	756	671	628	842	750	756	100	45	628	852	626	874	
Mercury	mg/kg	0.30	0.58	0.046	0.048	0.123	0.102	0.094	0.082	0.105	0.101	0.102	0.015	0.007	0.082	0.123	0.082	0.120	
Molybdenum	mg/kg	-	-	0.86	0.97	3.26	3.64	3.97	3.04	3.00	3.38	3.26	0.42	0.19	3.00	3.97	2.87	3.90	
Nickel	mg/kg	-	-	69.1	32.3	20.5	19.2	18.6	14.6	20.9	18.8	19.2	2.5	1.1	14.6	20.9	15.6	21.9	
Phosphorus	mg/kg	-	-	1,230	1,184	1,730	2,030	2,410	1,810	1,750	1,946	1,810	285	128	1,730	2,410	1,592	2,300	
Potassium	mg/kg	-	-	4,328	1,297	1,140	960	530	1,020	950	920	960	231	103	530	1,140	634	1,206	
Selenium	mg/kg	-	-	0.70	0.71	1.15	1.07	1.44	1.01	1.12	1.16	1.12	0.17	0.07	1.01	1.44	0.95	1.36	
Silver	mg/kg	-	-	0.166	0.157	0.405	0.360	0.392	0.320	0.361	0.368	0.361	0.033	0.015	0.320	0.405	0.327	0.409	
Sodium	mg/kg	-	-	424	478	630	540	330	620	510	526	540	121	54	330	630	376	676	
Strontium	mg/kg	-	-	114	75.1	122	110	69.7	119	110	106	110	21	9	70	122	80	132	
Sulfur (S)-Total	mg/kg	-	-	-	<500	1,000	1,000	1,500	1,500	1,100	1,220	1,100	259	116	1,000	1,500	899	1,541	
Thallium	mg/kg	-	-	0.310	0.133	<0.050	<0.050	<0.050	<0.050	0.050	0.050	0.050	0	0	<0.050	0.050	0.050	0.050	
Tin	mg/kg	-	-	0.56	0.39	1.46	1.23	1.25	1.34	1.29	1.31	1.29	0.09	0.04	1.23	1.46	1.20	1.43	
Titanium	mg/kg	-	-	1,084	963	1,430	1,270	1,150	1,300	1,480	1,326	1,300	132	59	1,150	1,480	1,163	1,489	
Uranium	mg/kg	-	-	1.95	1.24	0.999	1.05	1.08	1.07	1.21	1.08	1.07	0.08	0.03	1.00	1.21	0.98	1.18	
Vanadium	mg/kg	-	-	61.5	59.4	310	350	839	335	470	461	350	220	98	310	839	187	734	
Zinc	mg/kg	200	380	87.6	65.2	68.5	65.8	86.0	61.3	72.5	70.8	68.5	9.4	4.2	61.3	86.0	59.1	82.5	

Value is > Contaminated Sites Regulation (CSR) Sensitive Criterion. Values for exposed sites shown in bold text also exceed all Reference 95th Percentile values.

Value is > Contaminated Sites Regulation (CSR) Typical Criterion. Values for exposed sites shown in bold text also exceed all Reference 95th Percentile values.

¹ Reported moisture, pH, and total nitrogen data are based on bulk sediment. Data reported as less than the method detection limit (MDL) were used at the MDL for the calculation of summary statistics. Summary statistics are reported as < MDL if all the data used in their calculation were < MDL.

² Contaminated Sites Regulation (Government of British Columbia 1996)

³ 2015 Reference 95th percentiles were calculated using displayed data. For calculation of 2014 Reference 95th percentiles see Minnow (2015). The 5th percentile is reported for pH.

⁴ The maximum reference 95th percentile value from among reference areas sampled in 2014 (LREF1 and LREF2) is displayed for each parameter. Refer to Minnow (2015) for raw data.

Table D.3: Raw sediment quality data for Quesnel Lake littoral sampling areas, Mount Polley Mine, 2015. Metals and total organic carbon data are based on the < 63µm fraction of sediment ¹.

Parameter	Units	Contaminated Sites Regulation Criteria ²		Reference 95th Percentile ³		Exposed (LFF)												
						LFF-01	LFF-02	LFF-03	LFF-04	LFF-05	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum	Lower 95th Confidence Limit	Upper 95th Confidence Limit
						2014 ⁴	2015	25-Aug-15	25-Aug-15	26-Aug-15	26-Aug-15	25-Aug-15						
Date Sampled		Sensitive	Typical															
Physical Tests																		
Moisture	%	-	-	53.4	43.4	59.7	35.9	37.0	42.6	48.3	44.7	42.6	9.7	4.4	35.9	59.7	32.6	56.8
pH (1:2 soil:water)	pH	-	-	6.32	6.74	7.14	6.68	6.87	7.57	7.19	7.09	7.14	0.34	0.15	6.68	7.57	6.67	7.51
Particle Size																		
% Gravel (>2mm)	%	-	-	1.83	2.05	0.47	0.81	1.36	<0.10	1.05	0.76	0.81	0.49	0.22	<0.10	1.36	0.15	1.37
% Sand (2.0mm - 0.063mm)	%	-	-	65.8	64.6	59.5	79.6	64.9	42.0	55.6	60.3	59.5	13.7	6.13	42.0	79.6	43.3	77.3
% Silt (0.063mm - 4µm)	%	-	-	76.4	36.3	37.2	18.6	32.1	56.0	38.4	36.5	37.2	13.5	6.02	18.6	56.0	19.8	53.2
% Clay (<4µm)	%	-	-	6.33	6.13	2.84	0.97	1.56	1.95	4.93	2.45	1.95	1.54	0.69	0.97	4.93	0.53	4.37
Texture	-	-	-	-	-	Sandy loam	Sand	Loamy sand	Silt loam	Sandy loam	-	-	-	-	-	-	-	-
Organic / Inorganic Carbon (<63µm)																		
Total Organic Carbon	%	-	-	1.92	1.63	5.03	2.04	0.78	0.75	2.87	2.29	2.04	1.77	0.79	0.75	5.03	0.09	4.49
Nutrients (Bulk sediment)																		
Total Nitrogen by LECO	%	-	-	0.138	0.114	0.171	0.074	0.062	0.091	0.164	0.112	0.091	0.051	0.023	0.062	0.171	0.049	0.176
Metals (<63µm)																		
Aluminum	mg/kg	-	-	25,540	13,590	10,300	16,600	11,400	15,500	12,900	13,340	12,900	2,669	1,194	10,300	16,600	10,027	16,653
Antimony	mg/kg	-	-	0.36	0.33	0.30	0.24	0.24	0.27	0.25	0.26	0.25	0.03	0.01	0.24	0.30	0.23	0.29
Arsenic	mg/kg	11	20	4.92	5.28	3.02	2.75	4.82	6.83	2.77	4.04	3.02	1.78	0.80	2.75	6.83	1.83	6.25
Barium	mg/kg	-	-	133	122	58.1	54.5	65.3	104	61.1	68.6	61.1	20.2	9.0	54.5	104	43.5	93.7
Beryllium	mg/kg	-	-	0.69	0.40	0.29	0.38	0.36	0.41	0.31	0.35	0.36	0.05	0.02	0.29	0.41	0.29	0.41
Bismuth	mg/kg	-	-	0.47	0.12	<0.10	<0.10	<0.10	<0.10	0.11	0.10	0.10	0	0	<0.10	0.11	0.10	0.11
Boron	mg/kg	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	0	0	<10	<10	<10	<10
Cadmium	mg/kg	2.2	4.2	0.351	0.357	0.318	0.239	0.107	0.123	0.183	0.194	0.183	0.087	0.039	0.107	0.318	0.086	0.302
Calcium	mg/kg	-	-	14,400	8,077	10,200	12,000	9,470	12,800	8,640	10,622	10,200	1,738	777	8,640	12,800	8,465	12,779
Chromium	mg/kg	56	110	58.1	52.1	31.4	47.8	46.5	48.7	35.2	41.9	46.5	8.0	3.6	31.4	48.7	32.0	51.9
Cobalt	mg/kg	-	-	24.2	11.5	7.74	14.7	9.32	12.6	10.1	10.9	10.1	2.8	1.2	7.7	14.7	7.5	14.3
Copper	mg/kg	120	240	49.4	33.7	39.0	51.8	69.0	136	32.7	65.7	51.8	41.7	18.6	32.7	136	14.0	117
Iron	mg/kg	-	-	48,160	24,660	18,400	29,900	28,900	37,000	22,200	27,280	28,900	7,222	3,230	18,400	37,000	18,314	36,246
Lead	mg/kg	57	110	14.6	6.26	5.23	7.02	4.44	4.74	6.06	5.50	5.23	1.05	0.47	4.44	7.02	4.20	6.80
Lithium	mg/kg	-	-	45.8	11.7	10.9	12.8	10.5	12.7	14.8	12.3	12.7	1.7	0.8	10.5	14.8	10.2	14.5
Magnesium	mg/kg	-	-	12,320	6,780	4,900	9,800	5,490	7,700	5,870	6,752	5,870	1,999	894	4,900	9,800	4,270	9,234
Manganese	mg/kg	-	-	529	363	227	351	298	405	260	308	298	71	32	227	405	220	396
Mercury	mg/kg	0.30	0.58	0.046	0.048	0.067	0.060	0.045	0.112	0.044	0.066	0.060	0.028	0.012	0.044	0.112	0.031	0.100
Molybdenum	mg/kg	-	-	0.86	0.97	0.49	0.68	0.84	1.02	0.31	0.67	0.68	0.28	0.13	0.31	1.02	0.32	1.02
Nickel	mg/kg	-	-	69.1	32.3	23.9	33.5	21.2	25.7	26.8	26.2	25.7	4.6	2.1	21.2	33.5	20.5	31.9
Phosphorus	mg/kg	-	-	1,230	1,184	711	869	1,180	1,340	755	971	869	276	123	711	1,340	628	1,314
Potassium	mg/kg	-	-	4,328	1,297	830	760	940	1,320	1,180	1,006	940	237	106	760	1,320	712	1,300
Selenium	mg/kg	-	-	0.70	0.71	0.98	0.59	0.23	0.30	0.50	0.52	0.50	0.30	0.13	0.23	0.98	0.15	0.89
Silver	mg/kg	-	-	0.166	0.157	0.125	0.099	0.073	0.110	0.087	0.099	0.099	0.020	0.009	0.073	0.125	0.074	0.124
Sodium	mg/kg	-	-	424	478	260	330	410	680	250	386	330	176	79	250	680	167	605
Strontium	mg/kg	-	-	114	75.1	55.9	76.5	88.2	122	53.9	79.3	76.5	27.9	12.5	53.9	122	44.7	114
Sulfur (S)-Total	mg/kg	-	-	-	<500	2,100	600	600	700	600	920	600	661	296	600	2,100	99	1,741
Thallium	mg/kg	-	-	0.310	0.133	0.060	0.057	<0.050	<0.050	0.083	0.060	0.057	0.014	0.006	<0.050	0.083	0.043	0.077
Tin	mg/kg	-	-	0.56	0.39	0.32	0.43	0.46	0.67	0.32	0.44	0.43	0.14	0.06	0.32	0.67	0.26	0.62
Titanium	mg/kg	-	-	1,084	963	786	1,490	1,020	1,320	808	1,085	1,020	312	140	786	1,490	697	1,472
Uranium	mg/kg	-	-	1.95	1.24	1.42	1.02	0.903	1.04	0.901	1.06	1.02	0.21	0.10	0.90	1.42	0.79	1.32
Vanadium	mg/kg	-	-	61.5	59.4	45.6	98.5	107	129	46.5	85.3	98.5	37.5	16.8	45.6	129	38.7	132
Zinc	mg/kg	200	380	87.6	65.2	41.5	61.2	43.6	52.2	46.9	49.1	46.9	7.9	3.5	41.5	61.2	39.3	58.9

Value is > Contaminated Sites Regulation (CSR) Sensitive Criterion. Values for exposed sites shown in bold text also exceed all Reference 95th Percentile values.

Value is > Contaminated Sites Regulation (CSR) Typical Criterion. Values for exposed sites shown in bold text also exceed all Reference 95th Percentile values.

¹ Reported moisture, pH, and total nitrogen data are based on bulk sediment. Data reported as less than the method detection limit (MDL) were used at the MDL for the calculation of summary statistics. Summary statistics are reported as < MDL if all the data used in their calculation were < MDL.

² Contaminated Sites Regulation (Government of British Columbia 1996)

³ 2015 Reference 95th percentiles were calculated using displayed data. For calculation of 2014 Reference 95th percentiles see Minnow (2015). The 5th percentile is reported for pH.

⁴ The maximum reference 95th percentile value from among reference areas sampled in 2014 (LREF1 and LREF2) is displayed for each parameter. Refer to Minnow (2015) for raw data.

Table D.4: Raw sediment quality data for Quesnel Lake profundal sampling areas, Mount Polley Mine, 2015. Metals and total organic carbon data are based on the < 63µm fraction of sediment ¹.

Parameter	Units	Contaminated Sites Regulation Criteria ²		Reference 95th Percentile ³		Reference (PREF1)												
						PREF1-01	PREF1-02	PREF1-03	PREF1-04	PREF1-05	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum	Lower 95th Confidence Limit	Upper 95th Confidence Limit
						18-Aug-15	24-Aug-15	19-Aug-15	24-Aug-15	24-Aug-15								
Date Sampled		Sensitive	Typical	2014 ⁴	2015 (PREF1)													
Physical Tests																		
Moisture	%	-	-	70.5	54.1	52.6	-	53.3	-	54.2	53.4	53.3	0.8	0.5	52.6	54.2	51.4	55.4
pH (1:2 soil:water)	pH	-	-	6.83	6.72	7.36	-	6.69	-	7.01	7.02	7.01	0.34	0.19	6.69	7.36	6.19	7.85
Particle Size																		
% Gravel (>2mm)	%	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.0	0.0	<0.10	<0.10	<0.10	<0.10
% Sand (2.0mm - 0.063mm)	%	-	-	31.5	26.7	21.1	28.1	15.2	18.7	14.3	19.5	18.7	5.54	2.48	14.3	28.1	12.6	26.4
% Silt (0.063mm - 4µm)	%	-	-	74.3	74.0	67.7	62.5	73.0	71.7	74.3	69.8	71.7	4.79	2.14	62.5	74.3	63.9	75.8
% Clay (<4µm)	%	-	-	27.2	11.7	11.2	9.3	11.8	9.6	11.4	10.7	11.2	1.1	0.5	9.3	11.8	9.3	12.1
Texture	-	-	-	-	-	Silt loam	Silt loam	Silt loam	Silt loam	Silt loam	-	-	-	-	-	-	-	-
Organic / Inorganic Carbon (<63µm)																		
Total Organic Carbon	%	-	-	1.93	1.96	1.76	-	1.71	-	1.98	1.82	1.76	0.14	0.08	1.71	1.98	1.46	2.17
Nutrients (Bulk sediment)																		
Total Nitrogen by LECO	%	-	-	0.176	0.181	0.169	-	0.158	-	0.182	0.170	0.169	0.012	0.007	0.158	0.182	0.140	0.200
Metals (<63µm)																		
Aluminum	mg/kg	-	-	25,380	17,260	16,900	-	17,300	-	15,500	16,567	16,900	945	546	15,500	17,300	14,219	18,915
Antimony	mg/kg	-	-	0.44	0.47	0.47	-	0.43	-	0.41	0.44	0.43	0.03	0.02	0.41	0.47	0.36	0.51
Arsenic	mg/kg	11	20	20.9	9.02	8.64	-	8.98	-	9.02	8.88	8.98	0.21	0.12	8.64	9.02	8.36	9.40
Barium	mg/kg	-	-	220	151	147	-	151	-	143	147	147	4.0	2.3	143	151	137	157
Beryllium	mg/kg	-	-	0.90	0.52	0.52	-	0.50	-	0.45	0.49	0.50	0.04	0.02	0.45	0.52	0.40	0.58
Bismuth	mg/kg	-	-	0.51	0.17	0.17	-	0.15	-	0.15	0.16	0.15	0.01	0.01	0.15	0.17	0.13	0.19
Boron	mg/kg	-	-	<10	<10	<10	-	<10	-	<10	<10	<10	0	0	<10	<10	<10	<10
Cadmium	mg/kg	2.2	4.2	0.414	0.470	0.475	-	0.422	-	0.364	0.420	0.422	0.056	0.032	0.364	0.475	0.282	0.558
Calcium	mg/kg	-	-	8,034	8,834	8,780	-	8,840	-	8,620	8,747	8,780	114	66	8,620	8,840	8,464	9,029
Chromium	mg/kg	56	110	55.8	60.0	60.1	-	59.5	-	53.6	57.7	59.5	3.6	2.1	53.6	60.1	48.8	66.7
Cobalt	mg/kg	-	-	25.7	15.2	15.2	-	15.0	-	13.4	14.5	15.0	1.0	0.6	13.4	15.2	12.1	17.0
Copper	mg/kg	120	240	48	59	59	-	56	-	50	55	56	5	3	50	59	43	67
Iron	mg/kg	-	-	102,460	32,660	32,300	-	32,700	-	28,900	31,300	32,300	2,088	1,206	28,900	32,700	26,113	36,487
Lead	mg/kg	57	110	22.1	8.01	8.06	-	7.51	-	7.39	7.65	7.51	0.36	0.21	7.39	8.06	6.77	8.54
Lithium	mg/kg	-	-	37.4	15.5	15.5	-	15.2	-	12.6	14.4	15.2	1.6	0.9	12.6	15.5	10.5	18.4
Magnesium	mg/kg	-	-	9,344	8,635	8,410	-	8,660	-	7,380	8,150	8,410	678	392	7,380	8,660	6,464	9,836
Manganese	mg/kg	-	-	7,814	512	477	-	479	-	516	491	479	22	13	477	516	436	545
Mercury	mg/kg	0.30	0.58	0.0593	0.0624	0.0627	-	0.0515	-	0.0594	0.0579	0.0594	0.0058	0.0033	0.0515	0.0627	0.0436	0.0722
Molybdenum	mg/kg	-	-	2.72	1.18	1.20	-	1.02	-	1.01	1.08	1.02	0.11	0.06	1.01	1.20	0.81	1.34
Nickel	mg/kg	-	-	60.7	41.1	41.2	-	40.1	-	36.1	39.1	40.1	2.7	1.5	36.1	41.2	32.5	45.8
Phosphorus	mg/kg	-	-	1,776	1,199	1,150	-	1,190	-	1,200	1,180	1,190	26	15	1,150	1,200	1,114	1,246
Potassium	mg/kg	-	-	3,704	1,568	1,550	-	1,570	-	1,430	1,517	1,550	76	44	1,430	1,570	1,329	1,705
Selenium	mg/kg	-	-	0.94	1.08	1.10	-	0.93	-	0.88	0.97	0.93	0.12	0.07	0.88	1.10	0.68	1.26
Silver	mg/kg	-	-	0.203	0.236	0.238	-	0.216	-	0.189	0.214	0.216	0.025	0.014	0.189	0.238	0.153	0.275
Sodium	mg/kg	-	-	420	518	470	-	520	-	500	497	500	25	15	470	520	434	559
Strontium	mg/kg	-	-	94.3	88.5	82.0	-	84.5	-	88.9	85.1	84.5	3.5	2.0	82.0	88.9	76.5	93.8
Sulfur (S)-Total	mg/kg	-	-	-	1,390	1,400	-	1,300	-	800	1,167	1,300	321	186	800	1,400	368	1,965
Thallium	mg/kg	-	-	0.293	0.192	0.194	-	0.171	-	0.158	0.174	0.171	0.018	0.011	0.158	0.194	0.129	0.220
Tin	mg/kg	-	-	0.61	0.49	0.49	-	0.46	-	0.41	0.45	0.46	0.04	0.02	0.41	0.49	0.35	0.55
Titanium	mg/kg	-	-	1,084	1,187	1,160	-	1,190	-	1,040	1,130	1,160	79	46	1,040	1,190	933	1,327
Uranium	mg/kg	-	-	3.16	1.56	1.57	-	1.43	-	1.39	1.46	1.43	0.09	0.05	1.39	1.57	1.23	1.70
Vanadium	mg/kg	-	-	66.3	72.9	73.0	-	72.3	-	64.9	70.1	72.3	4.5	2.6	64.9	73.0	58.9	81.2
Zinc	mg/kg	200	380	95.3	84.9	85.1	-	82.6	-	71.6	79.8	82.6	7.2	4.1	71.6	85.1	61.9	97.6

Value is > Contaminated Sites Regulation (CSR) Sensitive Criterion. Values for exposed sites shown in bold text also exceed all Reference 95th Percentile values.

Value is > Contaminated Sites Regulation (CSR) Typical Criterion. Values for exposed sites shown in bold text also exceed all Reference 95th Percentile values.

¹ Reported moisture, pH, and total nitrogen data are based on bulk sediment. Data reported as less than the method detection limit (MDL) were used at the MDL for the calculation of summary statistics. Summary statistics are reported as < MDL if all the data used in their calculation were < MDL.

² Contaminated Sites Regulation (Government of British Columbia 1996)

³ 2015 Reference 95th percentiles were calculated using displayed data, for calculation of 2014 Reference 95th percentiles see Minnow (2015). The 5th percentile is reported for pH.

⁴ The maximum reference 95th percentile value from among reference areas sampled in 2014 (PREF1 and PREF2) is displayed for each parameter. Refer to Minnow (2015) for raw data.

Table D.4: Raw sediment quality data for Quesnel Lake profundal sampling areas, Mount Polley Mine, 2015. Metals and total organic carbon data are based on the < 63µm fraction of sediment ¹.

Parameter	Units	Contaminated Sites Regulation Criteria ²		Reference 95th Percentile ³		Exposed (PNF1)												
						PNF-01	PNF-02	PNF-03	PNF-04	PNF-05	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum	Lower 95th Confidence Limit	Upper 95th Confidence Limit
						2014 ⁴	2015 (PREF1)	17-Aug-15	14-Aug-15	15-Aug-15								
Physical Tests																		
Moisture	%	-	-	70.5	54.1	63.5	64.7	55.0	33.9	29.0	49.2	55.0	16.7	7.5	29.0	64.7	28.4	70.0
pH (1:2 soil:water)	pH	-	-	6.83	6.72	8.26	8.38	8.51	8.55	8.53	8.45	8.51	0.12	0.06	8.26	8.55	8.29	8.60
Particle Size																		
% Gravel (>2mm)	%	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0	0	<0.10	<0.10	<0.10	<0.10
% Sand (2.0mm - 0.063mm)	%	-	-	31.5	26.7	1.41	1.67	1.83	1.90	28.2	7.0	1.8	11.9	5.3	1.4	28.2	-7.7	21.7
% Silt (0.063mm - 4µm)	%	-	-	74.3	74.0	44.1	48.5	54.7	81.7	58.7	57.5	54.7	14.6	6.5	44.1	81.7	39.4	75.7
% Clay (<4µm)	%	-	-	27.2	11.7	54.5	49.9	43.5	16.4	13.1	35.5	43.5	19.4	8.7	13.1	54.5	11.4	59.5
Texture	-	-	-	-	-	Silty clay	Silty clay	Silty clay loam	Silt	Silt loam	-	-	-	-	-	-	-	-
Organic / Inorganic Carbon (<63µm)																		
Total Organic Carbon	%	-	-	1.93	1.96	0.42	0.52	0.25	<0.10	0.18	0.29	0.25	0.17	0.08	<0.10	0.52	0.08	0.51
Nutrients (Bulk sediment)																		
Total Nitrogen by LECO	%	-	-	0.176	0.181	0.064	0.055	0.043	0.027	0.028	0.043	0.043	0.016	0.007	0.027	0.064	0.023	0.064
Metals (<63µm)																		
Aluminum	mg/kg	-	-	25,380	17,260	33,300	34,500	28,800	17,700	18,300	26,520	28,800	8,065	3,607	17,700	34,500	16,507	36,533
Antimony	mg/kg	-	-	0.44	0.47	0.61	0.66	0.57	0.43	0.50	0.55	0.57	0.09	0.04	0.43	0.66	0.44	0.67
Arsenic	mg/kg	11	20	20.9	9.02	16.2	17.0	16.1	13.4	14.1	15.4	16.1	1.5	0.7	13.4	17.0	13.5	17.3
Barium	mg/kg	-	-	220	151	298	306	286	193	190	255	286	58	26	190	306	183	327
Beryllium	mg/kg	-	-	0.90	0.52	1.17	1.22	1.02	0.69	0.70	0.96	1.02	0.25	0.11	0.69	1.22	0.65	1.27
Bismuth	mg/kg	-	-	0.51	0.17	0.16	0.17	0.14	<0.10	<0.10	0.13	0.14	0.03	0.01	<0.10	0.17	0.09	0.17
Boron	mg/kg	-	-	<10	<10	12	13	12	<10	<10	11	12	1.3	0.6	<10	13	10	13
Cadmium	mg/kg	2.2	4.2	0.414	0.470	0.230	0.244	0.210	0.144	0.156	0.197	0.210	0.045	0.020	0.144	0.244	0.141	0.252
Calcium	mg/kg	-	-	8,034	8,834	33,000	34,900	30,700	28,100	29,100	31,160	30,700	2,792	1,249	28,100	34,900	27,693	34,627
Chromium	mg/kg	56	110	55.8	60.0	23.5	25.0	22.5	14.3	19.1	20.9	22.5	4.3	1.9	14.3	25.0	15.6	26.2
Cobalt	mg/kg	-	-	25.7	15.2	32.7	35.0	26.1	15.9	17.8	25.5	26.1	8.6	3.8	15.9	35.0	14.9	36.1
Copper	mg/kg	120	240	48	59	1,110	1,190	904	536	557	859	904	304	136	536	1,190	482	1,237
Iron	mg/kg	-	-	102,460	32,660	38,700	41,200	38,600	35,100	49,500	40,620	38,700	5,418	2,423	35,100	49,500	33,893	47,347
Lead	mg/kg	57	110	22.1	8.01	12.3	12.7	11.1	6.47	6.94	9.90	11.1	2.98	1.33	6.47	12.7	6.20	13.6
Lithium	mg/kg	-	-	37.4	15.5	39.7	41.2	30.5	18.2	19.2	29.8	30.5	10.9	4.9	18.2	41.2	16.2	43.3
Magnesium	mg/kg	-	-	9,344	8,635	23,100	25,000	17,900	10,200	10,400	17,320	17,900	6,916	3,093	10,200	25,000	8,734	25,906
Manganese	mg/kg	-	-	7,814	512	1,250	1,310	1,090	716	801	1,033	1,090	265	119	716	1,310	704	1,363
Mercury	mg/kg	0.30	0.58	0.0593	0.0624	0.116	0.114	0.0935	0.0751	0.0783	0.0954	0.0935	0.0192	0.0086	0.0751	0.116	0.0715	0.119
Molybdenum	mg/kg	-	-	2.72	1.18	4.64	4.82	4.15	3.17	3.47	4.05	4.15	0.72	0.32	3.17	4.82	3.16	4.94
Nickel	mg/kg	-	-	60.7	41.1	24.6	25.5	22.1	13.4	15.3	20.2	22.1	5.5	2.5	13.4	25.5	13.3	27.0
Phosphorus	mg/kg	-	-	1,776	1,199	1,080	1,180	1,310	1,650	1,540	1,352	1,310	240	107	1,080	1,650	1,055	1,649
Potassium	mg/kg	-	-	3,704	1,568	3,190	3,140	3,150	1,890	1,830	2,640	3,140	713	319	1,830	3,190	1,755	3,525
Selenium	mg/kg	-	-	0.94	1.08	1.54	1.61	1.29	0.82	0.87	1.23	1.29	0.37	0.16	0.82	1.61	0.77	1.68
Silver	mg/kg	-	-	0.203	0.236	0.441	0.462	0.378	0.269	0.295	0.369	0.378	0.086	0.038	0.269	0.462	0.263	0.475
Sodium	mg/kg	-	-	420	518	1,590	1,650	1,670	1,050	1,020	1,396	1,590	331	148	1,020	1,670	985	1,807
Strontium	mg/kg	-	-	94.3	88.5	241	242	231	172	172	212	231	36	16	172	242	166	257
Sulfur (S)-Total	mg/kg	-	-	-	1,390	1,800	1,700	1,500	1,400	1,400	1,560	1,500	182	81	1,400	1,800	1,334	1,786
Thallium	mg/kg	-	-	0.293	0.192	0.067	0.065	0.066	<0.050	<0.050	0.060	0.065	0.009	0.004	<0.05	0.067	0.049	0.071
Tin	mg/kg	-	-	0.61	0.49	2.31	2.47	2.01	1.41	1.76	1.99	2.01	0.42	0.19	1.41	2.47	1.46	2.52
Titanium	mg/kg	-	-	1,084	1,187	2,310	2,420	2,070	1,420	1,760	1,996	2,070	410	183	1,420	2,420	1,487	2,505
Uranium	mg/kg	-	-	3.16	1.56	1.54	1.59	1.42	1.13	1.27	1.39	1.42	0.19	0.09	1.13	1.59	1.15	1.63
Vanadium	mg/kg	-	-	66.3	72.9	128	136	132	127	189	142	132	26	12	127	189	110	175
Zinc	mg/kg	200	380	95.3	84.9	125	131	100	58.9	65.2	96.0	100	33.2	14.8	58.9	131	54.8	137

Value is > Contaminated Sites Regulation (CSR) Sensitive Criterion. Values for exposed sites shown in bold text also exceed all Reference 95th Percentile values.

Value is > Contaminated Sites Regulation (CSR) Typical Criterion. Values for exposed sites shown in bold text also exceed all Reference 95th Percentile values.

¹ Reported moisture, pH, and total nitrogen data are based on bulk sediment. Data reported as less than the method detection limit (MDL) were used at the MDL for the calculation of summary statistics. Summary statistics are reported as < MDL if all the data used in their calculation were < MDL.

² Contaminated Sites Regulation (Government of British Columbia 1996)

³ 2015 Reference 95th percentiles were calculated using displayed data, for calculation of 2014 Reference 95th percentiles see Minnow (2015). The 5th percentile is reported for pH.

⁴ The maximum reference 95th percentile value from among reference areas sampled in 2014 (PREF1 and PREF2) is displayed for each parameter. Refer to Minnow (2015) for raw data.

Memorandum

Date: January 29, 2016

To: Dale Reimer, Mount Polley Mining Corporation

From: Pierre Stecko, Katharina Batchelar, Minnow Environmental Inc.

Cc: Colleen Hughes, Katie McMahan, Mount Polley Mining Corporation
'Lyn Anglin, Imperial Metals Corporation

Re: Application of the SEM-AVS Method and Selective Extraction Analysis in Evaluating Sediments Collected in the Vicinity of the Mount Polley Mine - August 2015

In the ongoing assessment of the potential impact to aquatic environmental health following the failure of the Mount Polley tailings dam in August 2014, it is critical to develop an understanding of the post-depositional stability of tailings-derived materials released to the aquatic receiving environment. A number of evaluations have been undertaken to date to advance this understanding, and have generally indicated low mobility of tailings-associated metals (e.g., SRK 2015a,b; Minnow 2015a). This memorandum summarizes the application of the SEM-AVS (Simultaneously Extracted Metals - Acid Volatile Sulphide) method of evaluating potential metal mobility and toxicity (e.g., DiToro et al. 1990) and supporting Selective Extraction Analysis (SEA) to sediment collected in the vicinity of the Mount Polley Mine (Figures 1 and 2). Samples were collected in August 2015 from two waterbodies (Polley Lake and Quesnel Lake) affected by the dam failure, and from corresponding reference areas. The purpose of this memorandum is to apply the SEM-AVS method to the collected sediments in order to assess the mobility of sediment metals using both SEM-AVS and SEA, assess the potential for sediment toxicity to aquatic biota, and to evaluate of the utility of the SEM-AVS method in sediments from the mine-impacted areas of Polley Lake and Quesnel Lake.

Background

The evaluation of sediment chemistry results discussed in this memorandum is part of the ongoing assessment of the environmental impact of the Mount Polley tailings dam failure which occurred on August 4th 2014. Geochemical investigations were conducted in 2014 (SRK 2015a; Minnow 2015a) and 2015 (SRK 2015b), and generally indicated that the mineralogy /



LEGEND

Sediment Sampling Location

- Exposed
- Reference
- Bootjack Creek Dam
- ▭ Mine Infrastructure
- Waterbody
- Water Collection Ditch
- Bootjack Lake Bathymetry (5 m Intervals)
- Polley Lake Bathymetry (10 m Intervals)
- Watercourse
- Roads
- ➔ Water Flow Direction

0 200 400 800
Meters

N
W E
S

MAP INFORMATION
 Datum: NAD 83 Map Projection: UTM Zone 10U
 Data Source: Department of Natural Resources Canada. All rights reserved.
 Creation Date: December 2015
 Project No.: 2574

Figure 1: Polley Lake and Bootjack Lake Sediment Sampling Locations, Mount Polley Mine, 2015.





LEGEND

Sediment Sampling Location

- Exposed
- Reference
- Waterbody
- Quesnel Lake Bathymetry (10 m Intervals)
- Watercourse
- Roads
- Water Flow Direction

0 400 800 1,600
Meters

MAP INFORMATION
 Datum: NAD 83 Map Projection: UTM Zone 10U
 Data Source: Department of Natural Resources Canada. All rights reserved.
 Creation Date: December 2015
 Project No.: 2574

Figure 2: Quesnel Lake Profundal Sediment Sampling Locations, Mount Polley Mine, 2015.



geochemical characteristics of the Mount Polley tailings, and materials deposited to receiving environments, was such that the mobility of associated metals is expected to be low. The post-depositional stability of mine-derived sediments is critical to understanding potential impact to water quality and to aquatic life. Two sediment chemical methods were employed to advance understanding of these potential impacts; the SEM-AVS method and Selective Extraction Analyses (SEA; or “Tessier” extractions).

The SEM-AVS method (Di Toro et al. 1990; Di Toro et al. 1992) provides a means of assessing the potential toxicity of metals in anoxic sediments by relating the concentrations of solid phase acid volatile sulphide (AVS) that occur under anoxic conditions to concentrations of cationic simultaneously extracted metals (SEM; copper, cadmium, lead, nickel, zinc, and silver). Free metals can react with available AVS and partition from the interstitial water to the solid phase as insoluble metal sulphides, thereby decreasing the bioavailable metal concentrations and potential toxicity to aquatic biota (Di Toro et al. 1990). This method can be used to predict a lack of toxicity in anoxic sediments where the concentration of AVS exceeds that of the SEM (i.e. ratio of SEM/AVS < 1) and has been shown to be successful at doing so (Di Toro et al. 2005). However there are some limitations to the method applicability. For instance, although the SEM-AVS method can predict a lack of toxicity, it is not intended to predict the occurrence of toxicity when SEM is in excess of AVS (Di Toro et al. 2005; USEPA 2005). In addition, the SEM-AVS method is not appropriate for application to oxidized sediments which only have trace concentrations of AVS present, with the lower limit of method applicability estimated to be approximately 1 $\mu\text{mol/g}$ (or 32 mg/kg) of AVS (Di Toro et al. 1990). Both of these limitations are owing to the fact that the method does not explicitly consider other sediment constituents that are available for metal complexation (Di Toro et al. 2005; USEPA 2005), such as organic carbon, iron and manganese oxides, and carbonates (in oxidized sediments), among others. Therefore, limitations of the SEM-AVS method should be carefully considered in data interpretation, and caution should be applied to the interpretation of results from sediments with trace AVS concentrations.

Selective extraction analyses (SEA) were used as a second tool in further evaluating the current limits to metal mobility in the sediment. These extractions provide an indication of the fraction of “total” metal in sediment that could be mobilized under differing circumstances and, importantly from the perspective of exposure characterization, the fraction of “total” metal that could not realistically be mobilized (e.g., Tessier and Campbell 1987). The reagents typically used in the selective extraction analyses are weaker than reagents in the analysis of “total metal” concentrations in sediments, in an effort to mimic the fraction (or fractions) of sediment-

associated metal that could be released under natural conditions. Comparisons of SEA results between 2014 (Minnow 2015a) and the current sampling year (2015) can also be used in evaluating potential geochemical changes that could affect metal mobility within tailings-impacted sediments over time.

Methods

Sediment samples were collected between August 13th and 24th 2015 from impacted areas of Polley Lake and Quesnel Lake, and corresponding reference areas (Figures 1 and 2). Samples were collected from the same locations used in 2014 (Appendix Table A.1), and using the same methods (Minnow 2015a) wherever possible.

Sampling

Sediments were collected from Polley Lake, Bootjack Lake, and Quesnel Lake for the analysis of SEM and AVS, SEA (or “Tessier” extractions), and total organic carbon (TOC). In Polley and Bootjack lakes, sediments were collected for these analyses using a Kajak-Brinkhurst (KB) corer in accordance with technical guidance for gravity coring outlined in the British Columbia Field Sampling Manual (BCWLAP 2003) and the federal Technical Guidance Manual for Environmental Effects Monitoring (EEM; Environment Canada 2012). Briefly, all retrieved core samples were examined, and if acceptable, were extruded into a core collar, cut using a core knife to collect the top 3 cm of sediment, and transferred into a 250 mL glass sampling jar labelled with the project number, sample location, collection date, and required analyses. Sediment collected for the analysis of SEA and TOC was then transferred into one or more labelled sampling jars, while sediment collected for SEM and AVS analyses was transferred into a separate labelled 250 mL glass sampling jar. This procedure was repeated to provide composite samples of sufficient volume for the required analyses (a minimum of three cores per sample). The sulphide ion measured in SEM and AVS analyses is unstable in the presence oxygen (USEPA 1991); therefore sampling jars containing sediment for these analyses were filled completely to ensure minimum headspace. Within both Polley and Bootjack lakes, sediment was collected for SEM and AVS analyses from five replicate stations to represent each area, while sediment for SEA (Tessier) and TOC analysis was collected from five replicate stations within Polley Lake, and from three replicate stations within Bootjack Lake (Appendix Table A.1). All sampling equipment was rinsed between stations using site water.

In Quesnel Lake, sediment samples were collected from profundal habitats using a stainless steel petite ponar (15.2 cm x 15.2 cm; 0.023 m² sampling area) or standard ponar (22.9 cm

x 22.9 cm; 0.052 m² sampling area) grab sampler in accordance with technical guidance outlined in the British Columbia Field Sampling Manual (BCWLAP 2003) and the federal Technical Guidance Manual for EEM (Environment Canada 2012). Profundal grab samples (mean depth approximately 100 meters) were collected with the assistance of a commercial line hauler (Ace Line Hauler - Brutus Plus 40). Sediment was collected for SEM and AVS analyses from five replicate stations within both the exposed (near-field) and reference areas, while sediment for SEA and TOC analyses was collected from five replicate stations within the exposed (near-field) area, and from three replicate stations within the profundal reference area (Appendix Table A.1). At each station, composite samples of the top three centimeters of surficial sediment of three to six acceptable grabs (i.e., full to each edge of the sampler) were collected. Each grab was collected into a plastic tote and observed for completeness and any unusual characteristics. If the sample was deemed acceptable, surficial material to a depth of 3 centimeters was transferred using a stainless steel spoon directly into a labeled 250 mL glass sampling jar for SEM and AVS analyses (without homogenization in order to limit oxidation), and into a tote for collection for SEA and TOC analyses, and the remaining sediment was discarded. Sampling jars containing sediment for SEM and AVS analyses were capped between grabs to limit oxidation. This procedure was repeated for all subsequent grabs. When sufficient grabs had been collected, material obtained for SEA and TOC analyses was homogenized using a stainless steel spoon prior to being transferred into 250 mL glass sampling jars. Sampling jars containing sediment for SEM and AVS analyses were completely filled to eliminate headspace and minimize potential oxidation. All sampling jars were labelled with the project number, sample location and collection date, and all sampling equipment was rinsed between stations using site water.

Field duplicate (split) sediment samples were collected at a frequency of 10% for quality assurance/quality control (QA/QC) purposes. Supporting information collected at each sampling site included GPS (Geographic Positioning System) coordinates, sampling depth, Secchi depth, field meter measurements of temperature, specific conductance, dissolved oxygen and pH (using a YSI EXO™ handheld portable field meter equipped with YSI EXO2™ Sonde), site photographs (including photographs of sediment samples), and notes of the presence or absence of aquatic vegetation, and other physical observations (sediment texture, colour, density, etc.). Immediately after collection, samples were placed into a cooler with ice packs, where they were maintained cool prior to transport to the field laboratory. At the field laboratory, samples collected for SEA and TOC analyses were placed directly in a refrigerator, whereas the samples collected for SEM and AVS analyses

were sealed in a double layer of large Ziploc bags that were each purged and filled with nitrogen gas in order to minimize sample oxidation. All samples were then held in a refrigerator until shipment to the analytical laboratory. Sediment samples were shipped to the analytical laboratory (ALS Environmental, Burnaby, BC) at minimum frequency of weekly. Prior to shipment, samples were placed in a cooler with frozen ice packs and a chain-of custody form was prepared and packed with the samples. Coolers were shipped overnight for next day delivery to ALS Environmental.

Laboratory Analysis

Upon receipt, ALS Environmental opened the coolers, measured temperature to verify the maintenance of cold samples, removed each sample from the coolers, logged the sample, and assigned each sample a unique identification code. A sample receipt confirmation was then sent to MPMC and Minnow for verification.

Laboratory analyses included simultaneously extracted metals and acid volatile sulphides, selective extraction analyses, and total organic carbon analyses. Total organic carbon was determined in the silt/clay fraction (<63 µm diameter) to compliment metal concentrations measured in this sediment fraction reported in a previous memorandum (Minnow 2015b). Upon completion of these analyses (detailed below), data reports were provided by ALS Environmental to MPMC and Minnow electronically in Adobe Acrobat Portable Document Format (PDF), and as MSEXcel files.

The analysis of SEM and AVS in sediment was performed according to the USEPA Method EPA-821-R-91-100 (USEPA 1991). This analysis consisted of the cold extraction of sediment in hydrochloric acid, reported to release readily extractable reactive sulphides which are referred to as AVS. The concentrations of the reactive metals that are concurrently extracted during the cold acid extraction were also measured, and are referred to as SEM (ICMM 2007). The SEM-AVS method has been verified for 5 divalent metals (cadmium, copper, lead, nickel, and zinc), and one monovalent metal (silver; Wang and Chapman 1999). These have been shown to react with the AVS present in anoxic sediments to form insoluble metal sulphides that are generally not available for uptake by biota, and therefore non-toxic (McGrath et al. 2002; Di Toro et al. 2005). However, the SEM-AVS method is invalid in fully oxidized sediments where the AVS concentration is zero or near-zero, with the lower limit of method applicability being approximately 1 µmol/g (or 32 mg/kg; Di Toro et al. 1990). In these cases, metal partitioning would likely be controlled by other sediment constituents (Di Toro et al. 1990), such as iron and manganese oxides and organic carbon. The concurrent release of SEM and AVS does not necessarily indicate

that the SEM are bound to sulphides alone in the sediment (Allen et al. 1993; ICMM 2007). Total SEM is the sum of metals belonging to any metal-bearing phase that is released in the cold acid extraction (Allen et al. 1993; Di Toro et al. 1996). In Mount Polley tailings and tailings-influenced sediments for example, a significant amount of copper has been shown to be associated with the non-sulphide fraction of these sediments (likely as silicate chlorite), which is relatively stable at neutral pH, but which can leach under acidic conditions (SRK 2015a,b). The SEM-AVS method could therefore overestimate metal availability if the metals released as SEM during the cold acid extraction were bound to other constituents other than readily extractable reactive sulphides alone in the sediment (Fang et al. 2005). This may occur especially in oxidized sediments where trace amounts of AVS are present, and metal partitioning is dominated by other sediment phases. Concentrations of simultaneously extracted silver were not reported by the analytical laboratory and are not included in this report. Silver was not identified as a parameter of interest for either of the exposed sampling areas (Minnow 2015a).

Selective extraction analyses were performed using the sequential extraction scheme of Tessier et al. (1979) in order to allow comparison with the results of sediments analysed using this method in 2014 (Minnow 2015a). Selective extractions are useful in providing an indication of the fraction of “total” metal that could be mobilized under different circumstances, and provide a rough characterization of metal oxides (i.e., iron and manganese oxides) within the “Easily Reducible and Iron Oxides” fraction. The Tessier extraction method involves five sequential extraction steps of increasing strength, with each extraction step representing a fraction of sediment-associated metals that could be released under varying conditions: 1) changes in ionic strength (exchangeable & adsorbed metals fraction); 2) changes in pH (carbonate fraction); 3) reducing conditions such as those that could occur with diagenesis (easily reducible metals and iron oxides fraction); and 4) oxidizing conditions (organic and mineral bound metals fraction) (Tessier et al. 1979). The final digest in the procedure is a strong acid (aqua regia) digest that mobilizes metals resistant to the first four digestion steps (providing a residual metals fraction), and is the same digest used to mobilize “total” metals in the conventional chemical characterization of metals (although it does not digest all mineral forms and is not a true total).

Data Analysis

Upon receipt of the analytical data, a Data Quality Assessment (DQA) was completed, including an examination of data completeness, method detection limits achieved, laboratory and field precision, and laboratory accuracy. Following completion of the DQA,

sediment quality data (SEM and AVS, TOC, and SEA) were summarized by area, by calculating mean, median, standard deviation, standard error, 95% confidence limits, and minimum and maximum.

Total SEM data were compared to AVS data to determine whether SEM were in excess of AVS. This was achieved by calculating the ratio of total SEM/AVS, as well as the difference between total SEM and AVS $[(\Sigma \text{ total SEM})-(\text{AVS})]$. If the former is less than one or the latter is less than zero, AVS is in excess of SEM and the SEM is likely present as insoluble sulphide complexes. If the reverse is true (the former is greater than one or the latter is greater than zero), the latter is referred to as excess SEM, and is an indicator that AVS is insufficient to bind the SEM and of the importance of other metal-binding phases in influencing the bioavailability of excess SEM (Hansen et al. 1996; ICMM 2007; e.g., organic carbon, iron oxides, manganese oxides, carbonates). For samples with excess SEM, a binding sequence calculation was used to determine the concentration of each of the five SEM in excess of available AVS. This was accomplished for each sample by allocating the available AVS on a 1:1 molar basis to the individual SEM (copper, lead, cadmium, zinc, and nickel), according to the sequence of their relative sulphide solubility product constants. Therefore, available AVS was assigned to the five SEM in the following order: 1) copper, 2) lead, 3) cadmium, 4) zinc, 5) nickel (low to high sulphide solubility products; K_{sp}), until the AVS was exhausted. Simultaneously extracted mercury data were provided by the laboratory, however SEM-AVS calculations were limited to the five aforementioned metals for which the method has been verified in anoxic sediments (Wang and Chapman 1999). SEM were considered to likely be present as insoluble sulphide complexes if AVS was assigned to the SEM concentration in binding sequence calculations. If AVS was not allocated to a particular SEM concentration due to exhaustion of AVS earlier in the binding sequence (more likely for those metals at the end of the sequence), the SEM was considered to be in excess. Excess SEM represents the fraction of SEM with the potential to exist in the free metal form, but it is important to note that this is only if it is not bound to other sediment constituents (McGrath et al. 2002; e.g., organic carbon, or iron and manganese oxides, carbonates). In order to account for potential binding to total organic carbon, excess SEM concentrations (i.e., where total SEM > AVS), were related to the organic carbon content of sediment by calculating the organic carbon-normalized excess SEM value ($\mu\text{mol excess SEM/gOC}$). This was achieved by using the following equation: $([\text{Excess Total SEM}]/\text{fOC})$, where fOC is the fraction of sediment organic carbon, in grams of Organic Carbon/gram of Dry Weight (Di Toro et al. 2005; USEPA 2005).

SEA data collected in 2015 were compared to data collected from the same sampling stations in 2014. Mean metal concentrations in each of the fractions were compared among the two sampling years (2014 and 2015), by calculating relative percent differences. Concentrations of the parameters of interest (POIs) identified in 2014 for Polley Lake (arsenic, copper, iron, and zinc) and for Quesnel Lake profundal (arsenic, copper, iron, manganese, and nickel) sampling areas (Minnow 2015a) were further evaluated to compare the partitioning of these metals among the extracted fractions.

Results

The reported sediment chemistry results were of good quality as characterized by: 1) good detectability as demonstrated by the majority of method detection limits (MDL) meeting predicted laboratory MDLs (Appendix Table C.1); 2) negligible analyte concentrations in the majority (97%) of laboratory method blank samples; 3) good data precision, with all field (Appendix Table C.2) and laboratory duplicate results meeting data quality objectives; and 4) good laboratory accuracy, with all certified reference materials and standards results meeting data quality objectives. Additional details regarding the data quality assessment are presented in Appendix C.

Polley Lake

Simultaneously Extracted Metals and Acid Volatile Sulphides

Sediment collected from the south basin of Polley Lake in August 2015 (sampling area POL-P2; Figure 1) had SEM/AVS ratios of less than one, with the exception of the sampling station POL-P2-2 (Figure 3; Appendix Table C.3). This is similar to results observed in the corresponding reference area (BOL-B2 in Bootjack Lake), where SEM/AVS ratios were less than one for all samples (Figure 3; Appendix Table C.3). Accordingly, the difference between total SEM and AVS ($[\Sigma \text{ total SEM}] - [\text{AVS}]$) was less than zero for the majority of Polley Lake samples, indicating excess SEM was not present (Figure 4). These results indicate that the majority of sediment samples from the south basin of Polley Lake are predicted to be non-toxic because SEM within these sediments are likely present as insoluble metal sulphides (Di Toro et al. 1996; McGrath et al. 2002; Di Toro et al. 2005), which are present in the solid phase (i.e., not occurring in the interstitial water) and of limited bioavailability and toxicity to aquatic biota (Di Toro et al. 1990).

Total SEM exceeded the available AVS in one Polley Lake sample, as mentioned above (POL-P2-2). Concentrations of copper and total organic carbon in this sample were the highest in the sampling area and were accompanied by a low AVS concentration (<1.1

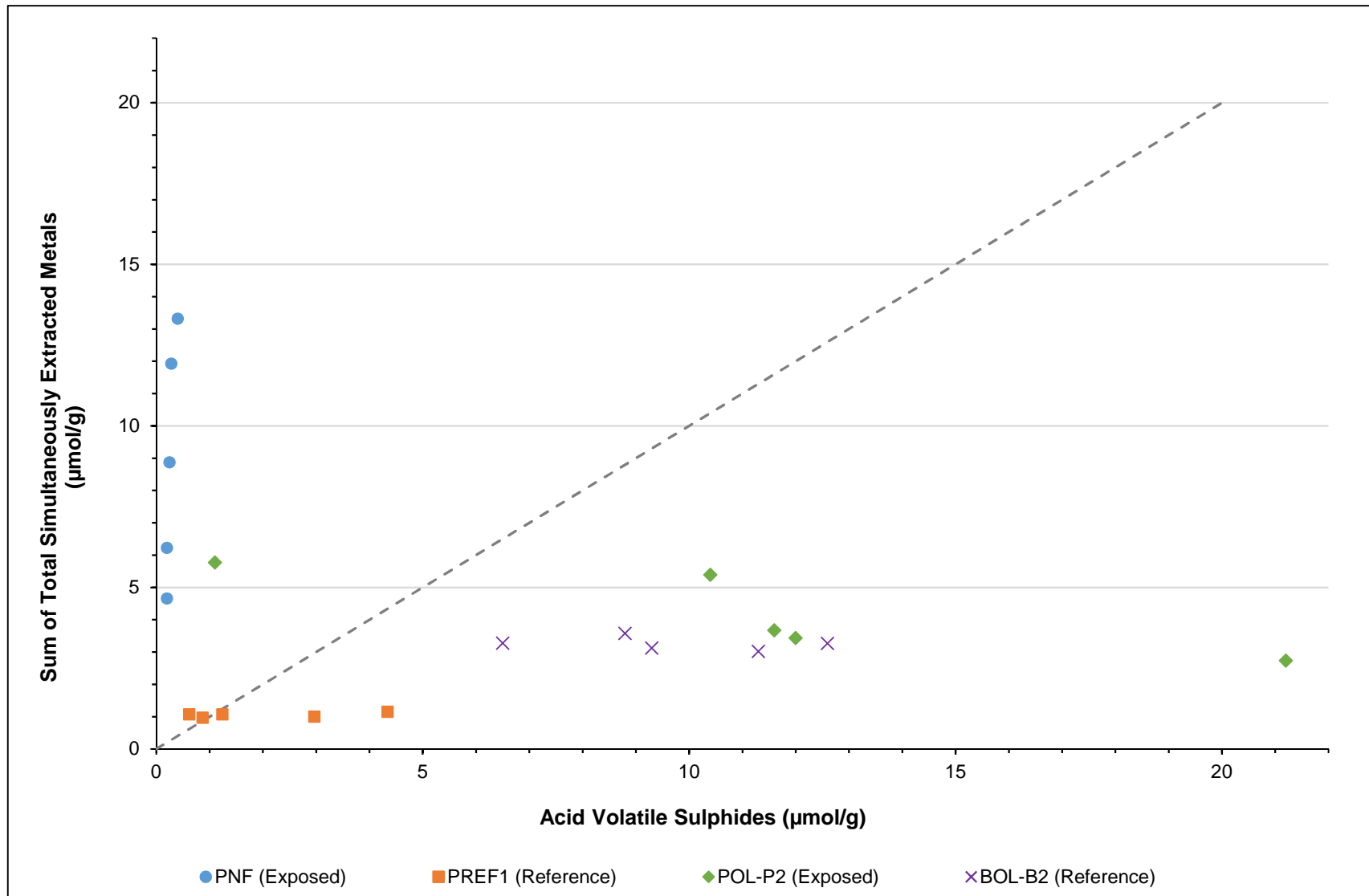


Figure 3: Sum of Simultaneously Extracted Metals (SEM) relative to Acid Volatile Sulphide (AVS) concentrations in sediment, Mount Polley Mine, August 2015. Samples with a SEM/AVS ratio of greater than one fall above the dotted line.

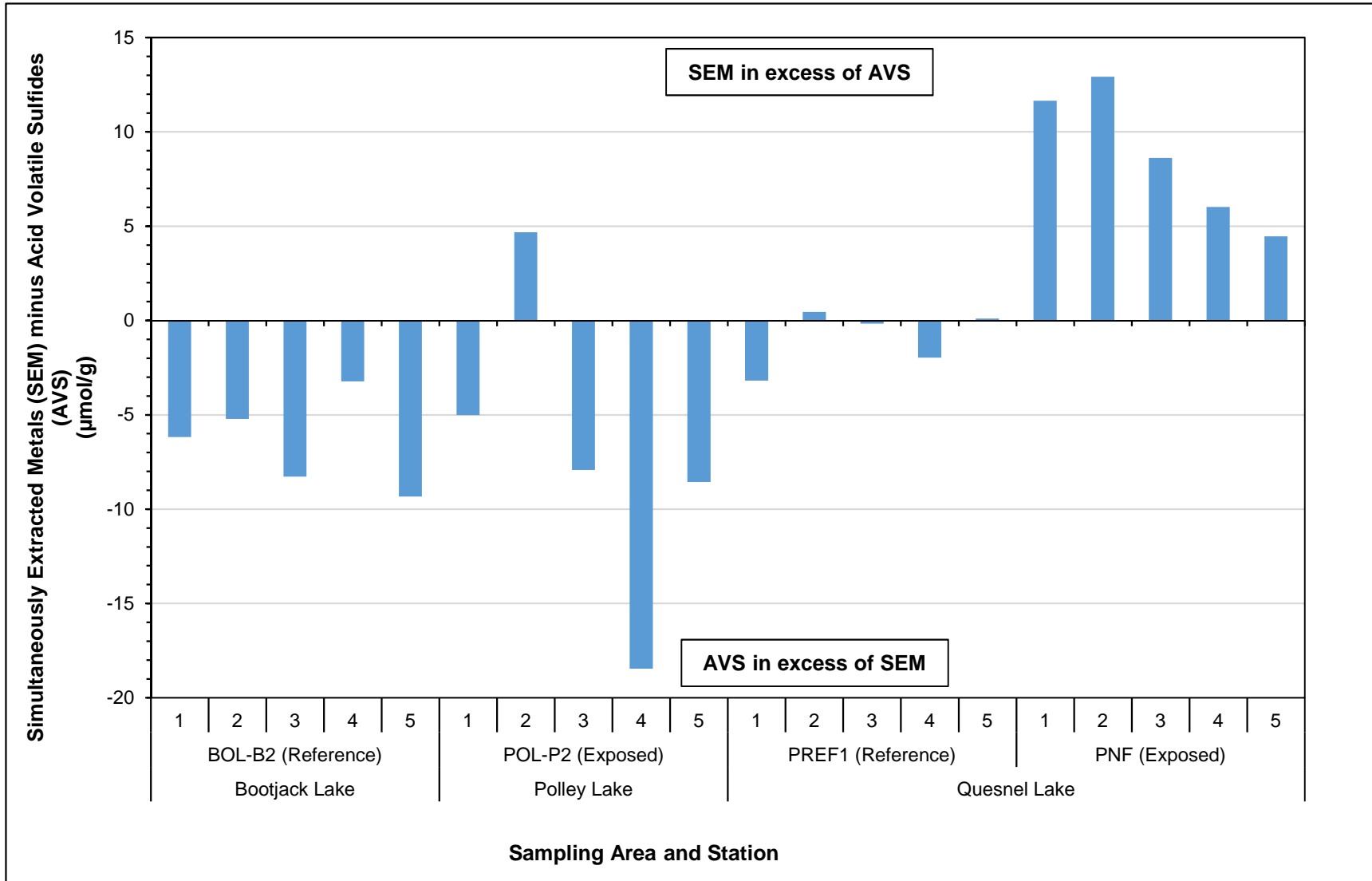


Figure 4: Difference between the sum of Simultaneously Extracted Metals (SEM) and Acid Volatile Sulphide (AVS) concentrations (Σ SEM-AVS) in sediment , Mount Polley Mine, August 2015.

*Negative values indicate that AVS is in excess of SEM, and SEM are likely bound as insoluble metal-sulfide complexes.

$\mu\text{mol/g}$ or 35 mg/kg), while all other samples from this area had AVS concentrations $> 10 \mu\text{mol/g}$ (321 mg/kg; Table C.3). A tailings influence in these sediments would be expected to result in high copper, low total organic carbon, and low AVS concentrations, and this sample is therefore anomalous. In this sample, simultaneously extracted copper was the highest of the excess SEM concentrations ($3.99 \mu\text{mol/g}$ or 254 mg/kg), as calculated using the excess SEM binding sequence (Figure 5; Appendix Table C.4). However, the presence of excess simultaneously extracted copper (and the remaining excess SEM; Figure 5) does not indicate that these metals are necessarily available for uptake by benthic biota. As discussed above, SEM concentrations do not necessarily only represent metals that are bound to sulphides in the sediment (Allen et al. 1993; ICMM 2007), but also include metals belonging to any metal-bearing phase that is released in the cold acid extraction (Allen et al. 1993; Di Toro et al. 1996). There is therefore a possibility that copper bound to sediment constituents other than sulphides may be released during the cold acid extraction. In the Mount Polley tailings and tailings-influenced sediments, copper has been shown to be associated with the non-sulphide fraction, and can be leached under acidic conditions (SRK 2015 a,b). This potential release of copper from the non-sulphide fraction during the cold acid extraction would result in an overestimation of the available copper.

The binding of excess SEM by other constituents in the sediment (e.g., organic carbon, iron and manganese oxides, carbonates) can also affect the bioavailability, and therefore toxicity, of these metals (Di Toro et al. 1990; Di Toro et al. 2005). Di Toro et al. (2005) have proposed the calculation of an organic carbon-normalized excess SEM as a means of accounting for the partitioning of excess SEM to organic carbon, and predicting toxicity (McGrath et al. 2002; Di Toro et al. 2005; USEPA 2005). Based on relationships between toxicity testing results and organic carbon-normalized excess SEM concentrations, it has been predicted that toxicity to biota is unlikely when organic carbon-normalized SEM concentrations are below $130 \mu\text{mol/gOC}$ (USEPA 2005). The organic carbon-normalized excess SEM concentration for sample POL-P2-2 fell well below this value ($46.2 \mu\text{mol/gOC}$; Figure 6; Appendix Table C.3), indicating that toxicity is not expected to benthic organisms in all sediment collected from the Polley Lake south basin in 2015. This is further supported by the toxicity testing of sediment from this area (P2) in 2014 following the tailings dam failure (Minnow 2015a), which reported no effects to the survival and growth of either *Hyalella azteca* or *Chironomus dilutus* in short term tests (14 and 10-day tests, respectively).

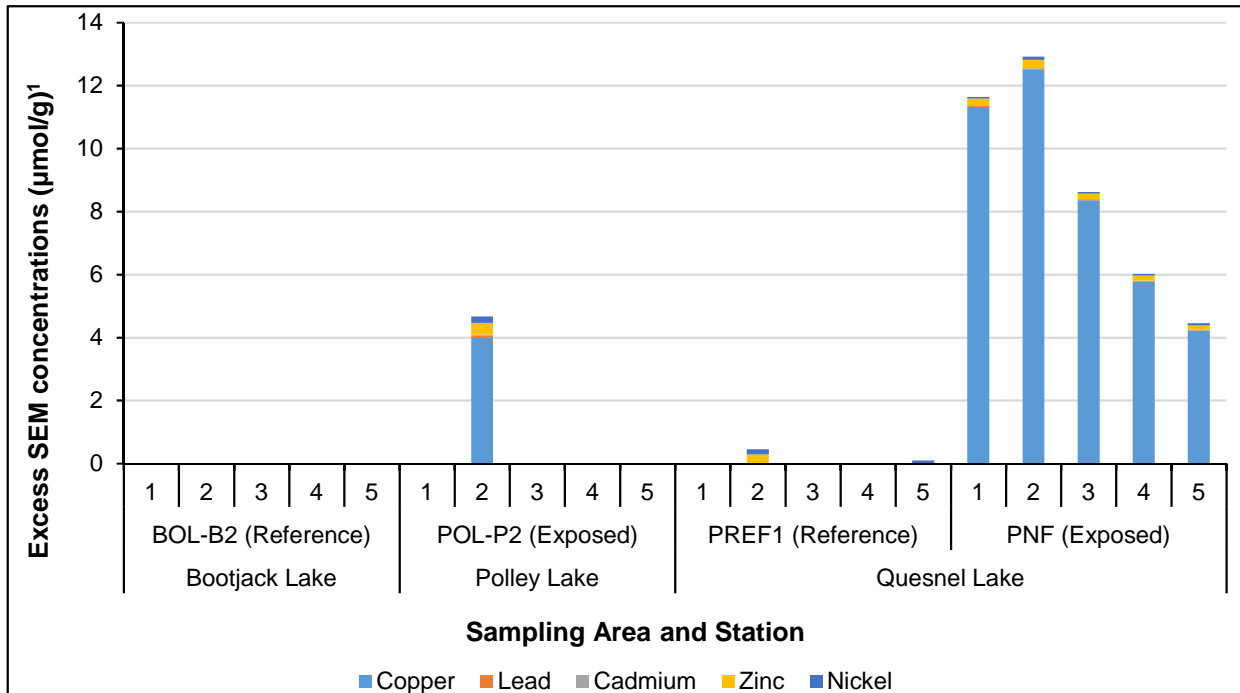


Figure 5: Concentrations of Simultaneously Extracted Metals (SEM) in excess of Acid Volatile Sulphides (AVS) in sediment, Mount Polley Mine, August 2015.

¹ Excess SEM (SEM in excess of AVS) may exist in the free metal form if not bound to other constituents (i.e. organic carbon).

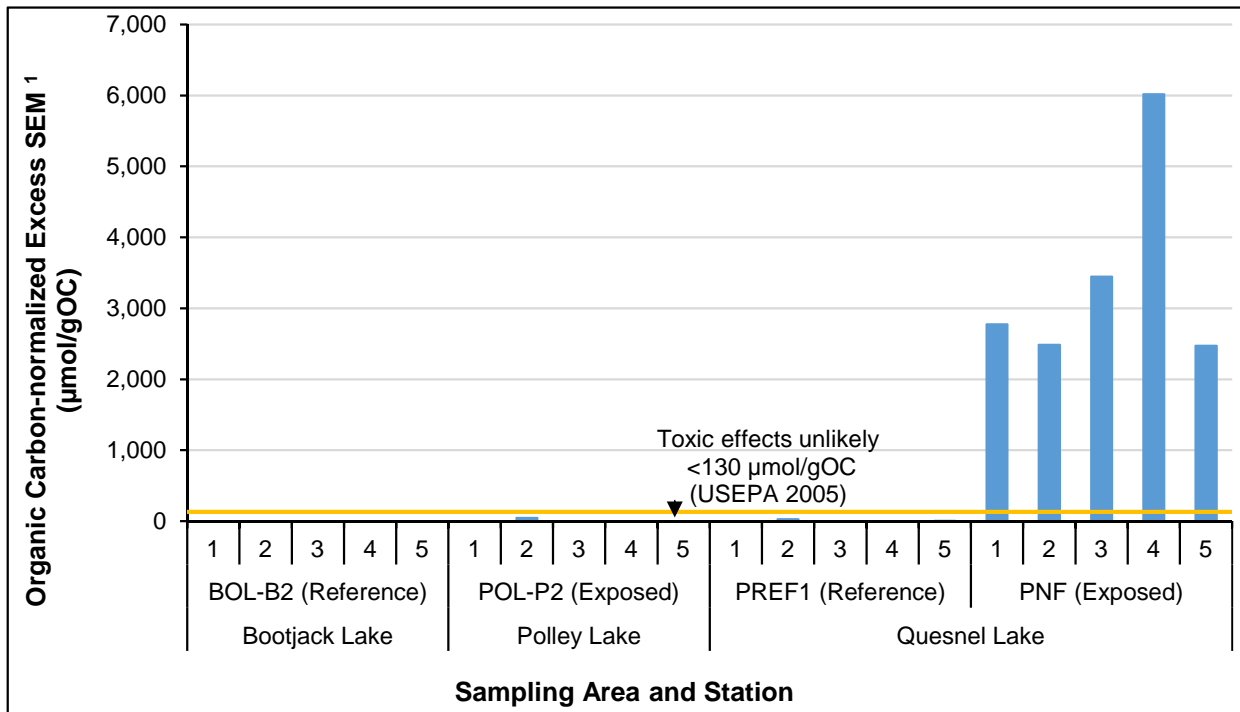


Figure 6: Organic Carbon (OC)-normalized excess SEM in sediment, Mount Polley Mine, August 2015.

¹ Organic carbon-normalized excess SEM = [Excess SEM/fraction OC], where fraction OC is the organic carbon content (Di Toro et al 2005).

Selectively Extracted Metals (Tessier)

Selective Extraction Analyses were performed on sediment from Polley Lake and a reference area (Bootjack Lake) to assist in further identifying the potential mobility of metals in these sediments, and to provide temporal comparison to 2014 SEA data. Concentrations of all metals evaluated within the five extraction phases were generally similar between the 2014 and 2015 sampling events, with 68% of all Polley Lake results being similar among sampling years (< 30% Relative Percent Difference), and 73% of all reference results being similar among years (Appendix Table C.5). More specifically, the partitioning of the metals identified as Parameters of Interest (POIs; arsenic, copper, iron, and zinc) in mine-influenced sediment from Polley Lake in 2014 (Minnow 2015a) was very similar in 2014 and 2015, and similar to the partitioning of metals observed in reference sediment (despite differing mean metal concentrations). With the exception of copper, the POIs were generally present primarily in the residual phase, as was observed in 2014 (Figure 7; Appendix Table C.6). This indicates that the majority of the concentrations of these POIs are unlikely to be mobilized under any conditions that could realistically occur in the environment, and are therefore not considered to be biologically available (e.g., Tessier et al. 1979; Campbell and Tessier 1996).

Copper concentrations were primarily present in the “organic and mineral bound metals” fraction, similar to sediment SEA results from Polley Lake (P2) in 2014, and similar to reference sediment results in both 2014 and 2015 (Figure 7; Appendix Table C.6). Separate investigation of the mineralogy and mineral solubility of Mount Polley tailings, and tailings-influenced sediments, indicated that copper was predominantly associated with chalcopyrite and chlorite minerals (SRK 2015a), and a significant amount of copper (29 – 66%) was associated with the non-sulphide fraction (likely in the mineral form of silicate chlorite; SRK 2015b), and presented a low risk of mobilization under environmentally realistic conditions (SRK 2015a,b). The similarities observed in metal partitioning in Polley Lake sediment in 2014 and 2015, and to reference sediment, indicate that concentrations of the POIs are likely not currently mobile among the sediment fractions.

Quesnel Lake Profundal

Simultaneously Extracted Metals and Acid Volatile Sulphides

Sediment collected from the profundal near-field (PNF; exposed) sampling area of Quesnel Lake had SEM/AVS ratios substantially greater than one (mean ratio = 33.1; Figure 3; Appendix Table C.7), and concentrations of excess total SEM > 4.5 µmol/g (mean = 8.73 µmol/g; Figure 4; Appendix Table C.7). In contrast, the majority of reference (PREF1)

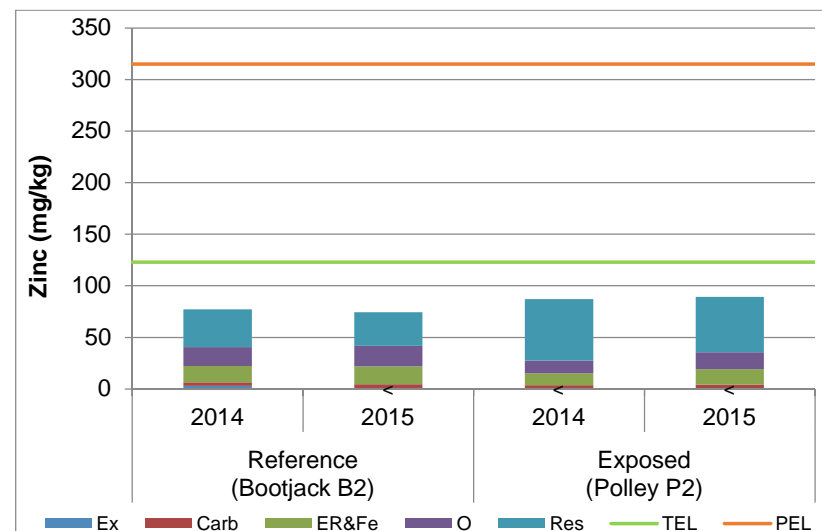
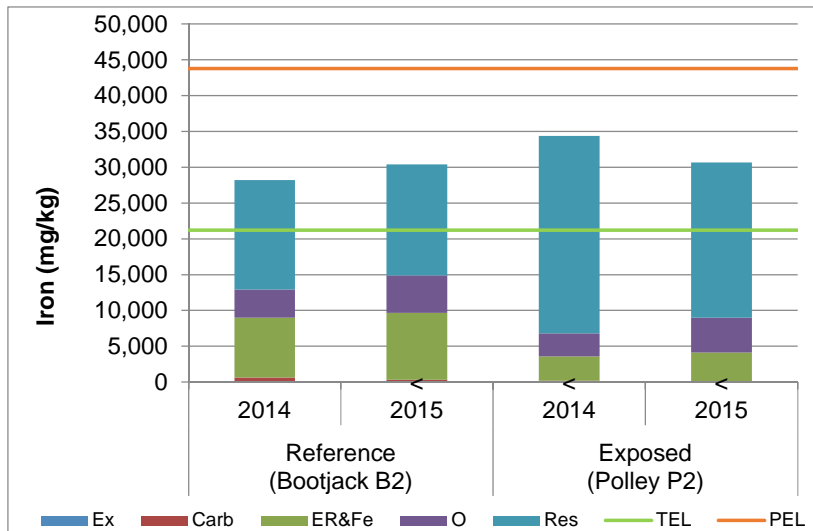
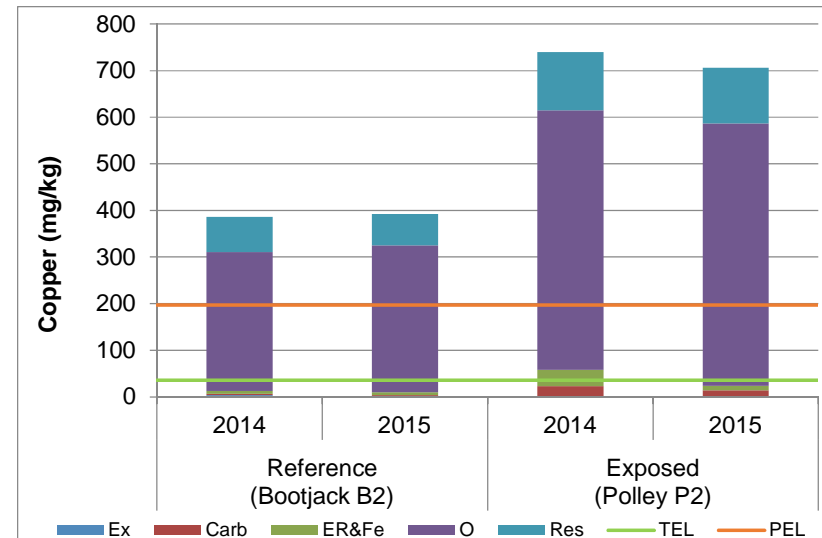
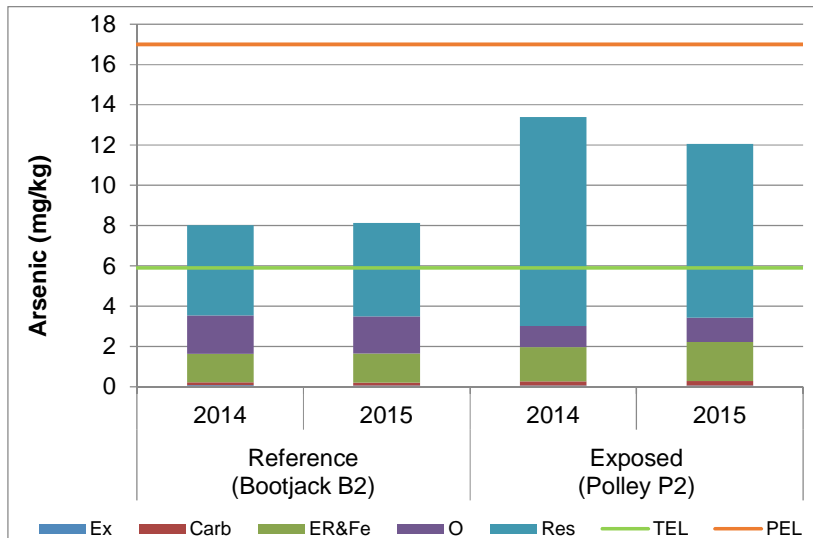


Figure 7: Concentrations of selectively extracted parameters of interest in Polley Lake (exposed) and the associated reference area (Bootjack Lake) sampled in 2014 and 2015, Mount Polley Mine. Selective extractions included Exchangeable & Adsorbed Metals (Ex), Carbonate Metals (Carb), Easily Reducible Metals and Iron Oxides (ER&Fe), Organic and Mineral Bound Metals (O), and Residual Metals (Res).

TEL = Threshold (or Lowest) Effect Level; PEL = Probable (or Severe) Effect Level (BCMOE 2015). Mean values are shown with a < symbol if all data used in their calculation were below the method detection limit (MDL).

samples had SEM/AVS ratios less than one (Figure 3; Appendix Table C.7), and differences between total SEM and AVS ($[\Sigma \text{ total SEM}] - [\text{AVS}]$) below zero (mean = $-0.96 \mu\text{mol/g}$; Figure 4; Appendix Table C.7). Based on the SEM-AVS method, reference samples were predicted to be non-toxic. SEM within these samples were likely present in the solid phase as insoluble metal sulphides (Di Toro et al. 1996; McGrath et al. 2002; Di Toro et al. 2005), and therefore of limited bioavailability and toxicity to aquatic biota (Di Toro et al. 1990). In exposed sediment from the near-field profundal area, the presence of excess SEM in all samples indicated that available AVS was insufficient to bind the SEM present and limit bioavailability. This result is not surprising given the fact that copper (the most prevalent excess SEM in these sediments) is significantly associated with the non-sulphide fraction of Mount Polley Tailings and tailings-influenced sediments (SRK 2015b). Due to the low AVS concentrations in this sediment ($< 0.40 \mu\text{mol/g}$ or 12.8 mg/kg), consideration should be given to the limitations of the SEM-AVS method. As discussed previously, use of the SEM-AVS method is not appropriate for oxidized sediments with only trace amounts of AVS, with the lower limit of the method being $1 \mu\text{mol/g}$ (or 32 mg/kg ; Di Toro et al. 1990). The partitioning of metals in these oxic sediments is likely controlled by other sediment constituents (Di Toro et al. 1990), such as organic carbon, iron and manganese oxides, and carbonates. Given that the SEM-AVS method does not consider other sediment components available for metal complexation, the presence of excess SEM cannot be used to predict the occurrence of toxicity (Di Toro et al. 2005).

Concentrations of each of the five SEM (copper, lead, cadmium, zinc, and nickel) were calculated for samples with excess SEM using the established binding sequence (Appendix Table C.4). Within the exposed sediment, AVS concentrations were less than the MDL in all samples and were exhausted in the first step of the binding sequence (copper; Appendix Table C.4). Copper had the highest excess concentrations ($4.2\text{-}12.5 \mu\text{mol/g}$ or $267\text{-}794 \text{ mg/kg}$), but concentrations of the remaining excess SEM (lead, cadmium, zinc and nickel) were also present in all exposed sediment samples (Figure 5; Appendix Table C.4). Within reference sediment, application of the SEM-AVS binding sequence resulted in the calculation of excess zinc and nickel at relatively low concentrations ($< 19 \text{ mg/kg}$; Figure 5; Appendix Table C.4). As previously mentioned, the SEM-AVS method has been shown to perform well at predicting a lack of toxicity to biota in anoxic sediments due to binding by AVS, but was not intended to suggest toxicity in sediments where total SEM is in excess of AVS (Di Toro et al. 2005), and is not appropriate for use when sediment AVS concentrations are less than $1 \mu\text{mol/g}$ (or 32 mg/kg ; Di Toro et al. 1990). Therefore, the presence of excess simultaneously extracted copper (and the remaining SEM) in excess of AVS in the exposed

area does not indicate that these metals are necessarily available for uptake by benthic biota.

Calculation of organic carbon-normalized excess SEM is a means of taking the potential complexation of excess SEM with organic carbon into consideration (Di Toro et al. 2005). In near-field (exposed) sediment, organic carbon-normalized excess SEM concentrations ranged from 2,473 to 3,447 $\mu\text{mol/gOC}$ (Figure 6; Appendix Table C.7). Those in the reference area (for the two samples which had excess total SEM) ranged from 5.3 to 24.5 $\mu\text{mol/gOC}$ (Figure 6; Appendix Table C.7), substantially lower than the concentration for which sediment toxicity is unexpected (i.e., $< 130 \mu\text{mol/gOC}$; USEPA 2005). The calculated values for exposed area sediment fell well above this range, indicating that the organic carbon present in exposed sediment (which is very low; $< 0.52\%$) is insufficient to bind SEM and limit bioavailability. However, the complexation of metals to other sediment constituents (i.e., iron and manganese oxides) may also serve to limit bioavailability, but are not accounted for in this calculation (Di Toro et al. 2005). Predictions about the potential toxicity of exposed sediments therefore cannot be made based on the organic carbon-normalized excess SEM concentrations alone. As described previously, total SEM is the sum of metals of any metal-bearing phase that is released in the cold acid extraction used for the SEM and AVS method (Allen et al. 1993; Di Toro et al. 1996), and therefore does not necessarily only represent metals that are bound to sulphides in the sediment (Allen et al. 1993; ICMM 2007). As such, the SEM-AVS method overestimates metal availability if metals are bound to other constituents in the sediment (i.e. iron and manganese oxides), and are extracted as SEM (Fang et al. 2005). This is an important consideration for the profundal exposed sediments which are characterized as oxic sediments, with low organic carbon content, low AVS concentrations (Appendix Table C.7), and in which copper is likely significantly associated with the non-sulphide portion of the substrates (as was demonstrated for Mount Polley tailings and tailings-influenced sediments; SRK 2015b). Given these facts, it is probable that the SEM (particularly copper) extracted from the near-field sediment were bound to sediment constituents other than sulphides, leading to an overestimation of the availability of metals in these oxidized sediments.

Overall, data from Quesnel Lake indicate that toxicity is not predicted in reference sediments, while the available AVS and organic carbon present in exposed sediment is insufficient to bind SEM. Based on the SEM-AVS method and the available data, sediment toxicity predictions cannot be made for the near-field (exposed) sampling area. However, previous mineral and mineral solubility investigations of the Mount Polley tailings, and of

tailings-influenced sediments, have indicated that the mobility of tailings-associated metals (copper in particular) is expected to be low (SRK 2015a,b).

Selectively Extracted Metals (Tessier)

Selective Extraction Analyses of sediment from exposed (near-field) and reference (Horsefly Bay) areas of Quesnel Lake were performed to further assist in assessing the potential mobility of metals in these sediments, and provide temporal comparison with 2014 data. Concentrations of all metals evaluated within the five extraction phases were generally similar between the 2014 and 2015 sampling events, with 74% of all profundal near-field area (PNF) results being similar among sampling years (< 30% Relative Percent Difference), and 84% of all reference results being similar among years (Appendix Table C.5). Five POIs (arsenic, copper, iron, manganese, and nickel) were identified in Quesnel Lake profundal sediment in 2014 following the tailings dam failure (Minnow 2015a). Partitioning of these POIs in the near-field sediment was very similar among sampling years, and relatively similar to the partitioning observed in reference sediment (PREF1), with the exception of a higher proportion of manganese in the residual phase of near-field sediment (Figure 8; Appendix Tables C.5 and C.8). Concentrations of the POIs (with the exception of copper) were present primarily in the residual phase of sediment collected in both 2014 and 2015 (Figure 8; Appendix Table C.8). This indicated that the majority of these metal concentrations are unlikely to be mobilized under any conditions that could realistically occur in the environment, and are therefore not considered to be biologically available (e.g., Tessier et al. 1979; Campbell and Tessier 1996).

Copper concentrations in the near-field sediment existed primarily in the “organic and mineral bound metals” phase, while copper in the reference area was primarily (> 58%) present in the residual phase (Figure 8; Appendix Table C.8). This difference in copper partitioning between the profundal near-field and reference areas of Quesnel Lake was also observed in 2014 (Minnow 2015a). Investigations of mineralogy, mineral solubility, and SEA of Mount Polley tailings and of tailings-influenced sediments identified copper to be of low mobilization risk under environmentally realistic conditions (SRK 2015 a,b). In addition, the observed similarities in POI partitioning within the profundal near field sediment in 2014 and 2015 indicate that these metals currently have limited mobility.

Summary

Application of the SEM-AVS method was successful in documenting an excess of AVS over SEM in sediments from Polley Lake and therefore predicting an absence of toxicity. Free metals within these sediments were likely present in the solid phase (as insoluble metal

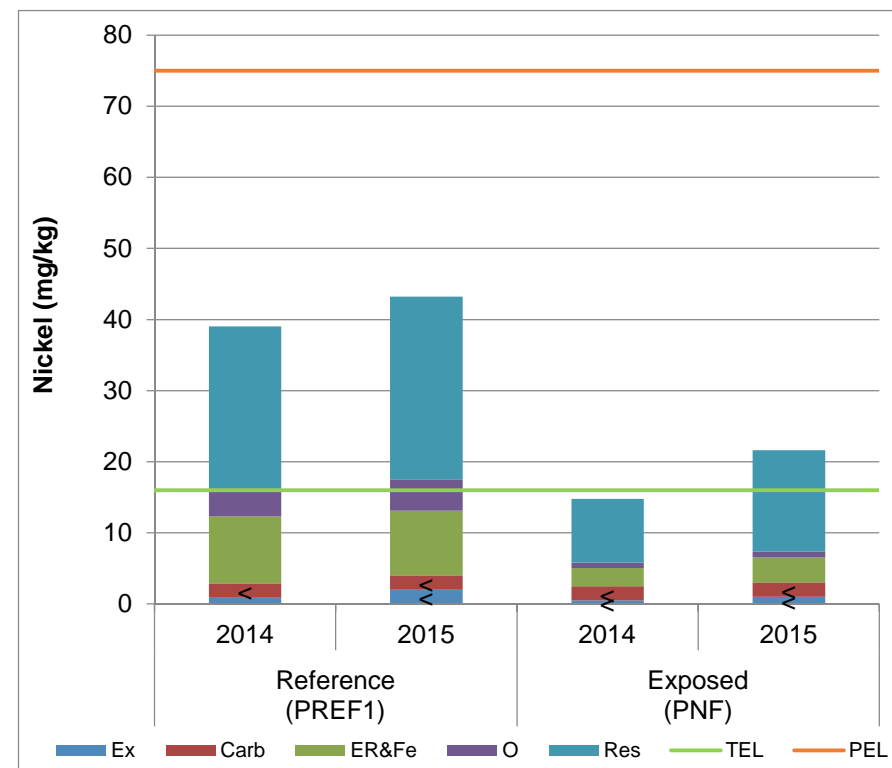
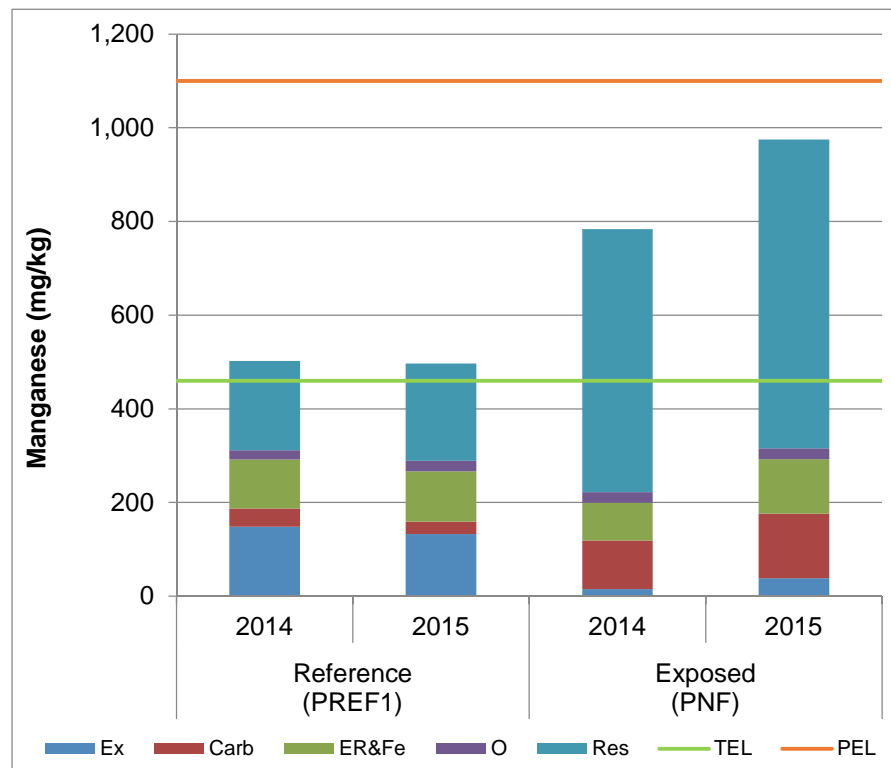
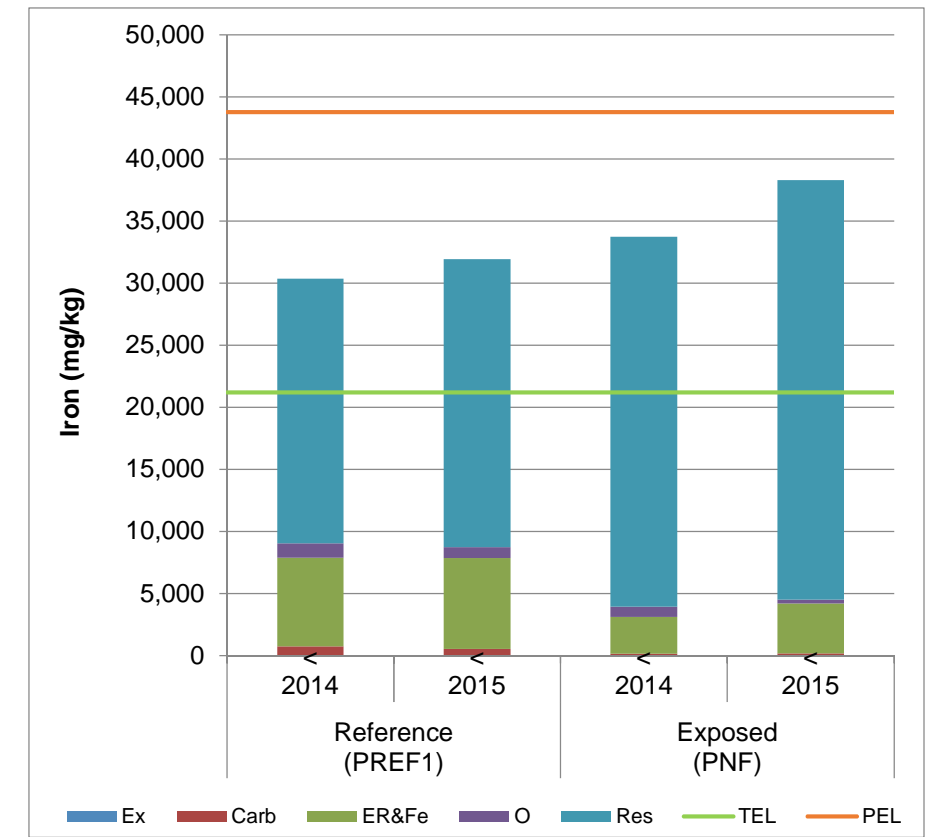
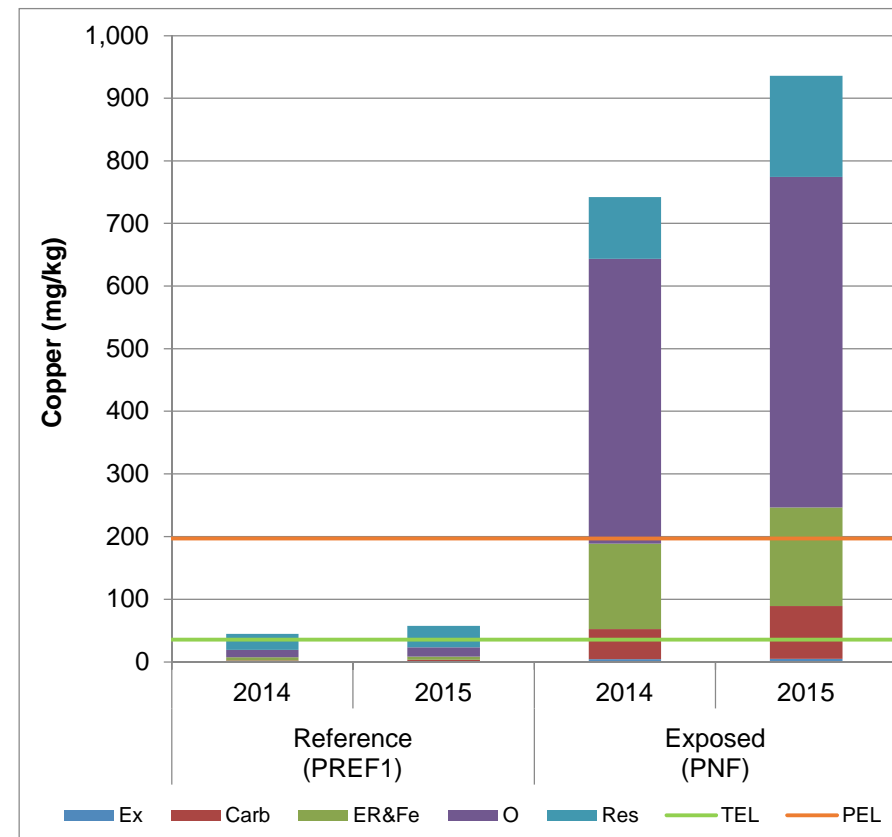
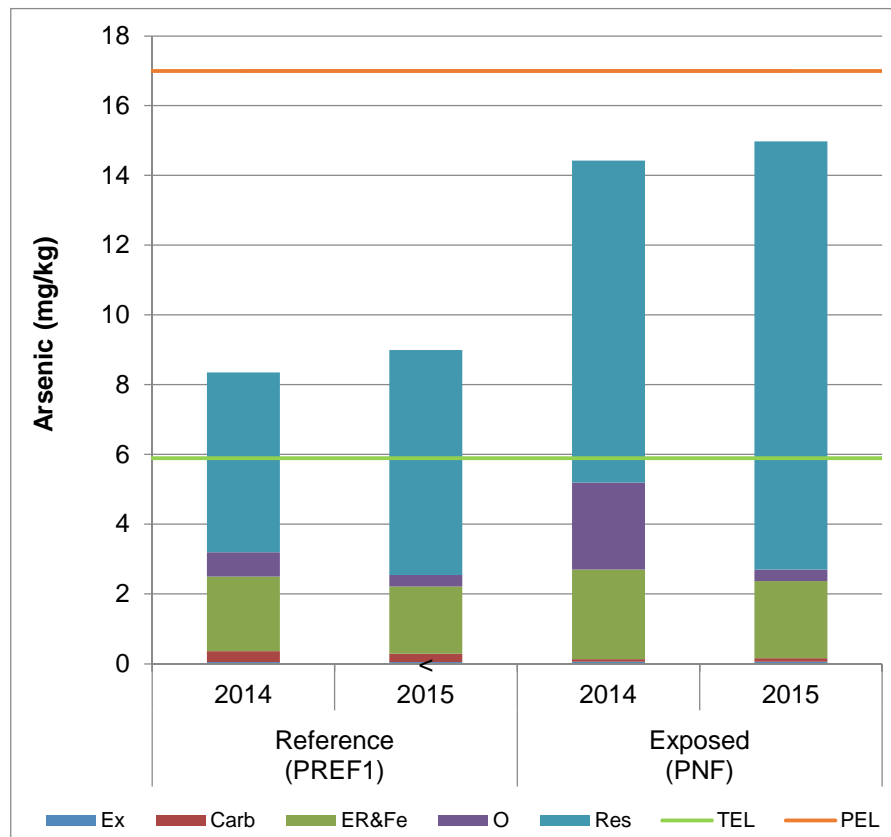
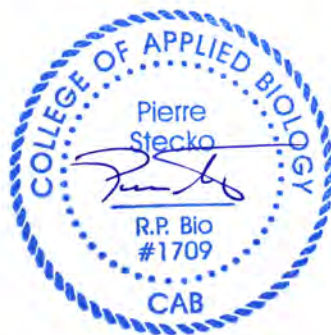


Figure 8: Concentrations of selectively extracted parameters of interest in exposed (PNF) and reference (PREF1) areas of Quesnel Lake sampled in 2014 and 2015, Mount Polley Mine. Selective extractions included Exchangeable & Adsorbed Metals (Ex), Carbonate Metals (Carb), Easily Reducible Metals and Iron Oxides (ER&Fe), Organic and Mineral Bound Metals (O), and Residual Metals (Res).

TEL = Threshold (or Lowest) Effect Level; PEL = Probable (or Severe) Effect Level (BCMOE 2015). Mean values are shown with a < symbol if all data used in their calculation were below the method detection limit (MDL).

sulphides), and of limited bioavailability and toxicity to aquatic biota. This finding is consistent with short term toxicity testing of sediment from this area in 2014 which reported no effects on the survival or growth of test organisms. SEM-AVS results for mine-influenced sediment from a deep area in Quesnel Lake indicated that available AVS and organic carbon concentrations were very low, and were insufficient to bind and limit the bioavailability of SEM. The SEM-AVS method can predict an absence of mobility and toxicity (i.e., metal binding by excess AVS), but cannot predict mobility and toxicity (DiToro et al. 2005; USEPA 2005) as it does not consider other metal binding constituents present in oxic sediment. The SEM-AVS method is not appropriate for application to oxic and sub-oxic sediments with very low AVS concentrations, such as the Quesnel Lake deep near-field sediment. Additionally, the cold acid extraction method used to determine SEM concentrations may release metals that are bound to other sediment constituents (such as organic carbon, iron oxide, manganese oxide, carbonate, and/or a non-sulphide mineral - likely silicate chlorite) in addition to those bound to sulphides, resulting in an overestimation of metal availability. As such, predictions of the potential for sediment toxicity in Quesnel Lake deep near-field exposed sediment cannot be made based on the SEM-AVS method and the available data alone. Previous geochemical investigations, however, have indicated that the mobility of tailings-associated metals is expected to be low (SRK 2015a,b). The data collected from both Polley Lake and Quesnel Lake can serve as components in further understanding the bioavailability and chemical stability of metals within these mine-influenced sediments. SEA (Tessier extraction) results demonstrated that the partitioning of POIs was similar among sampling years in mine-influenced sediment from both Polley Lake and Quesnel Lake. This indicated that the POIs are not currently mobile among the sediment fractions.



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APPENDIX A

**SAMPLE LOCATIONS
AND SUPPORTING DATA**

Table A.1: Sampling locations and methods of sediment quality monitoring, Mount Polley Mine, August 2015

Location	Area Code	Type	Replicate	GPS Coordinates		Sampling Date	Sampling Method	Grabs per Composite Sample	
				Easting	Northing			SEA and TOC analysis	AVS-SEM analysis
Polley Lake - South Basin	POL-P2	Exposed	1	595166	5822178	13-Aug-15	KB corer	3	5
			2	595137	5822146	14-Aug-15	KB corer	3	5
			3	595191	5822207	14-Aug-15	KB corer	3	6
			4	595158	5822228	14-Aug-15	KB corer	3	6
			5	595134	5822204	15-Aug-15	KB corer	3	6
Bootjack Lake - South Basin	BOL-B2	Reference	1	591265	5821636	16-Aug-15	KB corer	5	6
			2	591300	5821652	16-Aug-15	KB corer	5	6
			3	591241	5821684	16-Aug-15	KB corer	5	6
			4	591287	5821593	16-Aug-15	KB corer	-	6
			5	591213	5821639	16-Aug-15	KB corer	-	6
Quesnel Lake - Profundal Near-Field	PNF	Exposed	1	601814	5818205	17-Aug-15	standard ponar	6 ^b	
			2	601672	5818297	14-Aug-15	petite ponar	5	
			3	601914	5818113	15-Aug-15	standard ponar	3	
			4	602623	5817818	15-Aug-15	standard ponar	3	
			5	602272	5817946	16-Aug-15	standard ponar	3	
Quesnel Lake - Profundal Reference	PREF1	Reference	1	610434	5814754	18-Aug-15	standard ponar	3	
			2	610294	5814639	18-Aug-15	standard ponar	-	3
			3	610613	5814885	19-Aug-15	standard ponar	5 ^b	
			4	610526	5814608	24-Aug-15	standard ponar	-	3
			5	610714	5814799	24-Aug-15	standard ponar	3	

^b Additional grabs per sample collected to achieve volume required for quality control duplicate

Table A.2: Supporting measures for sediment quality monitoring, Mount Polley Mine, August 2015

Location	Area Code	Type	Replicate	Station Depth	Secchi Depth	Surface					Bottom						
						Temp.	Dissolved Oxygen		Specific Conductivity	pH	ORP	Temp.	Dissolved Oxygen		Specific Conductivity	pH	ORP
						(m)	(m)	°C	mg/L	%	µS/cm	pH units	mV	°C	mg/L	%	µS/cm
Polley Lake - South Basin	POL-P2	Exposed	1	28	7.18	19.9	8.17	89.7	282	8.03	150	6.0	3.00	24.1	288	7.14	157
			2	28	6.36	19.4	8.16	88.6	282	8.28	147	5.9	3.12	24.9	288	7.22	162
			3	29	6.34	19.4	8.17	88.8	282	7.94	170	5.9	3.10	24.7	288	7.08	168
			4	28	6.23	19.4	8.17	88.8	282	8.32	152	5.9	3.03	24.4	288	7.22	165
			5	28	6.96	19.4	8.22	89.4	282	8.21	160	5.9	3.26	25.4	288	7.18	173
Bootjack Lake - South Basin	BOL-B2	Reference	1	18	6.84	19.6	8.53	93.1	97	7.73	156	8.6	0.16	1.4	102	6.71	154
			2	16	7.15	19.1	8.43	91.1	97	7.59	179	8.5	0.15	1.3	103	6.54	84.6
			3	17	7.53	19.6	8.43	91.9	97	7.62	172	8.6	0.37	3.2	101	6.67	175
			4	15	7.27	19.7	8.40	91.7	97	7.75	169	8.7	0.24	2.2	101	6.67	175
			5	17	6.47	20.0	8.39	92.0	97	7.82	163	8.7	0.30	2.7	101	6.67	175
Quesnel Lake - Profundal Near-Field	PNF	Exposed	1	112	9.10	19.0	8.83	95.1	105	7.79	159	4.4	10.97	83.4	115	7.46	173
			2	111	9.32	17.9	8.80	92.8	137	7.82	140	4.4	10.32	79.4	146	7.41	166
			3	104	9.96	17.9	8.78	92.6	138	7.93	141	4.3	10.28	79.1	146	7.46	145
			4	97	8.54	17.9	8.79	92.8	138	7.95	154	4.3	10.10	77.8	147	7.51	148
			5	106	10.84	19.6	8.70	95.0	141	8.20	147	4.3	10.15	78.2	151	7.57	148
Quesnel Lake - Profundal Reference	PREF1	Reference	1	115	7.85	19.0	8.90	95.1	106	8.04	160	3.8	11.14	84.5	110	7.51	176
			2	103	7.02	19.2	8.93	96.7	108	7.66	169	3.8	10.98	83.4	110	7.35	169
			3	120	9.94	18.2	9.10	96.5	118	8.09	188	4.5	10.43	81.0	110	7.50	215
			4	102	11.26	18.7	9.16	98.0	111	8.21	206	4.1	10.29	80.0	113	7.66	227
			5	103	11.13	18.7	9.07	97.2	109	8.18	232	4.3	10.40	79.8	112	7.40	251

APPENDIX B

ANALYTICAL REPORTS



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 21-AUG-15
Report Date: 06-OCT-15 15:29 (MT)
Version: FINAL REV. 4

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1661656
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

Comments: Tessier sequential extraction and AVS/SEM analyses are not included in this report.

23-SEP-2015 Revision 2: The report to company has been modified.

6-OCT-2015 Revision 4: This revision includes data for AVS/SEM and Tessier Sequential Extraction analysis only.

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1661656-1 Sediment 17-AUG-15 PNF-01	L1661656-3 Sediment 14-AUG-15 PNF-02	L1661656-4 Sediment 15-AUG-15 PNF-03	L1661656-5 Sediment 15-AUG-15 PNF-04	L1661656-6 Sediment 16-AUG-15 PNF-05
Grouping	Analyte				
SOIL					
Physical Tests	Moisture (%)				
	63.5	64.7	55.0	33.9	29.0
Inorganic Parameters	Acid Volatile Sulphides (umol/g)				
Extractable Metals	Cadmium (Cd)-Extractable (umol/g)				
	Copper (Cu)-Extractable (umol/g)				
	Lead (Pb)-Extractable (umol/g)				
	Mercury (Hg)-Extractable (umol/g)				
	Nickel (Ni)-Extractable (umol/g)				
	Zinc (Zn)-Extractable (umol/g)				
Exchangeable & Adsorbed Metals	Aluminum (Al)-Leachable (mg/kg)				
	<50	<50	<50	<50	<50
	Antimony (Sb)-Leachable (mg/kg)				
	<0.10	<0.10	<0.10	<0.10	<0.10
	Arsenic (As)-Leachable (mg/kg)				
	0.067	0.071	0.059	<0.050	<0.050
	Barium (Ba)-Leachable (mg/kg)				
	22.1	20.8	18.0	12.9	11.9
	Beryllium (Be)-Leachable (mg/kg)				
	<0.20	<0.20	<0.20	<0.20	<0.20
	Bismuth (Bi)-Leachable (mg/kg)				
	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Leachable (mg/kg)				
	0.071	0.067	<0.050	<0.050	<0.050
	Calcium (Ca)-Leachable (mg/kg)				
	3550	3480	2570	1550	1440
	Chromium (Cr)-Leachable (mg/kg)				
	<0.50	<0.50	<0.50	<0.50	<0.50
	Cobalt (Co)-Leachable (mg/kg)				
	<0.10	<0.10	<0.10	<0.10	<0.10
	Copper (Cu)-Leachable (mg/kg)				
	6.93	6.73	5.59	1.80	2.17
	Iron (Fe)-Leachable (mg/kg)				
	<50	<50	<50	<50	<50
	Lead (Pb)-Leachable (mg/kg)				
	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Leachable (mg/kg)				
	<5.0	<5.0	<5.0	<5.0	<5.0
	Manganese (Mn)-Leachable (mg/kg)				
	48.3	36.7	52.0	28.2	26.5
	Molybdenum (Mo)-Leachable (mg/kg)				
	<0.50	<0.50	<0.50	<0.50	<0.50
	<1.0 ^{DLB}	<1.0 ^{DLB}	<1.0 ^{DLB}	<1.0 ^{DLB}	<1.0 ^{DLB}
	Nickel (Ni)-Leachable (mg/kg)				
	<50	<50	<50	<50	<50
	Phosphorus (P)-Leachable (mg/kg)				
	<50	<50	<50	<50	<50
	Potassium (K)-Leachable (mg/kg)				
	240	240	190	100	<100
	Selenium (Se)-Leachable (mg/kg)				
	<0.20	<0.20	<0.20	<0.20	<0.20
	Silver (Ag)-Leachable (mg/kg)				
	<0.10	<0.10	<0.10	<0.10	<0.10
	Sodium (Na)-Leachable (mg/kg)				
	160	160	<100	<100	<100
	Strontium (Sr)-Leachable (mg/kg)				
	49.2	47.8	34.8	15.8	13.4
	Thallium (Tl)-Leachable (mg/kg)				
	<0.050	<0.050	<0.050	<0.050	<0.050
	Tin (Sn)-Leachable (mg/kg)				
	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti)-Leachable (mg/kg)				
	<1.0	<1.0	<1.0	<1.0	<1.0
	Uranium (U)-Leachable (mg/kg)				
	0.083	0.085	0.053	<0.050	<0.050
	Vanadium (V)-Leachable (mg/kg)				
	<0.20	<0.20	<0.20	<0.20	<0.20

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1661656-7 Sediment 18-AUG-15 PREFI-01	L1661656-8 Sediment 19-AUG-15 PREFI-03	L1661656-15 Sediment 13-AUG-15 POL-P2-1	L1661656-17 Sediment 14-AUG-15 POL-P2-2	L1661656-19 Sediment 14-AUG-15 POL-P2-3
Grouping	Analyte				
SOIL					
Physical Tests	Moisture (%)				
	52.6	53.3	86.3	84.1	86.0
Inorganic Parameters	Acid Volatile Sulphides (umol/g)				
Extractable Metals	Cadmium (Cd)-Extractable (umol/g)				
	Copper (Cu)-Extractable (umol/g)				
	Lead (Pb)-Extractable (umol/g)				
	Mercury (Hg)-Extractable (umol/g)				
	Nickel (Ni)-Extractable (umol/g)				
	Zinc (Zn)-Extractable (umol/g)				
Exchangeable & Adsorbed Metals	Aluminum (Al)-Leachable (mg/kg)				
	<50	<50	<50	<50	<50
	Antimony (Sb)-Leachable (mg/kg)				
	<0.10	<0.10	<0.10	<0.10	<0.10
	Arsenic (As)-Leachable (mg/kg)				
	<0.050	<0.050	<0.050	0.057	<0.050
	Barium (Ba)-Leachable (mg/kg)				
	21.0	20.1	26.5	30.3	21.4
	Beryllium (Be)-Leachable (mg/kg)				
	<0.20	<0.20	<0.20	<0.20	<0.20
	Bismuth (Bi)-Leachable (mg/kg)				
	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Leachable (mg/kg)				
	0.136	0.118	0.051	0.082	0.083
	Calcium (Ca)-Leachable (mg/kg)				
	2650	2500	4680	6600	6960
	Chromium (Cr)-Leachable (mg/kg)				
	<0.50	<0.50	<0.50	<0.50	<0.50
	Cobalt (Co)-Leachable (mg/kg)				
	0.46	0.39	<0.10	0.10	<0.10
	Copper (Cu)-Leachable (mg/kg)				
	0.83	0.98	0.76	0.62	1.05
	Iron (Fe)-Leachable (mg/kg)				
	<50	<50	<50	<50	<50
	Lead (Pb)-Leachable (mg/kg)				
	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Leachable (mg/kg)				
	<5.0	<5.0	<5.0	<5.0	<5.0
	Manganese (Mn)-Leachable (mg/kg)				
	112	109	747	1210	315
	Molybdenum (Mo)-Leachable (mg/kg)				
	<0.50	<0.50	2.68	3.27	1.52
	Nickel (Ni)-Leachable (mg/kg)				
	<2.0 ^{DLB}	<2.0 ^{DLB}	<0.50	<0.50	<0.50
	Phosphorus (P)-Leachable (mg/kg)				
	<50	<50	<50	<50	<50
	Potassium (K)-Leachable (mg/kg)				
	<100	<100	170	120	130
	Selenium (Se)-Leachable (mg/kg)				
	<0.20	<0.20	<0.20	<0.20	<0.20
	Silver (Ag)-Leachable (mg/kg)				
	<0.10	<0.10	<0.10	<0.10	<0.10
	Sodium (Na)-Leachable (mg/kg)				
	<100	<100	210	460	330
	Strontium (Sr)-Leachable (mg/kg)				
	22.4	21.6	49.9	59.6	53.6
	Thallium (Tl)-Leachable (mg/kg)				
	<0.050	<0.050	<0.050	<0.050	<0.050
	Tin (Sn)-Leachable (mg/kg)				
	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti)-Leachable (mg/kg)				
	<1.0	<1.0	<1.0	<1.0	<1.0
	Uranium (U)-Leachable (mg/kg)				
	<0.050	<0.050	<0.050	<0.050	<0.050
	Vanadium (V)-Leachable (mg/kg)				
	<0.20	<0.20	<0.20	0.21	<0.20

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1661656-21 Sediment 14-AUG-15 POL-P2-4	L1661656-23 Sediment 15-AUG-15 POL-P2-5	L1661656-25 Sediment 16-AUG-15 BOL-B2-1	L1661656-27 Sediment 16-AUG-15 BOL-B2-2	L1661656-29 Sediment 16-AUG-15 BOL-B2-3
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	89.7	89.1	94.1	96.1	95.7
Inorganic Parameters	Acid Volatile Sulphides (umol/g)					
Extractable Metals	Cadmium (Cd)-Extractable (umol/g)					
	Copper (Cu)-Extractable (umol/g)					
	Lead (Pb)-Extractable (umol/g)					
	Mercury (Hg)-Extractable (umol/g)					
	Nickel (Ni)-Extractable (umol/g)					
	Zinc (Zn)-Extractable (umol/g)					
Exchangeable & Adsorbed Metals	Aluminum (Al)-Leachable (mg/kg)	<50	<50	<50	<50	<50
	Antimony (Sb)-Leachable (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Arsenic (As)-Leachable (mg/kg)	<0.050	<0.050	0.060	0.062	0.062
	Barium (Ba)-Leachable (mg/kg)	22.8	28.0	67.2	76.8	72.3
	Beryllium (Be)-Leachable (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Bismuth (Bi)-Leachable (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Leachable (mg/kg)	0.072	0.104	0.148	0.155	0.144
	Calcium (Ca)-Leachable (mg/kg)	5560	6240	4590	5490	4770
	Chromium (Cr)-Leachable (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Cobalt (Co)-Leachable (mg/kg)	<0.10	0.11	0.32	0.40	0.31
	Copper (Cu)-Leachable (mg/kg)	0.94	0.76	1.55	1.25	1.06
	Iron (Fe)-Leachable (mg/kg)	<50	<50	<50	<50	<50
	Lead (Pb)-Leachable (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Leachable (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Manganese (Mn)-Leachable (mg/kg)	964	1160	2980	1990	2410
	Molybdenum (Mo)-Leachable (mg/kg)	2.68	3.01	<0.50	<0.50	<0.50
	Nickel (Ni)-Leachable (mg/kg)	<0.50	<0.50	<0.60 ^{DLB}	<0.60 ^{DLB}	<0.50
	Phosphorus (P)-Leachable (mg/kg)	<50	<50	<50	<50	<50
	Potassium (K)-Leachable (mg/kg)	120	110	190	180	200
	Selenium (Se)-Leachable (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Silver (Ag)-Leachable (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Sodium (Na)-Leachable (mg/kg)	330	440	620	460	580
	Strontium (Sr)-Leachable (mg/kg)	49.6	51.8	46.5	54.8	46.9
	Thallium (Tl)-Leachable (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Tin (Sn)-Leachable (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti)-Leachable (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Uranium (U)-Leachable (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Vanadium (V)-Leachable (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1661656-33 Sediment 16-AUG-15 BOL-BX	L1661656-34 Sediment 17-AUG-15 PNF-01 (SEM/AVS)	L1661656-35 Sediment 17-AUG-15 PNF-01X (SEM/AVS)	L1661656-36 Sediment 14-AUG-15 PNF-02 (SEM/AVS)	L1661656-37 Sediment 15-AUG-15 PNF-03 (SEM/AVS)
Grouping	Analyte				
SOIL					
Physical Tests	Moisture (%)				
	94.8	60.1	61.0	64.2	45.3
Inorganic Parameters	Acid Volatile Sulphides (umol/g)				
		<0.28	<0.28	<0.40	<0.25
Extractable Metals	Cadmium (Cd)-Extractable (umol/g)				
		<0.0050	<0.0050	<0.010 ^{DLHM}	<0.0050
	Copper (Cu)-Extractable (umol/g)				
		11.6	11.4	12.9	8.61
	Lead (Pb)-Extractable (umol/g)				
		0.031	0.035	<0.040 ^{DLHM}	0.027
	Mercury (Hg)-Extractable (umol/g)				
		<0.000050	<0.000050	<0.000050 ^{DLHM}	<0.000050
	Nickel (Ni)-Extractable (umol/g)				
		0.054	0.058	<0.10 ^{DLHM}	<0.050
	Zinc (Zn)-Extractable (umol/g)				
		0.232	0.239	0.268	0.175
Exchangeable & Adsorbed Metals	Aluminum (Al)-Leachable (mg/kg)				
	<50				
	Antimony (Sb)-Leachable (mg/kg)				
	<0.10				
	Arsenic (As)-Leachable (mg/kg)				
	0.061				
	Barium (Ba)-Leachable (mg/kg)				
	58.5				
	Beryllium (Be)-Leachable (mg/kg)				
	<0.20				
	Bismuth (Bi)-Leachable (mg/kg)				
	<0.20				
	Cadmium (Cd)-Leachable (mg/kg)				
	0.146				
	Calcium (Ca)-Leachable (mg/kg)				
	4670				
	Chromium (Cr)-Leachable (mg/kg)				
	<0.50				
	Cobalt (Co)-Leachable (mg/kg)				
	0.41				
	Copper (Cu)-Leachable (mg/kg)				
	1.50				
	Iron (Fe)-Leachable (mg/kg)				
	<50				
	Lead (Pb)-Leachable (mg/kg)				
	<0.50				
	Lithium (Li)-Leachable (mg/kg)				
	<5.0				
	Manganese (Mn)-Leachable (mg/kg)				
	2050				
	Molybdenum (Mo)-Leachable (mg/kg)				
	<0.50				
	Nickel (Ni)-Leachable (mg/kg)				
	<0.70 ^{DLB}				
	Phosphorus (P)-Leachable (mg/kg)				
	<50				
	Potassium (K)-Leachable (mg/kg)				
	230				
	Selenium (Se)-Leachable (mg/kg)				
	<0.20				
	Silver (Ag)-Leachable (mg/kg)				
	<0.10				
	Sodium (Na)-Leachable (mg/kg)				
	580				
	Strontium (Sr)-Leachable (mg/kg)				
	44.5				
	Thallium (Tl)-Leachable (mg/kg)				
	<0.050				
	Tin (Sn)-Leachable (mg/kg)				
	<2.0				
	Titanium (Ti)-Leachable (mg/kg)				
	<1.0				
	Uranium (U)-Leachable (mg/kg)				
	<0.050				
	Vanadium (V)-Leachable (mg/kg)				
	<0.20				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1661656-38 Sediment 15-AUG-15 PNF-04 (SEM/AVS)	L1661656-39 Sediment 16-AUG-15 PNF-05 (SEM/AVS)	L1661656-40 Sediment 18-AUG-15 PREFI-01 (SEM/AVS)	L1661656-41 Sediment 18-AUG-15 PREFI-02 (SEM/AVS)	L1661656-42 Sediment 19-AUG-15 PREFI-03 (SEM/AVS)
Grouping	Analyte				
SOIL					
Physical Tests	Moisture (%)				
	37.5	26.3	52.4	49.0	48.1
Inorganic Parameters	Acid Volatile Sulphides (umol/g)				
	<0.20	<0.20	4.34	0.62	1.24
Extractable Metals	Cadmium (Cd)-Extractable (umol/g)				
	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Copper (Cu)-Extractable (umol/g)				
	5.97	4.42	0.458	0.493	0.483
	Lead (Pb)-Extractable (umol/g)				
	0.029	0.023	0.027	0.027	0.027
	Mercury (Hg)-Extractable (umol/g)				
	0.000062	<0.000050	<0.000050	<0.000050	<0.000050
	Nickel (Ni)-Extractable (umol/g)				
	0.054	0.074	0.201	0.160	0.168
	Zinc (Zn)-Extractable (umol/g)				
	0.160	0.130	0.457	0.380	0.389
Exchangeable & Adsorbed Metals	Aluminum (Al)-Leachable (mg/kg)				
	Antimony (Sb)-Leachable (mg/kg)				
	Arsenic (As)-Leachable (mg/kg)				
	Barium (Ba)-Leachable (mg/kg)				
	Beryllium (Be)-Leachable (mg/kg)				
	Bismuth (Bi)-Leachable (mg/kg)				
	Cadmium (Cd)-Leachable (mg/kg)				
	Calcium (Ca)-Leachable (mg/kg)				
	Chromium (Cr)-Leachable (mg/kg)				
	Cobalt (Co)-Leachable (mg/kg)				
	Copper (Cu)-Leachable (mg/kg)				
	Iron (Fe)-Leachable (mg/kg)				
	Lead (Pb)-Leachable (mg/kg)				
	Lithium (Li)-Leachable (mg/kg)				
	Manganese (Mn)-Leachable (mg/kg)				
	Molybdenum (Mo)-Leachable (mg/kg)				
	Nickel (Ni)-Leachable (mg/kg)				
	Phosphorus (P)-Leachable (mg/kg)				
	Potassium (K)-Leachable (mg/kg)				
	Selenium (Se)-Leachable (mg/kg)				
	Silver (Ag)-Leachable (mg/kg)				
	Sodium (Na)-Leachable (mg/kg)				
	Strontium (Sr)-Leachable (mg/kg)				
	Thallium (Tl)-Leachable (mg/kg)				
	Tin (Sn)-Leachable (mg/kg)				
	Titanium (Ti)-Leachable (mg/kg)				
	Uranium (U)-Leachable (mg/kg)				
	Vanadium (V)-Leachable (mg/kg)				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1661656-43 Sediment 13-AUG-15 POL-P2-1 (SEM/AVS)	L1661656-44 Sediment 14-AUG-15 POL-P2-2 (SEM/AVS)	L1661656-45 Sediment 14-AUG-15 POL-P2-3 (SEM/AVS)	L1661656-46 Sediment 14-AUG-15 POL-P2-4 (SEM/AVS)	L1661656-47 Sediment 15-AUG-15 POL-P2-5 (SEM/AVS)
Grouping	Analyte				
SOIL					
Physical Tests	Moisture (%)				
	84.8	88.7	87.2	72.5	81.5
Inorganic Parameters	Acid Volatile Sulphides (umol/g)				
	10.4	<1.1	11.6	21.2	12.0
Extractable Metals	Cadmium (Cd)-Extractable (umol/g)				
	<0.015 ^{DLHM}	<0.020 ^{DLHM}	<0.015 ^{DLHM}	<0.010 ^{DLHM}	<0.010 ^{DLHM}
	Copper (Cu)-Extractable (umol/g)				
	4.89	5.09	3.20	2.43	3.05
	Lead (Pb)-Extractable (umol/g)				
	<0.060 ^{DLHM}	<0.080 ^{DLHM}	<0.060 ^{DLHM}	<0.040 ^{DLHM}	<0.040 ^{DLHM}
	Mercury (Hg)-Extractable (umol/g)				
	<0.000050 ^{DLHM}	<0.000050 ^{DLHM}	<0.000050 ^{DLHM}	<0.000050 ^{DLHM}	<0.000050 ^{DLHM}
	Nickel (Ni)-Extractable (umol/g)				
	<0.15 ^{DLHM}	<0.20 ^{DLHM}	<0.15 ^{DLHM}	<0.10 ^{DLHM}	<0.10 ^{DLHM}
	Zinc (Zn)-Extractable (umol/g)				
	0.270	0.376	0.241	0.151	0.234
Exchangeable & Adsorbed Metals	Aluminum (Al)-Leachable (mg/kg)				
	Antimony (Sb)-Leachable (mg/kg)				
	Arsenic (As)-Leachable (mg/kg)				
	Barium (Ba)-Leachable (mg/kg)				
	Beryllium (Be)-Leachable (mg/kg)				
	Bismuth (Bi)-Leachable (mg/kg)				
	Cadmium (Cd)-Leachable (mg/kg)				
	Calcium (Ca)-Leachable (mg/kg)				
	Chromium (Cr)-Leachable (mg/kg)				
	Cobalt (Co)-Leachable (mg/kg)				
	Copper (Cu)-Leachable (mg/kg)				
	Iron (Fe)-Leachable (mg/kg)				
	Lead (Pb)-Leachable (mg/kg)				
	Lithium (Li)-Leachable (mg/kg)				
	Manganese (Mn)-Leachable (mg/kg)				
	Molybdenum (Mo)-Leachable (mg/kg)				
	Nickel (Ni)-Leachable (mg/kg)				
	Phosphorus (P)-Leachable (mg/kg)				
	Potassium (K)-Leachable (mg/kg)				
	Selenium (Se)-Leachable (mg/kg)				
	Silver (Ag)-Leachable (mg/kg)				
	Sodium (Na)-Leachable (mg/kg)				
	Strontium (Sr)-Leachable (mg/kg)				
	Thallium (Tl)-Leachable (mg/kg)				
	Tin (Sn)-Leachable (mg/kg)				
	Titanium (Ti)-Leachable (mg/kg)				
	Uranium (U)-Leachable (mg/kg)				
	Vanadium (V)-Leachable (mg/kg)				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1661656-48 Sediment 16-AUG-15 BOL-B2-1 (SEM/AVS)	L1661656-49 Sediment 16-AUG-15 BOL-B2-2 (SEM/AVS)	L1661656-50 Sediment 16-AUG-15 BOL-B2-3 (SEM/AVS)	L1661656-51 Sediment 16-AUG-15 BOL-B2-4 (SEM/AVS)	L1661656-52 Sediment 16-AUG-15 BOL-B2-5 (SEM/AVS)
Grouping	Analyte				
SOIL					
Physical Tests	Moisture (%)				
	92.1	92.6	92.2	92.4	92.5
Inorganic Parameters	Acid Volatile Sulphides (umol/g)				
	9.3	8.8	11.3	6.5	12.6
Extractable Metals	Cadmium (Cd)-Extractable (umol/g)				
	<0.025 ^{DLHM}	<0.030 ^{DLHM}	<0.025 ^{DLHM}	<0.025 ^{DLHM}	<0.030 ^{DLHM}
	Copper (Cu)-Extractable (umol/g)				
	2.25	2.53	2.13	2.38	2.29
	Lead (Pb)-Extractable (umol/g)				
	<0.10 ^{DLHM}	<0.12 ^{DLHM}	<0.10 ^{DLHM}	<0.10 ^{DLHM}	<0.12 ^{DLHM}
	Mercury (Hg)-Extractable (umol/g)				
	<0.000050 ^{DLHM}	<0.000050 ^{DLHM}	<0.000050 ^{DLHM}	<0.000050 ^{DLHM}	<0.000050 ^{DLHM}
	Nickel (Ni)-Extractable (umol/g)				
	<0.25 ^{DLHM}	<0.30 ^{DLHM}	<0.25 ^{DLHM}	<0.25 ^{DLHM}	<0.30 ^{DLHM}
	Zinc (Zn)-Extractable (umol/g)				
	0.494	0.593	0.508	0.517	0.522
Exchangeable & Adsorbed Metals	Aluminum (Al)-Leachable (mg/kg)				
	Antimony (Sb)-Leachable (mg/kg)				
	Arsenic (As)-Leachable (mg/kg)				
	Barium (Ba)-Leachable (mg/kg)				
	Beryllium (Be)-Leachable (mg/kg)				
	Bismuth (Bi)-Leachable (mg/kg)				
	Cadmium (Cd)-Leachable (mg/kg)				
	Calcium (Ca)-Leachable (mg/kg)				
	Chromium (Cr)-Leachable (mg/kg)				
	Cobalt (Co)-Leachable (mg/kg)				
	Copper (Cu)-Leachable (mg/kg)				
	Iron (Fe)-Leachable (mg/kg)				
	Lead (Pb)-Leachable (mg/kg)				
	Lithium (Li)-Leachable (mg/kg)				
	Manganese (Mn)-Leachable (mg/kg)				
	Molybdenum (Mo)-Leachable (mg/kg)				
	Nickel (Ni)-Leachable (mg/kg)				
	Phosphorus (P)-Leachable (mg/kg)				
	Potassium (K)-Leachable (mg/kg)				
	Selenium (Se)-Leachable (mg/kg)				
	Silver (Ag)-Leachable (mg/kg)				
	Sodium (Na)-Leachable (mg/kg)				
	Strontium (Sr)-Leachable (mg/kg)				
	Thallium (Tl)-Leachable (mg/kg)				
	Tin (Sn)-Leachable (mg/kg)				
	Titanium (Ti)-Leachable (mg/kg)				
	Uranium (U)-Leachable (mg/kg)				
	Vanadium (V)-Leachable (mg/kg)				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID				
	L1661656-53 Sediment 16-AUG-15 BOL-BX (SEM/AVS)				
Grouping	Analyte				
SOIL					
Physical Tests	Moisture (%)	92.1			
Inorganic Parameters	Acid Volatile Sulphides (umol/g)	13.0			
Extractable Metals	Cadmium (Cd)-Extractable (umol/g)	<0.025 ^{DLHM}			
	Copper (Cu)-Extractable (umol/g)	2.16			
	Lead (Pb)-Extractable (umol/g)	<0.10 ^{DLHM}			
	Mercury (Hg)-Extractable (umol/g)	<0.000050 ^{DLHM}			
	Nickel (Ni)-Extractable (umol/g)	<0.25 ^{DLHM}			
	Zinc (Zn)-Extractable (umol/g)	0.506			
Exchangeable & Adsorbed Metals	Aluminum (Al)-Leachable (mg/kg)				
	Antimony (Sb)-Leachable (mg/kg)				
	Arsenic (As)-Leachable (mg/kg)				
	Barium (Ba)-Leachable (mg/kg)				
	Beryllium (Be)-Leachable (mg/kg)				
	Bismuth (Bi)-Leachable (mg/kg)				
	Cadmium (Cd)-Leachable (mg/kg)				
	Calcium (Ca)-Leachable (mg/kg)				
	Chromium (Cr)-Leachable (mg/kg)				
	Cobalt (Co)-Leachable (mg/kg)				
	Copper (Cu)-Leachable (mg/kg)				
	Iron (Fe)-Leachable (mg/kg)				
	Lead (Pb)-Leachable (mg/kg)				
	Lithium (Li)-Leachable (mg/kg)				
	Manganese (Mn)-Leachable (mg/kg)				
	Molybdenum (Mo)-Leachable (mg/kg)				
	Nickel (Ni)-Leachable (mg/kg)				
	Phosphorus (P)-Leachable (mg/kg)				
	Potassium (K)-Leachable (mg/kg)				
	Selenium (Se)-Leachable (mg/kg)				
	Silver (Ag)-Leachable (mg/kg)				
	Sodium (Na)-Leachable (mg/kg)				
	Strontium (Sr)-Leachable (mg/kg)				
	Thallium (Tl)-Leachable (mg/kg)				
	Tin (Sn)-Leachable (mg/kg)				
	Titanium (Ti)-Leachable (mg/kg)				
	Uranium (U)-Leachable (mg/kg)				
	Vanadium (V)-Leachable (mg/kg)				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1661656-1	L1661656-3	L1661656-4	L1661656-5	L1661656-6
		Description	Sediment	Sediment	Sediment	Sediment	Sediment
		Sampled Date	17-AUG-15	14-AUG-15	15-AUG-15	15-AUG-15	16-AUG-15
		Sampled Time					
		Client ID	PNF-01	PNF-02	PNF-03	PNF-04	PNF-05
Grouping	Analyte						
SOIL							
Exchangeable & Adsorbed Metals	Zinc (Zn)-Leachable (mg/kg)		<1.0	<1.0	<1.0	<1.0	<1.0
Carbonate Metals	Aluminum (Al)-Leachable (mg/kg)		135	137	134	87	70
	Antimony (Sb)-Leachable (mg/kg)		<0.10	<0.10	<0.10	<0.10	<0.10
	Arsenic (As)-Leachable (mg/kg)		0.109	0.129	0.111	0.090	0.085
	Barium (Ba)-Leachable (mg/kg)		85.1	85.3	81.9	52.0	37.8
	Beryllium (Be)-Leachable (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Bismuth (Bi)-Leachable (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Leachable (mg/kg)		0.088	0.103	0.071	0.054	0.054
	Calcium (Ca)-Leachable (mg/kg)		12000	13400	10200	10400	10500
	Chromium (Cr)-Leachable (mg/kg)		<5.0	<5.0	<5.0	<5.0	<5.0
	Cobalt (Co)-Leachable (mg/kg)		0.56	0.61	0.49	0.38	0.35
	Copper (Cu)-Leachable (mg/kg)		96.8	98.7	90.8	71.8	64.9
	Iron (Fe)-Leachable (mg/kg)		135	139	151	120	117
	Lead (Pb)-Leachable (mg/kg)		1.19	1.25	1.23	0.89	0.92
	Lithium (Li)-Leachable (mg/kg)		<5.0	<5.0	<5.0	<5.0	<5.0
	Manganese (Mn)-Leachable (mg/kg)		140	135	138	145	134
	Molybdenum (Mo)-Leachable (mg/kg)		<0.50	<0.50	<0.50	<0.50	<0.50
	Nickel (Ni)-Leachable (mg/kg)		<2.0	<2.0	<2.0	<2.0	<2.0
	Phosphorus (P)-Leachable (mg/kg)		<50	<50	<50	<50	<50
	Selenium (Se)-Leachable (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Silver (Ag)-Leachable (mg/kg)		<0.10	<0.10	<0.10	<0.10	<0.10
	Strontium (Sr)-Leachable (mg/kg)		72.4	73.4	77.6	51.2	43.2
	Thallium (Tl)-Leachable (mg/kg)		<0.050	<0.050	<0.050	<0.050	<0.050
	Tin (Sn)-Leachable (mg/kg)		<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti)-Leachable (mg/kg)		<5.0	<5.0	<5.0	<5.0	<5.0
	Uranium (U)-Leachable (mg/kg)		0.160	0.182	0.108	0.061	0.055
	Vanadium (V)-Leachable (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Zinc (Zn)-Leachable (mg/kg)		1.9	1.9	1.7	1.2	<1.0
Easily Reducible Metals and Iron Oxides	Aluminum (Al)-Leachable (mg/kg)		2480	2520	2610	1900	1600
	Antimony (Sb)-Leachable (mg/kg)		<0.10	<0.10	<0.10	<0.10	<0.10
	Arsenic (As)-Leachable (mg/kg)		2.30	2.46	2.17	2.17	1.94
	Barium (Ba)-Leachable (mg/kg)		47.0	48.7	41.5	29.6	23.2
	Beryllium (Be)-Leachable (mg/kg)		0.31	0.34	0.28	<0.20	<0.20
	Bismuth (Bi)-Leachable (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Leachable (mg/kg)		0.074	0.079	0.068	<0.050	<0.050
	Calcium (Ca)-Leachable (mg/kg)		2190	2390	2070	1830	1710

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1661656-7 Sediment 18-AUG-15 PREFI-01	L1661656-8 Sediment 19-AUG-15 PREFI-03	L1661656-15 Sediment 13-AUG-15 POL-P2-1	L1661656-17 Sediment 14-AUG-15 POL-P2-2	L1661656-19 Sediment 14-AUG-15 POL-P2-3	
Grouping	Analyte					
SOIL						
Exchangeable & Adsorbed Metals	Zinc (Zn)-Leachable (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
Carbonate Metals	Aluminum (Al)-Leachable (mg/kg)	<50	<50	67	<50	<50
	Antimony (Sb)-Leachable (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Arsenic (As)-Leachable (mg/kg)	0.194	0.274	0.227	0.280	0.167
	Barium (Ba)-Leachable (mg/kg)	14.8	15.8	85.1	50.5	51.9
	Beryllium (Be)-Leachable (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Bismuth (Bi)-Leachable (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Leachable (mg/kg)	0.087	0.079	0.101	0.126	0.107
	Calcium (Ca)-Leachable (mg/kg)	324	349	7490	1790	3340
	Chromium (Cr)-Leachable (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Cobalt (Co)-Leachable (mg/kg)	0.66	0.63	0.52	0.44	0.27
	Copper (Cu)-Leachable (mg/kg)	2.14	2.34	21.4	6.24	17.9
	Iron (Fe)-Leachable (mg/kg)	451	599	179	<50	<50
	Lead (Pb)-Leachable (mg/kg)	<0.50	<0.50	0.92	<0.50	<0.50
	Lithium (Li)-Leachable (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Manganese (Mn)-Leachable (mg/kg)	23.3	24.8	786	556	481
	Molybdenum (Mo)-Leachable (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Nickel (Ni)-Leachable (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Phosphorus (P)-Leachable (mg/kg)	<50	<50	<50	<50	<50
	Selenium (Se)-Leachable (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Silver (Ag)-Leachable (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Strontium (Sr)-Leachable (mg/kg)	<5.0	<5.0	102	50.1	60.8
	Thallium (Tl)-Leachable (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Tin (Sn)-Leachable (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti)-Leachable (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Uranium (U)-Leachable (mg/kg)	0.351	0.351	0.260	0.283	0.338
	Vanadium (V)-Leachable (mg/kg)	0.46	0.66	1.02	1.15	0.50
	Zinc (Zn)-Leachable (mg/kg)	1.8	1.6	2.7	3.7	3.8
Easily Reducible Metals and Iron Oxides	Aluminum (Al)-Leachable (mg/kg)	1000	1020	2430	1440	1590
	Antimony (Sb)-Leachable (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.20 ^{DLM}
	Arsenic (As)-Leachable (mg/kg)	1.77	1.87	2.13	1.90	1.78
	Barium (Ba)-Leachable (mg/kg)	22.3	22.8	47.0	47.9	46.6
	Beryllium (Be)-Leachable (mg/kg)	0.21	0.20	0.31	0.29	<0.40 ^{DLM}
	Bismuth (Bi)-Leachable (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.40 ^{DLM}
	Cadmium (Cd)-Leachable (mg/kg)	0.204	0.192	0.083	0.159	<0.10 ^{DLM}
	Calcium (Ca)-Leachable (mg/kg)	771	817	1860	1170	1560

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1661656-21	L1661656-23	L1661656-25	L1661656-27	L1661656-29
		Description	Sediment	Sediment	Sediment	Sediment	Sediment
		Sampled Date	14-AUG-15	15-AUG-15	16-AUG-15	16-AUG-15	16-AUG-15
		Sampled Time					
		Client ID	POL-P2-4	POL-P2-5	BOL-B2-1	BOL-B2-2	BOL-B2-3
Grouping	Analyte						
SOIL							
Exchangeable & Adsorbed Metals	Zinc (Zn)-Leachable (mg/kg)		<1.0	<1.0	<1.0	<1.0	<1.0
Carbonate Metals	Aluminum (Al)-Leachable (mg/kg)		<50	<50	<50	<50	<50
	Antimony (Sb)-Leachable (mg/kg)		<0.10	<0.10	<0.10	<0.10	<0.10
	Arsenic (As)-Leachable (mg/kg)		0.270	0.205	0.143	0.155	0.116
	Barium (Ba)-Leachable (mg/kg)		59.2	53.5	55.7	49.7	59.9
	Beryllium (Be)-Leachable (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Bismuth (Bi)-Leachable (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Leachable (mg/kg)		0.084	0.114	0.068	0.078	0.064
	Calcium (Ca)-Leachable (mg/kg)		1500	2910	751	858	739
	Chromium (Cr)-Leachable (mg/kg)		<5.0	<5.0	<5.0	<5.0	<5.0
	Cobalt (Co)-Leachable (mg/kg)		0.38	0.48	0.37	0.45	0.35
	Copper (Cu)-Leachable (mg/kg)		12.8	8.14	2.04	2.72	2.19
	Iron (Fe)-Leachable (mg/kg)		<50	<50	346	166	284
	Lead (Pb)-Leachable (mg/kg)		0.58	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Leachable (mg/kg)		<5.0	<5.0	<5.0	<5.0	<5.0
	Manganese (Mn)-Leachable (mg/kg)		377	575	716	456	518
	Molybdenum (Mo)-Leachable (mg/kg)		<0.50	<0.50	<0.50	<0.50	<0.50
	Nickel (Ni)-Leachable (mg/kg)		<2.0	<2.0	<2.0	<2.0	<2.0
	Phosphorus (P)-Leachable (mg/kg)		<50	<50	<50	<50	<50
	Selenium (Se)-Leachable (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Silver (Ag)-Leachable (mg/kg)		<0.10	<0.10	<0.10	<0.10	<0.10
	Strontium (Sr)-Leachable (mg/kg)		78.4	52.1	11.6	11.7	10.9
	Thallium (Tl)-Leachable (mg/kg)		<0.050	<0.050	<0.050	<0.050	<0.050
	Tin (Sn)-Leachable (mg/kg)		<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti)-Leachable (mg/kg)		<5.0	<5.0	<5.0	<5.0	<5.0
	Uranium (U)-Leachable (mg/kg)		0.335	0.325	0.487	0.496	0.471
	Vanadium (V)-Leachable (mg/kg)		1.02	1.22	1.08	0.67	0.82
	Zinc (Zn)-Leachable (mg/kg)		2.7	4.0	3.6	4.0	3.5
Easily Reducible Metals and Iron Oxides	Aluminum (Al)-Leachable (mg/kg)		2120	1470	750	930	960
	Antimony (Sb)-Leachable (mg/kg)		<0.20 ^{DLM}	<0.20 ^{DLM}	<0.20 ^{DLM}	<0.20 ^{DLM}	<0.20 ^{DLM}
	Arsenic (As)-Leachable (mg/kg)		1.88	1.97	1.39	1.57	1.39
	Barium (Ba)-Leachable (mg/kg)		56.8	47.9	107	86.5	99.9
	Beryllium (Be)-Leachable (mg/kg)		<0.40 ^{DLM}	<0.40 ^{DLM}	<0.40 ^{DLM}	<0.40 ^{DLM}	<0.40 ^{DLM}
	Bismuth (Bi)-Leachable (mg/kg)		<0.40 ^{DLM}	<0.40 ^{DLM}	<0.40 ^{DLM}	<0.40 ^{DLM}	<0.40 ^{DLM}
	Cadmium (Cd)-Leachable (mg/kg)		0.13	0.14	0.16	0.21	0.16
	Calcium (Ca)-Leachable (mg/kg)		1270	1430	640	680	610

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1661656-33 Sediment 16-AUG-15 BOL-BX	L1661656-34 Sediment 17-AUG-15 PNF-01 (SEM/AVS)	L1661656-35 Sediment 17-AUG-15 PNF-01X (SEM/AVS)	L1661656-36 Sediment 14-AUG-15 PNF-02 (SEM/AVS)	L1661656-37 Sediment 15-AUG-15 PNF-03 (SEM/AVS)
Grouping	Analyte					
SOIL						
Exchangeable & Adsorbed Metals	Zinc (Zn)-Leachable (mg/kg)	1.3				
Carbonate Metals	Aluminum (Al)-Leachable (mg/kg)	<50				
	Antimony (Sb)-Leachable (mg/kg)	<0.10				
	Arsenic (As)-Leachable (mg/kg)	0.099				
	Barium (Ba)-Leachable (mg/kg)	54.5				
	Beryllium (Be)-Leachable (mg/kg)	<0.20				
	Bismuth (Bi)-Leachable (mg/kg)	<0.20				
	Cadmium (Cd)-Leachable (mg/kg)	0.067				
	Calcium (Ca)-Leachable (mg/kg)	686				
	Chromium (Cr)-Leachable (mg/kg)	<5.0				
	Cobalt (Co)-Leachable (mg/kg)	0.33				
	Copper (Cu)-Leachable (mg/kg)	2.31				
	Iron (Fe)-Leachable (mg/kg)	237				
	Lead (Pb)-Leachable (mg/kg)	<0.50				
	Lithium (Li)-Leachable (mg/kg)	<5.0				
	Manganese (Mn)-Leachable (mg/kg)	408				
	Molybdenum (Mo)-Leachable (mg/kg)	<0.50				
	Nickel (Ni)-Leachable (mg/kg)	<2.0				
	Phosphorus (P)-Leachable (mg/kg)	<50				
	Selenium (Se)-Leachable (mg/kg)	<0.20				
	Silver (Ag)-Leachable (mg/kg)	<0.10				
	Strontium (Sr)-Leachable (mg/kg)	10.3				
	Thallium (Tl)-Leachable (mg/kg)	<0.050				
	Tin (Sn)-Leachable (mg/kg)	<2.0				
	Titanium (Ti)-Leachable (mg/kg)	<5.0				
	Uranium (U)-Leachable (mg/kg)	0.460				
	Vanadium (V)-Leachable (mg/kg)	0.62				
	Zinc (Zn)-Leachable (mg/kg)	3.3				
Easily Reducible Metals and Iron Oxides	Aluminum (Al)-Leachable (mg/kg)	870				
	Antimony (Sb)-Leachable (mg/kg)	<0.20 ^{DLM}				
	Arsenic (As)-Leachable (mg/kg)	1.25				
	Barium (Ba)-Leachable (mg/kg)	104				
	Beryllium (Be)-Leachable (mg/kg)	<0.40 ^{DLM}				
	Bismuth (Bi)-Leachable (mg/kg)	<0.40 ^{DLM}				
	Cadmium (Cd)-Leachable (mg/kg)	0.16				
	Calcium (Ca)-Leachable (mg/kg)	610				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1661656-38 Sediment 15-AUG-15 PNF-04 (SEM/AVS)	L1661656-39 Sediment 16-AUG-15 PNF-05 (SEM/AVS)	L1661656-40 Sediment 18-AUG-15 PREFI-01 (SEM/AVS)	L1661656-41 Sediment 18-AUG-15 PREFI-02 (SEM/AVS)	L1661656-42 Sediment 19-AUG-15 PREFI-03 (SEM/AVS)
Grouping	Analyte					
SOIL						
Exchangeable & Adsorbed Metals	Zinc (Zn)-Leachable (mg/kg)					
Carbonate Metals	Aluminum (Al)-Leachable (mg/kg)					
	Antimony (Sb)-Leachable (mg/kg)					
	Arsenic (As)-Leachable (mg/kg)					
	Barium (Ba)-Leachable (mg/kg)					
	Beryllium (Be)-Leachable (mg/kg)					
	Bismuth (Bi)-Leachable (mg/kg)					
	Cadmium (Cd)-Leachable (mg/kg)					
	Calcium (Ca)-Leachable (mg/kg)					
	Chromium (Cr)-Leachable (mg/kg)					
	Cobalt (Co)-Leachable (mg/kg)					
	Copper (Cu)-Leachable (mg/kg)					
	Iron (Fe)-Leachable (mg/kg)					
	Lead (Pb)-Leachable (mg/kg)					
	Lithium (Li)-Leachable (mg/kg)					
	Manganese (Mn)-Leachable (mg/kg)					
	Molybdenum (Mo)-Leachable (mg/kg)					
	Nickel (Ni)-Leachable (mg/kg)					
	Phosphorus (P)-Leachable (mg/kg)					
	Selenium (Se)-Leachable (mg/kg)					
	Silver (Ag)-Leachable (mg/kg)					
	Strontium (Sr)-Leachable (mg/kg)					
	Thallium (Tl)-Leachable (mg/kg)					
	Tin (Sn)-Leachable (mg/kg)					
	Titanium (Ti)-Leachable (mg/kg)					
	Uranium (U)-Leachable (mg/kg)					
	Vanadium (V)-Leachable (mg/kg)					
	Zinc (Zn)-Leachable (mg/kg)					
Easily Reducible Metals and Iron Oxides	Aluminum (Al)-Leachable (mg/kg)					
	Antimony (Sb)-Leachable (mg/kg)					
	Arsenic (As)-Leachable (mg/kg)					
	Barium (Ba)-Leachable (mg/kg)					
	Beryllium (Be)-Leachable (mg/kg)					
	Bismuth (Bi)-Leachable (mg/kg)					
	Cadmium (Cd)-Leachable (mg/kg)					
	Calcium (Ca)-Leachable (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1661656-43	L1661656-44	L1661656-45	L1661656-46	L1661656-47
Description	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
Sampled Date	13-AUG-15	14-AUG-15	14-AUG-15	14-AUG-15	14-AUG-15	15-AUG-15
Sampled Time						
Client ID	POL-P2-1 (SEM/AVS)	POL-P2-2 (SEM/AVS)	POL-P2-3 (SEM/AVS)	POL-P2-4 (SEM/AVS)	POL-P2-5 (SEM/AVS)	POL-P2-5 (SEM/AVS)
Grouping	Analyte					
SOIL						
Exchangeable & Adsorbed Metals	Zinc (Zn)-Leachable (mg/kg)					
Carbonate Metals	Aluminum (Al)-Leachable (mg/kg)					
	Antimony (Sb)-Leachable (mg/kg)					
	Arsenic (As)-Leachable (mg/kg)					
	Barium (Ba)-Leachable (mg/kg)					
	Beryllium (Be)-Leachable (mg/kg)					
	Bismuth (Bi)-Leachable (mg/kg)					
	Cadmium (Cd)-Leachable (mg/kg)					
	Calcium (Ca)-Leachable (mg/kg)					
	Chromium (Cr)-Leachable (mg/kg)					
	Cobalt (Co)-Leachable (mg/kg)					
	Copper (Cu)-Leachable (mg/kg)					
	Iron (Fe)-Leachable (mg/kg)					
	Lead (Pb)-Leachable (mg/kg)					
	Lithium (Li)-Leachable (mg/kg)					
	Manganese (Mn)-Leachable (mg/kg)					
	Molybdenum (Mo)-Leachable (mg/kg)					
	Nickel (Ni)-Leachable (mg/kg)					
	Phosphorus (P)-Leachable (mg/kg)					
	Selenium (Se)-Leachable (mg/kg)					
	Silver (Ag)-Leachable (mg/kg)					
	Strontium (Sr)-Leachable (mg/kg)					
	Thallium (Tl)-Leachable (mg/kg)					
	Tin (Sn)-Leachable (mg/kg)					
	Titanium (Ti)-Leachable (mg/kg)					
	Uranium (U)-Leachable (mg/kg)					
	Vanadium (V)-Leachable (mg/kg)					
	Zinc (Zn)-Leachable (mg/kg)					
Easily Reducible Metals and Iron Oxides	Aluminum (Al)-Leachable (mg/kg)					
	Antimony (Sb)-Leachable (mg/kg)					
	Arsenic (As)-Leachable (mg/kg)					
	Barium (Ba)-Leachable (mg/kg)					
	Beryllium (Be)-Leachable (mg/kg)					
	Bismuth (Bi)-Leachable (mg/kg)					
	Cadmium (Cd)-Leachable (mg/kg)					
	Calcium (Ca)-Leachable (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1661656-48 Sediment 16-AUG-15 BOL-B2-1 (SEM/AVS)	L1661656-49 Sediment 16-AUG-15 BOL-B2-2 (SEM/AVS)	L1661656-50 Sediment 16-AUG-15 BOL-B2-3 (SEM/AVS)	L1661656-51 Sediment 16-AUG-15 BOL-B2-4 (SEM/AVS)	L1661656-52 Sediment 16-AUG-15 BOL-B2-5 (SEM/AVS)
Grouping	Analyte					
SOIL						
Exchangeable & Adsorbed Metals	Zinc (Zn)-Leachable (mg/kg)					
Carbonate Metals	Aluminum (Al)-Leachable (mg/kg)					
	Antimony (Sb)-Leachable (mg/kg)					
	Arsenic (As)-Leachable (mg/kg)					
	Barium (Ba)-Leachable (mg/kg)					
	Beryllium (Be)-Leachable (mg/kg)					
	Bismuth (Bi)-Leachable (mg/kg)					
	Cadmium (Cd)-Leachable (mg/kg)					
	Calcium (Ca)-Leachable (mg/kg)					
	Chromium (Cr)-Leachable (mg/kg)					
	Cobalt (Co)-Leachable (mg/kg)					
	Copper (Cu)-Leachable (mg/kg)					
	Iron (Fe)-Leachable (mg/kg)					
	Lead (Pb)-Leachable (mg/kg)					
	Lithium (Li)-Leachable (mg/kg)					
	Manganese (Mn)-Leachable (mg/kg)					
	Molybdenum (Mo)-Leachable (mg/kg)					
	Nickel (Ni)-Leachable (mg/kg)					
	Phosphorus (P)-Leachable (mg/kg)					
	Selenium (Se)-Leachable (mg/kg)					
	Silver (Ag)-Leachable (mg/kg)					
	Strontium (Sr)-Leachable (mg/kg)					
	Thallium (Tl)-Leachable (mg/kg)					
	Tin (Sn)-Leachable (mg/kg)					
	Titanium (Ti)-Leachable (mg/kg)					
	Uranium (U)-Leachable (mg/kg)					
	Vanadium (V)-Leachable (mg/kg)					
	Zinc (Zn)-Leachable (mg/kg)					
Easily Reducible Metals and Iron Oxides	Aluminum (Al)-Leachable (mg/kg)					
	Antimony (Sb)-Leachable (mg/kg)					
	Arsenic (As)-Leachable (mg/kg)					
	Barium (Ba)-Leachable (mg/kg)					
	Beryllium (Be)-Leachable (mg/kg)					
	Bismuth (Bi)-Leachable (mg/kg)					
	Cadmium (Cd)-Leachable (mg/kg)					
	Calcium (Ca)-Leachable (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID				
	L1661656-53 Sediment 16-AUG-15 BOL-BX (SEM/AVS)				
Grouping	Analyte				
SOIL					
Exchangeable & Adsorbed Metals	Zinc (Zn)-Leachable (mg/kg)				
Carbonate Metals	Aluminum (Al)-Leachable (mg/kg) Antimony (Sb)-Leachable (mg/kg) Arsenic (As)-Leachable (mg/kg) Barium (Ba)-Leachable (mg/kg) Beryllium (Be)-Leachable (mg/kg) Bismuth (Bi)-Leachable (mg/kg) Cadmium (Cd)-Leachable (mg/kg) Calcium (Ca)-Leachable (mg/kg) Chromium (Cr)-Leachable (mg/kg) Cobalt (Co)-Leachable (mg/kg) Copper (Cu)-Leachable (mg/kg) Iron (Fe)-Leachable (mg/kg) Lead (Pb)-Leachable (mg/kg) Lithium (Li)-Leachable (mg/kg) Manganese (Mn)-Leachable (mg/kg) Molybdenum (Mo)-Leachable (mg/kg) Nickel (Ni)-Leachable (mg/kg) Phosphorus (P)-Leachable (mg/kg) Selenium (Se)-Leachable (mg/kg) Silver (Ag)-Leachable (mg/kg) Strontium (Sr)-Leachable (mg/kg) Thallium (Tl)-Leachable (mg/kg) Tin (Sn)-Leachable (mg/kg) Titanium (Ti)-Leachable (mg/kg) Uranium (U)-Leachable (mg/kg) Vanadium (V)-Leachable (mg/kg) Zinc (Zn)-Leachable (mg/kg)				
Easily Reducible Metals and Iron Oxides	Aluminum (Al)-Leachable (mg/kg) Antimony (Sb)-Leachable (mg/kg) Arsenic (As)-Leachable (mg/kg) Barium (Ba)-Leachable (mg/kg) Beryllium (Be)-Leachable (mg/kg) Bismuth (Bi)-Leachable (mg/kg) Cadmium (Cd)-Leachable (mg/kg) Calcium (Ca)-Leachable (mg/kg)				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1661656-1 Sediment 17-AUG-15 PNF-01	L1661656-3 Sediment 14-AUG-15 PNF-02	L1661656-4 Sediment 15-AUG-15 PNF-03	L1661656-5 Sediment 15-AUG-15 PNF-04	L1661656-6 Sediment 16-AUG-15 PNF-05	
Grouping	Analyte					
SOIL						
Easily Reducible Metals and Iron Oxides	Chromium (Cr)-Leachable (mg/kg)	3.36	3.41	3.07	2.12	1.92
	Cobalt (Co)-Leachable (mg/kg)	3.35	3.40	2.88	1.88	1.65
	Copper (Cu)-Leachable (mg/kg)	176	179	180	141	111
	Iron (Fe)-Leachable (mg/kg)	4860	5150	4330	3010	2680
	Lead (Pb)-Leachable (mg/kg)	4.78	5.08	4.52	2.59	2.27
	Lithium (Li)-Leachable (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Manganese (Mn)-Leachable (mg/kg)	146	144	128	84.7	76.0
	Molybdenum (Mo)-Leachable (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Nickel (Ni)-Leachable (mg/kg)	4.15	4.03	3.93	3.06	2.56
	Phosphorus (P)-Leachable (mg/kg)	153	155	162	181	197
	Selenium (Se)-Leachable (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Silver (Ag)-Leachable (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Strontium (Sr)-Leachable (mg/kg)	22.6	23.9	26.0	34.2	24.6
	Thallium (Tl)-Leachable (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Tin (Sn)-Leachable (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti)-Leachable (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Uranium (U)-Leachable (mg/kg)	0.207	0.227	0.199	0.119	0.106
	Vanadium (V)-Leachable (mg/kg)	12.1	12.5	10.9	7.30	6.74
	Zinc (Zn)-Leachable (mg/kg)	15.4	16.0	12.5	7.7	7.3
Organic Bound Metals	Aluminum (Al)-Leachable (mg/kg)	1730	1820	1410	845	724
	Antimony (Sb)-Leachable (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Arsenic (As)-Leachable (mg/kg)	0.381	0.413	0.331	0.252	0.251
	Barium (Ba)-Leachable (mg/kg)	25.8	25.8	23.6	12.6	10.3
	Beryllium (Be)-Leachable (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Bismuth (Bi)-Leachable (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Leachable (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Calcium (Ca)-Leachable (mg/kg)	851	975	899	790	660
	Chromium (Cr)-Leachable (mg/kg)	1.01	1.13	0.60	<0.50	<0.50
	Cobalt (Co)-Leachable (mg/kg)	2.34	2.55	2.01	1.85	1.61
	Copper (Cu)-Leachable (mg/kg)	676	742	505	304	412
	Iron (Fe)-Leachable (mg/kg)	334	363	281	269	338
	Lead (Pb)-Leachable (mg/kg)	1.20	1.19	0.94	0.59	0.60
	Lithium (Li)-Leachable (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Manganese (Mn)-Leachable (mg/kg)	31.7	34.4	24.6	13.4	11.3
	Molybdenum (Mo)-Leachable (mg/kg)	0.64	0.70	0.53	<0.50	0.67
	Nickel (Ni)-Leachable (mg/kg)	0.99	1.06	0.82	0.62	0.56

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1661656-7 Sediment 18-AUG-15 PREFI-01	L1661656-8 Sediment 19-AUG-15 PREFI-03	L1661656-15 Sediment 13-AUG-15 POL-P2-1	L1661656-17 Sediment 14-AUG-15 POL-P2-2	L1661656-19 Sediment 14-AUG-15 POL-P2-3	
Grouping	Analyte					
SOIL						
Easily Reducible Metals and Iron Oxides	Chromium (Cr)-Leachable (mg/kg)	4.09	4.06	3.19	3.14	3.1
	Cobalt (Co)-Leachable (mg/kg)	4.89	4.94	2.00	1.96	2.31
	Copper (Cu)-Leachable (mg/kg)	5.00	5.25	11.2	7.73	11.8
	Iron (Fe)-Leachable (mg/kg)	7220	7210	4090	3710	3740
	Lead (Pb)-Leachable (mg/kg)	2.40	2.29	2.53	2.17	2.8
	Lithium (Li)-Leachable (mg/kg)	<5.0	<5.0	<5.0	<5.0	<10 ^{DLM}
	Manganese (Mn)-Leachable (mg/kg)	99.7	106	231	437	630
	Molybdenum (Mo)-Leachable (mg/kg)	<0.50	<0.50	0.65	0.62	<1.0 ^{DLM}
	Nickel (Ni)-Leachable (mg/kg)	9.30	9.26	3.48	4.98	4.5 ^{DLM}
	Phosphorus (P)-Leachable (mg/kg)	80	102	122	107	<100 ^{DLM}
	Selenium (Se)-Leachable (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.40 ^{DLM}
	Silver (Ag)-Leachable (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.20 ^{DLM}
	Strontium (Sr)-Leachable (mg/kg)	7.86	8.48	33.9	25.9	27.9
	Thallium (Tl)-Leachable (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.10 ^{DLM}
	Tin (Sn)-Leachable (mg/kg)	<2.0	<2.0	<2.0	<2.0	<4.0 ^{DLM}
	Titanium (Ti)-Leachable (mg/kg)	<1.0	<1.0	<1.0	<1.0	<2.0 ^{DLM}
	Uranium (U)-Leachable (mg/kg)	0.313	0.305	0.206	0.317	0.31
	Vanadium (V)-Leachable (mg/kg)	10.7	9.74	19.6	26.4	20.6
	Zinc (Zn)-Leachable (mg/kg)	18.1	17.9	11.5	15.6	15.0
Organic Bound Metals	Aluminum (Al)-Leachable (mg/kg)	1580	1440	3110	5470	4600
	Antimony (Sb)-Leachable (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Arsenic (As)-Leachable (mg/kg)	0.349	0.307	0.618	1.81	1.08
	Barium (Ba)-Leachable (mg/kg)	16.5	15.9	12.2	8.61	12.8
	Beryllium (Be)-Leachable (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Bismuth (Bi)-Leachable (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Leachable (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Calcium (Ca)-Leachable (mg/kg)	491	539	1530	1840	1500
	Chromium (Cr)-Leachable (mg/kg)	7.05	6.16	5.78	17.1	13.1
	Cobalt (Co)-Leachable (mg/kg)	1.96	1.78	3.55	5.78	4.52
	Copper (Cu)-Leachable (mg/kg)	17.4	13.8	728	457	587
	Iron (Fe)-Leachable (mg/kg)	1050	777	2000	7800	4020
	Lead (Pb)-Leachable (mg/kg)	0.53	<0.50	0.86	1.15	0.80
	Lithium (Li)-Leachable (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Manganese (Mn)-Leachable (mg/kg)	22.5	21.4	51.5	101	104
Molybdenum (Mo)-Leachable (mg/kg)	<0.50	<0.50	2.84	5.12	4.60	
Nickel (Ni)-Leachable (mg/kg)	4.66	4.34	4.28	11.4	8.02	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1661656-21 Sediment 14-AUG-15 POL-P2-4	L1661656-23 Sediment 15-AUG-15 POL-P2-5	L1661656-25 Sediment 16-AUG-15 BOL-B2-1	L1661656-27 Sediment 16-AUG-15 BOL-B2-2	L1661656-29 Sediment 16-AUG-15 BOL-B2-3	
Grouping	Analyte					
SOIL						
Easily Reducible Metals and Iron Oxides	Chromium (Cr)-Leachable (mg/kg)	3.9	3.1	2.4	2.7	2.5
	Cobalt (Co)-Leachable (mg/kg)	1.95	1.95	1.49	1.84	1.56
	Copper (Cu)-Leachable (mg/kg)	7.8	7.6	6.4	6.5	5.6
	Iron (Fe)-Leachable (mg/kg)	3890	4480	10700	8240	9140
	Lead (Pb)-Leachable (mg/kg)	2.9	2.4	2.6	3.5	3.1
	Lithium (Li)-Leachable (mg/kg)	<10 ^{DLM}	<10 ^{DLM}	<10 ^{DLM}	<10 ^{DLM}	<10 ^{DLM}
	Manganese (Mn)-Leachable (mg/kg)	285	304	529	307	289
	Molybdenum (Mo)-Leachable (mg/kg)	<1.0 ^{DLM}	<1.0 ^{DLM}	<1.0 ^{DLM}	<1.0 ^{DLM}	<1.0 ^{DLM}
	Nickel (Ni)-Leachable (mg/kg)	4.9	5.5	4.1	4.3	4.0
	Phosphorus (P)-Leachable (mg/kg)	110	110	340	190	240
	Selenium (Se)-Leachable (mg/kg)	<0.40 ^{DLM}	<0.40 ^{DLM}	<0.40 ^{DLM}	<0.40 ^{DLM}	<0.40 ^{DLM}
	Silver (Ag)-Leachable (mg/kg)	<0.20 ^{DLM}	<0.20 ^{DLM}	<0.20 ^{DLM}	<0.20 ^{DLM}	<0.20 ^{DLM}
	Strontium (Sr)-Leachable (mg/kg)	37.7	26.0	10.6	10.0	9.6
	Thallium (Tl)-Leachable (mg/kg)	<0.10 ^{DLM}	<0.10 ^{DLM}	<0.10 ^{DLM}	<0.10 ^{DLM}	<0.10 ^{DLM}
	Tin (Sn)-Leachable (mg/kg)	<4.0 ^{DLM}	<4.0 ^{DLM}	<4.0 ^{DLM}	<4.0 ^{DLM}	<4.0 ^{DLM}
	Titanium (Ti)-Leachable (mg/kg)	<2.0 ^{DLM}	<2.0 ^{DLM}	<2.0 ^{DLM}	<2.0 ^{DLM}	<2.0 ^{DLM}
	Uranium (U)-Leachable (mg/kg)	0.35	0.33	0.62	0.71	0.60
	Vanadium (V)-Leachable (mg/kg)	24.0	27.3	20.0	20.0	19.7
	Zinc (Zn)-Leachable (mg/kg)	15.5	15.6	16.9	18.1	16.8
Organic Bound Metals	Aluminum (Al)-Leachable (mg/kg)	4980	4810	4700	5450	4620
	Antimony (Sb)-Leachable (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Arsenic (As)-Leachable (mg/kg)	1.16	1.41	1.57	2.20	1.75
	Barium (Ba)-Leachable (mg/kg)	11.5	11.4	16.6	10.6	13.2
	Beryllium (Be)-Leachable (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Bismuth (Bi)-Leachable (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Leachable (mg/kg)	<0.050	<0.050	<0.050	0.071	0.052
	Calcium (Ca)-Leachable (mg/kg)	1740	1910	321	621	448
	Chromium (Cr)-Leachable (mg/kg)	13.8	14.8	14.2	16.8	14.4
	Cobalt (Co)-Leachable (mg/kg)	4.78	5.20	5.29	6.24	5.38
	Copper (Cu)-Leachable (mg/kg)	538	507	296	354	296
	Iron (Fe)-Leachable (mg/kg)	5120	5560	4680	6540	4480
	Lead (Pb)-Leachable (mg/kg)	0.92	0.89	0.82	1.26	0.87
	Lithium (Li)-Leachable (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Manganese (Mn)-Leachable (mg/kg)	67.1	80.1	99.5	75.8	64.3
	Molybdenum (Mo)-Leachable (mg/kg)	4.66	4.74	2.30	3.23	2.58
	Nickel (Ni)-Leachable (mg/kg)	9.34	10.0	10.7	12.9	10.9

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1661656-33 Sediment 16-AUG-15 BOL-BX	L1661656-34 Sediment 17-AUG-15 PNF-01 (SEM/AVS)	L1661656-35 Sediment 17-AUG-15 PNF-01X (SEM/AVS)	L1661656-36 Sediment 14-AUG-15 PNF-02 (SEM/AVS)	L1661656-37 Sediment 15-AUG-15 PNF-03 (SEM/AVS)
Grouping	Analyte				
SOIL					
Easily Reducible Metals and Iron Oxides	Chromium (Cr)-Leachable (mg/kg)	2.5			
	Cobalt (Co)-Leachable (mg/kg)	1.50			
	Copper (Cu)-Leachable (mg/kg)	5.5			
	Iron (Fe)-Leachable (mg/kg)	9040			
	Lead (Pb)-Leachable (mg/kg)	3.1			
	Lithium (Li)-Leachable (mg/kg)	<10 ^{DLM}			
	Manganese (Mn)-Leachable (mg/kg)	285			
	Molybdenum (Mo)-Leachable (mg/kg)	<1.0 ^{DLM}			
	Nickel (Ni)-Leachable (mg/kg)	4.0			
	Phosphorus (P)-Leachable (mg/kg)	260			
	Selenium (Se)-Leachable (mg/kg)	<0.40 ^{DLM}			
	Silver (Ag)-Leachable (mg/kg)	<0.20 ^{DLM}			
	Strontium (Sr)-Leachable (mg/kg)	9.9			
	Thallium (Tl)-Leachable (mg/kg)	<0.10 ^{DLM}			
	Tin (Sn)-Leachable (mg/kg)	<4.0 ^{DLM}			
	Titanium (Ti)-Leachable (mg/kg)	<2.0 ^{DLM}			
	Uranium (U)-Leachable (mg/kg)	0.66			
	Vanadium (V)-Leachable (mg/kg)	19.4			
	Zinc (Zn)-Leachable (mg/kg)	17.3			
Organic Bound Metals	Aluminum (Al)-Leachable (mg/kg)	4220			
	Antimony (Sb)-Leachable (mg/kg)	<0.10			
	Arsenic (As)-Leachable (mg/kg)	1.55			
	Barium (Ba)-Leachable (mg/kg)	13.2			
	Beryllium (Be)-Leachable (mg/kg)	<0.20			
	Bismuth (Bi)-Leachable (mg/kg)	<0.20			
	Cadmium (Cd)-Leachable (mg/kg)	0.052			
	Calcium (Ca)-Leachable (mg/kg)	373			
	Chromium (Cr)-Leachable (mg/kg)	14.1			
	Cobalt (Co)-Leachable (mg/kg)	5.18			
	Copper (Cu)-Leachable (mg/kg)	291			
	Iron (Fe)-Leachable (mg/kg)	4380			
	Lead (Pb)-Leachable (mg/kg)	0.82			
	Lithium (Li)-Leachable (mg/kg)	<5.0			
	Manganese (Mn)-Leachable (mg/kg)	62.0			
Molybdenum (Mo)-Leachable (mg/kg)	2.38				
Nickel (Ni)-Leachable (mg/kg)	10.6				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1661656-38 Sediment 15-AUG-15 PNF-04 (SEM/AVS)	L1661656-39 Sediment 16-AUG-15 PNF-05 (SEM/AVS)	L1661656-40 Sediment 18-AUG-15 PREFI-01 (SEM/AVS)	L1661656-41 Sediment 18-AUG-15 PREFI-02 (SEM/AVS)	L1661656-42 Sediment 19-AUG-15 PREFI-03 (SEM/AVS)
Grouping	Analyte					
SOIL						
Easily Reducible Metals and Iron Oxides	Chromium (Cr)-Leachable (mg/kg)					
	Cobalt (Co)-Leachable (mg/kg)					
	Copper (Cu)-Leachable (mg/kg)					
	Iron (Fe)-Leachable (mg/kg)					
	Lead (Pb)-Leachable (mg/kg)					
	Lithium (Li)-Leachable (mg/kg)					
	Manganese (Mn)-Leachable (mg/kg)					
	Molybdenum (Mo)-Leachable (mg/kg)					
	Nickel (Ni)-Leachable (mg/kg)					
	Phosphorus (P)-Leachable (mg/kg)					
	Selenium (Se)-Leachable (mg/kg)					
	Silver (Ag)-Leachable (mg/kg)					
	Strontium (Sr)-Leachable (mg/kg)					
	Thallium (Tl)-Leachable (mg/kg)					
	Tin (Sn)-Leachable (mg/kg)					
	Titanium (Ti)-Leachable (mg/kg)					
	Uranium (U)-Leachable (mg/kg)					
	Vanadium (V)-Leachable (mg/kg)					
	Zinc (Zn)-Leachable (mg/kg)					
Organic Bound Metals	Aluminum (Al)-Leachable (mg/kg)					
	Antimony (Sb)-Leachable (mg/kg)					
	Arsenic (As)-Leachable (mg/kg)					
	Barium (Ba)-Leachable (mg/kg)					
	Beryllium (Be)-Leachable (mg/kg)					
	Bismuth (Bi)-Leachable (mg/kg)					
	Cadmium (Cd)-Leachable (mg/kg)					
	Calcium (Ca)-Leachable (mg/kg)					
	Chromium (Cr)-Leachable (mg/kg)					
	Cobalt (Co)-Leachable (mg/kg)					
	Copper (Cu)-Leachable (mg/kg)					
	Iron (Fe)-Leachable (mg/kg)					
	Lead (Pb)-Leachable (mg/kg)					
	Lithium (Li)-Leachable (mg/kg)					
	Manganese (Mn)-Leachable (mg/kg)					
	Molybdenum (Mo)-Leachable (mg/kg)					
	Nickel (Ni)-Leachable (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1661656-43 Sediment 13-AUG-15 POL-P2-1 (SEM/AVS)	L1661656-44 Sediment 14-AUG-15 POL-P2-2 (SEM/AVS)	L1661656-45 Sediment 14-AUG-15 POL-P2-3 (SEM/AVS)	L1661656-46 Sediment 14-AUG-15 POL-P2-4 (SEM/AVS)	L1661656-47 Sediment 15-AUG-15 POL-P2-5 (SEM/AVS)
Grouping	Analyte					
SOIL						
Easily Reducible Metals and Iron Oxides	Chromium (Cr)-Leachable (mg/kg)					
	Cobalt (Co)-Leachable (mg/kg)					
	Copper (Cu)-Leachable (mg/kg)					
	Iron (Fe)-Leachable (mg/kg)					
	Lead (Pb)-Leachable (mg/kg)					
	Lithium (Li)-Leachable (mg/kg)					
	Manganese (Mn)-Leachable (mg/kg)					
	Molybdenum (Mo)-Leachable (mg/kg)					
	Nickel (Ni)-Leachable (mg/kg)					
	Phosphorus (P)-Leachable (mg/kg)					
	Selenium (Se)-Leachable (mg/kg)					
	Silver (Ag)-Leachable (mg/kg)					
	Strontium (Sr)-Leachable (mg/kg)					
	Thallium (Tl)-Leachable (mg/kg)					
	Tin (Sn)-Leachable (mg/kg)					
	Titanium (Ti)-Leachable (mg/kg)					
	Uranium (U)-Leachable (mg/kg)					
	Vanadium (V)-Leachable (mg/kg)					
	Zinc (Zn)-Leachable (mg/kg)					
Organic Bound Metals	Aluminum (Al)-Leachable (mg/kg)					
	Antimony (Sb)-Leachable (mg/kg)					
	Arsenic (As)-Leachable (mg/kg)					
	Barium (Ba)-Leachable (mg/kg)					
	Beryllium (Be)-Leachable (mg/kg)					
	Bismuth (Bi)-Leachable (mg/kg)					
	Cadmium (Cd)-Leachable (mg/kg)					
	Calcium (Ca)-Leachable (mg/kg)					
	Chromium (Cr)-Leachable (mg/kg)					
	Cobalt (Co)-Leachable (mg/kg)					
	Copper (Cu)-Leachable (mg/kg)					
	Iron (Fe)-Leachable (mg/kg)					
	Lead (Pb)-Leachable (mg/kg)					
	Lithium (Li)-Leachable (mg/kg)					
	Manganese (Mn)-Leachable (mg/kg)					
	Molybdenum (Mo)-Leachable (mg/kg)					
	Nickel (Ni)-Leachable (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1661656-48 Sediment 16-AUG-15 BOL-B2-1 (SEM/AVS)	L1661656-49 Sediment 16-AUG-15 BOL-B2-2 (SEM/AVS)	L1661656-50 Sediment 16-AUG-15 BOL-B2-3 (SEM/AVS)	L1661656-51 Sediment 16-AUG-15 BOL-B2-4 (SEM/AVS)	L1661656-52 Sediment 16-AUG-15 BOL-B2-5 (SEM/AVS)
Grouping	Analyte					
SOIL						
Easily Reducible Metals and Iron Oxides	Chromium (Cr)-Leachable (mg/kg)					
	Cobalt (Co)-Leachable (mg/kg)					
	Copper (Cu)-Leachable (mg/kg)					
	Iron (Fe)-Leachable (mg/kg)					
	Lead (Pb)-Leachable (mg/kg)					
	Lithium (Li)-Leachable (mg/kg)					
	Manganese (Mn)-Leachable (mg/kg)					
	Molybdenum (Mo)-Leachable (mg/kg)					
	Nickel (Ni)-Leachable (mg/kg)					
	Phosphorus (P)-Leachable (mg/kg)					
	Selenium (Se)-Leachable (mg/kg)					
	Silver (Ag)-Leachable (mg/kg)					
	Strontium (Sr)-Leachable (mg/kg)					
	Thallium (Tl)-Leachable (mg/kg)					
	Tin (Sn)-Leachable (mg/kg)					
	Titanium (Ti)-Leachable (mg/kg)					
	Uranium (U)-Leachable (mg/kg)					
	Vanadium (V)-Leachable (mg/kg)					
	Zinc (Zn)-Leachable (mg/kg)					
Organic Bound Metals	Aluminum (Al)-Leachable (mg/kg)					
	Antimony (Sb)-Leachable (mg/kg)					
	Arsenic (As)-Leachable (mg/kg)					
	Barium (Ba)-Leachable (mg/kg)					
	Beryllium (Be)-Leachable (mg/kg)					
	Bismuth (Bi)-Leachable (mg/kg)					
	Cadmium (Cd)-Leachable (mg/kg)					
	Calcium (Ca)-Leachable (mg/kg)					
	Chromium (Cr)-Leachable (mg/kg)					
	Cobalt (Co)-Leachable (mg/kg)					
	Copper (Cu)-Leachable (mg/kg)					
	Iron (Fe)-Leachable (mg/kg)					
	Lead (Pb)-Leachable (mg/kg)					
	Lithium (Li)-Leachable (mg/kg)					
	Manganese (Mn)-Leachable (mg/kg)					
	Molybdenum (Mo)-Leachable (mg/kg)					
	Nickel (Ni)-Leachable (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID				
	L1661656-53 Sediment 16-AUG-15 BOL-BX (SEM/AVS)				
Grouping	Analyte				
SOIL					
Easily Reducible Metals and Iron Oxides	Chromium (Cr)-Leachable (mg/kg) Cobalt (Co)-Leachable (mg/kg) Copper (Cu)-Leachable (mg/kg) Iron (Fe)-Leachable (mg/kg) Lead (Pb)-Leachable (mg/kg) Lithium (Li)-Leachable (mg/kg) Manganese (Mn)-Leachable (mg/kg) Molybdenum (Mo)-Leachable (mg/kg) Nickel (Ni)-Leachable (mg/kg) Phosphorus (P)-Leachable (mg/kg) Selenium (Se)-Leachable (mg/kg) Silver (Ag)-Leachable (mg/kg) Strontium (Sr)-Leachable (mg/kg) Thallium (Tl)-Leachable (mg/kg) Tin (Sn)-Leachable (mg/kg) Titanium (Ti)-Leachable (mg/kg) Uranium (U)-Leachable (mg/kg) Vanadium (V)-Leachable (mg/kg) Zinc (Zn)-Leachable (mg/kg)				
Organic Bound Metals	Aluminum (Al)-Leachable (mg/kg) Antimony (Sb)-Leachable (mg/kg) Arsenic (As)-Leachable (mg/kg) Barium (Ba)-Leachable (mg/kg) Beryllium (Be)-Leachable (mg/kg) Bismuth (Bi)-Leachable (mg/kg) Cadmium (Cd)-Leachable (mg/kg) Calcium (Ca)-Leachable (mg/kg) Chromium (Cr)-Leachable (mg/kg) Cobalt (Co)-Leachable (mg/kg) Copper (Cu)-Leachable (mg/kg) Iron (Fe)-Leachable (mg/kg) Lead (Pb)-Leachable (mg/kg) Lithium (Li)-Leachable (mg/kg) Manganese (Mn)-Leachable (mg/kg) Molybdenum (Mo)-Leachable (mg/kg) Nickel (Ni)-Leachable (mg/kg)				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID Description Sampled Date Sampled Time Client ID	L1661656-1 Sediment 17-AUG-15 PNF-01	L1661656-3 Sediment 14-AUG-15 PNF-02	L1661656-4 Sediment 15-AUG-15 PNF-03	L1661656-5 Sediment 15-AUG-15 PNF-04	L1661656-6 Sediment 16-AUG-15 PNF-05
Grouping	Analyte						
SOIL							
Organic Bound Metals	Selenium (Se)-Leachable (mg/kg)	1.38	1.45	1.04	0.66	0.67	
	Silver (Ag)-Leachable (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Strontium (Sr)-Leachable (mg/kg)	5.97	6.39	5.77	6.54	5.84	
	Thallium (Tl)-Leachable (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Tin (Sn)-Leachable (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0	
	Titanium (Ti)-Leachable (mg/kg)	1.8	<1.0	<1.0	<1.0	<1.0	
	Uranium (U)-Leachable (mg/kg)	0.136	0.137	0.121	0.134	0.099	
	Vanadium (V)-Leachable (mg/kg)	0.76	0.69	0.61	0.47	0.50	
	Zinc (Zn)-Leachable (mg/kg)	6.4	6.7	5.3	4.3	4.8	
Residual Metals	Aluminum (Al)-Leachable (mg/kg)	29100	30400	24600	16400	12600	
	Antimony (Sb)-Leachable (mg/kg)	0.58	0.58	0.50	0.32	0.22	
	Arsenic (As)-Leachable (mg/kg)	14.0	14.2	13.1	10.6	9.51	
	Barium (Ba)-Leachable (mg/kg)	130	131	117	102	86.6	
	Beryllium (Be)-Leachable (mg/kg)	0.67	0.72	0.62	0.49	0.43	
	Bismuth (Bi)-Leachable (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Cadmium (Cd)-Leachable (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Calcium (Ca)-Leachable (mg/kg)	12400	13000	13600	13000	10500	
	Chromium (Cr)-Leachable (mg/kg)	18.1	17.8	16.5	12.9	11.9	
	Cobalt (Co)-Leachable (mg/kg)	27.0	28.0	20.4	12.7	11.9	
	Copper (Cu)-Leachable (mg/kg)	227	241	162	81.1	95.5	
	Iron (Fe)-Leachable (mg/kg)	34300	35100	32400	31800	35300	
	Lead (Pb)-Leachable (mg/kg)	5.09	4.99	4.33	2.74	2.30	
	Lithium (Li)-Leachable (mg/kg)	29.7	32.1	22.8	15.3	14.0	
	Manganese (Mn)-Leachable (mg/kg)	857	892	682	461	404	
	Molybdenum (Mo)-Leachable (mg/kg)	3.37	3.45	3.03	2.48	3.03	
	Nickel (Ni)-Leachable (mg/kg)	18.4	18.2	15.2	10.3	9.1	
	Selenium (Se)-Leachable (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Silver (Ag)-Leachable (mg/kg)	0.41	0.42	0.34	0.23	0.26	
	Strontium (Sr)-Leachable (mg/kg)	82.8	83.4	79.6	67.7	49.3	
	Thallium (Tl)-Leachable (mg/kg)	0.054	<0.050	<0.050	<0.050	<0.050	
	Tin (Sn)-Leachable (mg/kg)	4.8	4.9	4.4	3.5	3.4	
	Titanium (Ti)-Leachable (mg/kg)	2250	2280	1920	1170	894	
	Uranium (U)-Leachable (mg/kg)	0.943	0.957	0.901	0.783	0.576	
	Vanadium (V)-Leachable (mg/kg)	117	122	117	118	133	
	Zinc (Zn)-Leachable (mg/kg)	99.6	102	77.4	47.9	44.8	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1661656-7	L1661656-8	L1661656-15	L1661656-17	L1661656-19
		Description	Sediment	Sediment	Sediment	Sediment	Sediment
		Sampled Date	18-AUG-15	19-AUG-15	13-AUG-15	14-AUG-15	14-AUG-15
		Sampled Time					
		Client ID	PREFI-01	PREFI-03	POL-P2-1	POL-P2-2	POL-P2-3
Grouping	Analyte						
SOIL							
Organic Bound Metals	Selenium (Se)-Leachable (mg/kg)	0.91	0.82	4.28	4.99	4.07	
	Silver (Ag)-Leachable (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Strontium (Sr)-Leachable (mg/kg)	4.35	4.53	13.1	16.0	15.8	
	Thallium (Tl)-Leachable (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Tin (Sn)-Leachable (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0	
	Titanium (Ti)-Leachable (mg/kg)	6.5	5.9	2.0	5.9	3.6	
	Uranium (U)-Leachable (mg/kg)	0.164	0.152	0.372	0.852	0.589	
	Vanadium (V)-Leachable (mg/kg)	3.16	3.12	7.78	36.8	20.8	
Zinc (Zn)-Leachable (mg/kg)	8.9	7.6	10.9	21.6	14.4		
Residual Metals	Aluminum (Al)-Leachable (mg/kg)	13500	14600	24300	18300	23600	
	Antimony (Sb)-Leachable (mg/kg)	0.33	0.32	0.85	0.66	0.66	
	Arsenic (As)-Leachable (mg/kg)	5.91	6.40	11.6	6.97	9.02	
	Barium (Ba)-Leachable (mg/kg)	70.1	81.2	148	111	127	
	Beryllium (Be)-Leachable (mg/kg)	<0.20	<0.20	0.56	0.34	0.47	
	Bismuth (Bi)-Leachable (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Cadmium (Cd)-Leachable (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050	
	Calcium (Ca)-Leachable (mg/kg)	4170	4260	11000	4810	7940	
	Chromium (Cr)-Leachable (mg/kg)	46.5	48.9	17.7	23.8	21.2	
	Cobalt (Co)-Leachable (mg/kg)	7.34	7.75	18.1	10.1	15.1	
	Copper (Cu)-Leachable (mg/kg)	33.0	34.1	151	94.4	135	
	Iron (Fe)-Leachable (mg/kg)	22500	23400	26900	18300	23000	
	Lead (Pb)-Leachable (mg/kg)	4.09	4.35	4.83	4.61	4.70	
	Lithium (Li)-Leachable (mg/kg)	10.4	10.8	19.8	14.8	20.7	
	Manganese (Mn)-Leachable (mg/kg)	200	212	577	324	462	
	Molybdenum (Mo)-Leachable (mg/kg)	0.92	0.81	3.16	3.01	3.25	
	Nickel (Ni)-Leachable (mg/kg)	24.9	26.4	15.7	16.3	17.4	
	Selenium (Se)-Leachable (mg/kg)	<0.20	<0.20	0.22	<0.20	<0.20	
	Silver (Ag)-Leachable (mg/kg)	<0.10	<0.10	0.38	0.36	0.43	
	Strontium (Sr)-Leachable (mg/kg)	38.5	40.4	72.4	40.6	52.7	
	Thallium (Tl)-Leachable (mg/kg)	0.125	0.138	<0.050	0.061	0.053	
	Tin (Sn)-Leachable (mg/kg)	2.6	2.8	4.7	3.5	4.1	
	Titanium (Ti)-Leachable (mg/kg)	956	1020	2060	1310	1500	
	Uranium (U)-Leachable (mg/kg)	0.511	0.571	0.828	0.494	0.610	
Vanadium (V)-Leachable (mg/kg)	53.6	56.3	97.5	52.5	69.9		
Zinc (Zn)-Leachable (mg/kg)	53.2	55.6	66.2	45.7	59.8		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1661656-21 Sediment 14-AUG-15 POL-P2-4	L1661656-23 Sediment 15-AUG-15 POL-P2-5	L1661656-25 Sediment 16-AUG-15 BOL-B2-1	L1661656-27 Sediment 16-AUG-15 BOL-B2-2	L1661656-29 Sediment 16-AUG-15 BOL-B2-3
Grouping	Analyte					
SOIL						
Organic Bound Metals	Selenium (Se)-Leachable (mg/kg)	4.57	4.41	2.82	2.89	2.65
	Silver (Ag)-Leachable (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Strontium (Sr)-Leachable (mg/kg)	17.7	17.0	5.98	7.11	5.88
	Thallium (Tl)-Leachable (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Tin (Sn)-Leachable (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti)-Leachable (mg/kg)	4.8	4.4	2.2	3.6	2.8
	Uranium (U)-Leachable (mg/kg)	0.710	0.717	0.671	0.961	0.778
	Vanadium (V)-Leachable (mg/kg)	23.5	30.6	25.2	30.2	25.7
	Zinc (Zn)-Leachable (mg/kg)	17.3	18.1	18.1	23.2	18.6
Residual Metals	Aluminum (Al)-Leachable (mg/kg)	21600	20200	13700	14500	13900
	Antimony (Sb)-Leachable (mg/kg)	0.67	0.72	0.86	0.94	0.93
	Arsenic (As)-Leachable (mg/kg)	7.56	7.94	4.39	5.06	4.45
	Barium (Ba)-Leachable (mg/kg)	111	120	98.5	84.3	82.0
	Beryllium (Be)-Leachable (mg/kg)	0.41	0.38	0.21	<0.20	<0.20
	Bismuth (Bi)-Leachable (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Leachable (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Calcium (Ca)-Leachable (mg/kg)	6730	6470	1870	1750	1760
	Chromium (Cr)-Leachable (mg/kg)	21.2	21.9	19.5	20.4	19.8
	Cobalt (Co)-Leachable (mg/kg)	11.4	11.5	4.42	4.62	4.54
	Copper (Cu)-Leachable (mg/kg)	108	107	65.7	68.8	66.2
	Iron (Fe)-Leachable (mg/kg)	19300	20800	16300	15400	14800
	Lead (Pb)-Leachable (mg/kg)	4.75	4.37	6.99	7.09	6.64
	Lithium (Li)-Leachable (mg/kg)	17.1	16.4	8.8	8.6	8.2
	Manganese (Mn)-Leachable (mg/kg)	364	362	150	149	146
	Molybdenum (Mo)-Leachable (mg/kg)	3.09	2.67	0.92	1.23	0.91
	Nickel (Ni)-Leachable (mg/kg)	15.8	15.9	12.1	12.7	12.5
	Selenium (Se)-Leachable (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Silver (Ag)-Leachable (mg/kg)	0.36	0.40	0.38	0.44	0.41
	Strontium (Sr)-Leachable (mg/kg)	49.6	46.2	24.2	25.2	24.1
	Thallium (Tl)-Leachable (mg/kg)	0.055	0.054	0.057	0.074	0.061
	Tin (Sn)-Leachable (mg/kg)	3.8	3.7	2.5	2.8	2.8
	Titanium (Ti)-Leachable (mg/kg)	1340	1390	593	642	617
	Uranium (U)-Leachable (mg/kg)	0.520	0.541	0.444	0.392	0.404
	Vanadium (V)-Leachable (mg/kg)	55.8	61.1	29.2	30.2	29.8
	Zinc (Zn)-Leachable (mg/kg)	47.8	49.0	32.1	33.0	32.5

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1661656-33 Sediment 16-AUG-15 BOL-BX	L1661656-34 Sediment 17-AUG-15 PNF-01 (SEM/AVS)	L1661656-35 Sediment 17-AUG-15 PNF-01X (SEM/AVS)	L1661656-36 Sediment 14-AUG-15 PNF-02 (SEM/AVS)	L1661656-37 Sediment 15-AUG-15 PNF-03 (SEM/AVS)
Grouping	Analyte					
SOIL						
Organic Bound Metals	Selenium (Se)-Leachable (mg/kg)	2.66				
	Silver (Ag)-Leachable (mg/kg)	<0.10				
	Strontium (Sr)-Leachable (mg/kg)	5.99				
	Thallium (Tl)-Leachable (mg/kg)	<0.050				
	Tin (Sn)-Leachable (mg/kg)	<2.0				
	Titanium (Ti)-Leachable (mg/kg)	2.1				
	Uranium (U)-Leachable (mg/kg)	0.736				
	Vanadium (V)-Leachable (mg/kg)	24.8				
	Zinc (Zn)-Leachable (mg/kg)	17.6				
Residual Metals	Aluminum (Al)-Leachable (mg/kg)	13500				
	Antimony (Sb)-Leachable (mg/kg)	0.88				
	Arsenic (As)-Leachable (mg/kg)	4.14				
	Barium (Ba)-Leachable (mg/kg)	81.7				
	Beryllium (Be)-Leachable (mg/kg)	<0.20				
	Bismuth (Bi)-Leachable (mg/kg)	<0.20				
	Cadmium (Cd)-Leachable (mg/kg)	<0.050				
	Calcium (Ca)-Leachable (mg/kg)	1750				
	Chromium (Cr)-Leachable (mg/kg)	18.9				
	Cobalt (Co)-Leachable (mg/kg)	4.40				
	Copper (Cu)-Leachable (mg/kg)	64.4				
	Iron (Fe)-Leachable (mg/kg)	14500				
	Lead (Pb)-Leachable (mg/kg)	5.93				
	Lithium (Li)-Leachable (mg/kg)	8.3				
	Manganese (Mn)-Leachable (mg/kg)	140				
	Molybdenum (Mo)-Leachable (mg/kg)	0.84				
	Nickel (Ni)-Leachable (mg/kg)	11.8				
	Selenium (Se)-Leachable (mg/kg)	<0.20				
	Silver (Ag)-Leachable (mg/kg)	0.38				
	Strontium (Sr)-Leachable (mg/kg)	23.6				
	Thallium (Tl)-Leachable (mg/kg)	0.055				
	Tin (Sn)-Leachable (mg/kg)	2.5				
	Titanium (Ti)-Leachable (mg/kg)	581				
	Uranium (U)-Leachable (mg/kg)	0.359				
	Vanadium (V)-Leachable (mg/kg)	28.4				
	Zinc (Zn)-Leachable (mg/kg)	32.1				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1661656-38 Sediment 15-AUG-15 PNF-04 (SEM/AVS)	L1661656-39 Sediment 16-AUG-15 PNF-05 (SEM/AVS)	L1661656-40 Sediment 18-AUG-15 PREFI-01 (SEM/AVS)	L1661656-41 Sediment 18-AUG-15 PREFI-02 (SEM/AVS)	L1661656-42 Sediment 19-AUG-15 PREFI-03 (SEM/AVS)
Grouping	Analyte					
SOIL						
Organic Bound Metals	Selenium (Se)-Leachable (mg/kg) Silver (Ag)-Leachable (mg/kg) Strontium (Sr)-Leachable (mg/kg) Thallium (Tl)-Leachable (mg/kg) Tin (Sn)-Leachable (mg/kg) Titanium (Ti)-Leachable (mg/kg) Uranium (U)-Leachable (mg/kg) Vanadium (V)-Leachable (mg/kg) Zinc (Zn)-Leachable (mg/kg)					
Residual Metals	Aluminum (Al)-Leachable (mg/kg) Antimony (Sb)-Leachable (mg/kg) Arsenic (As)-Leachable (mg/kg) Barium (Ba)-Leachable (mg/kg) Beryllium (Be)-Leachable (mg/kg) Bismuth (Bi)-Leachable (mg/kg) Cadmium (Cd)-Leachable (mg/kg) Calcium (Ca)-Leachable (mg/kg) Chromium (Cr)-Leachable (mg/kg) Cobalt (Co)-Leachable (mg/kg) Copper (Cu)-Leachable (mg/kg) Iron (Fe)-Leachable (mg/kg) Lead (Pb)-Leachable (mg/kg) Lithium (Li)-Leachable (mg/kg) Manganese (Mn)-Leachable (mg/kg) Molybdenum (Mo)-Leachable (mg/kg) Nickel (Ni)-Leachable (mg/kg) Selenium (Se)-Leachable (mg/kg) Silver (Ag)-Leachable (mg/kg) Strontium (Sr)-Leachable (mg/kg) Thallium (Tl)-Leachable (mg/kg) Tin (Sn)-Leachable (mg/kg) Titanium (Ti)-Leachable (mg/kg) Uranium (U)-Leachable (mg/kg) Vanadium (V)-Leachable (mg/kg) Zinc (Zn)-Leachable (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1661656-43 Sediment 13-AUG-15 POL-P2-1 (SEM/AVS)	L1661656-44 Sediment 14-AUG-15 POL-P2-2 (SEM/AVS)	L1661656-45 Sediment 14-AUG-15 POL-P2-3 (SEM/AVS)	L1661656-46 Sediment 14-AUG-15 POL-P2-4 (SEM/AVS)	L1661656-47 Sediment 15-AUG-15 POL-P2-5 (SEM/AVS)
Grouping	Analyte					
SOIL						
Organic Bound Metals	Selenium (Se)-Leachable (mg/kg) Silver (Ag)-Leachable (mg/kg) Strontium (Sr)-Leachable (mg/kg) Thallium (Tl)-Leachable (mg/kg) Tin (Sn)-Leachable (mg/kg) Titanium (Ti)-Leachable (mg/kg) Uranium (U)-Leachable (mg/kg) Vanadium (V)-Leachable (mg/kg) Zinc (Zn)-Leachable (mg/kg)					
Residual Metals	Aluminum (Al)-Leachable (mg/kg) Antimony (Sb)-Leachable (mg/kg) Arsenic (As)-Leachable (mg/kg) Barium (Ba)-Leachable (mg/kg) Beryllium (Be)-Leachable (mg/kg) Bismuth (Bi)-Leachable (mg/kg) Cadmium (Cd)-Leachable (mg/kg) Calcium (Ca)-Leachable (mg/kg) Chromium (Cr)-Leachable (mg/kg) Cobalt (Co)-Leachable (mg/kg) Copper (Cu)-Leachable (mg/kg) Iron (Fe)-Leachable (mg/kg) Lead (Pb)-Leachable (mg/kg) Lithium (Li)-Leachable (mg/kg) Manganese (Mn)-Leachable (mg/kg) Molybdenum (Mo)-Leachable (mg/kg) Nickel (Ni)-Leachable (mg/kg) Selenium (Se)-Leachable (mg/kg) Silver (Ag)-Leachable (mg/kg) Strontium (Sr)-Leachable (mg/kg) Thallium (Tl)-Leachable (mg/kg) Tin (Sn)-Leachable (mg/kg) Titanium (Ti)-Leachable (mg/kg) Uranium (U)-Leachable (mg/kg) Vanadium (V)-Leachable (mg/kg) Zinc (Zn)-Leachable (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1661656-48 Sediment 16-AUG-15 BOL-B2-1 (SEM/AVS)	L1661656-49 Sediment 16-AUG-15 BOL-B2-2 (SEM/AVS)	L1661656-50 Sediment 16-AUG-15 BOL-B2-3 (SEM/AVS)	L1661656-51 Sediment 16-AUG-15 BOL-B2-4 (SEM/AVS)	L1661656-52 Sediment 16-AUG-15 BOL-B2-5 (SEM/AVS)
Grouping	Analyte					
SOIL						
Organic Bound Metals	Selenium (Se)-Leachable (mg/kg) Silver (Ag)-Leachable (mg/kg) Strontium (Sr)-Leachable (mg/kg) Thallium (Tl)-Leachable (mg/kg) Tin (Sn)-Leachable (mg/kg) Titanium (Ti)-Leachable (mg/kg) Uranium (U)-Leachable (mg/kg) Vanadium (V)-Leachable (mg/kg) Zinc (Zn)-Leachable (mg/kg)					
Residual Metals	Aluminum (Al)-Leachable (mg/kg) Antimony (Sb)-Leachable (mg/kg) Arsenic (As)-Leachable (mg/kg) Barium (Ba)-Leachable (mg/kg) Beryllium (Be)-Leachable (mg/kg) Bismuth (Bi)-Leachable (mg/kg) Cadmium (Cd)-Leachable (mg/kg) Calcium (Ca)-Leachable (mg/kg) Chromium (Cr)-Leachable (mg/kg) Cobalt (Co)-Leachable (mg/kg) Copper (Cu)-Leachable (mg/kg) Iron (Fe)-Leachable (mg/kg) Lead (Pb)-Leachable (mg/kg) Lithium (Li)-Leachable (mg/kg) Manganese (Mn)-Leachable (mg/kg) Molybdenum (Mo)-Leachable (mg/kg) Nickel (Ni)-Leachable (mg/kg) Selenium (Se)-Leachable (mg/kg) Silver (Ag)-Leachable (mg/kg) Strontium (Sr)-Leachable (mg/kg) Thallium (Tl)-Leachable (mg/kg) Tin (Sn)-Leachable (mg/kg) Titanium (Ti)-Leachable (mg/kg) Uranium (U)-Leachable (mg/kg) Vanadium (V)-Leachable (mg/kg) Zinc (Zn)-Leachable (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID				
	L1661656-53 Sediment 16-AUG-15 BOL-BX (SEM/AVS)				
Grouping	Analyte				
SOIL					
Organic Bound Metals	Selenium (Se)-Leachable (mg/kg) Silver (Ag)-Leachable (mg/kg) Strontium (Sr)-Leachable (mg/kg) Thallium (Tl)-Leachable (mg/kg) Tin (Sn)-Leachable (mg/kg) Titanium (Ti)-Leachable (mg/kg) Uranium (U)-Leachable (mg/kg) Vanadium (V)-Leachable (mg/kg) Zinc (Zn)-Leachable (mg/kg)				
Residual Metals	Aluminum (Al)-Leachable (mg/kg) Antimony (Sb)-Leachable (mg/kg) Arsenic (As)-Leachable (mg/kg) Barium (Ba)-Leachable (mg/kg) Beryllium (Be)-Leachable (mg/kg) Bismuth (Bi)-Leachable (mg/kg) Cadmium (Cd)-Leachable (mg/kg) Calcium (Ca)-Leachable (mg/kg) Chromium (Cr)-Leachable (mg/kg) Cobalt (Co)-Leachable (mg/kg) Copper (Cu)-Leachable (mg/kg) Iron (Fe)-Leachable (mg/kg) Lead (Pb)-Leachable (mg/kg) Lithium (Li)-Leachable (mg/kg) Manganese (Mn)-Leachable (mg/kg) Molybdenum (Mo)-Leachable (mg/kg) Nickel (Ni)-Leachable (mg/kg) Selenium (Se)-Leachable (mg/kg) Silver (Ag)-Leachable (mg/kg) Strontium (Sr)-Leachable (mg/kg) Thallium (Tl)-Leachable (mg/kg) Tin (Sn)-Leachable (mg/kg) Titanium (Ti)-Leachable (mg/kg) Uranium (U)-Leachable (mg/kg) Vanadium (V)-Leachable (mg/kg) Zinc (Zn)-Leachable (mg/kg)				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Calcium (Ca)-Leachable	B	L1661656-1, -15, -17, -3, -4, -5, -6, -7, -8
Method Blank	Strontium (Sr)-Leachable	B	L1661656-1, -15, -17, -3, -4, -5, -6, -7, -8
Method Blank	Calcium (Ca)-Leachable	B	L1661656-19, -21, -23, -25, -27, -29, -33
Method Blank	Strontium (Sr)-Leachable	B	L1661656-19, -21, -23, -25, -27, -29, -33
Duplicate	Nickel (Ni)-Leachable	DLB	L1661656-19, -21, -23, -25, -27, -29, -33
Method Blank	Nickel (Ni)-Leachable	MB-LOR	L1661656-1, -15, -17, -3, -4, -5, -6, -7, -8
Method Blank	Nickel (Ni)-Leachable	MB-LOR	L1661656-19, -21, -23, -25, -27, -29, -33

Qualifiers for Individual Parameters Listed:

Qualifier	Description
B	Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable.
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DLHM	Detection Limit Adjusted: Sample has High Moisture Content
DLM	Detection Limit Adjusted due to sample matrix effects.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
AVS-COL-VA	Soil	Acid volatile sulphide by colourimetric	EPA 821/R-91-100
This analysis was carried out in accordance with the method described in EPA 821/R-91-100. In summary, hydrochloric acid is added to the sediment samples within a purge and trap system. The evolved hydrogen sulphide (H ₂ S) is carried into a basic zinc acetate (ZnAc) solution by argon gas. The acid volatile sulfide is then determined colourimetrically.			
C-TOT-63UM-LECO-SK	Soil	Total Carbon by combustion method (63um)	SSSA (1996) P. 973-974
The sample is ignited in a combustion analyzer where carbon in the reduced CO ₂ gas is determined using a thermal conductivity detector.			
C-TOT-ORG-63UM-SK	Soil	Organic Carbon by combustion method(63um)	SSSA (1996) p. 973
Total Organic Carbon (C-TOT-ORG-LECO-SK, C-TOT-ORG-SK)			
Total C and inorganic C are determined on separate samples. The total C is determined by combustion and thermal conductivity detection, while inorganic C is determined by weight loss after addition of hydrochloric acid. Organic C is calculated by the difference between these two determinations.			
Reference for Total C: Nelson, D.W. and Sommers, L.E. 1996. Total Carbon, organic carbon and organic matter. P. 961-1010 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5			
Reference for Inorganic C: Loeppert, R.H. and Suarez, D.L. 1996. Gravimetric Method for Loss of Carbon Dioxide. P. 455-456 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5			
HG-63UM-CVAF-VA	Soil	Hg in Soil by CVAFS	EPA 200.2/245.7
This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 63 um (230 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).			
Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.			
Deviation from Reference Method: This procedure deviates from the BC CSR SALM method, which specifies sieving to 2 mm (10 mesh).			
HG-SEM-CVAFS-VA	Soil	Simultaneously Extracted Metals in Soil	EPA 821/R-91-100; EPA245.7
This analysis was carried out in accordance with the method described in EPA 821/R-91-100. In summary, hydrochloric acid is added to the sediment samples within a purge and trap system. The extract produced from the addition of the acid is then analyzed for simultaneously extracted metals (SEM) using atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA 245.7).			
MET-63UM-CCMS-VA	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A
This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of			

Reference Information

Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 63 um (230 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MET-SEM-ICP-VA Soil Simultaneously Extracted Metals (ICPOES) EPA 821/R-91-100; EPA 6010B

This analysis was carried out in accordance with the method described in EPA 821/R-91-100. In summary, hydrochloric acid is added to the sediment samples within a purge and trap system. The extract produced from the addition of the acid is then analyzed for simultaneously extracted metals (SEM) using inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TESS-CM-CCMS-VA Soil METALS BY CCMS (TESSIER EXTRACTION #2) Tessier Extraction 1979/EPA 6020A

This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For Extraction #2, the extraction solution is 1M Sodium Acetate adjusted to pH 5 and is intended to extract the "Carbonate" metals.

MET-TESS-EA-CCMS-VA Soil METALS BY CCMS (TESSIER EXTRACTION #1) Tessier Extraction 1979/EPA 6020A

This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For Extraction #1, the extraction solution is 1M Magnesium Chloride and is intended to extract the "Exchangeable and Adsorbed" metals.

MET-TESS-FEO-CCMS-VA Soil METALS BY CCMS (TESSIER EXTRACTION #3) Tessier Extraction 1979/EPA 6020A

This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For Extraction #3, the extraction solution is 0.1 M Hydroxylamine Hydrochloride in 25% v/v Acetic Acid and is intended to extract the Easily Reducible Metals and Iron Oxides .

MET-TESS-OB-CCMS-VA Soil METALS BY CCMS (TESSIER EXTRACTION #4) Tessier Extraction 1979/EPA 6020A

"This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For Extraction #4, the extraction solution is 0.02 M Nitric Acid followed by 3.2M Ammonium Acetate and is intended to extract the Organic Bound metals.

MET-TESS-RM-CCMS-VA Soil METALS BY CCMS (TESSIER RM EXTRACTION) Tessier Extraction 1979/EPA 6020A

"This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with up to 6 different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For the Tessier "RM" Extraction, the extraction solution is 50/50 mix of 1:1 Nitric Acid along with 1:1 Hydrochloric Acid, and is hot block digested as per the BC SALM procedure. This is intended to extract the Residual metals.

MOISTURE-VA Soil Moisture content ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

N-TOT-LECO-SK Soil Total Nitrogen by combustion method SSSA (1996) P. 973-974

Reference Information

The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

PSA-PIPET+GRAVEL-SK Soil Particle size - Sieve and Pipette SSIR-51 METHOD 3.2.1

Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

S-TOT-LECO-SK Soil Total Sulphur by combustion method ISO 15178:2000

The sample is ignited in a combustion analyzer where sulfur in the reduced SO₂ gas is determined using a thermal conductivity detector.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1661656

Report Date: 06-OCT-15

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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
AVS-COL-VA								
	Soil							
Batch	R3257928							
WG2157923-4	DUP	L1661656-36						
Acid Volatile Sulphides		<0.40	<0.40	RPD-NA	umol/g	N/A	45	26-AUG-15
WG2157923-3	LCS							
Acid Volatile Sulphides			98.7		%		70-130	26-AUG-15
WG2157923-1	MB							
Acid Volatile Sulphides			<0.20		umol/g		0.2	26-AUG-15
HG-SEM-CVAFS-VA								
	Soil							
Batch	R3256201							
WG2157923-2	CRM	VA-NRC-MESS3						
Mercury (Hg)-Extractable			102.6		%		70-130	28-AUG-15
WG2157923-4	DUP	L1661656-36						
Mercury (Hg)-Extractable		<0.000050	<0.000050	RPD-NA	umol/g	N/A	30	28-AUG-15
WG2157923-1	MB							
Mercury (Hg)-Extractable			<0.000050		umol/g		0.00005	28-AUG-15
MET-SEM-ICP-VA								
	Soil							
Batch	R3255177							
WG2157923-2	CRM	VA-NRC-MESS3						
Copper (Cu)-Extractable			108.6		%		70-130	27-AUG-15
Lead (Pb)-Extractable			102.0		%		70-130	27-AUG-15
Nickel (Ni)-Extractable			93.0		%		70-130	27-AUG-15
Zinc (Zn)-Extractable			106.8		%		70-130	27-AUG-15
WG2157923-4	DUP	L1661656-36						
Cadmium (Cd)-Extractable		<0.010	<0.010	RPD-NA	umol/g	N/A	30	27-AUG-15
Copper (Cu)-Extractable		12.9	12.7		umol/g	1.5	30	27-AUG-15
Lead (Pb)-Extractable		<0.040	<0.040	RPD-NA	umol/g	N/A	30	27-AUG-15
Nickel (Ni)-Extractable		<0.10	<0.10	RPD-NA	umol/g	N/A	30	27-AUG-15
Zinc (Zn)-Extractable		0.268	0.269		umol/g	0.2	30	27-AUG-15
WG2157923-1	MB							
Cadmium (Cd)-Extractable			<0.0050		umol/g		0.005	27-AUG-15
Copper (Cu)-Extractable			<0.010		umol/g		0.01	27-AUG-15
Lead (Pb)-Extractable			<0.020		umol/g		0.02	27-AUG-15
Nickel (Ni)-Extractable			<0.050		umol/g		0.05	27-AUG-15
Zinc (Zn)-Extractable			<0.0050		umol/g		0.005	27-AUG-15
MET-TESS-CM-CCMS-VA								
	Soil							



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Client: MOUNT POLLEY MINING CORP.
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 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-CM-CCMS-VA Soil								
Batch	R3267103							
WG2164669-4 DUP		L1661656-4						
Aluminum (Al)-Leachable		134	145		mg/kg	7.6	30	15-SEP-15
Antimony (Sb)-Leachable		<0.10	<0.10	RPD-NA	mg/kg	N/A	30	15-SEP-15
Arsenic (As)-Leachable		0.111	0.113		mg/kg	2.3	30	15-SEP-15
Barium (Ba)-Leachable		81.9	86.9		mg/kg	6.0	30	15-SEP-15
Beryllium (Be)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	15-SEP-15
Bismuth (Bi)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	15-SEP-15
Cadmium (Cd)-Leachable		0.071	0.072		mg/kg	2.2	30	15-SEP-15
Calcium (Ca)-Leachable		10200	10800		mg/kg	5.7	30	15-SEP-15
Chromium (Cr)-Leachable		<5.0	<5.0	RPD-NA	mg/kg	N/A	30	15-SEP-15
Cobalt (Co)-Leachable		0.49	0.49		mg/kg	1.2	30	15-SEP-15
Copper (Cu)-Leachable		90.8	94.9		mg/kg	4.3	30	15-SEP-15
Iron (Fe)-Leachable		151	153		mg/kg	1.4	30	15-SEP-15
Lead (Pb)-Leachable		1.23	1.25		mg/kg	1.9	30	15-SEP-15
Lithium (Li)-Leachable		<5.0	<5.0	RPD-NA	mg/kg	N/A	30	15-SEP-15
Manganese (Mn)-Leachable		138	145		mg/kg	5.1	30	15-SEP-15
Molybdenum (Mo)-Leachable		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	15-SEP-15
Nickel (Ni)-Leachable		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	15-SEP-15
Phosphorus (P)-Leachable		<50	<50	RPD-NA	mg/kg	N/A	30	15-SEP-15
Selenium (Se)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	15-SEP-15
Silver (Ag)-Leachable		<0.10	<0.10	RPD-NA	mg/kg	N/A	30	15-SEP-15
Strontium (Sr)-Leachable		77.6	81.3		mg/kg	4.8	30	15-SEP-15
Thallium (Tl)-Leachable		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	15-SEP-15
Tin (Sn)-Leachable		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	15-SEP-15
Titanium (Ti)-Leachable		<5.0	<5.0	RPD-NA	mg/kg	N/A	30	15-SEP-15
Uranium (U)-Leachable		0.108	0.111		mg/kg	3.1	30	15-SEP-15
Vanadium (V)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	15-SEP-15
Zinc (Zn)-Leachable		1.7	1.7		mg/kg	1.7	30	15-SEP-15
WG2164669-2 LCS								
Aluminum (Al)-Leachable			99.7		%		70-130	15-SEP-15
Antimony (Sb)-Leachable			102.4		%		70-130	15-SEP-15
Arsenic (As)-Leachable			102.0		%		70-130	15-SEP-15
Barium (Ba)-Leachable			98.9		%		70-130	15-SEP-15
Beryllium (Be)-Leachable			97.9		%		70-130	15-SEP-15



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-CM-CCMS-VA Soil								
Batch	R3267103							
WG2164669-2	LCS							
Bismuth (Bi)-Leachable			91.9		%		70-130	15-SEP-15
Cadmium (Cd)-Leachable			100.5		%		70-130	15-SEP-15
Calcium (Ca)-Leachable			96.6		%		70-130	15-SEP-15
Chromium (Cr)-Leachable			94.1		%		70-130	15-SEP-15
Cobalt (Co)-Leachable			95.4		%		70-130	15-SEP-15
Copper (Cu)-Leachable			92.2		%		70-130	15-SEP-15
Iron (Fe)-Leachable			93.8		%		70-130	15-SEP-15
Lead (Pb)-Leachable			94.9		%		70-130	15-SEP-15
Lithium (Li)-Leachable			95.6		%		70-130	15-SEP-15
Manganese (Mn)-Leachable			95.6		%		70-130	15-SEP-15
Molybdenum (Mo)-Leachable			98.5		%		70-130	15-SEP-15
Nickel (Ni)-Leachable			94.1		%		70-130	15-SEP-15
Phosphorus (P)-Leachable			98.1		%		70-130	15-SEP-15
Selenium (Se)-Leachable			99.98		%		70-130	15-SEP-15
Silver (Ag)-Leachable			100.4		%		70-130	15-SEP-15
Strontium (Sr)-Leachable			97.6		%		70-130	15-SEP-15
Thallium (Tl)-Leachable			93.9		%		70-130	15-SEP-15
Tin (Sn)-Leachable			100.1		%		70-130	15-SEP-15
Titanium (Ti)-Leachable			90.6		%		70-130	15-SEP-15
Uranium (U)-Leachable			97.5		%		70-130	15-SEP-15
Vanadium (V)-Leachable			98.8		%		70-130	15-SEP-15
Zinc (Zn)-Leachable			93.1		%		70-130	15-SEP-15
WG2164669-1	MB							
Aluminum (Al)-Leachable			<50		mg/kg		50	15-SEP-15
Antimony (Sb)-Leachable			<0.10		mg/kg		0.1	15-SEP-15
Arsenic (As)-Leachable			<0.050		mg/kg		0.05	15-SEP-15
Barium (Ba)-Leachable			<2.0		mg/kg		2	15-SEP-15
Beryllium (Be)-Leachable			<0.20		mg/kg		0.2	15-SEP-15
Bismuth (Bi)-Leachable			<0.20		mg/kg		0.2	15-SEP-15
Cadmium (Cd)-Leachable			<0.050		mg/kg		0.05	15-SEP-15
Calcium (Ca)-Leachable			<50		mg/kg		50	15-SEP-15
Chromium (Cr)-Leachable			<5.0		mg/kg		5	15-SEP-15
Cobalt (Co)-Leachable			<0.10		mg/kg		0.1	15-SEP-15
Copper (Cu)-Leachable			<0.50		mg/kg		0.5	15-SEP-15



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Client: MOUNT POLLEY MINING CORP.
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-CM-CCMS-VA Soil								
Batch R3267103								
WG2164669-1 MB								
Iron (Fe)-Leachable			<50		mg/kg		50	15-SEP-15
Lead (Pb)-Leachable			<0.50		mg/kg		0.5	15-SEP-15
Lithium (Li)-Leachable			<5.0		mg/kg		5	15-SEP-15
Manganese (Mn)-Leachable			<5.0		mg/kg		5	15-SEP-15
Molybdenum (Mo)-Leachable			<0.50		mg/kg		0.5	15-SEP-15
Nickel (Ni)-Leachable			<2.0		mg/kg		2	15-SEP-15
Phosphorus (P)-Leachable			<50		mg/kg		50	15-SEP-15
Selenium (Se)-Leachable			<0.20		mg/kg		0.2	15-SEP-15
Silver (Ag)-Leachable			<0.10		mg/kg		0.1	15-SEP-15
Strontium (Sr)-Leachable			<5.0		mg/kg		5	15-SEP-15
Thallium (Tl)-Leachable			<0.050		mg/kg		0.05	15-SEP-15
Tin (Sn)-Leachable			<2.0		mg/kg		2	15-SEP-15
Titanium (Ti)-Leachable			<5.0		mg/kg		5	15-SEP-15
Uranium (U)-Leachable			<0.050		mg/kg		0.05	15-SEP-15
Vanadium (V)-Leachable			<0.20		mg/kg		0.2	15-SEP-15
Zinc (Zn)-Leachable			<1.0		mg/kg		1	15-SEP-15
Batch R3268728								
WG2168741-4 DUP								
		L1664712-13						
Aluminum (Al)-Leachable		<50	<50	RPD-NA	mg/kg	N/A	30	16-SEP-15
Antimony (Sb)-Leachable		<0.10	<0.10	RPD-NA	mg/kg	N/A	30	16-SEP-15
Arsenic (As)-Leachable		0.253	0.263		mg/kg	3.9	30	16-SEP-15
Barium (Ba)-Leachable		14.8	15.5		mg/kg	4.1	30	16-SEP-15
Beryllium (Be)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	16-SEP-15
Bismuth (Bi)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	16-SEP-15
Cadmium (Cd)-Leachable		0.061	0.063		mg/kg	2.5	30	16-SEP-15
Calcium (Ca)-Leachable		263	280		mg/kg	6.5	30	16-SEP-15
Chromium (Cr)-Leachable		<5.0	<5.0	RPD-NA	mg/kg	N/A	30	16-SEP-15
Cobalt (Co)-Leachable		0.44	0.46		mg/kg	4.3	30	16-SEP-15
Copper (Cu)-Leachable		2.27	2.38		mg/kg	4.5	30	16-SEP-15
Iron (Fe)-Leachable		421	425		mg/kg	1.0	30	16-SEP-15
Lead (Pb)-Leachable		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	16-SEP-15
Lithium (Li)-Leachable		<5.0	<5.0	RPD-NA	mg/kg	N/A	30	16-SEP-15
Manganese (Mn)-Leachable		32.9	35.5		mg/kg	7.7	30	16-SEP-15



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Client: MOUNT POLLEY MINING CORP.
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-CM-CCMS-VA Soil								
Batch	R3268728							
WG2168741-4 DUP		L1664712-13						
Molybdenum (Mo)-Leachable		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	16-SEP-15
Nickel (Ni)-Leachable		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	16-SEP-15
Phosphorus (P)-Leachable		<50	<50	RPD-NA	mg/kg	N/A	30	16-SEP-15
Selenium (Se)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	16-SEP-15
Silver (Ag)-Leachable		<0.10	<0.10	RPD-NA	mg/kg	N/A	30	16-SEP-15
Strontium (Sr)-Leachable		<5.0	5.2	RPD-NA	mg/kg	N/A	30	16-SEP-15
Thallium (Tl)-Leachable		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	16-SEP-15
Tin (Sn)-Leachable		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	16-SEP-15
Titanium (Ti)-Leachable		<5.0	<5.0	RPD-NA	mg/kg	N/A	30	16-SEP-15
Uranium (U)-Leachable		0.327	0.341		mg/kg	4.3	30	16-SEP-15
Vanadium (V)-Leachable		0.38	0.41		mg/kg	7.3	30	16-SEP-15
Zinc (Zn)-Leachable		1.2	1.3		mg/kg	8.7	30	16-SEP-15
WG2168741-2 LCS								
Aluminum (Al)-Leachable			100.4		%		70-130	16-SEP-15
Antimony (Sb)-Leachable			96.5		%		70-130	16-SEP-15
Arsenic (As)-Leachable			104.8		%		70-130	16-SEP-15
Barium (Ba)-Leachable			101.0		%		70-130	16-SEP-15
Beryllium (Be)-Leachable			102.1		%		70-130	16-SEP-15
Bismuth (Bi)-Leachable			96.9		%		70-130	16-SEP-15
Cadmium (Cd)-Leachable			98.2		%		70-130	16-SEP-15
Calcium (Ca)-Leachable			91.9		%		70-130	16-SEP-15
Chromium (Cr)-Leachable			98.0		%		70-130	16-SEP-15
Cobalt (Co)-Leachable			99.1		%		70-130	16-SEP-15
Copper (Cu)-Leachable			94.6		%		70-130	16-SEP-15
Iron (Fe)-Leachable			98.5		%		70-130	16-SEP-15
Lead (Pb)-Leachable			98.3		%		70-130	16-SEP-15
Lithium (Li)-Leachable			112.1		%		70-130	16-SEP-15
Manganese (Mn)-Leachable			103.3		%		70-130	16-SEP-15
Molybdenum (Mo)-Leachable			96.6		%		70-130	16-SEP-15
Nickel (Ni)-Leachable			96.7		%		70-130	16-SEP-15
Phosphorus (P)-Leachable			107.4		%		70-130	16-SEP-15
Selenium (Se)-Leachable			101.7		%		70-130	16-SEP-15
Silver (Ag)-Leachable			99.4		%		70-130	16-SEP-15



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Client: MOUNT POLLEY MINING CORP.
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-CM-CCMS-VA Soil								
Batch R3268728								
WG2168741-2 LCS								
Strontium (Sr)-Leachable			96.3		%		70-130	16-SEP-15
Thallium (Tl)-Leachable			94.1		%		70-130	16-SEP-15
Tin (Sn)-Leachable			96.9		%		70-130	16-SEP-15
Titanium (Ti)-Leachable			101.1		%		70-130	16-SEP-15
Uranium (U)-Leachable			102.2		%		70-130	16-SEP-15
Vanadium (V)-Leachable			102.2		%		70-130	16-SEP-15
Zinc (Zn)-Leachable			92.3		%		70-130	16-SEP-15
WG2168741-1 MB								
Aluminum (Al)-Leachable			<50		mg/kg		50	16-SEP-15
Antimony (Sb)-Leachable			<0.10		mg/kg		0.1	16-SEP-15
Arsenic (As)-Leachable			<0.050		mg/kg		0.05	16-SEP-15
Barium (Ba)-Leachable			<2.0		mg/kg		2	16-SEP-15
Beryllium (Be)-Leachable			<0.20		mg/kg		0.2	16-SEP-15
Bismuth (Bi)-Leachable			<0.20		mg/kg		0.2	16-SEP-15
Cadmium (Cd)-Leachable			<0.050		mg/kg		0.05	16-SEP-15
Calcium (Ca)-Leachable			<50		mg/kg		50	16-SEP-15
Chromium (Cr)-Leachable			<5.0		mg/kg		5	16-SEP-15
Cobalt (Co)-Leachable			<0.10		mg/kg		0.1	16-SEP-15
Copper (Cu)-Leachable			<0.50		mg/kg		0.5	16-SEP-15
Iron (Fe)-Leachable			<50		mg/kg		50	16-SEP-15
Lead (Pb)-Leachable			<0.50		mg/kg		0.5	16-SEP-15
Lithium (Li)-Leachable			<5.0		mg/kg		5	16-SEP-15
Manganese (Mn)-Leachable			<5.0		mg/kg		5	16-SEP-15
Molybdenum (Mo)-Leachable			<0.50		mg/kg		0.5	16-SEP-15
Nickel (Ni)-Leachable			<2.0		mg/kg		2	16-SEP-15
Phosphorus (P)-Leachable			<50		mg/kg		50	16-SEP-15
Selenium (Se)-Leachable			<0.20		mg/kg		0.2	16-SEP-15
Silver (Ag)-Leachable			<0.10		mg/kg		0.1	16-SEP-15
Strontium (Sr)-Leachable			<5.0		mg/kg		5	16-SEP-15
Thallium (Tl)-Leachable			<0.050		mg/kg		0.05	16-SEP-15
Tin (Sn)-Leachable			<2.0		mg/kg		2	16-SEP-15
Titanium (Ti)-Leachable			<5.0		mg/kg		5	16-SEP-15
Uranium (U)-Leachable			<0.050		mg/kg		0.05	16-SEP-15
Vanadium (V)-Leachable			<0.20		mg/kg		0.2	16-SEP-15



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Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-CM-CCMS-VA Soil								
Batch R3268728								
WG2168741-1 MB								
Zinc (Zn)-Leachable			<1.0		mg/kg		1	16-SEP-15
MET-TESS-EA-CCMS-VA Soil								
Batch R3265728								
WG2164669-4 DUP								
		L1661656-4						
Aluminum (Al)-Leachable		<50	<50	RPD-NA	mg/kg	N/A	30	10-SEP-15
Antimony (Sb)-Leachable		<0.10	<0.10	RPD-NA	mg/kg	N/A	30	10-SEP-15
Arsenic (As)-Leachable		0.059	0.061		mg/kg	3.4	30	10-SEP-15
Barium (Ba)-Leachable		18.0	18.5		mg/kg	2.5	30	10-SEP-15
Beryllium (Be)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	10-SEP-15
Bismuth (Bi)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	10-SEP-15
Cadmium (Cd)-Leachable		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	10-SEP-15
Calcium (Ca)-Leachable		2570	2640		mg/kg	2.6	30	10-SEP-15
Chromium (Cr)-Leachable		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	10-SEP-15
Cobalt (Co)-Leachable		<0.10	<0.10	RPD-NA	mg/kg	N/A	30	10-SEP-15
Copper (Cu)-Leachable		5.59	5.71		mg/kg	2.0	30	10-SEP-15
Iron (Fe)-Leachable		<50	<50	RPD-NA	mg/kg	N/A	30	10-SEP-15
Lead (Pb)-Leachable		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	10-SEP-15
Lithium (Li)-Leachable		<5.0	<5.0	RPD-NA	mg/kg	N/A	30	10-SEP-15
Manganese (Mn)-Leachable		52.0	54.5		mg/kg	4.7	30	10-SEP-15
Molybdenum (Mo)-Leachable		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	10-SEP-15
Nickel (Ni)-Leachable		<1.0	<1.0	RPD-NA	mg/kg	N/A	30	10-SEP-15
Phosphorus (P)-Leachable		<50	<50	RPD-NA	mg/kg	N/A	30	10-SEP-15
Potassium (K)-Leachable		190	200		mg/kg	6.3	30	10-SEP-15
Selenium (Se)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	10-SEP-15
Silver (Ag)-Leachable		<0.10	<0.10	RPD-NA	mg/kg	N/A	30	10-SEP-15
Sodium (Na)-Leachable		<100	100	RPD-NA	mg/kg	N/A	30	10-SEP-15
Strontium (Sr)-Leachable		34.8	35.9		mg/kg	3.1	30	10-SEP-15
Thallium (Tl)-Leachable		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	10-SEP-15
Tin (Sn)-Leachable		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	10-SEP-15
Titanium (Ti)-Leachable		<1.0	<1.0	RPD-NA	mg/kg	N/A	30	10-SEP-15
Uranium (U)-Leachable		0.053	0.056		mg/kg	5.5	30	10-SEP-15
Vanadium (V)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	10-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-EA-CCMS-VA Soil								
Batch R3265728								
WG2164669-4 DUP		L1661656-4						
Zinc (Zn)-Leachable		<1.0	<1.0	RPD-NA	mg/kg	N/A	30	10-SEP-15
WG2164669-2 LCS								
Aluminum (Al)-Leachable			96.1		%		70-130	10-SEP-15
Antimony (Sb)-Leachable			104.2		%		70-130	10-SEP-15
Arsenic (As)-Leachable			98.1		%		70-130	10-SEP-15
Barium (Ba)-Leachable			96.7		%		70-130	10-SEP-15
Beryllium (Be)-Leachable			99.3		%		70-130	10-SEP-15
Bismuth (Bi)-Leachable			94.1		%		70-130	10-SEP-15
Cadmium (Cd)-Leachable			99.5		%		70-130	10-SEP-15
Calcium (Ca)-Leachable			100.8		%		70-130	10-SEP-15
Chromium (Cr)-Leachable			94.5		%		70-130	10-SEP-15
Cobalt (Co)-Leachable			91.3		%		70-130	10-SEP-15
Copper (Cu)-Leachable			96.8		%		70-130	10-SEP-15
Iron (Fe)-Leachable			94.9		%		70-130	10-SEP-15
Lead (Pb)-Leachable			96.0		%		70-130	10-SEP-15
Lithium (Li)-Leachable			96.6		%		70-130	10-SEP-15
Manganese (Mn)-Leachable			94.5		%		70-130	10-SEP-15
Molybdenum (Mo)-Leachable			98.3		%		70-130	10-SEP-15
Nickel (Ni)-Leachable			93.8		%		70-130	10-SEP-15
Phosphorus (P)-Leachable			99.2		%		70-130	10-SEP-15
Potassium (K)-Leachable			96.3		%		70-130	10-SEP-15
Selenium (Se)-Leachable			95.6		%		70-130	10-SEP-15
Silver (Ag)-Leachable			102.2		%		70-130	10-SEP-15
Sodium (Na)-Leachable			96.0		%		70-130	10-SEP-15
Strontium (Sr)-Leachable			99.4		%		70-130	10-SEP-15
Thallium (Tl)-Leachable			93.9		%		70-130	10-SEP-15
Tin (Sn)-Leachable			100.6		%		70-130	10-SEP-15
Titanium (Ti)-Leachable			95.2		%		70-130	10-SEP-15
Uranium (U)-Leachable			99.9		%		70-130	10-SEP-15
Vanadium (V)-Leachable			98.3		%		70-130	10-SEP-15
Zinc (Zn)-Leachable			88.1		%		70-130	10-SEP-15
WG2164669-1 MB								
Aluminum (Al)-Leachable			<50		mg/kg		50	10-SEP-15
Antimony (Sb)-Leachable			<0.10		mg/kg		0.1	10-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-EA-CCMS-VA Soil								
Batch R3265728								
WG2164669-1 MB								
Arsenic (As)-Leachable			<0.050		mg/kg		0.05	10-SEP-15
Barium (Ba)-Leachable			<0.50		mg/kg		0.5	10-SEP-15
Beryllium (Be)-Leachable			<0.20		mg/kg		0.2	10-SEP-15
Bismuth (Bi)-Leachable			<0.20		mg/kg		0.2	10-SEP-15
Cadmium (Cd)-Leachable			<0.050		mg/kg		0.05	10-SEP-15
Calcium (Ca)-Leachable			271	B	mg/kg		50	10-SEP-15
Chromium (Cr)-Leachable			<0.50		mg/kg		0.5	10-SEP-15
Cobalt (Co)-Leachable			<0.10		mg/kg		0.1	10-SEP-15
Copper (Cu)-Leachable			<0.50		mg/kg		0.5	10-SEP-15
Iron (Fe)-Leachable			<50		mg/kg		50	10-SEP-15
Lead (Pb)-Leachable			<0.50		mg/kg		0.5	10-SEP-15
Lithium (Li)-Leachable			<5.0		mg/kg		5	10-SEP-15
Manganese (Mn)-Leachable			<1.0		mg/kg		1	10-SEP-15
Molybdenum (Mo)-Leachable			<0.50		mg/kg		0.5	10-SEP-15
Nickel (Ni)-Leachable			1.29	MB-LOR	mg/kg		0.5	10-SEP-15
Phosphorus (P)-Leachable			<50		mg/kg		50	10-SEP-15
Potassium (K)-Leachable			<100		mg/kg		100	10-SEP-15
Selenium (Se)-Leachable			<0.20		mg/kg		0.2	10-SEP-15
Silver (Ag)-Leachable			<0.10		mg/kg		0.1	10-SEP-15
Sodium (Na)-Leachable			<100		mg/kg		100	10-SEP-15
Strontium (Sr)-Leachable			0.87	B	mg/kg		0.5	10-SEP-15
Thallium (Tl)-Leachable			<0.050		mg/kg		0.05	10-SEP-15
Tin (Sn)-Leachable			<2.0		mg/kg		2	10-SEP-15
Titanium (Ti)-Leachable			<1.0		mg/kg		1	10-SEP-15
Uranium (U)-Leachable			<0.050		mg/kg		0.05	10-SEP-15
Vanadium (V)-Leachable			<0.20		mg/kg		0.2	10-SEP-15
Zinc (Zn)-Leachable			<1.0		mg/kg		1	10-SEP-15
Batch R3266373								
WG2168741-4 DUP L1664712-13								
Aluminum (Al)-Leachable		<50	<50	RPD-NA	mg/kg	N/A	30	14-SEP-15
Antimony (Sb)-Leachable		<0.10	<0.10	RPD-NA	mg/kg	N/A	30	14-SEP-15
Arsenic (As)-Leachable		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	14-SEP-15
Barium (Ba)-Leachable		19.3	19.4		mg/kg	0.2	30	14-SEP-15
Beryllium (Be)-Leachable		<0.20	<0.20					



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-EA-CCMS-VA Soil								
Batch R3266373								
WG2168741-4 DUP		L1664712-13						
Beryllium (Be)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	14-SEP-15
Bismuth (Bi)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	14-SEP-15
Cadmium (Cd)-Leachable		0.139	0.132		mg/kg	5.0	30	14-SEP-15
Calcium (Ca)-Leachable		2590	2570		mg/kg	0.6	30	14-SEP-15
Chromium (Cr)-Leachable		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	14-SEP-15
Cobalt (Co)-Leachable		0.33	0.34		mg/kg	1.2	30	14-SEP-15
Copper (Cu)-Leachable		0.81	0.82		mg/kg	1.0	30	14-SEP-15
Iron (Fe)-Leachable		<50	<50	RPD-NA	mg/kg	N/A	30	14-SEP-15
Lead (Pb)-Leachable		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	14-SEP-15
Lithium (Li)-Leachable		<5.0	<5.0	RPD-NA	mg/kg	N/A	30	14-SEP-15
Manganese (Mn)-Leachable		177	177		mg/kg	0.1	30	14-SEP-15
Molybdenum (Mo)-Leachable		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	14-SEP-15
Nickel (Ni)-Leachable		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	14-SEP-15
Phosphorus (P)-Leachable		<50	<50	RPD-NA	mg/kg	N/A	30	14-SEP-15
Potassium (K)-Leachable		<100	<100	RPD-NA	mg/kg	N/A	30	14-SEP-15
Selenium (Se)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	14-SEP-15
Silver (Ag)-Leachable		<0.10	<0.10	RPD-NA	mg/kg	N/A	30	14-SEP-15
Sodium (Na)-Leachable		<100	<100	RPD-NA	mg/kg	N/A	30	14-SEP-15
Strontium (Sr)-Leachable		21.6	21.7		mg/kg	0.3	30	14-SEP-15
Thallium (Tl)-Leachable		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	14-SEP-15
Tin (Sn)-Leachable		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	14-SEP-15
Titanium (Ti)-Leachable		<1.0	<1.0	RPD-NA	mg/kg	N/A	30	14-SEP-15
Uranium (U)-Leachable		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	14-SEP-15
Vanadium (V)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	14-SEP-15
Zinc (Zn)-Leachable		<1.0	<1.0	RPD-NA	mg/kg	N/A	30	14-SEP-15
WG2168741-1 MB								
Aluminum (Al)-Leachable			<50		mg/kg		50	14-SEP-15
Antimony (Sb)-Leachable			<0.10		mg/kg		0.1	14-SEP-15
Arsenic (As)-Leachable			<0.050		mg/kg		0.05	14-SEP-15
Barium (Ba)-Leachable			<0.50		mg/kg		0.5	14-SEP-15
Beryllium (Be)-Leachable			<0.20		mg/kg		0.2	14-SEP-15
Bismuth (Bi)-Leachable			<0.20		mg/kg		0.2	14-SEP-15
Cadmium (Cd)-Leachable			<0.050		mg/kg		0.05	14-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
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MET-TESS-EA-CCMS-VA Soil

Batch R3266373

WG2168741-1 MB

Calcium (Ca)-Leachable			287	B	mg/kg		50	14-SEP-15
Chromium (Cr)-Leachable			<0.50		mg/kg		0.5	14-SEP-15
Cobalt (Co)-Leachable			<0.10		mg/kg		0.1	14-SEP-15
Copper (Cu)-Leachable			<0.50		mg/kg		0.5	14-SEP-15
Iron (Fe)-Leachable			<50		mg/kg		50	14-SEP-15
Lead (Pb)-Leachable			<0.50		mg/kg		0.5	14-SEP-15
Lithium (Li)-Leachable			<5.0		mg/kg		5	14-SEP-15
Manganese (Mn)-Leachable			<1.0		mg/kg		1	14-SEP-15
Molybdenum (Mo)-Leachable			<0.50		mg/kg		0.5	14-SEP-15
Nickel (Ni)-Leachable			1.26	MB-LOR	mg/kg		0.5	14-SEP-15
Phosphorus (P)-Leachable			<50		mg/kg		50	14-SEP-15
Potassium (K)-Leachable			<100		mg/kg		100	14-SEP-15
Selenium (Se)-Leachable			<0.20		mg/kg		0.2	14-SEP-15
Silver (Ag)-Leachable			<0.10		mg/kg		0.1	14-SEP-15
Sodium (Na)-Leachable			<100		mg/kg		100	14-SEP-15
Strontium (Sr)-Leachable			0.86	B	mg/kg		0.5	14-SEP-15
Thallium (Tl)-Leachable			<0.050		mg/kg		0.05	14-SEP-15
Tin (Sn)-Leachable			<2.0		mg/kg		2	14-SEP-15
Titanium (Ti)-Leachable			<1.0		mg/kg		1	14-SEP-15
Uranium (U)-Leachable			<0.050		mg/kg		0.05	14-SEP-15
Vanadium (V)-Leachable			<0.20		mg/kg		0.2	14-SEP-15
Zinc (Zn)-Leachable			<1.0		mg/kg		1	14-SEP-15

MET-TESS-FEO-CCMS-VA Soil

Batch R3265778

WG2164669-4 DUP

L1661656-4

Aluminum (Al)-Leachable	2610	2690			mg/kg	2.8	30	10-SEP-15
Antimony (Sb)-Leachable	<0.10	<0.10		RPD-NA	mg/kg	N/A	30	10-SEP-15
Arsenic (As)-Leachable	2.17	2.24			mg/kg	3.2	30	10-SEP-15
Barium (Ba)-Leachable	41.5	43.2			mg/kg	4.0	30	10-SEP-15
Beryllium (Be)-Leachable	0.28	0.28			mg/kg	0.8	30	10-SEP-15
Bismuth (Bi)-Leachable	<0.20	<0.20		RPD-NA	mg/kg	N/A	30	10-SEP-15
Cadmium (Cd)-Leachable	0.068	0.068			mg/kg	0.6	30	10-SEP-15
Calcium (Ca)-Leachable	2070	2130			mg/kg	2.6	30	10-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-FEO-CCMS-VA Soil								
Batch R3265778								
WG2164669-4 DUP		L1661656-4						
Chromium (Cr)-Leachable		3.07	3.11		mg/kg	1.4	30	10-SEP-15
Cobalt (Co)-Leachable		2.88	2.98		mg/kg	3.6	30	10-SEP-15
Copper (Cu)-Leachable		180	184		mg/kg	2.5	30	10-SEP-15
Iron (Fe)-Leachable		4330	4410		mg/kg	1.8	30	10-SEP-15
Lead (Pb)-Leachable		4.52	4.53		mg/kg	0.1	30	10-SEP-15
Lithium (Li)-Leachable		<5.0	<5.0	RPD-NA	mg/kg	N/A	30	10-SEP-15
Manganese (Mn)-Leachable		128	130		mg/kg	2.1	30	10-SEP-15
Molybdenum (Mo)-Leachable		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	10-SEP-15
Nickel (Ni)-Leachable		3.93	3.88		mg/kg	1.3	30	10-SEP-15
Phosphorus (P)-Leachable		162	156		mg/kg	3.5	30	10-SEP-15
Selenium (Se)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	10-SEP-15
Silver (Ag)-Leachable		<0.10	<0.10	RPD-NA	mg/kg	N/A	30	10-SEP-15
Strontium (Sr)-Leachable		26.0	27.5		mg/kg	5.6	30	10-SEP-15
Thallium (Tl)-Leachable		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	10-SEP-15
Tin (Sn)-Leachable		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	10-SEP-15
Titanium (Ti)-Leachable		<1.0	<1.0	RPD-NA	mg/kg	N/A	30	10-SEP-15
Uranium (U)-Leachable		0.199	0.191		mg/kg	4.2	30	10-SEP-15
Vanadium (V)-Leachable		10.9	11.3		mg/kg	3.2	30	10-SEP-15
Zinc (Zn)-Leachable		12.5	13.0		mg/kg	3.7	30	10-SEP-15
WG2164669-2 LCS								
Aluminum (Al)-Leachable			103.4		%		70-130	10-SEP-15
Antimony (Sb)-Leachable			100.3		%		70-130	10-SEP-15
Arsenic (As)-Leachable			108.1		%		70-130	10-SEP-15
Barium (Ba)-Leachable			101.7		%		70-130	10-SEP-15
Beryllium (Be)-Leachable			101.8		%		70-130	10-SEP-15
Bismuth (Bi)-Leachable			101.5		%		70-130	10-SEP-15
Cadmium (Cd)-Leachable			99.7		%		70-130	10-SEP-15
Calcium (Ca)-Leachable			100.7		%		70-130	10-SEP-15
Chromium (Cr)-Leachable			103.7		%		70-130	10-SEP-15
Cobalt (Co)-Leachable			101.6		%		70-130	10-SEP-15
Copper (Cu)-Leachable			116.6		%		70-130	10-SEP-15
Iron (Fe)-Leachable			99.7		%		70-130	10-SEP-15
Lead (Pb)-Leachable			103.3		%		70-130	10-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-FEO-CCMS-VA Soil								
Batch R3265778								
WG2164669-2 LCS								
Lithium (Li)-Leachable			105.0		%		70-130	10-SEP-15
Manganese (Mn)-Leachable			105.0		%		70-130	10-SEP-15
Molybdenum (Mo)-Leachable			101.9		%		70-130	10-SEP-15
Nickel (Ni)-Leachable			102.0		%		70-130	10-SEP-15
Phosphorus (P)-Leachable			105.6		%		70-130	10-SEP-15
Selenium (Se)-Leachable			115.5		%		70-130	10-SEP-15
Silver (Ag)-Leachable			101.1		%		70-130	10-SEP-15
Strontium (Sr)-Leachable			100.3		%		70-130	10-SEP-15
Thallium (Tl)-Leachable			100.5		%		70-130	10-SEP-15
Tin (Sn)-Leachable			99.4		%		70-130	10-SEP-15
Titanium (Ti)-Leachable			100.5		%		70-130	10-SEP-15
Uranium (U)-Leachable			102.2		%		70-130	10-SEP-15
Vanadium (V)-Leachable			103.6		%		70-130	10-SEP-15
Zinc (Zn)-Leachable			97.0		%		70-130	10-SEP-15
WG2164669-1 MB								
Aluminum (Al)-Leachable			<50		mg/kg		50	10-SEP-15
Antimony (Sb)-Leachable			<0.10		mg/kg		0.1	10-SEP-15
Arsenic (As)-Leachable			<0.050		mg/kg		0.05	10-SEP-15
Barium (Ba)-Leachable			<0.50		mg/kg		0.5	10-SEP-15
Beryllium (Be)-Leachable			<0.20		mg/kg		0.2	10-SEP-15
Bismuth (Bi)-Leachable			<0.20		mg/kg		0.2	10-SEP-15
Cadmium (Cd)-Leachable			<0.050		mg/kg		0.05	10-SEP-15
Calcium (Ca)-Leachable			<50		mg/kg		50	10-SEP-15
Chromium (Cr)-Leachable			<0.50		mg/kg		0.5	10-SEP-15
Cobalt (Co)-Leachable			<0.10		mg/kg		0.1	10-SEP-15
Copper (Cu)-Leachable			<0.50		mg/kg		0.5	10-SEP-15
Iron (Fe)-Leachable			<50		mg/kg		50	10-SEP-15
Lead (Pb)-Leachable			<0.50		mg/kg		0.5	10-SEP-15
Lithium (Li)-Leachable			<5.0		mg/kg		5	10-SEP-15
Manganese (Mn)-Leachable			<1.0		mg/kg		1	10-SEP-15
Molybdenum (Mo)-Leachable			<0.50		mg/kg		0.5	10-SEP-15
Nickel (Ni)-Leachable			<0.50		mg/kg		0.5	10-SEP-15
Phosphorus (P)-Leachable			<50		mg/kg		50	10-SEP-15
Selenium (Se)-Leachable			<0.20		mg/kg		0.2	10-SEP-15



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Client: MOUNT POLLEY MINING CORP.
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-FEO-CCMS-VA Soil								
Batch R3265778								
WG2164669-1 MB								
Silver (Ag)-Leachable			<0.10		mg/kg		0.1	10-SEP-15
Strontium (Sr)-Leachable			<0.50		mg/kg		0.5	10-SEP-15
Thallium (Tl)-Leachable			<0.050		mg/kg		0.05	10-SEP-15
Tin (Sn)-Leachable			<2.0		mg/kg		2	10-SEP-15
Titanium (Ti)-Leachable			<1.0		mg/kg		1	10-SEP-15
Uranium (U)-Leachable			<0.050		mg/kg		0.05	10-SEP-15
Vanadium (V)-Leachable			<0.20		mg/kg		0.2	10-SEP-15
Zinc (Zn)-Leachable			<1.0		mg/kg		1	10-SEP-15
Batch R3273140								
WG2168741-2 LCS								
Aluminum (Al)-Leachable			102.0		%		70-130	21-SEP-15
Antimony (Sb)-Leachable			100.6		%		70-130	21-SEP-15
Arsenic (As)-Leachable			104.3		%		70-130	21-SEP-15
Barium (Ba)-Leachable			101.0		%		70-130	21-SEP-15
Beryllium (Be)-Leachable			101.3		%		70-130	21-SEP-15
Bismuth (Bi)-Leachable			99.6		%		70-130	21-SEP-15
Cadmium (Cd)-Leachable			102.2		%		70-130	21-SEP-15
Calcium (Ca)-Leachable			97.9		%		70-130	21-SEP-15
Chromium (Cr)-Leachable			99.8		%		70-130	21-SEP-15
Cobalt (Co)-Leachable			100.7		%		70-130	21-SEP-15
Copper (Cu)-Leachable			98.0		%		70-130	21-SEP-15
Iron (Fe)-Leachable			99.97		%		70-130	21-SEP-15
Lead (Pb)-Leachable			101.0		%		70-130	21-SEP-15
Lithium (Li)-Leachable			100.4		%		70-130	21-SEP-15
Manganese (Mn)-Leachable			99.98		%		70-130	21-SEP-15
Molybdenum (Mo)-Leachable			99.7		%		70-130	21-SEP-15
Nickel (Ni)-Leachable			100.2		%		70-130	21-SEP-15
Phosphorus (P)-Leachable			100.4		%		70-130	21-SEP-15
Selenium (Se)-Leachable			107.9		%		70-130	21-SEP-15
Silver (Ag)-Leachable			103.9		%		70-130	21-SEP-15
Strontium (Sr)-Leachable			99.2		%		70-130	21-SEP-15
Thallium (Tl)-Leachable			101.0		%		70-130	21-SEP-15
Tin (Sn)-Leachable			100.8		%		70-130	21-SEP-15
Titanium (Ti)-Leachable			96.7		%		70-130	21-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-FEO-CCMS-VA Soil								
Batch	R3273140							
WG2168741-2	LCS							
Uranium (U)-Leachable			101.2		%		70-130	21-SEP-15
Vanadium (V)-Leachable			103.7		%		70-130	21-SEP-15
Zinc (Zn)-Leachable			92.9		%		70-130	21-SEP-15
WG2168741-1	MB							
Aluminum (Al)-Leachable			<100		mg/kg		100	21-SEP-15
Antimony (Sb)-Leachable			<0.20		mg/kg		0.2	21-SEP-15
Arsenic (As)-Leachable			<0.10		mg/kg		0.1	21-SEP-15
Barium (Ba)-Leachable			<1.0		mg/kg		1	21-SEP-15
Beryllium (Be)-Leachable			<0.40		mg/kg		0.4	21-SEP-15
Bismuth (Bi)-Leachable			<0.40		mg/kg		0.4	21-SEP-15
Cadmium (Cd)-Leachable			<0.10		mg/kg		0.1	21-SEP-15
Calcium (Ca)-Leachable			<100		mg/kg		100	21-SEP-15
Chromium (Cr)-Leachable			<1.0		mg/kg		1	21-SEP-15
Cobalt (Co)-Leachable			<0.20		mg/kg		0.2	21-SEP-15
Copper (Cu)-Leachable			<1.0		mg/kg		1	21-SEP-15
Iron (Fe)-Leachable			<100		mg/kg		100	21-SEP-15
Lead (Pb)-Leachable			<1.0		mg/kg		1	21-SEP-15
Lithium (Li)-Leachable			<10		mg/kg		10	21-SEP-15
Manganese (Mn)-Leachable			<2.0		mg/kg		2	21-SEP-15
Molybdenum (Mo)-Leachable			<1.0		mg/kg		1	21-SEP-15
Nickel (Ni)-Leachable			<1.0		mg/kg		1	21-SEP-15
Phosphorus (P)-Leachable			<100		mg/kg		100	21-SEP-15
Selenium (Se)-Leachable			<0.40		mg/kg		0.4	21-SEP-15
Silver (Ag)-Leachable			<0.20		mg/kg		0.2	21-SEP-15
Strontium (Sr)-Leachable			<1.0		mg/kg		1	21-SEP-15
Thallium (Tl)-Leachable			<0.10		mg/kg		0.1	21-SEP-15
Tin (Sn)-Leachable			<4.0		mg/kg		4	21-SEP-15
Titanium (Ti)-Leachable			<2.0		mg/kg		2	21-SEP-15
Uranium (U)-Leachable			<0.10		mg/kg		0.1	21-SEP-15
Vanadium (V)-Leachable			<0.40		mg/kg		0.4	21-SEP-15
Zinc (Zn)-Leachable			<2.0		mg/kg		2	21-SEP-15

MET-TESS-OB-CCMS-VA Soil



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-OB-CCMS-VA Soil								
Batch	R3265686							
WG2164669-4 DUP		L1661656-4						
Aluminum (Al)-Leachable		1410	1390		mg/kg	2.0	30	11-SEP-15
Antimony (Sb)-Leachable		<0.10	<0.10	RPD-NA	mg/kg	N/A	30	11-SEP-15
Arsenic (As)-Leachable		0.331	0.333		mg/kg	0.8	30	11-SEP-15
Barium (Ba)-Leachable		23.6	23.7		mg/kg	0.4	30	11-SEP-15
Beryllium (Be)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	11-SEP-15
Bismuth (Bi)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	11-SEP-15
Cadmium (Cd)-Leachable		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	11-SEP-15
Calcium (Ca)-Leachable		899	877		mg/kg	2.4	30	11-SEP-15
Chromium (Cr)-Leachable		0.60	0.60		mg/kg	1.2	30	11-SEP-15
Cobalt (Co)-Leachable		2.01	2.02		mg/kg	0.3	30	11-SEP-15
Copper (Cu)-Leachable		505	503		mg/kg	0.2	30	11-SEP-15
Iron (Fe)-Leachable		281	257		mg/kg	8.8	30	11-SEP-15
Lead (Pb)-Leachable		0.94	0.97		mg/kg	3.1	30	11-SEP-15
Lithium (Li)-Leachable		<5.0	<5.0	RPD-NA	mg/kg	N/A	30	11-SEP-15
Manganese (Mn)-Leachable		24.6	24.2		mg/kg	1.7	30	11-SEP-15
Molybdenum (Mo)-Leachable		0.53	0.52		mg/kg	3.4	30	11-SEP-15
Nickel (Ni)-Leachable		0.82	0.78		mg/kg	4.8	30	11-SEP-15
Selenium (Se)-Leachable		1.04	1.10		mg/kg	5.7	30	11-SEP-15
Silver (Ag)-Leachable		<0.10	<0.10	RPD-NA	mg/kg	N/A	30	11-SEP-15
Strontium (Sr)-Leachable		5.77	5.79		mg/kg	0.4	30	11-SEP-15
Thallium (Tl)-Leachable		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	11-SEP-15
Tin (Sn)-Leachable		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	11-SEP-15
Titanium (Ti)-Leachable		<1.0	<1.0	RPD-NA	mg/kg	N/A	30	11-SEP-15
Uranium (U)-Leachable		0.121	0.139		mg/kg	14	30	11-SEP-15
Vanadium (V)-Leachable		0.61	0.57		mg/kg	6.4	30	11-SEP-15
Zinc (Zn)-Leachable		5.3	5.6		mg/kg	5.4	30	11-SEP-15
WG2164669-2 LCS								
Aluminum (Al)-Leachable			94.1		%		70-130	11-SEP-15
Antimony (Sb)-Leachable			95.5		%		70-130	11-SEP-15
Arsenic (As)-Leachable			98.6		%		70-130	11-SEP-15
Barium (Ba)-Leachable			95.8		%		70-130	11-SEP-15
Beryllium (Be)-Leachable			92.7		%		70-130	11-SEP-15
Bismuth (Bi)-Leachable			97.3		%		70-130	11-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-OB-CCMS-VA Soil								
Batch	R3265686							
WG2164669-2	LCS							
Cadmium (Cd)-Leachable			97.3		%		70-130	11-SEP-15
Calcium (Ca)-Leachable			94.8		%		70-130	11-SEP-15
Chromium (Cr)-Leachable			94.9		%		70-130	11-SEP-15
Cobalt (Co)-Leachable			97.5		%		70-130	11-SEP-15
Copper (Cu)-Leachable			97.6		%		70-130	11-SEP-15
Iron (Fe)-Leachable			98.1		%		70-130	11-SEP-15
Lead (Pb)-Leachable			97.3		%		70-130	11-SEP-15
Lithium (Li)-Leachable			95.0		%		70-130	11-SEP-15
Manganese (Mn)-Leachable			95.3		%		70-130	11-SEP-15
Molybdenum (Mo)-Leachable			94.0		%		70-130	11-SEP-15
Nickel (Ni)-Leachable			95.2		%		70-130	11-SEP-15
Selenium (Se)-Leachable			104.2		%		70-130	11-SEP-15
Silver (Ag)-Leachable			95.0		%		70-130	11-SEP-15
Strontium (Sr)-Leachable			92.0		%		70-130	11-SEP-15
Thallium (Tl)-Leachable			93.0		%		70-130	11-SEP-15
Tin (Sn)-Leachable			95.4		%		70-130	11-SEP-15
Titanium (Ti)-Leachable			91.8		%		70-130	11-SEP-15
Uranium (U)-Leachable			96.3		%		70-130	11-SEP-15
Vanadium (V)-Leachable			95.0		%		70-130	11-SEP-15
Zinc (Zn)-Leachable			90.4		%		70-130	11-SEP-15
WG2164669-1	MB							
Aluminum (Al)-Leachable			<50		mg/kg		50	11-SEP-15
Antimony (Sb)-Leachable			<0.10		mg/kg		0.1	11-SEP-15
Arsenic (As)-Leachable			<0.050		mg/kg		0.05	11-SEP-15
Barium (Ba)-Leachable			<0.50		mg/kg		0.5	11-SEP-15
Beryllium (Be)-Leachable			<0.20		mg/kg		0.2	11-SEP-15
Bismuth (Bi)-Leachable			<0.20		mg/kg		0.2	11-SEP-15
Cadmium (Cd)-Leachable			<0.050		mg/kg		0.05	11-SEP-15
Calcium (Ca)-Leachable			<50		mg/kg		50	11-SEP-15
Chromium (Cr)-Leachable			<0.50		mg/kg		0.5	11-SEP-15
Cobalt (Co)-Leachable			<0.10		mg/kg		0.1	11-SEP-15
Copper (Cu)-Leachable			<0.50		mg/kg		0.5	11-SEP-15
Iron (Fe)-Leachable			<50		mg/kg		50	11-SEP-15
Lead (Pb)-Leachable			<0.50		mg/kg		0.5	11-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-OB-CCMS-VA Soil								
Batch R3265686								
WG2164669-1 MB								
Lithium (Li)-Leachable			<5.0		mg/kg		5	11-SEP-15
Manganese (Mn)-Leachable			<1.0		mg/kg		1	11-SEP-15
Molybdenum (Mo)-Leachable			<0.50		mg/kg		0.5	11-SEP-15
Nickel (Ni)-Leachable			<0.50		mg/kg		0.5	11-SEP-15
Selenium (Se)-Leachable			<0.20		mg/kg		0.2	11-SEP-15
Silver (Ag)-Leachable			<0.10		mg/kg		0.1	11-SEP-15
Strontium (Sr)-Leachable			<0.50		mg/kg		0.5	11-SEP-15
Thallium (Tl)-Leachable			<0.050		mg/kg		0.05	11-SEP-15
Tin (Sn)-Leachable			<2.0		mg/kg		2	11-SEP-15
Titanium (Ti)-Leachable			<1.0		mg/kg		1	11-SEP-15
Uranium (U)-Leachable			<0.050		mg/kg		0.05	11-SEP-15
Vanadium (V)-Leachable			<0.20		mg/kg		0.2	11-SEP-15
Zinc (Zn)-Leachable			<1.0		mg/kg		1	11-SEP-15
Batch R3273977								
WG2168741-4 DUP								
		L1664712-13						
Aluminum (Al)-Leachable		1590	1590		mg/kg	0.3	30	22-SEP-15
Antimony (Sb)-Leachable		<0.10	<0.10	RPD-NA	mg/kg	N/A	30	22-SEP-15
Arsenic (As)-Leachable		0.347	0.318		mg/kg	8.6	30	22-SEP-15
Barium (Ba)-Leachable		17.9	18.1		mg/kg	1.3	30	22-SEP-15
Beryllium (Be)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	22-SEP-15
Bismuth (Bi)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	22-SEP-15
Cadmium (Cd)-Leachable		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	22-SEP-15
Calcium (Ca)-Leachable		499	475		mg/kg	4.8	30	22-SEP-15
Chromium (Cr)-Leachable		6.38	6.34		mg/kg	0.6	30	22-SEP-15
Cobalt (Co)-Leachable		1.67	1.69		mg/kg	1.1	30	22-SEP-15
Copper (Cu)-Leachable		13.8	13.7		mg/kg	0.7	30	22-SEP-15
Iron (Fe)-Leachable		836	831		mg/kg	0.6	30	22-SEP-15
Lead (Pb)-Leachable		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	22-SEP-15
Lithium (Li)-Leachable		<5.0	<5.0	RPD-NA	mg/kg	N/A	30	22-SEP-15
Manganese (Mn)-Leachable		22.5	22.7		mg/kg	0.9	30	22-SEP-15
Molybdenum (Mo)-Leachable		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	22-SEP-15
Nickel (Ni)-Leachable		4.24	4.28		mg/kg	1.0	30	22-SEP-15
Selenium (Se)-Leachable		0.83	0.87		mg/kg	4.3	30	22-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-OB-CCMS-VA Soil								
Batch	R3273977							
WG2168741-4 DUP		L1664712-13						
Silver (Ag)-Leachable		<0.10	<0.10	RPD-NA	mg/kg	N/A	30	22-SEP-15
Strontium (Sr)-Leachable		4.99	4.95		mg/kg	1.0	30	22-SEP-15
Thallium (Tl)-Leachable		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	22-SEP-15
Tin (Sn)-Leachable		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	22-SEP-15
Titanium (Ti)-Leachable		3.0	1.7	J	mg/kg	1.3	2	22-SEP-15
Uranium (U)-Leachable		0.160	0.161		mg/kg	0.6	30	22-SEP-15
Vanadium (V)-Leachable		2.07	1.55		mg/kg	29	30	22-SEP-15
Zinc (Zn)-Leachable		7.6	7.6		mg/kg	0.4	30	22-SEP-15
WG2168741-2 LCS								
Aluminum (Al)-Leachable			101.4		%		70-130	22-SEP-15
Antimony (Sb)-Leachable			102.4		%		70-130	22-SEP-15
Arsenic (As)-Leachable			101.2		%		70-130	22-SEP-15
Barium (Ba)-Leachable			100.1		%		70-130	22-SEP-15
Beryllium (Be)-Leachable			101.3		%		70-130	22-SEP-15
Bismuth (Bi)-Leachable			102.3		%		70-130	22-SEP-15
Cadmium (Cd)-Leachable			92.1		%		70-130	22-SEP-15
Calcium (Ca)-Leachable			101.2		%		70-130	22-SEP-15
Chromium (Cr)-Leachable			98.2		%		70-130	22-SEP-15
Cobalt (Co)-Leachable			98.9		%		70-130	22-SEP-15
Copper (Cu)-Leachable			98.2		%		70-130	22-SEP-15
Iron (Fe)-Leachable			98.9		%		70-130	22-SEP-15
Lead (Pb)-Leachable			101.6		%		70-130	22-SEP-15
Lithium (Li)-Leachable			97.1		%		70-130	22-SEP-15
Manganese (Mn)-Leachable			99.3		%		70-130	22-SEP-15
Molybdenum (Mo)-Leachable			103.0		%		70-130	22-SEP-15
Nickel (Ni)-Leachable			97.3		%		70-130	22-SEP-15
Selenium (Se)-Leachable			101.2		%		70-130	22-SEP-15
Silver (Ag)-Leachable			102.9		%		70-130	22-SEP-15
Strontium (Sr)-Leachable			100.9		%		70-130	22-SEP-15
Thallium (Tl)-Leachable			98.2		%		70-130	22-SEP-15
Tin (Sn)-Leachable			95.9		%		70-130	22-SEP-15
Titanium (Ti)-Leachable			87.8		%		70-130	22-SEP-15
Uranium (U)-Leachable			100.6		%		70-130	22-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-OB-CCMS-VA Soil								
Batch R3273977								
WG2168741-2 LCS								
	Vanadium (V)-Leachable		98.8		%		70-130	22-SEP-15
	Zinc (Zn)-Leachable		90.2		%		70-130	22-SEP-15
WG2168741-1 MB								
	Aluminum (Al)-Leachable		<50		mg/kg		50	22-SEP-15
	Antimony (Sb)-Leachable		<0.10		mg/kg		0.1	22-SEP-15
	Arsenic (As)-Leachable		<0.050		mg/kg		0.05	22-SEP-15
	Barium (Ba)-Leachable		<0.50		mg/kg		0.5	22-SEP-15
	Beryllium (Be)-Leachable		<0.20		mg/kg		0.2	22-SEP-15
	Bismuth (Bi)-Leachable		<0.20		mg/kg		0.2	22-SEP-15
	Cadmium (Cd)-Leachable		<0.050		mg/kg		0.05	22-SEP-15
	Calcium (Ca)-Leachable		<50		mg/kg		50	22-SEP-15
	Chromium (Cr)-Leachable		<0.50		mg/kg		0.5	22-SEP-15
	Cobalt (Co)-Leachable		<0.10		mg/kg		0.1	22-SEP-15
	Copper (Cu)-Leachable		<0.50		mg/kg		0.5	22-SEP-15
	Iron (Fe)-Leachable		<50		mg/kg		50	22-SEP-15
	Lead (Pb)-Leachable		<0.50		mg/kg		0.5	22-SEP-15
	Lithium (Li)-Leachable		<5.0		mg/kg		5	22-SEP-15
	Manganese (Mn)-Leachable		<1.0		mg/kg		1	22-SEP-15
	Molybdenum (Mo)-Leachable		<0.50		mg/kg		0.5	22-SEP-15
	Nickel (Ni)-Leachable		<0.50		mg/kg		0.5	22-SEP-15
	Selenium (Se)-Leachable		<0.20		mg/kg		0.2	22-SEP-15
	Silver (Ag)-Leachable		<0.10		mg/kg		0.1	22-SEP-15
	Strontium (Sr)-Leachable		<0.50		mg/kg		0.5	22-SEP-15
	Thallium (Tl)-Leachable		<0.050		mg/kg		0.05	22-SEP-15
	Tin (Sn)-Leachable		<2.0		mg/kg		2	22-SEP-15
	Titanium (Ti)-Leachable		<1.0		mg/kg		1	22-SEP-15
	Uranium (U)-Leachable		<0.050		mg/kg		0.05	22-SEP-15
	Vanadium (V)-Leachable		<0.20		mg/kg		0.2	22-SEP-15
	Zinc (Zn)-Leachable		<1.0		mg/kg		1	22-SEP-15
MET-TESS-RM-CCMS-VA Soil								
Batch R3266292								
WG2164669-4 DUP								
	Aluminum (Al)-Leachable	L1661656-4	24500		mg/kg	0.5	30	11-SEP-15
	Antimony (Sb)-Leachable	24600	0.53		mg/kg	6.9	30	11-SEP-15



Quality Control Report

Workorder: L1661656

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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-RM-CCMS-VA Soil								
Batch	R3266292							
WG2164669-4 DUP		L1661656-4						
Arsenic (As)-Leachable		13.1	13.6		mg/kg	3.0	30	11-SEP-15
Barium (Ba)-Leachable		117	122		mg/kg	4.7	30	11-SEP-15
Beryllium (Be)-Leachable		0.62	0.63		mg/kg	3.0	30	11-SEP-15
Bismuth (Bi)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	11-SEP-15
Cadmium (Cd)-Leachable		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	11-SEP-15
Calcium (Ca)-Leachable		13600	14000		mg/kg	3.4	30	11-SEP-15
Chromium (Cr)-Leachable		16.5	17.0		mg/kg	2.8	30	11-SEP-15
Cobalt (Co)-Leachable		20.4	20.5		mg/kg	0.3	30	11-SEP-15
Copper (Cu)-Leachable		162	170		mg/kg	4.6	30	11-SEP-15
Iron (Fe)-Leachable		32400	33200		mg/kg	2.6	30	11-SEP-15
Lead (Pb)-Leachable		4.33	4.42		mg/kg	2.1	30	11-SEP-15
Lithium (Li)-Leachable		22.8	23.3		mg/kg	2.0	30	11-SEP-15
Manganese (Mn)-Leachable		682	719		mg/kg	5.3	30	11-SEP-15
Molybdenum (Mo)-Leachable		3.03	2.99		mg/kg	1.3	30	11-SEP-15
Nickel (Ni)-Leachable		15.2	15.4		mg/kg	1.4	30	11-SEP-15
Selenium (Se)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	11-SEP-15
Silver (Ag)-Leachable		0.34	0.33		mg/kg	1.5	30	11-SEP-15
Strontium (Sr)-Leachable		79.6	80.9		mg/kg	1.6	30	11-SEP-15
Thallium (Tl)-Leachable		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	11-SEP-15
Tin (Sn)-Leachable		4.4	4.6		mg/kg	5.3	30	11-SEP-15
Titanium (Ti)-Leachable		1920	2160		mg/kg	12	30	11-SEP-15
Uranium (U)-Leachable		0.901	0.961		mg/kg	6.5	30	11-SEP-15
Vanadium (V)-Leachable		117	121		mg/kg	3.5	30	11-SEP-15
Zinc (Zn)-Leachable		77.4	78.7		mg/kg	1.7	30	11-SEP-15
WG2164669-2 LCS								
Aluminum (Al)-Leachable			96.5		%		70-130	11-SEP-15
Antimony (Sb)-Leachable			104.9		%		70-130	11-SEP-15
Arsenic (As)-Leachable			100.2		%		70-130	11-SEP-15
Barium (Ba)-Leachable			104.8		%		70-130	11-SEP-15
Beryllium (Be)-Leachable			103.6		%		70-130	11-SEP-15
Bismuth (Bi)-Leachable			99.3		%		70-130	11-SEP-15
Cadmium (Cd)-Leachable			101.4		%		70-130	11-SEP-15
Calcium (Ca)-Leachable			94.1		%		70-130	11-SEP-15



Quality Control Report

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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-RM-CCMS-VA Soil								
Batch R3266292								
WG2164669-2 LCS								
Chromium (Cr)-Leachable			99.1		%		70-130	11-SEP-15
Cobalt (Co)-Leachable			101.3		%		70-130	11-SEP-15
Copper (Cu)-Leachable			97.5		%		70-130	11-SEP-15
Iron (Fe)-Leachable			98.0		%		70-130	11-SEP-15
Lead (Pb)-Leachable			99.3		%		70-130	11-SEP-15
Lithium (Li)-Leachable			94.5		%		70-130	11-SEP-15
Manganese (Mn)-Leachable			99.9		%		70-130	11-SEP-15
Molybdenum (Mo)-Leachable			93.4		%		70-130	11-SEP-15
Nickel (Ni)-Leachable			99.8		%		70-130	11-SEP-15
Selenium (Se)-Leachable			101.2		%		70-130	11-SEP-15
Silver (Ag)-Leachable			103.8		%		70-130	11-SEP-15
Strontium (Sr)-Leachable			95.1		%		70-130	11-SEP-15
Thallium (Tl)-Leachable			98.7		%		70-130	11-SEP-15
Tin (Sn)-Leachable			100.2		%		70-130	11-SEP-15
Titanium (Ti)-Leachable			95.3		%		70-130	11-SEP-15
Uranium (U)-Leachable			99.8		%		70-130	11-SEP-15
Vanadium (V)-Leachable			99.3		%		70-130	11-SEP-15
Zinc (Zn)-Leachable			91.5		%		70-130	11-SEP-15
WG2164669-1 MB								
Aluminum (Al)-Leachable			<50		mg/kg		50	11-SEP-15
Antimony (Sb)-Leachable			<0.10		mg/kg		0.1	11-SEP-15
Arsenic (As)-Leachable			<0.50		mg/kg		0.5	11-SEP-15
Barium (Ba)-Leachable			<2.0		mg/kg		2	11-SEP-15
Beryllium (Be)-Leachable			<0.20		mg/kg		0.2	11-SEP-15
Bismuth (Bi)-Leachable			<0.20		mg/kg		0.2	11-SEP-15
Cadmium (Cd)-Leachable			<0.050		mg/kg		0.05	11-SEP-15
Calcium (Ca)-Leachable			<50		mg/kg		50	11-SEP-15
Chromium (Cr)-Leachable			<5.0		mg/kg		5	11-SEP-15
Cobalt (Co)-Leachable			<0.10		mg/kg		0.1	11-SEP-15
Copper (Cu)-Leachable			<0.50		mg/kg		0.5	11-SEP-15
Iron (Fe)-Leachable			<50		mg/kg		50	11-SEP-15
Lead (Pb)-Leachable			<0.50		mg/kg		0.5	11-SEP-15
Lithium (Li)-Leachable			<5.0		mg/kg		5	11-SEP-15
Manganese (Mn)-Leachable			<5.0		mg/kg		5	11-SEP-15



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-RM-CCMS-VA Soil								
Batch R3266292								
WG2164669-1 MB								
Molybdenum (Mo)-Leachable			<0.50		mg/kg		0.5	11-SEP-15
Nickel (Ni)-Leachable			<2.0		mg/kg		2	11-SEP-15
Selenium (Se)-Leachable			<0.20		mg/kg		0.2	11-SEP-15
Silver (Ag)-Leachable			<0.10		mg/kg		0.1	11-SEP-15
Strontium (Sr)-Leachable			<5.0		mg/kg		5	11-SEP-15
Thallium (Tl)-Leachable			<0.050		mg/kg		0.05	11-SEP-15
Tin (Sn)-Leachable			<2.0		mg/kg		2	11-SEP-15
Titanium (Ti)-Leachable			<5.0		mg/kg		5	11-SEP-15
Uranium (U)-Leachable			<0.050		mg/kg		0.05	11-SEP-15
Vanadium (V)-Leachable			<0.20		mg/kg		0.2	11-SEP-15
Zinc (Zn)-Leachable			<1.0		mg/kg		1	11-SEP-15
Batch R3273977								
WG2168741-4 DUP L1664712-13								
Aluminum (Al)-Leachable		14800	15200		mg/kg	2.5	30	22-SEP-15
Antimony (Sb)-Leachable		0.34	0.38		mg/kg	10	30	22-SEP-15
Arsenic (As)-Leachable		7.04	6.85		mg/kg	2.7	30	22-SEP-15
Barium (Ba)-Leachable		80.4	83.1		mg/kg	3.3	30	22-SEP-15
Beryllium (Be)-Leachable		<0.20	0.21	RPD-NA	mg/kg	N/A	30	22-SEP-15
Bismuth (Bi)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	22-SEP-15
Cadmium (Cd)-Leachable		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	22-SEP-15
Calcium (Ca)-Leachable		4700	4860		mg/kg	3.3	30	22-SEP-15
Chromium (Cr)-Leachable		47.8	48.0		mg/kg	0.4	30	22-SEP-15
Cobalt (Co)-Leachable		7.68	7.49		mg/kg	2.4	30	22-SEP-15
Copper (Cu)-Leachable		35.0	34.4		mg/kg	1.7	30	22-SEP-15
Iron (Fe)-Leachable		23700	23600		mg/kg	0.7	30	22-SEP-15
Lead (Pb)-Leachable		4.46	4.57		mg/kg	2.5	30	22-SEP-15
Lithium (Li)-Leachable		12.0	11.8		mg/kg	1.6	30	22-SEP-15
Manganese (Mn)-Leachable		211	210		mg/kg	0.7	30	22-SEP-15
Molybdenum (Mo)-Leachable		1.00	1.00		mg/kg	0.2	30	22-SEP-15
Nickel (Ni)-Leachable		25.8	25.6		mg/kg	0.9	30	22-SEP-15
Selenium (Se)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	22-SEP-15
Silver (Ag)-Leachable		<0.10	<0.10	RPD-NA	mg/kg	N/A	30	22-SEP-15
Strontium (Sr)-Leachable		42.8	45.6		mg/kg	6.2	30	22-SEP-15



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Client: MOUNT POLLEY MINING CORP.
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 Likely BC VOL 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-RM-CCMS-VA Soil								
Batch R3273977								
WG2168741-4 DUP		L1664712-13						
Thallium (Tl)-Leachable		0.127	0.129		mg/kg	1.6	30	22-SEP-15
Tin (Sn)-Leachable		2.5	2.7		mg/kg	5.3	30	22-SEP-15
Titanium (Ti)-Leachable		935	990		mg/kg	5.7	30	22-SEP-15
Uranium (U)-Leachable		0.565	0.588		mg/kg	3.9	30	22-SEP-15
Vanadium (V)-Leachable		56.9	57.0		mg/kg	0.3	30	22-SEP-15
Zinc (Zn)-Leachable		55.0	54.2		mg/kg	1.5	30	22-SEP-15
WG2168741-2 LCS								
Aluminum (Al)-Leachable			101.0		%		70-130	22-SEP-15
Antimony (Sb)-Leachable			102.5		%		70-130	22-SEP-15
Arsenic (As)-Leachable			98.7		%		70-130	22-SEP-15
Barium (Ba)-Leachable			103.8		%		70-130	22-SEP-15
Beryllium (Be)-Leachable			99.9		%		70-130	22-SEP-15
Bismuth (Bi)-Leachable			105.1		%		70-130	22-SEP-15
Cadmium (Cd)-Leachable			95.6		%		70-130	22-SEP-15
Calcium (Ca)-Leachable			101.1		%		70-130	22-SEP-15
Chromium (Cr)-Leachable			98.3		%		70-130	22-SEP-15
Cobalt (Co)-Leachable			100.7		%		70-130	22-SEP-15
Copper (Cu)-Leachable			98.7		%		70-130	22-SEP-15
Iron (Fe)-Leachable			97.6		%		70-130	22-SEP-15
Lead (Pb)-Leachable			103.3		%		70-130	22-SEP-15
Lithium (Li)-Leachable			99.8		%		70-130	22-SEP-15
Manganese (Mn)-Leachable			99.6		%		70-130	22-SEP-15
Molybdenum (Mo)-Leachable			101.3		%		70-130	22-SEP-15
Nickel (Ni)-Leachable			97.9		%		70-130	22-SEP-15
Selenium (Se)-Leachable			92.1		%		70-130	22-SEP-15
Silver (Ag)-Leachable			105.7		%		70-130	22-SEP-15
Strontium (Sr)-Leachable			99.7		%		70-130	22-SEP-15
Thallium (Tl)-Leachable			100.3		%		70-130	22-SEP-15
Tin (Sn)-Leachable			95.9		%		70-130	22-SEP-15
Titanium (Ti)-Leachable			96.2		%		70-130	22-SEP-15
Uranium (U)-Leachable			104.0		%		70-130	22-SEP-15
Vanadium (V)-Leachable			100.4		%		70-130	22-SEP-15
Zinc (Zn)-Leachable			90.8		%		70-130	22-SEP-15
WG2168741-1 MB								



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC VOL 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-RM-CCMS-VA Soil								
Batch R3273977								
WG2168741-1 MB								
	Aluminum (Al)-Leachable		<50		mg/kg		50	22-SEP-15
	Antimony (Sb)-Leachable		<0.10		mg/kg		0.1	22-SEP-15
	Arsenic (As)-Leachable		<0.50		mg/kg		0.5	22-SEP-15
	Barium (Ba)-Leachable		<2.0		mg/kg		2	22-SEP-15
	Beryllium (Be)-Leachable		<0.20		mg/kg		0.2	22-SEP-15
	Bismuth (Bi)-Leachable		<0.20		mg/kg		0.2	22-SEP-15
	Cadmium (Cd)-Leachable		<0.050		mg/kg		0.05	22-SEP-15
	Calcium (Ca)-Leachable		<50		mg/kg		50	22-SEP-15
	Chromium (Cr)-Leachable		<5.0		mg/kg		5	22-SEP-15
	Cobalt (Co)-Leachable		<0.10		mg/kg		0.1	22-SEP-15
	Copper (Cu)-Leachable		<0.50		mg/kg		0.5	22-SEP-15
	Iron (Fe)-Leachable		<50		mg/kg		50	22-SEP-15
	Lead (Pb)-Leachable		<0.50		mg/kg		0.5	22-SEP-15
	Lithium (Li)-Leachable		<5.0		mg/kg		5	22-SEP-15
	Manganese (Mn)-Leachable		<5.0		mg/kg		5	22-SEP-15
	Molybdenum (Mo)-Leachable		<0.50		mg/kg		0.5	22-SEP-15
	Nickel (Ni)-Leachable		<2.0		mg/kg		2	22-SEP-15
	Selenium (Se)-Leachable		<0.20		mg/kg		0.2	22-SEP-15
	Silver (Ag)-Leachable		<0.10		mg/kg		0.1	22-SEP-15
	Strontium (Sr)-Leachable		<5.0		mg/kg		5	22-SEP-15
	Thallium (Tl)-Leachable		<0.050		mg/kg		0.05	22-SEP-15
	Tin (Sn)-Leachable		<2.0		mg/kg		2	22-SEP-15
	Titanium (Ti)-Leachable		<5.0		mg/kg		5	22-SEP-15
	Uranium (U)-Leachable		<0.050		mg/kg		0.05	22-SEP-15
	Vanadium (V)-Leachable		<0.20		mg/kg		0.2	22-SEP-15
	Zinc (Zn)-Leachable		<1.0		mg/kg		1	22-SEP-15
MOISTURE-VA Soil								
Batch R3252780								
WG2156408-3 DUP L1660910-1								
	Moisture	18.7	16.5		%	13	20	25-AUG-15
WG2156408-2 LCS								
	Moisture		100.5		%		90-110	25-AUG-15
WG2156408-1 MB								
	Moisture		<0.25		%		0.25	25-AUG-15

Quality Control Report

Workorder: L1661656

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Client: MOUNT POLLEY MINING CORP.

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Likely BC VOL 1N0

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Contact: Colleen Hughes

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable.
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
J	Duplicate results and limits are expressed in terms of absolute difference.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Report To		Report Format / Distribution			Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)																																									
Company: MOUNT POLLEY MINING CORP.		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)			R <input checked="" type="checkbox"/> Regular (Standard TAT if received by 3 pm - business days)																																									
Contact: Colleen Hughes		Quality Control (QC) Report with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			P <input type="checkbox"/> Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT																																									
Address: PO Box 12, Likely, BC, V0L 1N0		<input type="checkbox"/> Criteria on Report - provide details below if box checked			E <input type="checkbox"/> Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT																																									
Phone: 250-790-2617		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			E2 <input type="checkbox"/> Same day or weekend emergency - contact ALS to confirm TAT and surcharge																																									
		Email 1 or Fax: chughes@mountpolley.com; pstecko@minnow.ca			Specify Date Required for E2, E or P:																																									
		Email 2			Analysis Request																																									
Invoice To		Invoice Distribution			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below																																									
Same as Report To <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX																																												
Copy of Invoice with Report <input type="checkbox"/> Yes <input type="checkbox"/> No		Email 1 or Fax: chughes@mountpolley.com																																												
Company:		Email 2																																												
Contact:																																														
Project Information		Oil and Gas Required Fields (client use)																																												
ALS Quote #: Q51555		Approver ID:			MET-63UM-SED-VA (CCME Metals < 63um)			HG-63UM-CVAF-CA (Hg < 63um)			C-TOT-ORG-LECO-SK (TOC) <i>463um</i>			pH-1.2-VA (pH)			N-TOT-LECO-SK (Total nitrogen)			S-TOT-LECO-SK (Total Sulphur)			PSA-PIPE+GRAVEL-SK (Particle Size)			MOISTURE-VA (Moisture)			MET-TESS-STD-VA (Tessier Extractions)			MET-SEM-ICP-VA (SEM analysis)			HG-SEM-CVAFS-VA (Hg SEM analysis)			AVS-COL-VA (AVS analysis)			Number of Containers					
Job #:		GL Account																																												
PO / A/E:		Activity Code:																																												
LSD:		Location:																																												
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang			Sampler: <i>Steve Stecko</i>																																									
ALS Sample # (lab use only)		Sample Identification and/or Coordinates (This descriptor will appear on the report)			Date (dd-mm-yy)		Time (hh:mm)		Sample Type																																					
		PNF-01			17-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			5								
		PNF-01X			17-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			4								
		PNF-02			14-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			4								
		PNF-03			15-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			4								
		PNF-04			15-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			4								
		PNF-05			16-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			4								
		PRef1-01			18-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			4								
		PRef1-03			19-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			4								
		PRef1-03X			19-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			3								
		LNFI-1			17-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			2								
		LNFI-2			17-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			2								
		LNFI-3			17-08-15		—		Sediment		X			X			X			X			X			X			X			X			X			2								
Drinking Water (DW) Samples¹ (client use)		Special Instructions / Specify Criteria to add on report (client use)										SAMPLE CONDITION AS RECEIVED (lab use only)																																		
Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input type="checkbox"/> No												Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>																																		
Are samples for human drinking water use? <input type="checkbox"/> Yes <input type="checkbox"/> No												Ice packs Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>																																		
												Cooling Initiated <input type="checkbox"/>																																		
												INITIAL COOLER TEMPERATURES °C					FINAL COOLER TEMPERATURES °C																													
																	6.7, 4, 5, 7, 7.9																													
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)										FINAL SHIPMENT RECEPTION (lab use only)																																		
Released by: <i>Katharina Bachelar</i>		Date: <i>Aug 20/15</i>		Time: <i>13:00</i>		Received by:		Date:		Time:		Received by: <i>Jean</i>		Date: <i>21 Aug</i>		Time: <i>9 AM</i>																														



Report To		Report Format / Distribution			Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)															
Company: MOUNT POLLEY MINING CORP.		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EOD (DIGITAL)			R <input checked="" type="checkbox"/> Regular (Standard TAT if received by 3 pm - business days)															
Contact: Colleen Hughes		Quality Control (QC) Report with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			P <input type="checkbox"/> Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT															
Address: PO Box 12, Lkely, BC, V0L 1N0		<input type="checkbox"/> Criteria on Report - provide details below if box checked			E <input type="checkbox"/> Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT															
Phone: 250-790-2617		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			E2 <input type="checkbox"/> Same day or weekend emergency - contact ALS to confirm TAT and surcharge															
		Email 1 or Fax: chughes@mountpolley.com; pstecko@minnow.ca			Specify Date Required for E2, E or P:															
		Email 2			Analysis Request															
Invoice To Same as Report To <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Invoice Distribution			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below															
Copy of Invoice with Report <input type="checkbox"/> Yes <input type="checkbox"/> No		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX																		
Company:		Email 1 or Fax: chughes@mountpolley.com																		
Contact:		Email 2																		
Project Information		Oil and Gas Required Fields (client use)																		
ALS Quote #: Q51555		Approver ID:																		
Job #:		GL Account:																		
PO / AFE:		Activity Code:																		
LSD:		Location:																		
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang			Sample: Pierre Stecko Katharina Bachelar															
ALS Sample # (lab use only)		Sample Identification and/or Coordinates (This description will appear on the report)			Date (dd-mm-yy)		Time (hh:mm)		Sample Type											
LNFI-4					17-08-15		-		Sediment											
LNFI-5					17-08-15		-		Sediment											
POL-P2-1					13-08-15		-		Sediment											
POL-P2-1 (PS)					13-08-15		-		Sediment											
POL-P2-2					14-08-15		-		Sediment											
POL-P2-2 (PS)					14-08-15		-		Sediment											
POL-P2-3					14-08-15		-		Sediment											
POL-P2-3 (PS)					14-08-15		-		Sediment											
POL-P2-4					14-08-15		-		Sediment											
POL-P2-4 (PS)					14-08-15		-		Sediment											
POL-P2-5					15-08-15		-		Sediment											
POL-P2-5 (PS)					15-08-15		-		Sediment											
Drinking Water (DW) Samples¹ (client use)		Special Instructions / Specify Criteria to add on report (client use)			SAMPLE CONDITION AS RECEIVED (lab use only)															
Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input type="checkbox"/> No					Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>															
Are samples for human drinking water use? <input type="checkbox"/> Yes <input type="checkbox"/> No					Ice packs Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>															
					Cooling Initiated <input type="checkbox"/>															
					INITIAL COOLER TEMPERATURES °C: FINAL COOLER TEMPERATURES °C															
					67.4 5.7 79															
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)															
Released by: Katharina Bachelar		Received by: Jean																		
Date: Aug 20/15		Date: 21 Aug																		
Time: 13:00		Time: 9AM																		

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ALS Form 001-001 Rev 04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.


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Report To		Report Format / Distribution			Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)															
Company: MOUNT POLLEY MINING CORP.		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)			<input checked="" type="checkbox"/> Regular (Standard TAT if received by 3 pm - business days) <input type="checkbox"/> Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT <input type="checkbox"/> Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT <input type="checkbox"/> E2 Same day or weekend emergency - contact ALS to confirm TAT and surcharge															
Contact: Colleen Hughes		Quality Control (QC) Report with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No																		
Address: PO Box 12, Likely, BC, V0L 1N0		<input type="checkbox"/> Criteria on Report - provide details below if box checked																		
Phone: 250-790-2817		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			Specify Date Required for E2, E or P:															
		Email 1 or Fax chughes@mountpolley.com; pstecko@minnow.ca																		
		Email 2			Analysis Request															
Invoice To Same as Report To <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Invoice Distribution			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below															
Copy of Invoice with Report <input type="checkbox"/> Yes <input type="checkbox"/> No		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX																		
Company:		Email 1 or Fax chughes@mountpolley.com																		
Contact:		Email 2																		
Project Information		Oil and Gas Required Fields (client use)																		
ALS Quote #: Q51555		Approver ID:																		
Job #:		GL Account:																		
PO / AFE:		Activity Code:																		
LSD:		Location:																		
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang			Sampler:															
ALS Sample # (lab use only)		Sample Identification and/or Coordinates (This description will appear on the report)			Date (dd-mm-yy)		Time (hh:mm)		Sample Type											
		BOL-B2-1			16-08-15		-		Sediment											
		BOL-B2-1 (PS)			16-08-15		-		Sediment											
		BOL-B2-2			16-08-15		-		Sediment											
		BOL-B2-2 (PS)			16-08-15		-		Sediment											
		BOL-B2-3			16-08-15		-		Sediment											
		BOL-B2-3 (PS)			16-08-15		-		Sediment											
		BOL-B2-4 (PS)			16-08-15		-		Sediment											
		BOL-B2-5 (PS)			16-08-15		-		Sediment											
		BOL-BX			16-08-15		-		Sediment											
		PNF-01 (SEM/AVS)			17-08-15		-		Sediment											
		PNF-01X (SEM/AVS)			17-08-15		-		Sediment											
		PNF-02 (SEM/AVS)			14-08-15		-		Sediment											
Drinking Water (DW) Samples¹ (client use)		Special Instructions / Specify Criteria to add on report (client Use)			SAMPLE CONDITION AS RECEIVED (lab use only)															
Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input type="checkbox"/> No					Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/> Ice packs Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Coating Initiated <input type="checkbox"/>															
Are samples for human drinking water use? <input type="checkbox"/> Yes <input type="checkbox"/> No					INITIAL COOLER TEMPERATURES °C: _____ FINAL COOLER TEMPERATURES °C: _____ _____ 67.4 5.7 7.9															
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (tab use only)															
Released by: Katherine Bachlor		Date: August 15		Time: 13:00		Received by: Jean		Date: 21 Aug		Time: 9AM										

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16-08-2015 10:00

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.



Report To		Report Format / Distribution			Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)															
Company: MOUNT POLLEY MINING CORP.		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)			R <input checked="" type="checkbox"/> Regular (Standard TAT if received by 3 pm - business days)															
Contact: Colleen Hughes		Quality Control (QC) Report with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			P <input type="checkbox"/> Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT															
Address: PO Box 12, Likely, BC, V0L 1N0		<input type="checkbox"/> Criteria on Report - provide details below if box checked			E <input type="checkbox"/> Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT															
Phone: 250-790-2817		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			E2 <input type="checkbox"/> Same day or weekend emergency - contact ALS to confirm TAT and surcharge															
		Email 1 or Fax chughes@mountpolley.com; pstecko@minnow.ca			Specify Date Required for E2, E or P:															
		Email 2			Analysis Request															
Invoice To		Invoice Distribution			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below															
Same as Report To <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX																		
Copy of Invoice with Report <input type="checkbox"/> Yes <input type="checkbox"/> No		Email 1 or Fax chughes@mountpolley.com																		
Company:		Email 2																		
Contact:																				
Project Information		Oil and Gas Required Fields (client use)																		
ALS Quote #: Q51555		Approver ID:																		
Job #:		Cost Center:																		
PO / AFE:		GL Account:																		
LSD:		Routing Code:																		
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang			Sampler:															
ALS Sample # (lab use only)		Sample Identification and/or Coordinates (This description will appear on the report)			Date (dd-mm-yy)		Time (hh:mm)		Sample Type											
		PNF-03 (SEM/AVS)			15-08-15		-		Sediment											
		PNF-04 (SEM/AVS)			15-08-15		-		Sediment											
		PNF-05 (SEM/AVS)			16-08-15		-		Sediment											
		PRef1-01 (SEM/AVS)			18-08-15		-		Sediment											
		PRef1-02 (SEM/AVS)			18-08-15		-		Sediment											
		PRef1-03 (SEM/AVS)			19-08-15		-		Sediment											
		POL-P2-1 (SEM/AVS)			13-08-15		-		Sediment											
		POL-P2-2 (SEM/AVS)			14-08-15		-		Sediment											
		POL-P2-3 (SEM/AVS)			14-08-15		-		Sediment											
		POL-P2-4 (SEM/AVS)			14-08-15		-		Sediment											
		POL-P2-5 (SEM/AVS)			15-08-15		-		Sediment											
		POL-P2-1 (SEM/AVS)			16-08-15		-		Sediment											
Drinking Water (DW) Samples (client use)		Special Instructions / Specify Criteria to add on report (client Use)			SAMPLE CONDITION AS RECEIVED (lab use only)															
Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input type="checkbox"/> No		SEM/AVS samples enclosed in nitrogen lined ziplocs. Extra sample can be used for metals analyses for the same sampling station.			Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>															
Are samples for human drinking water use? <input type="checkbox"/> Yes <input type="checkbox"/> No					Ice packs: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>															
					Cooling Initiated: <input type="checkbox"/>															
					INITIAL COOLER TEMPERATURES °C					FINAL COOLER TEMPERATURES °C										
										6.7, 4, 5.7, 7.9										
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)															
Released by: Katherine Batchelor		Received by: Jean																		
Date: Aug 2015		Date: 2 Aug																		
Time: 13:00		Time: 9 AM																		



Report To Company: MOUNT POLLEY MINING CORP. Contact: Colleen Hughes Address: PO Box 12, Likely, BC, V0L 1N0 Phone: 250-790-2617		Report Format / Distribution Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL) Quality Control (QC) Report with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Criteria on Report - provide details below if box checked Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX Email 1 or Fax: chughes@mountpolley.com; pstecko@minnow.ca Email 2:		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests) R <input checked="" type="checkbox"/> Regular (Standard TAT if received by 3 pm - business days) P <input type="checkbox"/> Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT E <input type="checkbox"/> Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT E2 <input type="checkbox"/> Same day or weekend emergency - contact ALS to confirm TAT and surcharge Specify Date Required for E2, E or P:																																		
Invoice To Same as Report To <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Copy of invoice with Report <input type="checkbox"/> Yes <input type="checkbox"/> No		Invoice Distribution Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX Email 1 or Fax: chughes@mountpolley.com Email 2:		Analysis Request Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below										Number of Containers																								
Project Information ALS Quote #: Q51555 Job #: PO / AFE: LSD:		Oil and Gas Required Fields (client use) Approver ID: GL Account: Activity Code: Location:		<table border="1"> <tr> <td>MET-63UM-SED-VA (CCME Metals < 63um)</td> <td>HG-63UM-CVAF-CA (Hg < 63um)</td> <td>C-TOT-ORG-LECO-SK (TOC) <i>CC 3um</i></td> <td>pH-1.2-VA (pH)</td> <td>N-TOT-LECO-SK (Total Nitrogen)</td> <td>S-TOT-LECO-SK (Total Sulphur)</td> <td>PSA-PIPET+GRAVEL-SK (Particle Size)</td> <td>MOISTURE-VA (Moisture)</td> <td>MET-TESS-STD-VA (Tessier Extractions)</td> <td>MET-SEM-ICP-VA (SEM analysis)</td> <td>HG-SEM-CVAF-S-VA (Hg SEM analysis)</td> <td>AVS-COL-VA (AVS analysis)</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>											MET-63UM-SED-VA (CCME Metals < 63um)	HG-63UM-CVAF-CA (Hg < 63um)	C-TOT-ORG-LECO-SK (TOC) <i>CC 3um</i>	pH-1.2-VA (pH)	N-TOT-LECO-SK (Total Nitrogen)	S-TOT-LECO-SK (Total Sulphur)	PSA-PIPET+GRAVEL-SK (Particle Size)	MOISTURE-VA (Moisture)	MET-TESS-STD-VA (Tessier Extractions)	MET-SEM-ICP-VA (SEM analysis)	HG-SEM-CVAF-S-VA (Hg SEM analysis)	AVS-COL-VA (AVS analysis)												
MET-63UM-SED-VA (CCME Metals < 63um)	HG-63UM-CVAF-CA (Hg < 63um)	C-TOT-ORG-LECO-SK (TOC) <i>CC 3um</i>	pH-1.2-VA (pH)	N-TOT-LECO-SK (Total Nitrogen)	S-TOT-LECO-SK (Total Sulphur)	PSA-PIPET+GRAVEL-SK (Particle Size)	MOISTURE-VA (Moisture)	MET-TESS-STD-VA (Tessier Extractions)	MET-SEM-ICP-VA (SEM analysis)	HG-SEM-CVAF-S-VA (Hg SEM analysis)	AVS-COL-VA (AVS analysis)																											
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang Sampler:																																				
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)			Date (dd-mmm-yy)	Time (hh:mm)	Sample Type																																
	BOL-B2-2 (SEM/AVS)			16/08/15	-	Sediment					X	X	X																									
	BOL-B2-3 (SEM/AVS)			16/08/15	-	Sediment					X	X	X																									
	BOL-B2-4 (SEM/AVS)			16/08/15	-	Sediment					X	X	X																									
	BOL-B2-5 (SEM/AVS)			16/08/15	-	Sediment					X	X	X																									
	BOL-BX (SEM/AVS)			16/08/15	-	Sediment					X	X	X																									
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Drinking Water (DW) Samples¹ (client use) Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input type="checkbox"/> No Are samples for human drinking water use? <input type="checkbox"/> Yes <input type="checkbox"/> No		Special Instructions / Specify Criteria to add on report (client use)		SAMPLE CONDITION AS RECEIVED (lab use only) Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/> Ice packs Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Cooling Initiated <input type="checkbox"/> INITIAL COOLER TEMPERATURES °C: 6.7, 4, 5.7, 7.9 FINAL COOLER TEMPERATURES °C:																																		
SHIPMENT RELEASE (client use) Released by: Katherine Batchelor Date: Aug 20 15 Time: 13:00		INITIAL SHIPMENT RECEPTION (lab use only) Received by: Date: Time:		FINAL SHIPMENT RECEPTION (lab use only) Received by: Sean Date: 21 Time: 9 AM																																		



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 28-AUG-15
Report Date: 06-OCT-15 15:40 (MT)
Version: FINAL REV. 4

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1664712
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: 1, 2
Legal Site Desc:

Comments: ADDITIONAL 29-SEP-15 10:20
Tessier sequential extraction and AVS/SEM analyses are not included in this report.

24-SEP-2015 Revision 2: This revision includes the Quality Control Reports.

2-OCT-2015 Revision 3: This revision includes Total Organic Carbon analysis.

6-OCT-2015 Revision 4: This revision includes data for AVS/SEM and Tessier Sequential Extraction analysis only.

Can Dang
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1664712-13 Sediment 24-AUG-15 PREF1-05	L1664712-14 Sediment 24-AUG-15 PREF1-04 (SEM/AVS)	L1664712-15 Sediment 24-AUG-15 PREF1-05 (SEM/AVS)	
Grouping	Analyte				
SOIL					
Physical Tests	Moisture (%)	54.2	44.6	47.4	
Inorganic Parameters	Acid Volatile Sulphides (umol/g)		2.97	0.87	
Extractable Metals	Cadmium (Cd)-Extractable (umol/g)		0.0063	0.0061	
	Copper (Cu)-Extractable (umol/g)		0.422	0.429	
	Lead (Pb)-Extractable (umol/g)		0.021	0.021	
	Mercury (Hg)-Extractable (umol/g)		<0.000050	<0.000050	
	Nickel (Ni)-Extractable (umol/g)		0.166	0.157	
	Zinc (Zn)-Extractable (umol/g)		0.380	0.353	
Exchangeable & Adsorbed Metals	Aluminum (Al)-Leachable (mg/kg)	<50			
	Antimony (Sb)-Leachable (mg/kg)	<0.10			
	Arsenic (As)-Leachable (mg/kg)	<0.050			
	Barium (Ba)-Leachable (mg/kg)	19.3			
	Beryllium (Be)-Leachable (mg/kg)	<0.20			
	Bismuth (Bi)-Leachable (mg/kg)	<0.20			
	Cadmium (Cd)-Leachable (mg/kg)	0.139			
	Calcium (Ca)-Leachable (mg/kg)	2590			
	Chromium (Cr)-Leachable (mg/kg)	<0.50			
	Cobalt (Co)-Leachable (mg/kg)	0.33			
	Copper (Cu)-Leachable (mg/kg)	0.81			
	Iron (Fe)-Leachable (mg/kg)	<50			
	Lead (Pb)-Leachable (mg/kg)	<0.50			
	Lithium (Li)-Leachable (mg/kg)	<5.0			
	Manganese (Mn)-Leachable (mg/kg)	177			
	Molybdenum (Mo)-Leachable (mg/kg)	<0.50			
	Nickel (Ni)-Leachable (mg/kg)	<2.0 ^{DLB}			
	Phosphorus (P)-Leachable (mg/kg)	<50			
	Potassium (K)-Leachable (mg/kg)	<100			
	Selenium (Se)-Leachable (mg/kg)	<0.20			
	Silver (Ag)-Leachable (mg/kg)	<0.10			
	Sodium (Na)-Leachable (mg/kg)	<100			
	Strontium (Sr)-Leachable (mg/kg)	21.6			
	Thallium (Tl)-Leachable (mg/kg)	<0.050			
	Tin (Sn)-Leachable (mg/kg)	<2.0			
	Titanium (Ti)-Leachable (mg/kg)	<1.0			
	Uranium (U)-Leachable (mg/kg)	<0.050			
	Vanadium (V)-Leachable (mg/kg)	<0.20			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1664712-13 Sediment 24-AUG-15 PREF1-05	L1664712-14 Sediment 24-AUG-15 PREF1-04 (SEM/AVS)	L1664712-15 Sediment 24-AUG-15 PREF1-05 (SEM/AVS)	
Grouping	Analyte				
SOIL					
Exchangeable & Adsorbed Metals	Zinc (Zn)-Leachable (mg/kg)	<1.0			
Carbonate Metals	Aluminum (Al)-Leachable (mg/kg)	<50			
	Antimony (Sb)-Leachable (mg/kg)	<0.10			
	Arsenic (As)-Leachable (mg/kg)	0.253			
	Barium (Ba)-Leachable (mg/kg)	14.8			
	Beryllium (Be)-Leachable (mg/kg)	<0.20			
	Bismuth (Bi)-Leachable (mg/kg)	<0.20			
	Cadmium (Cd)-Leachable (mg/kg)	0.061			
	Calcium (Ca)-Leachable (mg/kg)	263			
	Chromium (Cr)-Leachable (mg/kg)	<5.0			
	Cobalt (Co)-Leachable (mg/kg)	0.44			
	Copper (Cu)-Leachable (mg/kg)	2.27			
	Iron (Fe)-Leachable (mg/kg)	421			
	Lead (Pb)-Leachable (mg/kg)	<0.50			
	Lithium (Li)-Leachable (mg/kg)	<5.0			
	Manganese (Mn)-Leachable (mg/kg)	32.9			
	Molybdenum (Mo)-Leachable (mg/kg)	<0.50			
	Nickel (Ni)-Leachable (mg/kg)	<2.0			
	Phosphorus (P)-Leachable (mg/kg)	<50			
	Selenium (Se)-Leachable (mg/kg)	<0.20			
	Silver (Ag)-Leachable (mg/kg)	<0.10			
	Strontium (Sr)-Leachable (mg/kg)	<5.0			
	Thallium (Tl)-Leachable (mg/kg)	<0.050			
	Tin (Sn)-Leachable (mg/kg)	<2.0			
	Titanium (Ti)-Leachable (mg/kg)	<5.0			
	Uranium (U)-Leachable (mg/kg)	0.327			
	Vanadium (V)-Leachable (mg/kg)	0.38			
	Zinc (Zn)-Leachable (mg/kg)	1.2			
Easily Reducible Metals and Iron Oxides	Aluminum (Al)-Leachable (mg/kg)	900			
	Antimony (Sb)-Leachable (mg/kg)	<0.20 ^{DLM}			
	Arsenic (As)-Leachable (mg/kg)	2.12			
	Barium (Ba)-Leachable (mg/kg)	24.0			
	Beryllium (Be)-Leachable (mg/kg)	<0.40 ^{DLM}			
	Bismuth (Bi)-Leachable (mg/kg)	<0.40 ^{DLM}			
	Cadmium (Cd)-Leachable (mg/kg)	0.19			
	Calcium (Ca)-Leachable (mg/kg)	730			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1664712-13 Sediment 24-AUG-15 PREF1-05	L1664712-14 Sediment 24-AUG-15 PREF1-04 (SEM/AVS)	L1664712-15 Sediment 24-AUG-15 PREF1-05 (SEM/AVS)	
Grouping	Analyte				
SOIL					
Easily Reducible Metals and Iron Oxides	Chromium (Cr)-Leachable (mg/kg)	3.7			
	Cobalt (Co)-Leachable (mg/kg)	4.95			
	Copper (Cu)-Leachable (mg/kg)	5.1			
	Iron (Fe)-Leachable (mg/kg)	7490			
	Lead (Pb)-Leachable (mg/kg)	2.3			
	Lithium (Li)-Leachable (mg/kg)	<10	DLM		
	Manganese (Mn)-Leachable (mg/kg)	116			
	Molybdenum (Mo)-Leachable (mg/kg)	<1.0	DLM		
	Nickel (Ni)-Leachable (mg/kg)	8.8			
	Phosphorus (P)-Leachable (mg/kg)	100			
	Selenium (Se)-Leachable (mg/kg)	<0.40	DLM		
	Silver (Ag)-Leachable (mg/kg)	<0.20	DLM		
	Strontium (Sr)-Leachable (mg/kg)	8.5			
	Thallium (Tl)-Leachable (mg/kg)	<0.10	DLM		
	Tin (Sn)-Leachable (mg/kg)	<4.0	DLM		
	Titanium (Ti)-Leachable (mg/kg)	<2.0	DLM		
	Uranium (U)-Leachable (mg/kg)	0.30			
	Vanadium (V)-Leachable (mg/kg)	9.55			
	Zinc (Zn)-Leachable (mg/kg)	17.0			
Organic Bound Metals	Aluminum (Al)-Leachable (mg/kg)	1590			
	Antimony (Sb)-Leachable (mg/kg)	<0.10			
	Arsenic (As)-Leachable (mg/kg)	0.347			
	Barium (Ba)-Leachable (mg/kg)	17.9			
	Beryllium (Be)-Leachable (mg/kg)	<0.20			
	Bismuth (Bi)-Leachable (mg/kg)	<0.20			
	Cadmium (Cd)-Leachable (mg/kg)	<0.050			
	Calcium (Ca)-Leachable (mg/kg)	499			
	Chromium (Cr)-Leachable (mg/kg)	6.38			
	Cobalt (Co)-Leachable (mg/kg)	1.67			
	Copper (Cu)-Leachable (mg/kg)	13.8			
	Iron (Fe)-Leachable (mg/kg)	836			
	Lead (Pb)-Leachable (mg/kg)	<0.50			
	Lithium (Li)-Leachable (mg/kg)	<5.0			
	Manganese (Mn)-Leachable (mg/kg)	22.5			
	Molybdenum (Mo)-Leachable (mg/kg)	<0.50			
	Nickel (Ni)-Leachable (mg/kg)	4.24			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1664712-13 Sediment 24-AUG-15 PREF1-05	L1664712-14 Sediment 24-AUG-15 PREF1-04 (SEM/AVS)	L1664712-15 Sediment 24-AUG-15 PREF1-05 (SEM/AVS)	
Grouping	Analyte				
SOIL					
Organic Bound Metals	Selenium (Se)-Leachable (mg/kg)	0.83			
	Silver (Ag)-Leachable (mg/kg)	<0.10			
	Strontium (Sr)-Leachable (mg/kg)	4.99			
	Thallium (Tl)-Leachable (mg/kg)	<0.050			
	Tin (Sn)-Leachable (mg/kg)	<2.0			
	Titanium (Ti)-Leachable (mg/kg)	3.0			
	Uranium (U)-Leachable (mg/kg)	0.160			
	Vanadium (V)-Leachable (mg/kg)	2.07			
	Zinc (Zn)-Leachable (mg/kg)	7.6			
Residual Metals	Aluminum (Al)-Leachable (mg/kg)	14800			
	Antimony (Sb)-Leachable (mg/kg)	0.34			
	Arsenic (As)-Leachable (mg/kg)	7.04			
	Barium (Ba)-Leachable (mg/kg)	80.4			
	Beryllium (Be)-Leachable (mg/kg)	<0.20			
	Bismuth (Bi)-Leachable (mg/kg)	<0.20			
	Cadmium (Cd)-Leachable (mg/kg)	<0.050			
	Calcium (Ca)-Leachable (mg/kg)	4700			
	Chromium (Cr)-Leachable (mg/kg)	47.8			
	Cobalt (Co)-Leachable (mg/kg)	7.68			
	Copper (Cu)-Leachable (mg/kg)	35.0			
	Iron (Fe)-Leachable (mg/kg)	23700			
	Lead (Pb)-Leachable (mg/kg)	4.46			
	Lithium (Li)-Leachable (mg/kg)	12.0			
	Manganese (Mn)-Leachable (mg/kg)	211			
	Molybdenum (Mo)-Leachable (mg/kg)	1.00			
	Nickel (Ni)-Leachable (mg/kg)	25.8			
	Selenium (Se)-Leachable (mg/kg)	<0.20			
	Silver (Ag)-Leachable (mg/kg)	<0.10			
	Strontium (Sr)-Leachable (mg/kg)	42.8			
	Thallium (Tl)-Leachable (mg/kg)	0.127			
	Tin (Sn)-Leachable (mg/kg)	2.5			
	Titanium (Ti)-Leachable (mg/kg)	935			
	Uranium (U)-Leachable (mg/kg)	0.565			
	Vanadium (V)-Leachable (mg/kg)	56.9			
	Zinc (Zn)-Leachable (mg/kg)	55.0			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Calcium (Ca)-Leachable	B	L1664712-13
Method Blank	Strontium (Sr)-Leachable	B	L1664712-13
Duplicate	Nickel (Ni)-Leachable	DLB	L1664712-13
Method Blank	Nickel (Ni)-Leachable	MB-LOR	L1664712-13

Qualifiers for Individual Parameters Listed:

Qualifier	Description
B	Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable.
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DLM	Detection Limit Adjusted due to sample matrix effects.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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AVS-COL-VA Soil Acid volatile sulphide by colourimetric EPA 821/R-91-100
 This analysis was carried out in accordance with the method described in EPA 821/R-91-100. In summary, hydrochloric acid is added to the sediment samples within a purge and trap system. The evolved hydrogen sulphide (H₂S) is carried into a basic zinc acetate (ZnAc) solution by argon gas. The acid volatile sulfide is then determined colourimetrically.

C-TOT-63UM-LECO-SK Soil Total Carbon by combustion method (63um) SSSA (1996) P. 973-974
 The sample is ignited in a combustion analyzer where carbon in the reduced CO₂ gas is determined using a thermal conductivity detector.

C-TOT-ORG-63UM-SK Soil Organic Carbon by combustion method(63um) SSSA (1996) p. 973
 Total Organic Carbon (C-TOT-ORG-LECO-SK, C-TOT-ORG-SK)

Total C and inorganic C are determined on separate samples. The total C is determined by combustion and thermal conductivity detection, while inorganic C is determined by weight loss after addition of hydrochloric acid. Organic C is calculated by the difference between these two determinations.

Reference for Total C:

Nelson, D.W. and Sommers, L.E. 1996. Total Carbon, organic carbon and organic matter. P. 961-1010 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

Reference for Inorganic C:

Loeppert, R.H. and Suarez, D.L. 1996. Gravimetric Method for Loss of Carbon Dioxide. P. 455-456 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

HG-63UM-CVAF-VA Soil Hg in Soil by CVAFS EPA 200.2/245.7

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 63 um (230 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Deviation from Reference Method: This procedure deviates from the BC CSR SALM method, which specifies sieving to 2 mm (10 mesh).

HG-SEM-CVAFS-VA Soil Simultaneously Extracted Metals in Soil EPA 821/R-91-100; EPA245.7

This analysis was carried out in accordance with the method described in EPA 821/R-91-100. In summary, hydrochloric acid is added to the sediment samples within a purge and trap system. The extract produced from the addition of the acid is then analyzed for simultaneously extracted metals (SEM) using atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA 245.7).

MET-63UM-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 63 um (230 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may

Reference Information

be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MET-SEM-ICP-VA Soil Simultaneously Extracted Metals (ICPOES) EPA 821/R-91-100; EPA 6010B

This analysis was carried out in accordance with the method described in EPA 821/R-91-100. In summary, hydrochloric acid is added to the sediment samples within a purge and trap system. The extract produced from the addition of the acid is then analyzed for simultaneously extracted metals (SEM) using inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TESS-CM-CCMS-VA Soil METALS BY CCMS (TESSIER EXTRACTION #2) Tessier Extraction 1979/EPA 6020A

This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For Extraction #2, the extraction solution is 1M Sodium Acetate adjusted to pH 5 and is intended to extract the "Carbonate" metals.

MET-TESS-EA-CCMS-VA Soil METALS BY CCMS (TESSIER EXTRACTION #1) Tessier Extraction 1979/EPA 6020A

This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For Extraction #1, the extraction solution is 1M Magnesium Chloride and is intended to extract the "Exchangeable and Adsorbed" metals.

MET-TESS-FEO-CCMS-VA Soil METALS BY CCMS (TESSIER EXTRACTION #3) Tessier Extraction 1979/EPA 6020A

This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For Extraction #3, the extraction solution is 0.1 M Hydroxylamine Hydrochloride in 25% v/v Acetic Acid and is intended to extract the Easily Reducible Metals and Iron Oxides .

MET-TESS-OB-CCMS-VA Soil METALS BY CCMS (TESSIER EXTRACTION #4) Tessier Extraction 1979/EPA 6020A

"This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with 5 or 6 (if a pre-liminary water extraction is included) different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For Extraction #4, the extraction solution is 0.02 M Nitric Acid followed by 3.2M Ammonium Acetate and is intended to extract the Organic Bound metals.

MET-TESS-RM-CCMS-VA Soil METALS BY CCMS (TESSIER RM EXTRACTION) Tessier Extraction 1979/EPA 6020A

"This analysis is modified from the extraction procedure outlined in the "Sequential Extraction Procedure for the Speciation of Particulate Trace Metals" Analytical Chemistry, (A. Tessier, P.G.C. Campbell, and M. Bisson, June 1979). Initially, the sample is manually homogenized, dried at <60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed for extraction. In summary, the sample is sequentially extracted with up to 6 different extraction solutions. The extract is then centrifuged for 30 minutes and the supernatant is subsequently removed and analysed. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Note: For the Tessier "RM" Extraction, the extraction solution is 50/50 mix of 1:1 Nitric Acid along with 1:1 Hydrochloric Acid, and is hot block digested as per the BC SALM procedure. This is intended to extract the Residual metals.

MOISTURE-VA Soil Moisture content ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

N-TOT-LECO-SK Soil Total Nitrogen by combustion method SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH

Reference Information

probe.

PSA-PIPET+GRAVEL-SK Soil Particle size - Sieve and Pipette SSIR-51 METHOD 3.2.1

Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

S-TOT-LECO-SK Soil Total Sulphur by combustion method ISO 15178:2000

The sample is ignited in a combustion analyzer where sulfur in the reduced SO₂ gas is determined using a thermal conductivity detector.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

1	2
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GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1664712

Report Date: 06-OCT-15

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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0
 Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
AVS-COL-VA								
	Soil							
Batch	R3266236							
WG2162055-4	DUP	L1664712-14						
Acid Volatile Sulphides		2.97	3.05		umol/g	2.7	45	01-SEP-15
WG2162055-3	LCS							
Acid Volatile Sulphides			95.5		%		70-130	01-SEP-15
WG2162055-1	MB							
Acid Volatile Sulphides			<0.20		umol/g		0.2	01-SEP-15
HG-SEM-CVAFS-VA								
	Soil							
Batch	R3262724							
WG2162055-2	CRM	VA-NRC-MESS3						
Mercury (Hg)-Extractable			84.6		%		70-130	09-SEP-15
WG2162055-4	DUP	L1664712-14						
Mercury (Hg)-Extractable		<0.000050	<0.000050	RPD-NA	umol/g	N/A	30	09-SEP-15
WG2162055-1	MB							
Mercury (Hg)-Extractable			<0.000050		umol/g		0.00005	09-SEP-15
MET-SEM-ICP-VA								
	Soil							
Batch	R3259231							
WG2162055-2	CRM	VA-NRC-MESS3						
Copper (Cu)-Extractable			101.9		%		70-130	02-SEP-15
Lead (Pb)-Extractable			96.0		%		70-130	02-SEP-15
Nickel (Ni)-Extractable			91.3		%		70-130	02-SEP-15
Zinc (Zn)-Extractable			102.6		%		70-130	02-SEP-15
WG2162055-4	DUP	L1664712-14						
Cadmium (Cd)-Extractable		0.0063	0.0065		umol/g	3.2	30	10-SEP-15
Copper (Cu)-Extractable		0.422	0.406		umol/g	3.8	30	10-SEP-15
Lead (Pb)-Extractable		0.021	0.022		umol/g	1.2	30	10-SEP-15
Nickel (Ni)-Extractable		0.166	0.166		umol/g	0.3	30	10-SEP-15
Zinc (Zn)-Extractable		0.380	0.384		umol/g	1.2	30	10-SEP-15
WG2162055-1	MB							
Cadmium (Cd)-Extractable			<0.0050		umol/g		0.005	02-SEP-15
Copper (Cu)-Extractable			<0.010		umol/g		0.01	02-SEP-15
Lead (Pb)-Extractable			<0.020		umol/g		0.02	02-SEP-15
Nickel (Ni)-Extractable			<0.050		umol/g		0.05	02-SEP-15
Zinc (Zn)-Extractable			<0.0050		umol/g		0.005	02-SEP-15
MET-TESS-CM-CCMS-VA								
	Soil							



Quality Control Report

Workorder: L1664712

Report Date: 06-OCT-15

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-CM-CCMS-VA Soil								
Batch	R3268728							
WG2168741-4 DUP		L1664712-13						
Aluminum (Al)-Leachable		<50	<50	RPD-NA	mg/kg	N/A	30	16-SEP-15
Antimony (Sb)-Leachable		<0.10	<0.10	RPD-NA	mg/kg	N/A	30	16-SEP-15
Arsenic (As)-Leachable		0.253	0.263		mg/kg	3.9	30	16-SEP-15
Barium (Ba)-Leachable		14.8	15.5		mg/kg	4.1	30	16-SEP-15
Beryllium (Be)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	16-SEP-15
Bismuth (Bi)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	16-SEP-15
Cadmium (Cd)-Leachable		0.061	0.063		mg/kg	2.5	30	16-SEP-15
Calcium (Ca)-Leachable		263	280		mg/kg	6.5	30	16-SEP-15
Chromium (Cr)-Leachable		<5.0	<5.0	RPD-NA	mg/kg	N/A	30	16-SEP-15
Cobalt (Co)-Leachable		0.44	0.46		mg/kg	4.3	30	16-SEP-15
Copper (Cu)-Leachable		2.27	2.38		mg/kg	4.5	30	16-SEP-15
Iron (Fe)-Leachable		421	425		mg/kg	1.0	30	16-SEP-15
Lead (Pb)-Leachable		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	16-SEP-15
Lithium (Li)-Leachable		<5.0	<5.0	RPD-NA	mg/kg	N/A	30	16-SEP-15
Manganese (Mn)-Leachable		32.9	35.5		mg/kg	7.7	30	16-SEP-15
Molybdenum (Mo)-Leachable		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	16-SEP-15
Nickel (Ni)-Leachable		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	16-SEP-15
Phosphorus (P)-Leachable		<50	<50	RPD-NA	mg/kg	N/A	30	16-SEP-15
Selenium (Se)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	16-SEP-15
Silver (Ag)-Leachable		<0.10	<0.10	RPD-NA	mg/kg	N/A	30	16-SEP-15
Strontium (Sr)-Leachable		<5.0	5.2	RPD-NA	mg/kg	N/A	30	16-SEP-15
Thallium (Tl)-Leachable		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	16-SEP-15
Tin (Sn)-Leachable		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	16-SEP-15
Titanium (Ti)-Leachable		<5.0	<5.0	RPD-NA	mg/kg	N/A	30	16-SEP-15
Uranium (U)-Leachable		0.327	0.341		mg/kg	4.3	30	16-SEP-15
Vanadium (V)-Leachable		0.38	0.41		mg/kg	7.3	30	16-SEP-15
Zinc (Zn)-Leachable		1.2	1.3		mg/kg	8.7	30	16-SEP-15
WG2168741-2 LCS								
Aluminum (Al)-Leachable			100.4		%		70-130	16-SEP-15
Antimony (Sb)-Leachable			96.5		%		70-130	16-SEP-15
Arsenic (As)-Leachable			104.8		%		70-130	16-SEP-15
Barium (Ba)-Leachable			101.0		%		70-130	16-SEP-15
Beryllium (Be)-Leachable			102.1		%		70-130	16-SEP-15
Bismuth (Bi)-Leachable			96.9		%		70-130	16-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-CM-CCMS-VA Soil								
Batch	R3268728							
WG2168741-2 LCS								
Cadmium (Cd)-Leachable			98.2		%		70-130	16-SEP-15
Calcium (Ca)-Leachable			91.9		%		70-130	16-SEP-15
Chromium (Cr)-Leachable			98.0		%		70-130	16-SEP-15
Cobalt (Co)-Leachable			99.1		%		70-130	16-SEP-15
Copper (Cu)-Leachable			94.6		%		70-130	16-SEP-15
Iron (Fe)-Leachable			98.5		%		70-130	16-SEP-15
Lead (Pb)-Leachable			98.3		%		70-130	16-SEP-15
Lithium (Li)-Leachable			112.1		%		70-130	16-SEP-15
Manganese (Mn)-Leachable			103.3		%		70-130	16-SEP-15
Molybdenum (Mo)-Leachable			96.6		%		70-130	16-SEP-15
Nickel (Ni)-Leachable			96.7		%		70-130	16-SEP-15
Phosphorus (P)-Leachable			107.4		%		70-130	16-SEP-15
Selenium (Se)-Leachable			101.7		%		70-130	16-SEP-15
Silver (Ag)-Leachable			99.4		%		70-130	16-SEP-15
Strontium (Sr)-Leachable			96.3		%		70-130	16-SEP-15
Thallium (Tl)-Leachable			94.1		%		70-130	16-SEP-15
Tin (Sn)-Leachable			96.9		%		70-130	16-SEP-15
Titanium (Ti)-Leachable			101.1		%		70-130	16-SEP-15
Uranium (U)-Leachable			102.2		%		70-130	16-SEP-15
Vanadium (V)-Leachable			102.2		%		70-130	16-SEP-15
Zinc (Zn)-Leachable			92.3		%		70-130	16-SEP-15
WG2168741-1 MB								
Aluminum (Al)-Leachable			<50		mg/kg		50	16-SEP-15
Antimony (Sb)-Leachable			<0.10		mg/kg		0.1	16-SEP-15
Arsenic (As)-Leachable			<0.050		mg/kg		0.05	16-SEP-15
Barium (Ba)-Leachable			<2.0		mg/kg		2	16-SEP-15
Beryllium (Be)-Leachable			<0.20		mg/kg		0.2	16-SEP-15
Bismuth (Bi)-Leachable			<0.20		mg/kg		0.2	16-SEP-15
Cadmium (Cd)-Leachable			<0.050		mg/kg		0.05	16-SEP-15
Calcium (Ca)-Leachable			<50		mg/kg		50	16-SEP-15
Chromium (Cr)-Leachable			<5.0		mg/kg		5	16-SEP-15
Cobalt (Co)-Leachable			<0.10		mg/kg		0.1	16-SEP-15
Copper (Cu)-Leachable			<0.50		mg/kg		0.5	16-SEP-15
Iron (Fe)-Leachable			<50		mg/kg		50	16-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-CM-CCMS-VA Soil								
Batch R3268728								
WG2168741-1 MB								
Lead (Pb)-Leachable			<0.50		mg/kg		0.5	16-SEP-15
Lithium (Li)-Leachable			<5.0		mg/kg		5	16-SEP-15
Manganese (Mn)-Leachable			<5.0		mg/kg		5	16-SEP-15
Molybdenum (Mo)-Leachable			<0.50		mg/kg		0.5	16-SEP-15
Nickel (Ni)-Leachable			<2.0		mg/kg		2	16-SEP-15
Phosphorus (P)-Leachable			<50		mg/kg		50	16-SEP-15
Selenium (Se)-Leachable			<0.20		mg/kg		0.2	16-SEP-15
Silver (Ag)-Leachable			<0.10		mg/kg		0.1	16-SEP-15
Strontium (Sr)-Leachable			<5.0		mg/kg		5	16-SEP-15
Thallium (Tl)-Leachable			<0.050		mg/kg		0.05	16-SEP-15
Tin (Sn)-Leachable			<2.0		mg/kg		2	16-SEP-15
Titanium (Ti)-Leachable			<5.0		mg/kg		5	16-SEP-15
Uranium (U)-Leachable			<0.050		mg/kg		0.05	16-SEP-15
Vanadium (V)-Leachable			<0.20		mg/kg		0.2	16-SEP-15
Zinc (Zn)-Leachable			<1.0		mg/kg		1	16-SEP-15
MET-TESS-EA-CCMS-VA Soil								
Batch R3266373								
WG2168741-4 DUP								
Aluminum (Al)-Leachable		L1664712-13	<50		mg/kg	RPD-NA	30	14-SEP-15
Antimony (Sb)-Leachable			<0.10	<0.10	mg/kg	RPD-NA	30	14-SEP-15
Arsenic (As)-Leachable			<0.050	<0.050	mg/kg	RPD-NA	30	14-SEP-15
Barium (Ba)-Leachable			19.3	19.4	mg/kg		0.2	30
Beryllium (Be)-Leachable			<0.20	<0.20	mg/kg	RPD-NA	30	14-SEP-15
Bismuth (Bi)-Leachable			<0.20	<0.20	mg/kg	RPD-NA	30	14-SEP-15
Cadmium (Cd)-Leachable			0.139	0.132	mg/kg		5.0	30
Calcium (Ca)-Leachable			2590	2570	mg/kg		0.6	30
Chromium (Cr)-Leachable			<0.50	<0.50	mg/kg	RPD-NA	30	14-SEP-15
Cobalt (Co)-Leachable			0.33	0.34	mg/kg		1.2	30
Copper (Cu)-Leachable			0.81	0.82	mg/kg		1.0	30
Iron (Fe)-Leachable			<50	<50	mg/kg	RPD-NA	30	14-SEP-15
Lead (Pb)-Leachable			<0.50	<0.50	mg/kg	RPD-NA	30	14-SEP-15
Lithium (Li)-Leachable			<5.0	<5.0	mg/kg	RPD-NA	30	14-SEP-15
Manganese (Mn)-Leachable			177	177	mg/kg		0.1	30
Molybdenum (Mo)-Leachable			<0.50	<0.50	mg/kg	RPD-NA	30	14-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-EA-CCMS-VA Soil								
Batch	R3266373							
WG2168741-4 DUP		L1664712-13						
Nickel (Ni)-Leachable		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	14-SEP-15
Phosphorus (P)-Leachable		<50	<50	RPD-NA	mg/kg	N/A	30	14-SEP-15
Potassium (K)-Leachable		<100	<100	RPD-NA	mg/kg	N/A	30	14-SEP-15
Selenium (Se)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	14-SEP-15
Silver (Ag)-Leachable		<0.10	<0.10	RPD-NA	mg/kg	N/A	30	14-SEP-15
Sodium (Na)-Leachable		<100	<100	RPD-NA	mg/kg	N/A	30	14-SEP-15
Strontium (Sr)-Leachable		21.6	21.7		mg/kg	0.3	30	14-SEP-15
Thallium (Tl)-Leachable		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	14-SEP-15
Tin (Sn)-Leachable		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	14-SEP-15
Titanium (Ti)-Leachable		<1.0	<1.0	RPD-NA	mg/kg	N/A	30	14-SEP-15
Uranium (U)-Leachable		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	14-SEP-15
Vanadium (V)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	14-SEP-15
Zinc (Zn)-Leachable		<1.0	<1.0	RPD-NA	mg/kg	N/A	30	14-SEP-15
WG2168741-1 MB								
Aluminum (Al)-Leachable			<50		mg/kg		50	14-SEP-15
Antimony (Sb)-Leachable			<0.10		mg/kg		0.1	14-SEP-15
Arsenic (As)-Leachable			<0.050		mg/kg		0.05	14-SEP-15
Barium (Ba)-Leachable			<0.50		mg/kg		0.5	14-SEP-15
Beryllium (Be)-Leachable			<0.20		mg/kg		0.2	14-SEP-15
Bismuth (Bi)-Leachable			<0.20		mg/kg		0.2	14-SEP-15
Cadmium (Cd)-Leachable			<0.050		mg/kg		0.05	14-SEP-15
Calcium (Ca)-Leachable			287	B	mg/kg		50	14-SEP-15
Chromium (Cr)-Leachable			<0.50		mg/kg		0.5	14-SEP-15
Cobalt (Co)-Leachable			<0.10		mg/kg		0.1	14-SEP-15
Copper (Cu)-Leachable			<0.50		mg/kg		0.5	14-SEP-15
Iron (Fe)-Leachable			<50		mg/kg		50	14-SEP-15
Lead (Pb)-Leachable			<0.50		mg/kg		0.5	14-SEP-15
Lithium (Li)-Leachable			<5.0		mg/kg		5	14-SEP-15
Manganese (Mn)-Leachable			<1.0		mg/kg		1	14-SEP-15
Molybdenum (Mo)-Leachable			<0.50		mg/kg		0.5	14-SEP-15
Nickel (Ni)-Leachable			1.26	MB-LOR	mg/kg		0.5	14-SEP-15
Phosphorus (P)-Leachable			<50		mg/kg		50	14-SEP-15
Potassium (K)-Leachable			<100		mg/kg		100	14-SEP-15
Selenium (Se)-Leachable			<0.20		mg/kg		0.2	14-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-EA-CCMS-VA		Soil						
Batch	R3266373							
WG2168741-1	MB							
Silver (Ag)-Leachable			<0.10		mg/kg		0.1	14-SEP-15
Sodium (Na)-Leachable			<100		mg/kg		100	14-SEP-15
Strontium (Sr)-Leachable			0.86	B	mg/kg		0.5	14-SEP-15
Thallium (Tl)-Leachable			<0.050		mg/kg		0.05	14-SEP-15
Tin (Sn)-Leachable			<2.0		mg/kg		2	14-SEP-15
Titanium (Ti)-Leachable			<1.0		mg/kg		1	14-SEP-15
Uranium (U)-Leachable			<0.050		mg/kg		0.05	14-SEP-15
Vanadium (V)-Leachable			<0.20		mg/kg		0.2	14-SEP-15
Zinc (Zn)-Leachable			<1.0		mg/kg		1	14-SEP-15
MET-TESS-FEO-CCMS-VA		Soil						
Batch	R3273140							
WG2168741-2	LCS							
Aluminum (Al)-Leachable			102.0		%		70-130	21-SEP-15
Antimony (Sb)-Leachable			100.6		%		70-130	21-SEP-15
Arsenic (As)-Leachable			104.3		%		70-130	21-SEP-15
Barium (Ba)-Leachable			101.0		%		70-130	21-SEP-15
Beryllium (Be)-Leachable			101.3		%		70-130	21-SEP-15
Bismuth (Bi)-Leachable			99.6		%		70-130	21-SEP-15
Cadmium (Cd)-Leachable			102.2		%		70-130	21-SEP-15
Calcium (Ca)-Leachable			97.9		%		70-130	21-SEP-15
Chromium (Cr)-Leachable			99.8		%		70-130	21-SEP-15
Cobalt (Co)-Leachable			100.7		%		70-130	21-SEP-15
Copper (Cu)-Leachable			98.0		%		70-130	21-SEP-15
Iron (Fe)-Leachable			99.97		%		70-130	21-SEP-15
Lead (Pb)-Leachable			101.0		%		70-130	21-SEP-15
Lithium (Li)-Leachable			100.4		%		70-130	21-SEP-15
Manganese (Mn)-Leachable			99.98		%		70-130	21-SEP-15
Molybdenum (Mo)-Leachable			99.7		%		70-130	21-SEP-15
Nickel (Ni)-Leachable			100.2		%		70-130	21-SEP-15
Phosphorus (P)-Leachable			100.4		%		70-130	21-SEP-15
Selenium (Se)-Leachable			107.9		%		70-130	21-SEP-15
Silver (Ag)-Leachable			103.9		%		70-130	21-SEP-15
Strontium (Sr)-Leachable			99.2		%		70-130	21-SEP-15
Thallium (Tl)-Leachable			101.0		%		70-130	21-SEP-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-FEO-CCMS-VA Soil								
Batch	R3273140							
WG2168741-2	LCS							
Tin (Sn)-Leachable			100.8		%		70-130	21-SEP-15
Titanium (Ti)-Leachable			96.7		%		70-130	21-SEP-15
Uranium (U)-Leachable			101.2		%		70-130	21-SEP-15
Vanadium (V)-Leachable			103.7		%		70-130	21-SEP-15
Zinc (Zn)-Leachable			92.9		%		70-130	21-SEP-15
WG2168741-1	MB							
Aluminum (Al)-Leachable			<100		mg/kg		100	21-SEP-15
Antimony (Sb)-Leachable			<0.20		mg/kg		0.2	21-SEP-15
Arsenic (As)-Leachable			<0.10		mg/kg		0.1	21-SEP-15
Barium (Ba)-Leachable			<1.0		mg/kg		1	21-SEP-15
Beryllium (Be)-Leachable			<0.40		mg/kg		0.4	21-SEP-15
Bismuth (Bi)-Leachable			<0.40		mg/kg		0.4	21-SEP-15
Cadmium (Cd)-Leachable			<0.10		mg/kg		0.1	21-SEP-15
Calcium (Ca)-Leachable			<100		mg/kg		100	21-SEP-15
Chromium (Cr)-Leachable			<1.0		mg/kg		1	21-SEP-15
Cobalt (Co)-Leachable			<0.20		mg/kg		0.2	21-SEP-15
Copper (Cu)-Leachable			<1.0		mg/kg		1	21-SEP-15
Iron (Fe)-Leachable			<100		mg/kg		100	21-SEP-15
Lead (Pb)-Leachable			<1.0		mg/kg		1	21-SEP-15
Lithium (Li)-Leachable			<10		mg/kg		10	21-SEP-15
Manganese (Mn)-Leachable			<2.0		mg/kg		2	21-SEP-15
Molybdenum (Mo)-Leachable			<1.0		mg/kg		1	21-SEP-15
Nickel (Ni)-Leachable			<1.0		mg/kg		1	21-SEP-15
Phosphorus (P)-Leachable			<100		mg/kg		100	21-SEP-15
Selenium (Se)-Leachable			<0.40		mg/kg		0.4	21-SEP-15
Silver (Ag)-Leachable			<0.20		mg/kg		0.2	21-SEP-15
Strontium (Sr)-Leachable			<1.0		mg/kg		1	21-SEP-15
Thallium (Tl)-Leachable			<0.10		mg/kg		0.1	21-SEP-15
Tin (Sn)-Leachable			<4.0		mg/kg		4	21-SEP-15
Titanium (Ti)-Leachable			<2.0		mg/kg		2	21-SEP-15
Uranium (U)-Leachable			<0.10		mg/kg		0.1	21-SEP-15
Vanadium (V)-Leachable			<0.40		mg/kg		0.4	21-SEP-15
Zinc (Zn)-Leachable			<2.0		mg/kg		2	21-SEP-15

MET-TESS-OB-CCMS-VA Soil



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MET-TESS-OB-CCMS-VA Soil								
Batch	R3273977							
WG2168741-4 DUP		L1664712-13						
Aluminum (Al)-Leachable		1590	1590		mg/kg	0.3	30	22-SEP-15
Antimony (Sb)-Leachable		<0.10	<0.10	RPD-NA	mg/kg	N/A	30	22-SEP-15
Arsenic (As)-Leachable		0.347	0.318		mg/kg	8.6	30	22-SEP-15
Barium (Ba)-Leachable		17.9	18.1		mg/kg	1.3	30	22-SEP-15
Beryllium (Be)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	22-SEP-15
Bismuth (Bi)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	22-SEP-15
Cadmium (Cd)-Leachable		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	22-SEP-15
Calcium (Ca)-Leachable		499	475		mg/kg	4.8	30	22-SEP-15
Chromium (Cr)-Leachable		6.38	6.34		mg/kg	0.6	30	22-SEP-15
Cobalt (Co)-Leachable		1.67	1.69		mg/kg	1.1	30	22-SEP-15
Copper (Cu)-Leachable		13.8	13.7		mg/kg	0.7	30	22-SEP-15
Iron (Fe)-Leachable		836	831		mg/kg	0.6	30	22-SEP-15
Lead (Pb)-Leachable		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	22-SEP-15
Lithium (Li)-Leachable		<5.0	<5.0	RPD-NA	mg/kg	N/A	30	22-SEP-15
Manganese (Mn)-Leachable		22.5	22.7		mg/kg	0.9	30	22-SEP-15
Molybdenum (Mo)-Leachable		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	22-SEP-15
Nickel (Ni)-Leachable		4.24	4.28		mg/kg	1.0	30	22-SEP-15
Selenium (Se)-Leachable		0.83	0.87		mg/kg	4.3	30	22-SEP-15
Silver (Ag)-Leachable		<0.10	<0.10	RPD-NA	mg/kg	N/A	30	22-SEP-15
Strontium (Sr)-Leachable		4.99	4.95		mg/kg	1.0	30	22-SEP-15
Thallium (Tl)-Leachable		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	22-SEP-15
Tin (Sn)-Leachable		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	22-SEP-15
Titanium (Ti)-Leachable		3.0	1.7	J	mg/kg	1.3	2	22-SEP-15
Uranium (U)-Leachable		0.160	0.161		mg/kg	0.6	30	22-SEP-15
Vanadium (V)-Leachable		2.07	1.55		mg/kg	29	30	22-SEP-15
Zinc (Zn)-Leachable		7.6	7.6		mg/kg	0.4	30	22-SEP-15
WG2168741-2 LCS								
Aluminum (Al)-Leachable			101.4		%		70-130	22-SEP-15
Antimony (Sb)-Leachable			102.4		%		70-130	22-SEP-15
Arsenic (As)-Leachable			101.2		%		70-130	22-SEP-15
Barium (Ba)-Leachable			100.1		%		70-130	22-SEP-15
Beryllium (Be)-Leachable			101.3		%		70-130	22-SEP-15
Bismuth (Bi)-Leachable			102.3		%		70-130	22-SEP-15
Cadmium (Cd)-Leachable			92.1		%		70-130	22-SEP-15



Quality Control Report

Workorder: L1664712

Report Date: 06-OCT-15

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-OB-CCMS-VA		Soil						
Batch	R3273977							
WG2168741-2		LCS						
Calcium (Ca)-Leachable			101.2		%		70-130	22-SEP-15
Chromium (Cr)-Leachable			98.2		%		70-130	22-SEP-15
Cobalt (Co)-Leachable			98.9		%		70-130	22-SEP-15
Copper (Cu)-Leachable			98.2		%		70-130	22-SEP-15
Iron (Fe)-Leachable			98.9		%		70-130	22-SEP-15
Lead (Pb)-Leachable			101.6		%		70-130	22-SEP-15
Lithium (Li)-Leachable			97.1		%		70-130	22-SEP-15
Manganese (Mn)-Leachable			99.3		%		70-130	22-SEP-15
Molybdenum (Mo)-Leachable			103.0		%		70-130	22-SEP-15
Nickel (Ni)-Leachable			97.3		%		70-130	22-SEP-15
Selenium (Se)-Leachable			101.2		%		70-130	22-SEP-15
Silver (Ag)-Leachable			102.9		%		70-130	22-SEP-15
Strontium (Sr)-Leachable			100.9		%		70-130	22-SEP-15
Thallium (Tl)-Leachable			98.2		%		70-130	22-SEP-15
Tin (Sn)-Leachable			95.9		%		70-130	22-SEP-15
Titanium (Ti)-Leachable			87.8		%		70-130	22-SEP-15
Uranium (U)-Leachable			100.6		%		70-130	22-SEP-15
Vanadium (V)-Leachable			98.8		%		70-130	22-SEP-15
Zinc (Zn)-Leachable			90.2		%		70-130	22-SEP-15
WG2168741-1		MB						
Aluminum (Al)-Leachable			<50		mg/kg		50	22-SEP-15
Antimony (Sb)-Leachable			<0.10		mg/kg		0.1	22-SEP-15
Arsenic (As)-Leachable			<0.050		mg/kg		0.05	22-SEP-15
Barium (Ba)-Leachable			<0.50		mg/kg		0.5	22-SEP-15
Beryllium (Be)-Leachable			<0.20		mg/kg		0.2	22-SEP-15
Bismuth (Bi)-Leachable			<0.20		mg/kg		0.2	22-SEP-15
Cadmium (Cd)-Leachable			<0.050		mg/kg		0.05	22-SEP-15
Calcium (Ca)-Leachable			<50		mg/kg		50	22-SEP-15
Chromium (Cr)-Leachable			<0.50		mg/kg		0.5	22-SEP-15
Cobalt (Co)-Leachable			<0.10		mg/kg		0.1	22-SEP-15
Copper (Cu)-Leachable			<0.50		mg/kg		0.5	22-SEP-15
Iron (Fe)-Leachable			<50		mg/kg		50	22-SEP-15
Lead (Pb)-Leachable			<0.50		mg/kg		0.5	22-SEP-15
Lithium (Li)-Leachable			<5.0		mg/kg		5	22-SEP-15



Quality Control Report

Workorder: L1664712

Report Date: 06-OCT-15

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-OB-CCMS-VA Soil								
Batch	R3273977							
WG2168741-1 MB								
Manganese (Mn)-Leachable			<1.0		mg/kg		1	22-SEP-15
Molybdenum (Mo)-Leachable			<0.50		mg/kg		0.5	22-SEP-15
Nickel (Ni)-Leachable			<0.50		mg/kg		0.5	22-SEP-15
Selenium (Se)-Leachable			<0.20		mg/kg		0.2	22-SEP-15
Silver (Ag)-Leachable			<0.10		mg/kg		0.1	22-SEP-15
Strontium (Sr)-Leachable			<0.50		mg/kg		0.5	22-SEP-15
Thallium (Tl)-Leachable			<0.050		mg/kg		0.05	22-SEP-15
Tin (Sn)-Leachable			<2.0		mg/kg		2	22-SEP-15
Titanium (Ti)-Leachable			<1.0		mg/kg		1	22-SEP-15
Uranium (U)-Leachable			<0.050		mg/kg		0.05	22-SEP-15
Vanadium (V)-Leachable			<0.20		mg/kg		0.2	22-SEP-15
Zinc (Zn)-Leachable			<1.0		mg/kg		1	22-SEP-15
MET-TESS-RM-CCMS-VA Soil								
Batch	R3273977							
WG2168741-4 DUP		L1664712-13						
Aluminum (Al)-Leachable		14800	15200		mg/kg	2.5	30	22-SEP-15
Antimony (Sb)-Leachable		0.34	0.38		mg/kg	10	30	22-SEP-15
Arsenic (As)-Leachable		7.04	6.85		mg/kg	2.7	30	22-SEP-15
Barium (Ba)-Leachable		80.4	83.1		mg/kg	3.3	30	22-SEP-15
Beryllium (Be)-Leachable		<0.20	0.21	RPD-NA	mg/kg	N/A	30	22-SEP-15
Bismuth (Bi)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	22-SEP-15
Cadmium (Cd)-Leachable		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	22-SEP-15
Calcium (Ca)-Leachable		4700	4860		mg/kg	3.3	30	22-SEP-15
Chromium (Cr)-Leachable		47.8	48.0		mg/kg	0.4	30	22-SEP-15
Cobalt (Co)-Leachable		7.68	7.49		mg/kg	2.4	30	22-SEP-15
Copper (Cu)-Leachable		35.0	34.4		mg/kg	1.7	30	22-SEP-15
Iron (Fe)-Leachable		23700	23600		mg/kg	0.7	30	22-SEP-15
Lead (Pb)-Leachable		4.46	4.57		mg/kg	2.5	30	22-SEP-15
Lithium (Li)-Leachable		12.0	11.8		mg/kg	1.6	30	22-SEP-15
Manganese (Mn)-Leachable		211	210		mg/kg	0.7	30	22-SEP-15
Molybdenum (Mo)-Leachable		1.00	1.00		mg/kg	0.2	30	22-SEP-15
Nickel (Ni)-Leachable		25.8	25.6		mg/kg	0.9	30	22-SEP-15
Selenium (Se)-Leachable		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	22-SEP-15
Silver (Ag)-Leachable		<0.10	<0.10	RPD-NA	mg/kg	N/A	30	22-SEP-15



Quality Control Report

Workorder: L1664712

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TESS-RM-CCMS-VA Soil								
Batch	R3273977							
WG2168741-1 MB								
Aluminum (Al)-Leachable			<50		mg/kg		50	22-SEP-15
Antimony (Sb)-Leachable			<0.10		mg/kg		0.1	22-SEP-15
Arsenic (As)-Leachable			<0.50		mg/kg		0.5	22-SEP-15
Barium (Ba)-Leachable			<2.0		mg/kg		2	22-SEP-15
Beryllium (Be)-Leachable			<0.20		mg/kg		0.2	22-SEP-15
Bismuth (Bi)-Leachable			<0.20		mg/kg		0.2	22-SEP-15
Cadmium (Cd)-Leachable			<0.050		mg/kg		0.05	22-SEP-15
Calcium (Ca)-Leachable			<50		mg/kg		50	22-SEP-15
Chromium (Cr)-Leachable			<5.0		mg/kg		5	22-SEP-15
Cobalt (Co)-Leachable			<0.10		mg/kg		0.1	22-SEP-15
Copper (Cu)-Leachable			<0.50		mg/kg		0.5	22-SEP-15
Iron (Fe)-Leachable			<50		mg/kg		50	22-SEP-15
Lead (Pb)-Leachable			<0.50		mg/kg		0.5	22-SEP-15
Lithium (Li)-Leachable			<5.0		mg/kg		5	22-SEP-15
Manganese (Mn)-Leachable			<5.0		mg/kg		5	22-SEP-15
Molybdenum (Mo)-Leachable			<0.50		mg/kg		0.5	22-SEP-15
Nickel (Ni)-Leachable			<2.0		mg/kg		2	22-SEP-15
Selenium (Se)-Leachable			<0.20		mg/kg		0.2	22-SEP-15
Silver (Ag)-Leachable			<0.10		mg/kg		0.1	22-SEP-15
Strontium (Sr)-Leachable			<5.0		mg/kg		5	22-SEP-15
Thallium (Tl)-Leachable			<0.050		mg/kg		0.05	22-SEP-15
Tin (Sn)-Leachable			<2.0		mg/kg		2	22-SEP-15
Titanium (Ti)-Leachable			<5.0		mg/kg		5	22-SEP-15
Uranium (U)-Leachable			<0.050		mg/kg		0.05	22-SEP-15
Vanadium (V)-Leachable			<0.20		mg/kg		0.2	22-SEP-15
Zinc (Zn)-Leachable			<1.0		mg/kg		1	22-SEP-15
MOISTURE-VA Soil								
Batch	R3257998							
WG2161944-2 LCS								
Moisture			100.4		%		90-110	02-SEP-15
WG2161944-1 MB								
Moisture			<0.25		%		0.25	02-SEP-15



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Workorder: L1664712

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-VA	Soil							
Batch	R3260486							
WG2165115-6	LCS							
Moisture			100.2		%		90-110	05-SEP-15
WG2165115-5	MB							
Moisture			<0.25		%		0.25	05-SEP-15

Quality Control Report

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable.
J	Duplicate results and limits are expressed in terms of absolute difference.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Report To		Report Format / Distribution			Select service Level Below (Rush Turnaround Time (TAT) is not available for all tests)														
Company: MOUNT POLLEY MINING CORP.		Select Report Format: <input checked="" type="checkbox"/> PDF <input type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)			R <input checked="" type="checkbox"/> Regular (Standard TAT if received by 3pm - business days)														
Contact: Colleen Hughes		Quality Control (QC) Report with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			P <input type="checkbox"/> Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT														
Address: PO Box 12, Likely, BC, V0L 1N0		<input type="checkbox"/> Criteria on Report - provide details below if box checked			E <input type="checkbox"/> Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT														
Phone: 250-790-2617		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			E2 <input type="checkbox"/> Same day or weekend emergency - contact ALS to confirm TAT and surcharge														
		Email 1 or Fax: chughes@mountpolley.com; pstecko@minnow.ca			Specify Date Required for E2, E or P:														
		Email 2			Analysis Request														
Invoice To		Invoice Distribution			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below														
Same as Report To <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX																	
Copy of Invoice with Report <input type="checkbox"/> Yes <input type="checkbox"/> No		Email 1 or Fax: chughes@mountpolley.com																	
Company:		Email 2																	
Contact:																			
Project Information		Oil and Gas Required Fields (client use)																	
ALS Quote #: Q51555		Approver ID: _____ Cost Center: _____																	
Job #:		GL Account: _____ Routing Code: _____																	
PO / AFE:		Activity Code: _____																	
LSD:		Location: _____																	
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang			Sampler: KB														
L1664712																			
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)			Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-63UM-SED-VA (CCME Metals < 63um)	HG-63UM-CVAF-CA (Hg < 63um)	C-TOT-ORG-LECO-SK (TOC) < 63um	pH-1.2-VA (pH)	N-TOT-LECO-SK (Total nitrogen)	S-TOT-LECO-SK (Total Sulphur)	PSA-PIPET-GRAVEL-SK (Particle Size)	MOISTURE-VA (Moisture)	MET-TSS-STD-VA (Tessier Extractions)	MET-SEM-ICP-VA (SEM analysis)	HG-SEM-CVAFS-VA (Hg SEM analysis)	AVS-COL-VA (AVS analysis)	Number of Containers
	HAC-SED1			20 Aug 15	—	Sediment	X	X	X	X	X	X	X	X					2
	HAC-SED2			20 Aug 15	—	Sediment	X	X	X	X	X	X	X	X					2
	HAC-SED3			20 Aug 15	—	Sediment	X	X	X	X	X	X	X	X					2
	HAC-SED4			20 Aug 15	—	Sediment	X	X	X	X	X	X	X	X					2
	HAC-SEDS			20 Aug 15	—	Sediment	X	X	X	X	X	X	X	X					2
	LFF-01			25 Aug 15	—	Sediment	X	X	X	X	X	X	X	X					2
	LFF-02			25 Aug 15	—	Sediment	X	X	X	X	X	X	X	X					2
	LFF-03			26 Aug 15	—	Sediment	X	X	X	X	X	X	X	X					2
	LFF-04			26 Aug 15	—	Sediment	X	X	X	X	X	X	X	X					2
	LFF-05			25 Aug 15	—	Sediment	X	X	X	X	X	X	X	X					2
	Pref1-02 (PS)			24 Aug 15	—	Sediment							X						1
	Pref1-04 (PS)			24 Aug 15	—	Sediment							X						1
Drinking Water (DW) Samples (client use)		Special Instructions / Specify Criteria to add on report (client Use)																	
Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input type="checkbox"/> No		Analyse for <63um TOC if sample volume allows. SEM/AVS samples are in nitrogen-filled bags.																	
Are samples for human drinking water use? <input type="checkbox"/> Yes <input type="checkbox"/> No																			
SHIPMENT RELEASE (client use)		SAMPLE CONDITION AS RECEIVED (lab use only)										FINAL SHIPMENT RECEPTION (lab use only)							
Released by: <u>Katharina Butcher</u> Date: <u>Aug 27 15</u> Time: <u>8:35</u>		Frozen: <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>										Ice packs Yes <input type="checkbox"/> No <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>							
Received by: <u>MIKE</u> Date: <u>8/28</u> Time: <u>8:50</u>		Cooling Initiated <input type="checkbox"/>										INITIAL COOLER TEMPERATURES °C: <u>8.4</u> <u>9.5</u> FINAL COOLER TEMPERATURES °C:							



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L1664712-COFC

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Report To		Report Format			Analysis Request																
Company: MOUNT POLLEY MINING CORP.		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)			R <input checked="" type="checkbox"/> Regular (Standard TAT if received by 3pm - business days)																
Contact: Colleen Hughes		Quality Control (QC) Report with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			P <input type="checkbox"/> Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT																
Address: PO Box 12, Likely, BC, V0L 1N0		<input type="checkbox"/> Criteria on Report - provide details below if box checked			E <input type="checkbox"/> Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT																
Phone: 250-790-2617		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			E2 <input type="checkbox"/> Same day or weekend emergency - contact ALS to confirm TAT and surcharge																
		Email 1 or Fax: chughes@mountpolley.com; pstecko@minnow.ca			Specify Date Required for E2, E or P:																
		Email 2																			
Invoice To		Invoice Distribution			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below																
Same as Report To <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX																			
Copy of Invoice with Report <input type="checkbox"/> Yes <input type="checkbox"/> No		Email 1 or Fax: chughes@mountpolley.com																			
Company:		Email 2																			
Contact:																					
Project Information		Oil and Gas Required Fields (client use)																			
ALS Quote #: Q51555		Approver ID:																			
Job #:		GL Account:																			
PO / AFE:		Activity Code:																			
LSD:		Location:																			
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang			Sampler:																
L1664712																					
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)			Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-63UM-SED-VA (COC Metals < 63um)	HG-63UM-CVAF-CA (Hg < 63um)	G-101-ORG-LECO-SK (TOC < 63um)	pH-12-VA (pH)	N-TOT-LECO-SK (Total nitrogen)	S-TOT-LECO-SK (Total Sulphur)	PSA-PIPET+GRAVEL-SK (Particle Size)	MOISTURE-VA (Moisture)	MET-TESS-STD-VA (Tessier Extractions)	MET-SEM-ICP-VA (SEM analysis)	HG-SEM-CVAFS-VA (Hg SEM analysis)	AVS-COL-VA (AVS analysis)	Number of Containers		
	PRef1-05			24 Aug 15	-	Sediment	X	X	X	X	X	X	X	X	X				4		
	PRef1-04 (SEM/AVS)			24 Aug 15	-	Sediment										X	X	X	1		
	PRef1-05 (SEM/AVS)			24 Aug 15	-	Sediment										X	X	X	1		
	LRef1-01			24 Aug 15	-	Sediment	X	X	X	X	X	X	X	X					2		
	LRef1-03			25 Aug 15	-	Sediment	X	X	X	X	X	X	X	X					2		
	LRef1-03X			25 Aug 15	-	Sediment	X	X	X	X	X	X	X	X					2		
	LRef1-04			25 Aug 15	-	Sediment	X	X	X	X	X	X	X	X					2		
						Sediment															
						Sediment															
						Sediment															
						Sediment															
Drinking Water (DW) Samples (client use)		Special Instructions / Specify Criteria to add on report (client use)																			
Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input type="checkbox"/> No		SEM/AVS samples in nitrogen-filled bags. Extra sample can be used for other analyses if needed.																			
Are samples for human drinking water use? <input type="checkbox"/> Yes <input type="checkbox"/> No																					
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)										SAMPLE CONDITION AS RECEIVED (lab use only)									
Released by: Katharina Butcher		Date: Aug 27 15		Time: 8:35		Received by: MIKE		Date: 8/28		Time: 8:50		Frozen: <input type="checkbox"/>		SIF Observations: Yes <input type="checkbox"/> No <input type="checkbox"/>		Ice packs: Yes <input type="checkbox"/> No <input type="checkbox"/>		Custody seal intact: Yes <input type="checkbox"/> No <input type="checkbox"/>		Cooling initiated: <input type="checkbox"/>	
												INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C					
												8.4				9.5					
SHIPMENT RELEASE (client use)		FINAL SHIPMENT RECEPTION (lab use only)																			
Received by:		Date:		Time:		Received by:		Date:		Time:											

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

ALS Form 0206 v03 Form 04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

APPENDIX C
SEDIMENT QUALITY DATA

C1.0 DATA QUALITY ASSESSMENT OF SEDIMENT SAMPLES

C1.1 Method Detection Limits

Method detection limits (MDLs) of the analytical laboratory reports (Appendix B) were examined and assessed in all cases where sample results were reported as less than the MDL. Target MDLs for moisture, Acid Volatile Sulphide (AVS), and Simultaneously Extractable Metals (SEM) were provided by the analytical laboratory (ALS Environmental) as a component of the analytical laboratory quote prior to sample submission and analysis (Table C.1). The target MDL for moisture was met in all cases, but the target MDL for AVS analyses was not met for 5 of the 22 samples analysed which had results < MDL. In general, where < MDL results were reported for AVS (32% of samples) the achieved detection limits for AVS were lower than the sum of SEM metals reported and therefore had little effect on data interpretability. For SEM analyses in sediment, target MDLs were not achieved for cadmium, lead, and nickel in 12 of the 22 samples due to high sample moisture content requiring an adjustment of the detection limits for these three analytes. Given that these metals have not been shown to be parameters of interest or indicator parameters in the collected sediment (Minnow 2015a), this did not affect data interpretation. Overall, MDLs achieved for the moisture, AVS, and SEM analyses were appropriate for the study, and did not adversely affect data interpretability.

MDLs achieved in the selective extraction analyses (SEA or “Tessier” extractions) met the laboratory target MDLs for most metals and extractants (Table C.1), with the exception of the following: 1) nickel in “exchangeable” extracts; and 2) antimony, beryllium, bismuth, cadmium, lithium, molybdenum, phosphorus, selenium, silver, thallium, tin and titanium in the “easily reducible and iron oxide” extracts. The target MDL for nickel in the “exchangeable” extract was exceeded in 11 of the 18 reported results due to detection of the analyte in a method blank and an accompanying increase in detection limit. Within the “easily reducible and iron oxide” extract, the target MDLs were exceeded for the results of 12 analytes within 8 of the 17 analysed samples, with the detection limits raised for analyte results in these samples due to sample matrix interferences. None of these 12 analytes, however, have been shown to be parameters of interest or indicator parameters in sediment from these sampling areas (Minnow 2015a), therefore data interpretation was not affected. For data interpretation, SEA results were primarily used to provide perspective on the relative distribution of metals among extracts (or “phases”), and results below the target MDLs did not impair interpretation. Copper is the primary parameter of

interest in the collected sediment (i.e. Minnow 2015a), and target MDLs were met for all SEA extracts. Overall, the cases of achieved MDLs higher than target had a negligible effect on data interpretability.

C1.2 Laboratory Blank Sample Analysis

All of the method blank results within laboratory reports L1661656 and L1664712 associated with moisture, AVS, and SEM analyses were non-detectable (Appendix B) and are therefore considered reliable. Only eleven (3%) of the 405 laboratory method blank samples associated with selective extraction analyses (Tessier) were detectable. Eight of these detectable method blank samples were associated with sample results at least five-times greater than blank levels, and are therefore considered reliable. For the rest (three method blank samples), the Limits of Reporting were adjusted by the laboratory for samples with results below five-times blank level (Appendix B). Consequently, these data are also considered reliable. The method blank results for this study indicate no inadvertent contamination of samples within the laboratory during sediment analysis

C1.3 Data Precision

Field Duplicate Samples

Two field duplicate samples were collected for quality assurance (Table C.2). The relative percent difference (RPD) between duplicates was less than the DQO of 40% for all the parameters reported (moisture, AVS, SEM, and SEA results). Overall, the precision associated with sediment quality analyses is considered excellent.

Laboratory Duplicate Samples

Within the two laboratory reports L1661656 and L1664712, five laboratory duplicate samples were evaluated for moisture; two laboratory duplicate samples were evaluated for AVS and SEM, and another three laboratory duplicates were evaluated for SEA metals (Appendix B). All laboratory duplicate results (370 in total) met ALS Environmental's data quality objectives of < 25% RPD for moisture, < 40% RPD for AVS, and <30% RPD for SEM and SEA metals (Appendix B), and thus laboratory precision achieved in this study is considered good.

C1.4 Data Accuracy

Data accuracy within the laboratory reports L1661656 and L1664712 was evaluated based on results of certified reference materials (CRM) and laboratory control samples (LCS; Appendix B). Specifically, two CRM samples were used to evaluate the accuracy

of SEM metals analyses, nine LCS were used to evaluate the accuracy of moisture analyses, two LCS samples were used to assess the accuracy of AVS analyses, and three LCS were used to evaluate the accuracy of SEA metals analyses (Appendix B). All CRM and LCS results (368 in total) met ALS Environmental's data quality objectives for accuracy (Appendix B) and thus laboratory accuracy achieved in this study is considered good.

C1.5 Holding Time and General Laboratory Flags

All sediment analyses were conducted within ALS Environmental's recommended hold times. There were no general laboratory flags associated with either analytical report (ALS Environmental Report L1661656 and L1664712; Appendix B).

Table C.1: Laboratory method detection limit (MDL) evaluation for sediment chemistry analysis (Simultaneously Extracted Metals, Acid Volatile Sulphides, and Selective Extraction Analyses) relative to laboratory target method detection limits. Only analytes with < MDL values are reported.

Parameter	Units	ALS Laboratory Target Method Detection Limit	Maximum Method Detection Limit Achieved
Physical Tests			
Moisture	%	0.25	0.25
Inorganic Parameters			
Acid Volatile Sulphides (AVS)	µmol/g	0.2	1.1
Simultaneously Extractable Metals (SEM)			
Cadmium	µmol/g	0.005	0.03
Lead	µmol/g	0.02	0.12
Mercury	µmol/g	0.00005	0.00005
Nickel	µmol/g	0.05	0.3
Exchangeable & Adsorbed Metals (SEA)			
Aluminum	mg/kg	50	50
Antimony	mg/kg	0.1	0.1
Arsenic	mg/kg	0.05	0.05
Beryllium	mg/kg	0.2	0.2
Bismuth	mg/kg	0.2	0.2
Cadmium	mg/kg	0.05	0.05
Chromium	mg/kg	0.5	0.5
Cobalt	mg/kg	0.1	0.1
Iron	mg/kg	50	50
Lead	mg/kg	0.5	0.5
Lithium	mg/kg	5	5
Molybdenum	mg/kg	0.5	0.5
Nickel	mg/kg	0.5	2
Phosphorus	mg/kg	50	50
Potassium	mg/kg	100	100
Selenium	mg/kg	0.2	0.2
Silver	mg/kg	0.1	0.1
Sodium	mg/kg	100	100
Thallium	mg/kg	0.05	0.05
Tin	mg/kg	2	2
Titanium	mg/kg	1	1
Uranium	mg/kg	0.05	0.05
Vanadium	mg/kg	0.2	0.2
Zinc	mg/kg	1	1
Carbonate Metals (SEA)			
Aluminum	mg/kg	50	50
Antimony	mg/kg	0.1	0.1
Beryllium	mg/kg	0.2	0.2
Bismuth	mg/kg	0.2	0.2
Chromium	mg/kg	5	5
Iron	mg/kg	50	50
Lead	mg/kg	0.5	0.5
Lithium	mg/kg	5	5
Molybdenum	mg/kg	0.5	0.5
Nickel	mg/kg	2	2
Phosphorus	mg/kg	50	50
Selenium	mg/kg	0.2	0.2
Silver	mg/kg	0.1	0.1
Strontium	mg/kg	5	5
Thallium	mg/kg	0.05	0.05
Tin	mg/kg	2	2
Titanium	mg/kg	5	5
Vanadium	mg/kg	0.2	0.2
Zinc	mg/kg	1	1
Easily Reducible Metals and Iron Oxides (SEA)			
Antimony	mg/kg	0.1	0.2
Beryllium	mg/kg	0.2	0.4
Bismuth	mg/kg	0.2	0.4
Cadmium	mg/kg	0.05	0.1
Lithium	mg/kg	5	10
Molybdenum	mg/kg	0.5	1
Phosphorus	mg/kg	50	100
Selenium	mg/kg	0.2	0.4
Silver	mg/kg	0.1	0.2
Thallium	mg/kg	0.05	0.1
Tin	mg/kg	2	4
Titanium	mg/kg	1	2
Organic and Mineral Bound Metals (SEA)			
Antimony	mg/kg	0.1	0.1
Beryllium	mg/kg	0.2	0.2
Bismuth	mg/kg	0.2	0.2
Cadmium	mg/kg	0.05	0.05
Chromium	mg/kg	0.5	0.5
Lead	mg/kg	0.5	0.5
Lithium	mg/kg	5	5
Molybdenum	mg/kg	0.5	0.5
Silver	mg/kg	0.1	0.1
Thallium	mg/kg	0.05	0.05
Tin	mg/kg	2	2
Titanium	mg/kg	1	1
Residual Metals (SEA)			
Beryllium	mg/kg	0.2	0.2
Bismuth	mg/kg	0.2	0.2
Cadmium	mg/kg	0.05	0.05
Selenium	mg/kg	0.2	0.2
Silver	mg/kg	0.1	0.1
Thallium	mg/kg	0.05	0.05


 Achieved Method Detection Limit exceeds the target MDL quoted by the analytical laboratory.

Table C.2: Field duplicate results for sediment chemistry analyses. Highlighted values did not meet the data quality objective of ≤ 40% Relative Percent Difference (RPD).

Client Sample ID	Units	Lab Report L1661656								
		BOL-B2-3	BOL-BX	RPD (%) ^a	PNF-01	PNF-01X	RPD (%) ^a	BOL-B2-3	BOL-BX	RPD (%) ^a
		16-Aug-15	16-Aug-15		17-Aug-15	17-Aug-15		16-Aug-15	16-Aug-15	
Date Sampled		L1661656-29	L1661656-33	L1661656-34	L1661656-35	L1661656-50	L1661656-53			
ALS Sample ID										
Physical Tests										
Moisture	%	95.7	94.8	0.9	60.1	61.0	1.5	92.2	92.1	0.1
Inorganic Parameters										
Acid Volatile Sulphides (AVS)	µmol/g	-	-	-	<0.28	<0.28	0	11.3	13.0	14.0
Simultaneously Extractable Metals (SEM)										
Cadmium	µmol/g	-	-	-	<0.0050	<0.0050	0	<0.025	<0.025	0
Copper	µmol/g	-	-	-	11.6	11.4	1.7	2.13	2.16	1.4
Lead	µmol/g	-	-	-	0.031	0.035	12.1	<0.10	<0.10	0
Mercury	µmol/g	-	-	-	<0.000050	<0.000050	0	<0.000050	<0.000050	0
Nickel	µmol/g	-	-	-	0.054	0.058	7.1	<0.25	<0.25	0
Zinc	µmol/g	-	-	-	0.232	0.239	3.0	0.508	0.506	0.4
Exchangeable & Adsorbed Metals (SEA)										
Aluminum	mg/kg	<50	<50	0	-	-	-	-	-	-
Antimony	mg/kg	<0.10	<0.10	0	-	-	-	-	-	-
Arsenic	mg/kg	0.062	0.061	1.6	-	-	-	-	-	-
Barium	mg/kg	72.3	58.5	21.1	-	-	-	-	-	-
Beryllium	mg/kg	<0.20	<0.20	0	-	-	-	-	-	-
Bismuth	mg/kg	<0.20	<0.20	0	-	-	-	-	-	-
Cadmium	mg/kg	0.144	0.146	1.4	-	-	-	-	-	-
Calcium	mg/kg	4,770	4,670	2.1	-	-	-	-	-	-
Chromium	mg/kg	<0.50	<0.50	0	-	-	-	-	-	-
Cobalt	mg/kg	0.31	0.41	27.8	-	-	-	-	-	-
Copper	mg/kg	1.06	1.50	34.4	-	-	-	-	-	-
Iron	mg/kg	<50	<50	0	-	-	-	-	-	-
Lead	mg/kg	<0.50	<0.50	0	-	-	-	-	-	-
Lithium	mg/kg	<5.0	<5.0	0	-	-	-	-	-	-
Manganese	mg/kg	2,410	2,050	16.1	-	-	-	-	-	-
Molybdenum	mg/kg	<0.50	<0.50	0	-	-	-	-	-	-
Nickel	mg/kg	<0.50	<0.70	33.3	-	-	-	-	-	-
Phosphorus	mg/kg	<50	<50	0	-	-	-	-	-	-
Potassium	mg/kg	200	230	14.0	-	-	-	-	-	-
Selenium	mg/kg	<0.20	<0.20	0	-	-	-	-	-	-
Silver	mg/kg	<0.10	<0.10	0	-	-	-	-	-	-
Sodium	mg/kg	580	580	0	-	-	-	-	-	-
Strontium	mg/kg	46.9	44.5	5.3	-	-	-	-	-	-
Thallium	mg/kg	<0.050	<0.050	0	-	-	-	-	-	-
Tin	mg/kg	<2.0	<2.0	0	-	-	-	-	-	-
Titanium	mg/kg	<1.0	<1.0	0	-	-	-	-	-	-
Uranium	mg/kg	<0.050	<0.050	0	-	-	-	-	-	-
Vanadium	mg/kg	<0.20	<0.20	0	-	-	-	-	-	-
Zinc	mg/kg	<1.0	1.3	26.1	-	-	-	-	-	-
Carbonate Metals (SEA)										
Aluminum	mg/kg	<50	<50	0	-	-	-	-	-	-
Antimony	mg/kg	<0.10	<0.10	0	-	-	-	-	-	-
Arsenic	mg/kg	0.116	0.099	15.8	-	-	-	-	-	-
Barium	mg/kg	59.9	54.5	9.4	-	-	-	-	-	-
Beryllium	mg/kg	<0.20	<0.20	0	-	-	-	-	-	-
Bismuth	mg/kg	<0.20	<0.20	0	-	-	-	-	-	-
Cadmium	mg/kg	0.064	0.067	4.6	-	-	-	-	-	-
Calcium	mg/kg	739	686	7.4	-	-	-	-	-	-
Chromium	mg/kg	<5.0	<5.0	0	-	-	-	-	-	-
Cobalt	mg/kg	0.35	0.33	5.9	-	-	-	-	-	-
Copper	mg/kg	2.19	2.31	5.3	-	-	-	-	-	-
Iron	mg/kg	284	237	18.0	-	-	-	-	-	-
Lead	mg/kg	<0.50	<0.50	0	-	-	-	-	-	-
Lithium	mg/kg	<5.0	<5.0	0	-	-	-	-	-	-
Manganese	mg/kg	518	408	23.8	-	-	-	-	-	-
Molybdenum	mg/kg	<0.50	<0.50	0	-	-	-	-	-	-
Nickel	mg/kg	<2.0	<2.0	0	-	-	-	-	-	-
Phosphorus	mg/kg	<50	<50	0	-	-	-	-	-	-
Selenium	mg/kg	<0.20	<0.20	0	-	-	-	-	-	-
Silver	mg/kg	<0.10	<0.10	0	-	-	-	-	-	-
Strontium	mg/kg	10.9	10.3	5.7	-	-	-	-	-	-
Thallium	mg/kg	<0.050	<0.050	0	-	-	-	-	-	-
Tin	mg/kg	<2.0	<2.0	0	-	-	-	-	-	-
Titanium	mg/kg	<5.0	<5.0	0	-	-	-	-	-	-
Uranium	mg/kg	0.471	0.460	2.4	-	-	-	-	-	-
Vanadium	mg/kg	0.82	0.62	27.8	-	-	-	-	-	-
Zinc	mg/kg	3.5	3.3	5.9	-	-	-	-	-	-

Table C.2: Field duplicate results for sediment chemistry analyses. Highlighted values did not meet the data quality objective of ≤ 40% Relative Percent Difference (RPD).

Client Sample ID	Units	Lab Report L1661656								
		BOL-B2-3	BOL-BX	RPD (%) ^a	PNF-01	PNF-01X	RPD (%) ^a	BOL-B2-3	BOL-BX	RPD (%) ^a
		16-Aug-15	16-Aug-15		17-Aug-15	17-Aug-15		16-Aug-15	16-Aug-15	
Date Sampled	ALS Sample ID	L1661656-29	L1661656-33	L1661656-34	L1661656-35	L1661656-50	L1661656-53			
Easily Reducible Metals and Iron Oxides (SEA)										
Aluminum	mg/kg	960	870	9.8	-	-	-	-	-	-
Antimony	mg/kg	<0.20	<0.20	0	-	-	-	-	-	-
Arsenic	mg/kg	1.39	1.25	10.6	-	-	-	-	-	-
Barium	mg/kg	99.9	104	4.0	-	-	-	-	-	-
Beryllium	mg/kg	<0.40	<0.40	0	-	-	-	-	-	-
Bismuth	mg/kg	<0.40	<0.40	0	-	-	-	-	-	-
Cadmium	mg/kg	0.16	0.16	0	-	-	-	-	-	-
Calcium	mg/kg	610	610	0	-	-	-	-	-	-
Chromium	mg/kg	2.5	2.5	0	-	-	-	-	-	-
Cobalt	mg/kg	1.56	1.50	3.9	-	-	-	-	-	-
Copper	mg/kg	5.6	5.5	1.8	-	-	-	-	-	-
Iron	mg/kg	9,140	9,040	1.1	-	-	-	-	-	-
Lead	mg/kg	3.1	3.1	0	-	-	-	-	-	-
Lithium	mg/kg	<10	<10	0	-	-	-	-	-	-
Manganese	mg/kg	289	285	1.4	-	-	-	-	-	-
Molybdenum	mg/kg	<1.0	<1.0	0	-	-	-	-	-	-
Nickel	mg/kg	4.0	4.0	0	-	-	-	-	-	-
Phosphorus	mg/kg	240	260	8.0	-	-	-	-	-	-
Selenium	mg/kg	<0.40	<0.40	0	-	-	-	-	-	-
Silver	mg/kg	<0.20	<0.20	0	-	-	-	-	-	-
Strontium	mg/kg	9.6	9.9	3.1	-	-	-	-	-	-
Thallium	mg/kg	<0.10	<0.10	0	-	-	-	-	-	-
Tin	mg/kg	<4.0	<4.0	0	-	-	-	-	-	-
Titanium	mg/kg	<2.0	<2.0	0	-	-	-	-	-	-
Uranium	mg/kg	0.60	0.66	9.5	-	-	-	-	-	-
Vanadium	mg/kg	19.7	19.4	1.5	-	-	-	-	-	-
Zinc	mg/kg	16.8	17.3	2.9	-	-	-	-	-	-
Organic and Mineral Bound Metals (SEA)										
Aluminum	mg/kg	4,620	4,220	9.0	-	-	-	-	-	-
Antimony	mg/kg	<0.10	<0.10	0	-	-	-	-	-	-
Arsenic	mg/kg	1.75	1.55	12.1	-	-	-	-	-	-
Barium	mg/kg	13.2	13.2	0	-	-	-	-	-	-
Beryllium	mg/kg	<0.20	<0.20	0	-	-	-	-	-	-
Bismuth	mg/kg	<0.20	<0.20	0	-	-	-	-	-	-
Cadmium	mg/kg	0.052	0.052	0	-	-	-	-	-	-
Calcium	mg/kg	448	373	18.3	-	-	-	-	-	-
Chromium	mg/kg	14.4	14.1	2.1	-	-	-	-	-	-
Cobalt	mg/kg	5.38	5.18	3.8	-	-	-	-	-	-
Copper	mg/kg	296	291	1.7	-	-	-	-	-	-
Iron	mg/kg	4,480	4,380	2.3	-	-	-	-	-	-
Lead	mg/kg	0.87	0.82	5.9	-	-	-	-	-	-
Lithium	mg/kg	<5.0	<5.0	0	-	-	-	-	-	-
Manganese	mg/kg	64.3	62.0	3.6	-	-	-	-	-	-
Molybdenum	mg/kg	2.58	2.38	8.1	-	-	-	-	-	-
Nickel	mg/kg	10.9	10.6	2.8	-	-	-	-	-	-
Selenium	mg/kg	2.65	2.66	0.4	-	-	-	-	-	-
Silver	mg/kg	<0.10	<0.10	0	-	-	-	-	-	-
Strontium	mg/kg	5.88	5.99	1.9	-	-	-	-	-	-
Thallium	mg/kg	<0.050	<0.050	0	-	-	-	-	-	-
Tin	mg/kg	<2.0	<2.0	0	-	-	-	-	-	-
Titanium	mg/kg	2.8	2.1	28.6	-	-	-	-	-	-
Uranium	mg/kg	0.778	0.736	5.5	-	-	-	-	-	-
Vanadium	mg/kg	25.7	24.8	3.6	-	-	-	-	-	-
Zinc	mg/kg	18.6	17.6	5.5	-	-	-	-	-	-
Residual Metals (SEA)										
Aluminum	mg/kg	13,900	13,500	2.9	-	-	-	-	-	-
Antimony	mg/kg	0.93	0.88	5.5	-	-	-	-	-	-
Arsenic	mg/kg	4.45	4.14	7.2	-	-	-	-	-	-
Barium	mg/kg	82.0	81.7	0.4	-	-	-	-	-	-
Beryllium	mg/kg	<0.20	<0.20	0	-	-	-	-	-	-
Bismuth	mg/kg	<0.20	<0.20	0	-	-	-	-	-	-
Cadmium	mg/kg	<0.050	<0.050	0	-	-	-	-	-	-
Calcium	mg/kg	1,760	1,750	0.6	-	-	-	-	-	-
Chromium	mg/kg	19.8	18.9	4.7	-	-	-	-	-	-
Cobalt	mg/kg	4.54	4.40	3.1	-	-	-	-	-	-
Copper	mg/kg	66.2	64.4	2.8	-	-	-	-	-	-
Iron	mg/kg	14,800	14,500	2.0	-	-	-	-	-	-
Lead	mg/kg	6.64	5.93	11.3	-	-	-	-	-	-
Lithium	mg/kg	8.2	8.3	1.2	-	-	-	-	-	-
Manganese	mg/kg	146	140	4.2	-	-	-	-	-	-
Molybdenum	mg/kg	0.91	0.84	8.0	-	-	-	-	-	-
Nickel	mg/kg	12.5	11.8	5.8	-	-	-	-	-	-
Selenium	mg/kg	<0.20	<0.20	0	-	-	-	-	-	-
Silver	mg/kg	0.41	0.38	7.6	-	-	-	-	-	-
Strontium	mg/kg	24.1	23.6	2.1	-	-	-	-	-	-
Thallium	mg/kg	0.061	0.055	10.3	-	-	-	-	-	-
Tin	mg/kg	2.8	2.5	11.3	-	-	-	-	-	-
Titanium	mg/kg	617	581	6.0	-	-	-	-	-	-
Uranium	mg/kg	0.404	0.359	11.8	-	-	-	-	-	-
Vanadium	mg/kg	29.8	28.4	4.8	-	-	-	-	-	-
Zinc	mg/kg	32.5	32.1	1.2	-	-	-	-	-	-

^a The RPD was calculated using method detection limit (MDL) values where data were below the MDL.
RPD calculation: $RPD = \frac{|(Absolute\ Value(Replicate\ 1) - Replicate\ 2)|}{Average(Replicate\ 1, Replicate\ 2)} * 100$

Table C.3: Raw Selectively Extracted Metals (SEM) and Acid Volatile Sulphide (AVS) data for sediment from Polley Lake and Bootjack Lake sampling areas, Mount Polley Mine, August 2015 ¹.

Parameter	Units	Bootjack Lake B2 (Reference)												
		BOL-B2-1	BOL-B2-2	BOL-B2-3	BOL-B2-4	BOL-B2-5	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum	Lower 95th Confidence Limit	Upper 95th Confidence Limit
Date Sampled	16-Aug-15	16-Aug-15	16-Aug-15	16-Aug-15	16-Aug-15									
Organic / Inorganic Carbon (<63 µm) ²														
Total Organic Carbon	%	14.8	15.5	15.1	-	-	15.1	15.1	0.4	0.2	14.8	15.5	14.3	16.0
Acid Volatile Sulphides														
Acid Volatile Sulphides	µmol/g	9.3	8.8	11.3	6.5	12.6	9.7	9.3	2.4	1.1	6.5	12.6	6.8	12.6
Simultaneously Extractable Metals														
Cadmium	µmol/g	<0.025	<0.030	<0.025	<0.025	<0.030	<0.030	<0.025	0.003	0.001	<0.025	<0.030	0.027	0.033
Copper	µmol/g	2.25	2.53	2.13	2.38	2.29	2.32	2.29	0.15	0.07	2.13	2.53	2.13	2.50
Lead	µmol/g	<0.10	<0.12	<0.10	<0.10	<0.12	<0.12	<0.10	0.01	0.005	<0.10	<0.12	0.11	0.13
Mercury	µmol/g	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0	0	<0.000050	<0.000050	<0.000050	<0.000050
Nickel	µmol/g	<0.25	<0.30	<0.25	<0.25	<0.30	<0.30	<0.25	0.03	0.01	<0.25	<0.30	0.27	0.33
Zinc	µmol/g	0.494	0.593	0.508	0.517	0.522	0.527	0.517	0.039	0.017	0.494	0.593	0.479	0.575
Summary SEM-AVS Calculations														
Sum of SEM	µmol/g	3.12	3.57	3.01	3.27	3.26	3.25	3.26	0.21	0.09	3.01	3.57	2.99	3.51
Ratio of SEM/AVS	-	0.34	0.41	0.27	0.50	0.26	0.35	0.34	0.10	0.05	0.26	0.50	0.23	0.48
Excess SEM (ΣSEM - AVS) ³	µmol/g	-6.18	-5.23	-8.29	-3.23	-9.34	-6.45	-6.18	2.43	1.09	-9.34	-3.23	-9.47	-3.43
Organic carbon-normalized excess SEM ⁴	µmol/g Organic Carbon	-40.8	-34.5	-54.8	-21.3	-61.7	-42.6	-40.8	16.1	7.2	-61.7	-21.3	-62.6	-22.7

SEM/AVS ratio exceeds 1; SEM is in excess of AVS present.

¹ Summary statistics were calculated using method detection limit (MDL) values if data were below the MDL, and were shown with a < symbol if all data used in their calculation were below the MDL. If MDLs were variable, means were reported as < the maximum MDL and this value was used in 95% confidence limit calculations.

² Analytical reports presenting this total organic carbon (TOC) data were provided with a previous memorandum (Minnow 2015b), and are not included in the present report.

³ Excess SEM (SEM in excess of AVS) may exist in the free metal form if not bound to other constituents (i.e. organic carbon).

⁴ Organic carbon-normalized excess SEM = [Excess SEM/fraction OC], where fraction OC is the organic carbon content (Di Toro et al 2005). The mean TOC was used in calculations if data were not available for each station (i.e. BOL-B2).

Table C.3: Raw Selectively Extracted Metals (SEM) and Acid Volatile Sulphide (AVS) data for sediment from Polley Lake and Bootjack Lake sampling areas, Mount Polley Mine, August 2015¹.

Parameter	Units	Polley Lake P2 (Exposed)												
		POL-P2-1	POL-P2-2	POL-P2-3	POL-P2-4	POL-P2-5	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum	Lower 95th Confidence Limit	Upper 95th Confidence Limit
Date Sampled		13-Aug-15	14-Aug-15	14-Aug-15	14-Aug-15	15-Aug-15								
Organic / Inorganic Carbon (<63 µm)²														
Total Organic Carbon	%	3.8	10.1	7.4	7.5	8.3	7.4	7.5	2.3	1.0	3.8	10.1	4.6	10.3
Acid Volatile Sulphides														
Acid Volatile Sulphides	µmol/g	10.4	<1.1	11.6	21.2	12.0	11.3	11.6	7.1	3.2	<1.1	21.2	2.4	20.1
Simultaneously Extractable Metals														
Cadmium	µmol/g	<0.015	<0.020	<0.015	<0.010	<0.010	<0.020	<0.015	0.004	0.002	<0.010	<0.020	0.015	0.025
Copper	µmol/g	4.89	5.09	3.20	2.43	3.05	3.73	3.20	1.19	0.53	2.43	5.09	2.26	5.20
Lead	µmol/g	<0.06	<0.08	<0.06	<0.04	<0.04	<0.08	<0.06	0.02	0.01	<0.04	<0.08	0.06	0.10
Mercury	µmol/g	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0	0	<0.000050	<0.000050	<0.000050	<0.000050
Nickel	µmol/g	<0.15	<0.20	<0.15	<0.10	<0.10	<0.20	<0.15	0.04	0.02	<0.10	<0.20	0.15	0.25
Zinc	µmol/g	0.270	0.376	0.241	0.151	0.234	0.254	0.241	0.081	0.036	0.151	0.376	0.154	0.355
Summary SEM-AVS Calculations														
Sum of SEM	µmol/g	5.39	5.77	3.67	2.73	3.43	4.20	3.67	1.31	0.59	2.73	5.77	2.57	5.83
Ratio of SEM/AVS	-	0.52	5.24	0.32	0.13	0.29	1.30	0.32	2.21	0.99	0.13	5.24	-1.44	4.04
Excess SEM (ΣSEM - AVS) ³	µmol/g	-5.01	4.67	-7.93	-18.5	-8.57	-7.06	-7.93	8.29	3.71	-18.5	4.67	-17.4	3.23
Organic carbon-normalized excess SEM ⁴	µmol/g Organic Carbon	-132	46.2	-108	-246	-103	-108	-108	104	46.6	-246	46.2	-238	20.9

SEM/AVS ratio exceeds 1; SEM is in excess of AVS present.

¹ Summary statistics were calculated using method detection limit (MDL) values if data were below the MDL, and were shown with a < symbol if all data used in their calculation were below the MDL. If MDLs were variable, means were reported as < the maximum MDL and this value was used in 95% confidence limit calculations.

² Analytical reports presenting this total organic carbon (TOC) data were provided with a previous memorandum (Minnow 2015b), and are not included in the present report.

³ Excess SEM (SEM in excess of AVS) may exist in the free metal form if not bound to other constituents (i.e. organic carbon).

⁴ Organic carbon-normalized excess SEM = [Excess SEM/fraction OC], where fraction OC is the organic carbon content (Di Toro et al 2005). The mean TOC was used in calculations if data were not available for each station (i.e. BOL-B2).

Table C.4: Calculation of Simultaneously Extractable Metal (SEM) concentrations in excess of Acid Volatile Sulphides (AVS) present in sediment, Mount Polley Mine, August 2015 ¹.

Binding Sequence of SEM	Simultaneously Extractable Metals (SEM)	Units	Polley Lake (Exposed)				Quesnel Lake Reference (Horsefly Bay)							
			POL-P2-2				PREF1-02				PREF1-05			
			Measured concentrations	Calculations			Measured concentrations	Calculations			Measured concentrations	Calculations		
				Available AVS	Sulphide Bound SEM	Excess SEM ²		Available AVS	Sulphide Bound SEM	Excess SEM ²		Available AVS	Sulphide Bound SEM	Excess SEM ²
	Acid Volatile Sulphides	umol/g	<1.1	-	-	-	0.62	-	-	-	0.87	-	-	-
1	Copper	µmol/g	5.09	<1.1	1.1	4.0	0.49	0.62	0.49	0	0.43	0.87	0.43	0
2	Lead	µmol/g	<0.080	-	-	<0.08	0.03	0.13	0.03	0	0.02	0.44	0.02	0
3	Cadmium	µmol/g	<0.020	-	-	<0.02	<0.005	0.10	<0.005	0	0.01	0.42	0.01	0
4	Zinc	µmol/g	0.376	-	-	0.38	0.380	0.095	0.095	0.285	0.353	0.414	0.353	0
5	Nickel	µmol/g	<0.20	-	-	<0.20	0.160	-	-	0.160	0.157	0.061	0.061	0.096


Available AVS exhausted at this step of SEM binding sequence

¹ Concentrations of excess SEM were calculated according to the binding sequence of SEM with AVS, as determined by the solubility coefficient of each metal sulfide (Di Toro 1990; ICMM 2007).

² Excess SEM (SEM in excess of AVS) may exist in the free metal form if not bound to other constituents (i.e. organic carbon).

Table C.4: Calculation of Simultaneously Extractable Metal (SEM) concentrations in excess of Acid Volatile Sulphides (AVS) present in sediment, Mount Polley Mine, August 2015 ¹.

Binding Sequence of SEM	Simultaneously Extractable Metals (SEM)	Units	Quesnel Lake Exposed (Near-field)																			
			PNF-01				PNF-02				PNF-03				PNF-04				PNF-05			
			Measured concentrations	Calculations			Measured concentrations	Calculations			Measured concentrations	Calculations			Measured concentrations	Calculations			Measured concentrations	Calculations		
				Available AVS	Sulphide Bound SEM	Excess SEM ²		Available AVS	Sulphide Bound SEM	Excess SEM ²		Available AVS	Sulphide Bound SEM	Excess SEM ²		Available AVS	Sulphide Bound SEM	Excess SEM ²		Available AVS	Sulphide Bound SEM	Excess SEM ²
	Acid Volatile Sulphides	µmol/g	<0.28	-	-	-	<0.40	-	-	-	<0.25	-	-	-	<0.20	-	-	-	<0.20	-	-	-
1	Copper	µmol/g	11.6	<0.28	0.28	11.3	12.9	<0.40	0.40	12.5	8.61	<0.25	0.25	8.36	5.97	<0.20	0.20	5.77	4.42	<0.20	0.20	4.22
2	Lead	µmol/g	0.031	-	-	0.031	<0.040	-	-	<0.040	0.027	-	-	0.027	0.029	-	-	0.029	0.023	-	-	0.023
3	Cadmium	µmol/g	<0.005	-	-	<0.005	<0.010	-	-	<0.010	<0.005	-	-	<0.005	<0.005	-	-	<0.005	<0.005	-	-	<0.005
4	Zinc	µmol/g	0.232	-	-	0.232	0.268	-	-	0.268	0.175	-	-	0.175	0.160	-	-	0.160	0.130	-	-	0.130
5	Nickel	µmol/g	0.054	-	-	0.054	<0.10	-	-	<0.10	<0.050	-	-	<0.050	0.054	-	-	0.054	0.074	-	-	0.074

 Available AVS exhausted at this step of SEM binding sequence

¹ Concentrations of excess SEM were calculated according to the binding sequence of SEM with AVS, as determined by the solubility coefficient of each metal sulfide (Di Toro 1990; ICMM 2007).

² Excess SEM (SEM in excess of AVS) may exist in the free metal form if not bound to other constituents (i.e. organic carbon).

Table C.5: Comparison of Selectively Extracted (Tessier extraction) metals data for Polley Lake, Bootjack Lake, and Quesnel Lake sediment sampling areas, Mount Polley Mine, 2014 and 2015 ¹.

Parameter	Units	Polley Lake						Quesnel Lake Profundal					
		Reference (Bootjack Lake B2)			Exposed (Polley Lake P2)			Reference (Horsefly Bay)			Exposed (Near-field)		
		2014 Mean	2015 Mean	RPD ²	2014 Mean	2015 Mean	RPD ²	2014 Mean	2015 Mean	RPD ²	2014 Mean	2015 Mean	RPD ²
Exchangeable & Adsorbed Metals													
Aluminum	mg/kg	<50	<50	0%	<50	<50	0%	<50	<50	0%	<50	<50	0%
Antimony	mg/kg	<0.10	<0.10	0%	<0.10	<0.10	0%	<0.10	<0.10	0%	<0.10	<0.10	0%
Arsenic	mg/kg	0.076	0.061	21%	0.063	0.051	21%	0.054	<0.050	7%	0.060	0.059	1%
Barium	mg/kg	136	72.1	61%	<34	25.8	27%	<25	20.1	22%	<26	17.1	41%
Beryllium	mg/kg	<0.20	<0.20	0%	<0.20	<0.20	0%	<0.2	<0.20	0%	<0.20	<0.20	0%
Bismuth	mg/kg	<0.20	<0.20	0%	<0.20	<0.20	0%	<0.2	<0.20	0%	<0.20	<0.20	0%
Cadmium	mg/kg	0.189	0.149	24%	0.060	0.078	26%	0.121	0.131	8%	<0.050	0.058	14%
Calcium	mg/kg	5,347	4,950	8%	4,890	6,008	21%	2,408	2,580	7%	1,738	2,518	37%
Chromium	mg/kg	<0.50	<0.50	0%	<0.50	<0.50	0%	<0.50	<0.50	0%	<0.50	<0.50	0%
Cobalt	mg/kg	0.60	0.34	54%	<0.10	0.10	2%	0.36	0.39	9%	<0.10	<0.10	0%
Copper	mg/kg	3.65	1.29	96%	1.09	0.83	27%	0.71	0.87	21%	4.04	4.64	14%
Iron	mg/kg	155	<50	103%	<50	<50	0%	<50	<50	0%	<50	<50	0%
Lead	mg/kg	0.52	<0.50	5%	<0.50	<0.50	0%	<0.50	<0.50	0%	<0.50	<0.50	0%
Lithium	mg/kg	<5.0	<5.0	0%	<5.0	<5.0	0%	<5.0	<5.0	0%	<5.0	<5.0	0%
Manganese	mg/kg	887	2,460	94%	99.6	879	159%	149	133	11%	15.3	38	86%
Molybdenum	mg/kg	<0.50	<0.50	0%	<4.0	2.63	41%	<0.50	<0.50	0%	<0.70	<0.50	33%
Nickel	mg/kg	0.88	<0.60	37%	<0.50	<0.50	0%	0.87	<2.0	79%	<0.50	<1.0	67%
Phosphorus	mg/kg	<50	<50	0%	<50	<50	0%	<50	<50	0%	<50	<50	0%
Potassium	mg/kg	167	190	13%	153	130	16%	<100	<100	0%	138	174	23%
Selenium	mg/kg	<0.20	<0.20	0%	<0.20	<0.20	0%	<0.20	<0.20	0%	<0.20	<0.20	0%
Silver	mg/kg	<0.10	<0.10	0%	<0.10	<0.10	0%	<0.10	<0.10	0%	<0.10	<0.10	0%
Sodium	mg/kg	<100	553	139%	177	354	67%	<100	<100	0%	<100	124	21%
Strontium	mg/kg	54.9	49.4	10%	42.4	52.9	22%	20.5	21.9	6%	17.5	32.2	59%
Thallium	mg/kg	<0.050	<0.050	0%	<0.050	<0.050	0%	<0.05	<0.050	0%	<0.05	<0.050	0%
Tin	mg/kg	<2.0	<2.0	0%	<2.0	<2.0	0%	<2.0	<2.0	0%	<2.0	<2.0	0%
Titanium	mg/kg	<1.0	<1.0	0%	<1.0	<1.0	0%	<1.0	<1.0	0%	<1.0	<1.0	0%
Uranium	mg/kg	<0.050	<0.050	0%	0.061	<0.050	20%	<0.050	<0.050	0%	<0.050	0.064	25%
Vanadium	mg/kg	<0.20	<0.20	0%	0.24	0.20	19%	<0.2	<0.20	0%	<0.2	<0.20	0%
Zinc	mg/kg	3.1	<1.0	102%	<1.0	<1.0	0%	<1.0	<1.0	0%	<1.0	<1.0	0%
Carbonate Metals													
Aluminum	mg/kg	<50	<50	0%	73	53	31%	<50	<50	0%	72	113	45%
Antimony	mg/kg	<0.10	<0.10	0%	<0.10	<0.10	0%	<0.1	<0.10	0%	<0.1	<0.10	0%
Arsenic	mg/kg	0.147	0.138	6%	0.195	0.230	16%	0.308	0.240	25%	0.072	0.105	37%
Barium	mg/kg	42.0	55.1	27%	62.3	60.0	4%	16.7	15.1	10%	52.6	68.4	26%
Beryllium	mg/kg	<0.20	<0.20	0%	<0.20	<0.20	0%	<0.20	<0.20	0%	<0.2	<0.20	0%
Bismuth	mg/kg	<0.20	<0.20	0%	<0.20	<0.20	0%	<0.20	<0.20	0%	<0.2	<0.20	0%
Cadmium	mg/kg	0.059	0.070	16%	0.092	0.106	14%	0.053	0.076	35%	0.052	0.074	35%
Calcium	mg/kg	676	783	15%	10,083	3,406	99%	383	312	20%	13,380	11,300	17%
Chromium	mg/kg	<5.0	<5.0	0%	<5.0	<5.0	0%	<5.0	<5.0	0%	<5.0	<5.0	0%
Cobalt	mg/kg	0.273	0.39	35%	0.35	0.42	17%	0.84	0.58	38%	0.28	0.48	51%
Copper	mg/kg	3.01	2.32	26%	22.0	13.3	50%	1.58	2.25	35%	48.4	84.6	54%
Iron	mg/kg	484	265	58%	151	76	66%	684	490	33%	88	132	40%
Lead	mg/kg	0.66	<0.50	27%	0.82	0.60	31%	<0.50	<0.50	0%	0.82	1.10	29%
Lithium	mg/kg	<5.0	<5.0	0%	<5.0	<5.0	0%	<5.0	<5.0	0%	<5.0	<5.0	0%
Manganese	mg/kg	157	563	113%	123	555	127%	38.6	27.0	35%	104	138	29%
Molybdenum	mg/kg	<0.50	<0.50	0%	<0.50	<0.50	0%	<0.50	<0.50	0%	<0.5	<0.50	0%
Nickel	mg/kg	<2.0	<2.0	0%	<2.0	<2.0	0%	<2.0	<2.0	0%	<2.0	<2.0	0%
Phosphorus	mg/kg	51	<50	3%	<50	<50	0%	<50	<50	0%	<50	<50	0%
Selenium	mg/kg	<0.20	<0.20	0%	<0.20	<0.20	0%	<0.20	<0.20	0%	<0.20	<0.20	0%
Silver	mg/kg	<0.10	<0.10	0%	<0.10	<0.10	0%	<0.10	<0.10	0%	<0.10	<0.10	0%
Strontium	mg/kg	8.5	11.4	29%	63.9	68.7	7%	<5.0	<5.0	0%	54.1	63.6	16%
Thallium	mg/kg	<0.050	<0.050	0%	<0.050	<0.050	0%	<0.05	<0.050	0%	<0.050	<0.050	0%
Tin	mg/kg	<2.0	<2.0	0%	<2.0	<2.0	0%	<2.0	<2.0	0%	<2.0	<2.0	0%
Titanium	mg/kg	<5.0	<5.0	0%	<5.0	<5.0	0%	<5.0	<5.0	0%	<5.0	<5.0	0%
Uranium	mg/kg	0.553	0.485	13%	0.204	0.308	41%	0.338	0.343	2%	0.081	0.113	34%
Vanadium	mg/kg	1.02	0.86	17%	1.11	0.98	12%	0.788	0.50	45%	<0.20	<0.20	0%
Zinc	mg/kg	3.4	3.7	9%	2.6	3.4	27%	1.84	1.5	18%	1.3	1.5	20%
Easily Reducible Metals and Iron Oxides													
Aluminum	mg/kg	901	880	2%	1,703	1,810	6%	981	973	1%	1,786	2,222	22%
Antimony	mg/kg	<0.10	<0.20	67%	<0.10	<0.20	67%	<0.10	<0.20	67%	<0.10	<0.10	0%
Arsenic	mg/kg	1.40	1.45	4%	1.71	1.93	12%	2.14	1.92	11%	2.57	2.21	15%
Barium	mg/kg	61.3	97.8	46%	30.0	49.2	49%	23.1	23.0	0%	32.4	38.0	16%
Beryllium	mg/kg	0.33	<0.40	20%	0.27	0.36	30%	<0.20	0.27	30%	0.22	0.27	21%
Bismuth	mg/kg	<0.20	<0.40	67%	<0.20	<0.40	67%	<0.20	<0.40	67%	<0.20	<0.20	0%
Cadmium	mg/kg	0.141	0.177	22%	0.098	0.122	22%	0.201	0.195	3%	0.062	0.064	3%
Calcium	mg/kg	528	643	20%	2,033	1,458	33%	768	773	1%	2,006	2,038	2%
Chromium	mg/kg	2.53	2.53	0%	2.38	3.29	32%	4.00	3.95	1%	2.00	2.78	33%
Cobalt	mg/kg	1.21	1.63	30%	1.73	2.03	16%	4.70	4.93	5%	1.77	2.63	39%
Copper	mg/kg	5.73	6.17	7%	35.1	9.2	117%	5.25	5.12	3%	136	157	15%
Iron	mg/kg	8,350	9,360	11%	3,397	3,982	16%	7,134	7,307	2%	2,970	4,006	30%
Lead	mg/kg	2.84	3.07	8%	1.88	2.56	30%	2.31	2.33	1%	2.68	3.85	36%
Lithium	mg/kg	<5.0	<10	67%	<5.0	<10	67%	<5.0	<10	67%	<5.0	<5.0	0%
Manganese	mg/kg	182	375	69%	94.5	377	120%	104	107	3%	81.1	116	35%
Molybdenum	mg/kg	<0.50	<1.0	67%	<0.50	0.85	52%	<0.50	<1.0	67%	<0.50	<0.50	0%
Nickel	mg/kg	3.18	4.13	26%	2.97	4.67	44%	9.43	9.12	3%	2.53	3.55	33%
Phosphorus	mg/kg	263	257	2%	101	110	9%	93	94	1%	187	170	10%
Selenium	mg/kg	<0.20	<0.40	67%	<0.20	<0.40	67%	<0.20	<0.40	67%	<0.20	<0.20	0%
Silver	mg/kg	<0.10	<0.20	67%	<0.10	<0.20	67%	<0.10	<0.20	67%	<0.10	<0.10	0%
Strontium	mg/kg	7.23	10.1	33%	32.3	30.3	6%	8.13	8.28	2%	26.7	26.3	2%
Thallium	mg/kg	<0.050	<0.10	67%	<0.050	<0.10	67%	<0.050	<0.10	67%	<0.050	<0.050	0%
Tin	mg/kg	<2.0	<4.0	67%	<2.0	<4.0	67%	<2.0	<4.0	67%	<2.0	<2.0	0%
Titanium	mg/kg	<1.0	<2.0	67%	1.1	<2.0	61%	1.2	<2.0	53%	<1.0	<1.0	0%
Uranium	mg/kg	0.572	0.643	12%	0.214	0.303	34%	0.293	0.306	4%	0.151	0.172	13%
Vanadium	mg/kg	18.3	19.9	9%	15.3	23.6	43%	9.71	10.0	3%	7.93	9.91	22%
Zinc	mg/kg	15.8	17.3	9%	11.5	14.6	24%	18.6	17.7	5%	9.1	11.8	26%

¹ The RPD was calculated using method detection limit (MDL) values where data were below the MDL.

² RPD = Relative Percent Difference

Relative Percent Different exceeds 30%

Table C.5: Comparison of Selectively Extracted (Tessier extraction) metals data for Polley Lake, Bootjack Lake, and Quesnel Lake sediment sampling areas, Mount Polley Mine, 2014 and 2015 ¹.

Parameter	Units	Poley Lake						Quesnel Lake Profundal					
		Reference (Bootjack Lake B2)			Exposed (Poley Lake P2)			Reference (Horsefly Bay)			Exposed (Near-field)		
		2014 Mean	2015 Mean	RPD ²	2014 Mean	2015 Mean	RPD ²	2014 Mean	2015 Mean	RPD ²	2014 Mean	2015 Mean	RPD ²
Organic and Mineral Bound Metals													
Aluminum	mg/kg	4,497	4,923	9%	3,100	4,594	39%	1,716	1,537	11%	1,506	1,306	14%
Antimony	mg/kg	<0.10	<0.10	0%	<0.10	<0.10	0%	<0.10	<0.10	0%	<0.1	<0.10	0%
Arsenic	mg/kg	1.91	1.84	4%	1.05	1.22	15%	0.691	0.334	70%	2.49	0.326	154%
Barium	mg/kg	15.1	13.5	12%	11.1	11.3	2%	16.1	16.8	4%	21.7	19.6	10%
Beryllium	mg/kg	<0.20	<0.20	0%	<0.20	<0.20	0%	<0.20	<0.20	0%	<0.20	<0.20	0%
Bismuth	mg/kg	<0.20	<0.20	0%	<0.20	<0.20	0%	<0.20	<0.20	0%	<0.20	<0.20	0%
Cadmium	mg/kg	0.056	0.058	2%	<0.050	<0.050	0%	<0.050	<0.050	0%	<0.050	<0.050	0%
Calcium	mg/kg	320	463	37%	1,275	1,704	29%	905	510	56%	2,416	835	97%
Chromium	mg/kg	14.5	15.1	5%	7.85	12.9	49%	5.70	6.53	14%	0.56	0.75	29%
Cobalt	mg/kg	5.12	5.64	10%	3.69	4.77	26%	1.62	1.80	11%	2.08	2.07	0%
Copper	mg/kg	298	315	6%	557	563	1%	11.3	15.0	28%	455	528	15%
Iron	mg/kg	3,927	5,233	29%	3,222	4,900	41%	1,161	888	27%	834	317	90%
Lead	mg/kg	0.94	0.98	5%	0.88	0.92	5%	0.79	0.51	43%	1.29	0.90	35%
Lithium	mg/kg	<5.0	<5.0	0%	<5.0	<5.0	0%	<5.0	<5.0	0%	<5.0	<5.0	0%
Manganese	mg/kg	51.8	79.9	43%	39.2	80.7	69%	19.9	22.1	11%	21.9	23.1	5%
Molybdenum	mg/kg	3.36	2.70	22%	2.19	4.39	67%	<0.50	<0.50	0%	1.08	0.61	56%
Nickel	mg/kg	10.5	11.5	9%	5.37	8.61	46%	3.96	4.41	11%	0.80	0.81	1%
Selenium	mg/kg	2.69	2.79	4%	2.29	4.46	64%	0.71	0.85	18%	0.83	1.04	23%
Silver	mg/kg	<0.10	<0.10	0%	<0.10	<0.10	0%	<0.10	<0.10	0%	<0.10	<0.10	0%
Strontium	mg/kg	5.07	6.32	22%	13.0	15.9	20%	5.95	4.62	25%	11.6	6.10	62%
Thallium	mg/kg	<0.050	<0.050	0%	<0.050	<0.050	0%	<0.50	<0.050	164%	<0.50	<0.050	164%
Tin	mg/kg	<2.0	<2.0	0%	<2.0	<2.0	0%	<2.0	<2.0	0%	<2.0	<2.0	0%
Titanium	mg/kg	32.9	2.9	168%	4.2	4.1	1%	6.2	5.1	19%	3.6	1.2	103%
Uranium	mg/kg	0.777	0.803	3%	0.449	0.648	36%	0.157	0.159	1%	0.195	0.125	43%
Vanadium	mg/kg	25.2	27.0	7%	14.3	23.9	50%	3.90	2.78	33%	1.97	0.61	106%
Zinc	mg/kg	18.3	20.0	9%	12.4	16.5	28%	8.3	8.0	4%	5.2	5.5	6%
Residual Metals													
Aluminum	mg/kg	15,367	14,033	9%	22,733	21,600	5%	14,180	14,300	1%	16,980	22,620	28%
Antimony	mg/kg	0.85	0.91	6%	0.50	0.71	36%	0.24	0.33	33%	0.38	0.44	15%
Arsenic	mg/kg	4.48	4.63	3%	10.4	8.62	18%	5.16	6.45	22%	9.23	12.3	28%
Barium	mg/kg	75	88.3	17%	133	123	7%	80.3	77.2	4%	96.4	113	16%
Beryllium	mg/kg	<0.20	0.20	2%	0.55	0.43	24%	<0.20	<0.20	0%	0.54	0.59	8%
Bismuth	mg/kg	<0.20	<0.20	0%	<0.20	<0.20	0%	<0.20	<0.20	0%	<0.20	<0.20	0%
Cadmium	mg/kg	<0.050	<0.050	0%	<0.050	<0.050	0%	<0.050	<0.050	0%	<0.050	<0.050	0%
Calcium	mg/kg	1,723	1,793	4%	10,920	7,390	39%	3,652	4,377	18%	13,136	12,500	5%
Chromium	mg/kg	21.6	19.9	8%	17.3	21.2	20%	44.5	47.7	7%	9.8	15.4	45%
Cobalt	mg/kg	4.91	4.53	8%	16.4	13.2	21%	6.55	7.59	15%	14.5	20.0	32%
Copper	mg/kg	75.4	66.9	12%	125	119	5%	25.8	34.0	28%	98.6	161	48%
Iron	mg/kg	15,267	15,500	2%	27,567	21,660	24%	21,320	23,200	8%	29,780	33,780	13%
Lead	mg/kg	6.34	6.91	9%	3.61	4.65	25%	3.50	4.30	21%	2.44	3.89	46%
Lithium	mg/kg	8.9	8.5	5%	22.2	17.8	22%	10.5	11.1	6%	19.6	22.8	15%
Manganese	mg/kg	151	148	2%	550	418	27%	190	208	9%	562	659	16%
Molybdenum	mg/kg	0.67	1.02	42%	2.19	3.04	33%	0.80	0.91	13%	2.49	3.07	21%
Nickel	mg/kg	13.5	12.4	8%	14.5	16.2	11%	22.8	25.7	12%	8.9	14.2	46%
Selenium	mg/kg	<0.20	<0.20	0%	<0.20	0.20	2%	<0.2	<0.20	0%	0.21	<0.20	4%
Silver	mg/kg	0.37	0.41	11%	0.36	0.39	6%	<0.10	<0.10	0%	0.27	0.33	20%
Strontium	mg/kg	24.5	24.5	0%	71.5	52.3	31%	40.2	40.6	1%	71.7	72.6	1%
Thallium	mg/kg	0.061	0.064	5%	0.055	0.055	0%	0.127	0.130	2%	<0.050	0.051	2%
Tin	mg/kg	<2.0	2.7	30%	2.1	4.0	61%	<2.0	2.6	27%	2.5	4.2	50%
Titanium	mg/kg	663	617	7%	2,010	1,520	28%	1,050	970	8%	1,918	1,703	12%
Uranium	mg/kg	0.371	0.413	11%	0.754	0.599	23%	0.528	0.549	4%	0.978	0.832	16%
Vanadium	mg/kg	32.0	29.7	7%	101	67.4	40%	50.6	55.6	9%	118	121	3%
Zinc	mg/kg	36.7	32.5	12%	59.7	53.7	11%	48.1	54.6	13%	52.9	74.3	34%

¹ The RPD was calculated using method detection limit (MDL) values where data were below the MDL.

² RPD = Relative Percent Difference


 Relative Percent Different exceeds 30%

Table C.6: Raw Selectively Extracted (Tessier Extraction) metals data for sediment from Polley Lake and Bootjack Lake sampling areas, Mount Polley Mine, August 2015 ¹.

Parameter	Units	Bootjack Lake B2 (Reference)											Polley Lake P2 (Exposed)												
		BOL-B2-1	BOL-B2-2	BOL-B2-3	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum	Lower 95th Confidence Limit	Upper 95th Confidence Limit	POL-P2-1	POL-P2-2	POL-P2-3	POL-P2-4	POL-P2-5	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum	Lower 95th Confidence Limit	Upper 95th Confidence Limit
		16-Aug-15	16-Aug-15	16-Aug-15									13-Aug-15	14-Aug-15	14-Aug-15	14-Aug-15	15-Aug-15								
Residual Metals																									
Aluminum	mg/kg	13,700	14,500	13,900	14,033	13,900	416	240	13,700	14,500	12,999	15,068	24,300	18,300	23,600	21,600	20,200	21,600	21,600	2,457	1,099	18,300	24,300	18,550	24,650
Antimony	mg/kg	0.86	0.94	0.93	0.91	0.93	0.04	0.03	0.86	0.94	0.80	1.02	0.85	0.66	0.66	0.67	0.72	0.71	0.67	0.08	0.04	0.66	0.85	0.61	0.81
Arsenic	mg/kg	4.39	5.06	4.45	4.63	4.45	0.37	0.21	4.39	5.06	3.71	5.55	11.6	6.97	9.02	7.56	7.94	8.62	7.94	1.83	0.82	6.97	11.60	6.35	10.89
Barium	mg/kg	98.5	84.3	82.0	88.3	84.3	8.9	5.2	82.0	98.5	66.1	110	148	111	127	111	120	123	120	15.3	6.8	111	148	104	142
Beryllium	mg/kg	0.21	<0.20	<0.20	0.20	<0.20	0.006	0.003	<0.20	0.21	0.19	0.22	0.56	0.34	0.47	0.41	0.38	0.43	0.41	0.09	0.04	0.34	0.56	0.33	0.54
Bismuth	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20	0	0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0	0	<0.20	<0.20	<0.20	<0.20
Cadmium	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0	0	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0	0	<0.050	<0.050	<0.050	<0.050
Calcium	mg/kg	1,870	1,750	1,760	1,793	1,760	67	38	1,750	1,870	1,628	1,959	11,000	4,810	7,940	6,730	6,470	7,390	6,730	2,306	1,031	4,810	11,000	4,527	10,253
Chromium	mg/kg	19.5	20.4	19.8	19.9	19.8	0.5	0.3	19.5	20.4	18.8	21.0	17.7	23.8	21.2	21.2	21.9	21.2	21.2	2.2	1.0	17.7	23.8	18.4	23.9
Cobalt	mg/kg	4.42	4.62	4.54	4.53	4.54	0.10	0.06	4.42	4.62	4.28	4.78	18.1	10.1	15.1	11.4	11.5	13.2	11.5	3.3	1.5	10.1	18.1	9.2	17.3
Copper	mg/kg	65.7	68.8	66.2	66.9	66.2	1.7	1.0	65.7	68.8	62.8	71.0	151	94.4	135	108	107	119	108	23	10	94	151	90	148
Iron	mg/kg	16,300	15,400	14,800	15,500	15,400	755	436	14,800	16,300	13,624	17,376	26,900	18,300	23,000	19,300	20,800	21,660	20,800	3,422	1,531	18,300	26,900	17,411	25,909
Lead	mg/kg	6.99	7.09	6.64	6.91	6.99	0.24	0.14	6.64	7.09	6.32	7.49	4.83	4.61	4.70	4.75	4.37	4.65	4.70	0.18	0.08	4.37	4.83	4.43	4.87
Lithium	mg/kg	8.8	8.6	8.2	8.5	8.6	0.3	0.2	8.2	8.8	7.8	9.3	19.8	14.8	20.7	17.1	16.4	17.8	17.1	2.4	1.1	14.8	20.7	14.7	20.8
Manganese	mg/kg	150	149	146	148	149	2	1	146	150	143	154	577	324	462	364	362	418	364	103	46	324	577	290	545
Molybdenum	mg/kg	0.92	1.23	0.91	1.02	0.92	0.18	0.11	0.91	1.23	0.57	1.47	3.16	3.01	3.25	3.09	2.67	3.04	3.09	0.22	0.10	2.67	3.25	2.76	3.31
Nickel	mg/kg	12.1	12.7	12.5	12.4	12.5	0.3	0.2	12.1	12.7	11.7	13.2	15.7	16.3	17.4	15.8	15.9	16.2	15.9	0.7	0.3	15.7	17.4	15.4	17.1
Selenium	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20	0	0	<0.20	<0.20	<0.20	<0.20	0.22	<0.20	<0.20	<0.20	<0.20	0.20	<0.20	0.009	0.004	<0.20	0.22	0.19	0.22
Silver	mg/kg	0.38	0.44	0.41	0.41	0.41	0.03	0.02	0.38	0.44	0.34	0.48	0.38	0.36	0.43	0.36	0.40	0.39	0.38	0.03	0.01	0.36	0.43	0.35	0.42
Strontium	mg/kg	24.2	25.2	24.1	24.5	24.2	0.6	0.4	24.1	25.2	23.0	26.0	72.4	40.6	52.7	49.6	46.2	52.3	49.6	12.1	5.4	40.6	72.4	37.3	67.3
Thallium	mg/kg	0.057	0.074	0.061	0.064	0.061	0.009	0.005	0.057	0.074	0.042	0.086	<0.050	0.061	0.053	0.055	0.054	0.055	0.054	0.004	0.002	<0.050	0.061	0.050	0.060
Tin	mg/kg	2.5	2.8	2.8	2.7	2.8	0.2	0.1	2.5	2.8	2.3	3.1	4.7	3.5	4.1	3.8	3.7	4.0	3.8	0.5	0.2	3.5	4.7	3.4	4.5
Titanium	mg/kg	593	642	617	617	617	25	14	593	642	556	678	2,060	1,310	1,500	1,340	1,390	1,520	1,390	310	139	1,310	2,060	1,135	1,905
Uranium	mg/kg	0.444	0.392	0.404	0.413	0.404	0.027	0.016	0.392	0.444	0.346	0.481	0.828	0.494	0.610	0.520	0.541	0.599	0.541	0.135	0.060	0.494	0.828	0.431	0.767
Vanadium	mg/kg	29.2	30.2	29.8	29.7	29.8	0.5	0.3	29.2	30.2	28.5	31.0	97.5	52.5	69.9	55.8	61.1	67.4	61.1	18.1	8.1	52.5	97.5	44.9	89.8
Zinc	mg/kg	32.1	33.0	32.5	32.5	32.5	0.5	0.3	32.1	33.0	31.4	33.7	66.2	45.7	59.8	47.8	49.0	53.7	49.0	8.9	4.0	45.7	66.2	42.7	64.7

¹ Summary statistics were calculated using method detection limit (MDL) values if data were below the MDL, and were shown with a < symbol if all data used in their calculation were < MDL. If MDLs were variable, means were reported as < the maximum MDL and this value was used in 95% confidence limit calculations.

Table C.7: Raw Selectively Extracted Metals (SEM) and Acid Volatile Sulphide (AVS) data for sediment from Quesnel Lake profundal sampling areas, Mount Polley Mine, August 2015 ¹.

Parameter	Units	Horsefly Bay (Reference)												
		PREF1-01	PREF1-02	PREF1-03	PREF1-04	PREF1-05	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum	Lower 95th Confidence Limit	Upper 95th Confidence Limit
Date Sampled		18-Aug-15	18-Aug-15	19-Aug-15	24-Aug-15	24-Aug-15								
Organic / Inorganic Carbon (<63 µm) ²														
Total Organic Carbon (TOC)	%	1.76	-	1.71	-	1.98	1.82	1.76	0.14	0.08	1.71	1.98	1.46	2.17
Acid Volatile Sulphides														
Acid Volatile Sulphides	µmol/g	4.34	0.62	1.24	2.97	0.87	2.01	1.24	1.59	0.71	0.62	4.34	0.03	3.99
Simultaneously Extractable Metals														
Cadmium	µmol/g	<0.0050	<0.0050	<0.0050	0.0063	0.0061	0.0055	<0.0050	0.0007	0.0003	<0.0050	0.0063	0.0047	0.0063
Copper	µmol/g	0.458	0.493	0.483	0.422	0.429	0.457	0.458	0.032	0.014	0.422	0.493	0.418	0.496
Lead	µmol/g	0.027	0.027	0.027	0.021	0.021	0.025	0.027	0.003	0.001	0.021	0.027	0.021	0.029
Mercury	µmol/g	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0	0	<0.000050	<0.000050	<0.000050	<0.000050
Nickel	µmol/g	0.201	0.160	0.168	0.166	0.157	0.170	0.166	0.018	0.008	0.157	0.201	0.148	0.192
Zinc	µmol/g	0.457	0.380	0.389	0.380	0.353	0.392	0.380	0.039	0.017	0.353	0.457	0.344	0.440
Summary SEM/AVS Calculations														
Sum of SEM	µmol/g	1.15	1.07	1.07	1.00	0.97	1.05	1.07	0.07	0.03	0.97	1.15	0.96	1.14
Ratio of SEM/AVS	-	0.26	1.72	0.86	0.34	1.11	0.86	0.86	0.60	0.27	0.26	1.72	0.12	1.60
Excess SEM (Σ SEM - AVS) ³	µmol/g	-3.19	0.45	-0.17	-1.97	0.10	-0.96	-0.17	1.56	0.70	-3.19	0.45	-2.89	0.98
Organic carbon-normalized excess SEM ⁴	µmol/g Organic Carbon	-176	24.5	-9.2	-109	5.3	-52.8	-9.2	85.8	38.4	-176	24.5	-159	53.8

SEM/AVS ratio exceeds 1; SEM is in excess of AVS present.

¹ Summary statistics were calculated using method detection limit (MDL) values if data were below the MDL, and were shown with a < symbol if all data used in their calculation were below the MDL. If MDLs were variable, means were reported as < the maximum MDL and this value was used in 95% confidence limit calculations.

² Analytical reports presenting this total organic carbon (TOC) data were provided with a previous memorandum (Minnow 2015b), and are not included in the present report.

³ Excess SEM (SEM in excess of AVS) may exist in the free metal form if not bound to other constituents (i.e. organic carbon).

⁴ Organic carbon-normalized excess SEM = [Excess SEM/fraction OC], where fraction OC is the organic carbon content (Di Toro et al 2005). The mean TOC was used in calculations if data were not available for each station (i.e. BOL-B2).

Table C.7: Raw Selectively Extracted Metals (SEM) and Acid Volatile Sulphide (AVS) data for sediment from Quesnel Lake profundal sampling areas, Mount Polley Mine, August 2015 ¹.

Parameter	Units	Near-field (Exposed)												
		PNF-01	PNF-02	PNF-03	PNF-04	PNF-05	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum	Lower 95th Confidence Limit	Upper 95th Confidence Limit
Date Sampled		17-Aug-15	14-Aug-15	15-Aug-15	15-Aug-15	16-Aug-15								
Organic / Inorganic Carbon (<63 µm) ²														
Total Organic Carbon (TOC)	%	0.42	0.52	0.25	<0.10	0.18	0.29	0.25	0.17	0.08	<0.10	0.52	0.08	0.51
Acid Volatile Sulphides														
Acid Volatile Sulphides	µmol/g	<0.28	<0.40	<0.25	<0.20	<0.20	<0.40	<0.25	0.08	0.04	<0.20	<0.40	0.30	0.50
Simultaneously Extractable Metals														
Cadmium	µmol/g	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	0.002	0.001	<0.0050	<0.010	0.007	0.013
Copper	µmol/g	11.6	12.9	8.61	5.97	4.42	8.70	8.61	3.60	1.61	4.42	12.9	4.23	13.2
Lead	µmol/g	0.031	<0.040	0.027	0.029	0.023	0.030	0.029	0.006	0.003	0.023	<0.040	0.022	0.038
Mercury	µmol/g	<0.000050	<0.000050	<0.000050	0.000062	<0.000050	0.000052	<0.000050	0.000005	0.000002	<0.000050	0.000062	0.000046	0.000059
Nickel	µmol/g	0.054	<0.10	<0.050	0.054	0.074	0.066	0.054	0.021	0.009	<0.050	<0.10	0.040	0.092
Zinc	µmol/g	0.232	0.268	0.175	0.160	0.130	0.193	0.175	0.056	0.025	0.130	0.268	0.124	0.262
Summary SEM/AVS Calculations														
Sum of SEM	µmol/g	11.9	13.3	8.87	6.22	4.65	9.00	8.87	3.67	1.64	4.65	13.3	4.44	13.6
Ratio of SEM/AVS	-	42.6	33.3	35.5	31.1	23.3	33.1	33.3	7.0	3.1	23.3	42.6	24.4	41.8
Excess SEM (Σ SEM - AVS) ³	µmol/g	11.6	12.9	8.62	6.02	4.45	8.73	8.62	3.59	1.61	4.45	12.9	4.27	13.2
Organic carbon-normalized excess SEM ⁴	µmol/g Organic Carbon	2,772	2,484	3,447	6,018	2,473	3,439	2,772	1,495	669	2,473	6,018	1,583	5,295

SEM/AVS ratio exceeds 1; SEM is in excess of AVS present.

¹ Summary statistics were calculated using method detection limit (MDL) values if data were below the MDL, and were shown with a < symbol if all data used in their calculation were below the MDL. If MDLs were variable, means were reported as < the maximum MDL and this value was used in 95% confidence limit calculations.

² Analytical reports presenting this total organic carbon (TOC) data were provided with a previous memorandum (Minnow 2015b), and are not included in the present report.

³ Excess SEM (SEM in excess of AVS) may exist in the free metal form if not bound to other constituents (i.e. organic carbon).

⁴ Organic carbon-normalized excess SEM = [Excess SEM/fraction OC], where fraction OC is the organic carbon content (Di Toro et al 2005). The mean TOC was used in calculations if data were not available for each station (i.e. BOL-B2).

Table C.8: Raw Selectively Extracted (Tessier Extraction) metals data for sediment from Quesnel Lake profundal sampling areas, Mount Polley Mine, August 2015 ¹.

Parameter	Units	Horsefly Bay (Reference)											Near-field (Exposed)													
		PREF1-01	PREF1-03	PREF1-05	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum	Lower 95th Confidence Limit	Upper 95th Confidence Limit	PNF-01	PNF-02	PNF-03	PNF-04	PNF-05	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum	Lower 95th Confidence Limit	Upper 95th Confidence Limit	
		18-Aug-15	19-Aug-15	24-Aug-15									17-Aug-15	14-Aug-15	15-Aug-15	15-Aug-15	16-Aug-15									
Residual Metals																										
Aluminum	mg/kg	13,500	14,600	14,800	14,300	14,600	700	404	13,500	14,800	12,561	16,039	29,100	30,400	24,600	16,400	12,600	22,620	24,600	7,835	3,504	12,600	30,400	12,894	32,346	
Antimony	mg/kg	0.33	0.32	0.34	0.33	0.33	0.01	0.01	0.32	0.34	0.31	0.35	0.58	0.58	0.50	0.32	0.22	0.44	0.50	0.16	0.07	0.22	0.58	0.24	0.64	
Arsenic	mg/kg	5.9	6.4	7.0	6.5	6.4	0.6	0.3	5.9	7.0	5.0	7.9	14.0	14.2	13.1	10.6	9.51	12.3	13.1	2.1	0.9	9.5	14.2	9.7	14.9	
Barium	mg/kg	70.1	81.2	80.4	77.2	80.4	6.2	3.6	70.1	81.2	61.9	92.6	130	131	117	102	86.6	113	117	19.0	8.5	86.6	131	89.7	137	
Beryllium	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20	0	0	<0.20	<0.20	<0.20	<0.20	0.67	0.72	0.62	0.49	0.43	0.59	0.62	0.12	0.05	0.43	0.72	0.43	0.74	
Bismuth	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20	0	0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0	0	<0.20	<0.20	<0.20	<0.20	
Cadmium	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0	0	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0	0	<0.050	<0.050	<0.050	<0.050	
Calcium	mg/kg	4,170	4,260	4,700	4,377	4,260	284	164	4,170	4,700	3,672	5,081	12,400	13,000	13,600	13,000	10,500	12,500	13,000	1,196	535	10,500	13,600	11,015	13,985	
Chromium	mg/kg	46.5	48.9	47.8	47.7	47.8	1.2	0.7	46.5	48.9	44.7	50.7	18.1	17.8	16.5	12.9	11.9	15.4	16.5	2.9	1.3	11.9	18.1	11.9	19.0	
Cobalt	mg/kg	7.3	7.8	7.7	7.6	7.7	0.2	0.1	7.3	7.8	7.0	8.1	27.0	28.0	20.4	12.7	11.9	20.0	20.4	7.6	3.4	11.9	28.0	10.5	29.5	
Copper	mg/kg	33.0	34.1	35.0	34.0	34.1	1.0	0.6	33.0	35.0	31.5	36.5	227	241	162	81.1	95.5	161	162	73.2	32.7	81.1	241	70.4	252	
Iron	mg/kg	22,500	23,400	23,700	23,200	23,400	624	361	22,500	23,700	21,649	24,751	34,300	35,100	32,400	31,800	35,300	33,780	34,300	1,593	712	31,800	35,300	31,803	35,757	
Lead	mg/kg	4.09	4.35	4.46	4.30	4.35	0.19	0.11	4.09	4.46	3.83	4.77	5.09	4.99	4.33	2.74	2.30	3.89	4.33	1.29	0.58	2.30	5.09	2.28	5.50	
Lithium	mg/kg	10.4	10.8	12.0	11.1	10.8	0.8	0.5	10.4	12.0	9.0	13.1	29.7	32.1	22.8	15.3	14.0	22.8	22.8	8.2	3.7	14.0	32.1	12.6	32.9	
Manganese	mg/kg	200	212	211	208	211	7	4	200	212	191	224	857	892	682	461	404	659	682	223	100	404	892	383	936	
Molybdenum	mg/kg	0.92	0.81	1.00	0.91	0.92	0.10	0.06	0.81	1.00	0.67	1.15	3.37	3.45	3.03	2.48	3.03	3.07	3.03	0.38	0.17	2.48	3.45	2.60	3.55	
Nickel	mg/kg	24.9	26.4	25.8	25.7	25.8	0.8	0.4	24.9	26.4	23.8	27.6	18.4	18.2	15.2	10.3	9.1	14.2	15.2	4.4	1.9	9.1	18.4	8.8	19.6	
Selenium	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20	0	0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0	0	<0.20	<0.20	<0.20	<0.20	
Silver	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	0	0	<0.10	<0.10	<0.10	<0.10	0.41	0.42	0.34	0.23	0.26	0.33	0.34	0.09	0.04	0.23	0.42	0.23	0.44	
Strontium	mg/kg	38.5	40.4	42.8	40.6	40.4	2.2	1.2	38.5	42.8	35.2	45.9	82.8	83.4	79.6	67.7	49.3	72.6	79.6	14.5	6.5	49.3	83.4	54.6	90.5	
Thallium	mg/kg	0.125	0.138	0.127	0.130	0.127	0.007	0.004	0.125	0.138	0.113	0.147	0.054	<0.050	<0.050	<0.050	<0.050	0.051	<0.050	0.002	0.001	<0.050	0.054	0.049	0.053	
Tin	mg/kg	2.6	2.8	2.5	2.6	2.6	0.2	0.1	2.5	2.8	2.3	3.0	4.8	4.9	4.4	3.5	3.4	4.2	4.4	0.7	0.3	3.4	4.9	3.3	5.1	
Titanium	mg/kg	956	1,020	935	970	956	44	26	935	1,020	860	1,080	2,250	2,280	1,920	1,170	894	1,703	1,920	636	284	894	2,280	913	2,492	
Uranium	mg/kg	0.511	0.571	0.565	0.549	0.565	0.033	0.019	0.511	0.571	0.467	0.631	0.943	0.957	0.901	0.783	0.576	0.832	0.901	0.159	0.071	0.576	0.957	0.635	1.029	
Vanadium	mg/kg	53.6	56.3	56.9	55.6	56.3	1.8	1.0	53.6	56.9	51.2	60.0	117	122	117	118	133	121	118	6.8	3.0	117	133	113	130	
Zinc	mg/kg	53.2	55.6	55.0	54.6	55.0	1.2	0.7	53.2	55.6	51.5	57.7	99.6	102	77.4	47.9	44.8	74.3	77.4	27.3	12.2	44.8	102	40.4	108	

¹ Summary statistics were calculated using method detection limit (MDL) values if data were below the MDL, and were shown with a < symbol if all data used in their calculation were < MDL. If MDLs were variable, means were reported as < the maximum MDL and this value was used in 95% confidence limit calculations.



APPENDIX F

Toxicology and Benthic Invertebrate Tissue Metal Analysis

Investigation of the Influence of Sediment Physical Characteristics on Sediment Toxicity Test Results

Summary and Interpretation of Water Toxicity Tests (August to September 2014)

Summary and Interpretation of Water Toxicity Tests (Nov 2014 to Apr 2015)

Prepared by:

Pierre Stecko, M.Sc., EP, R.P.Bio.

Minnow Environmental Inc.

Update on Post-event Aquatic Toxicity Testing – March to November 2015.

Prepared by:

Jordana Van Geest, Ph.D., R.P.Bio, and Gary Lawrence, M.R.M., R.P.Bio.

Golder Associates Ltd.

Memorandum

Date: January 29, 2016

To: Dale Reimer, Mount Polley Mining Corporation

From: Pierre Stecko, Minnow Environmental Inc.

Cc: Colleen Hughes, Katie McMahan, Mount Polley Mining Corporation
'Lyn Anglin, Imperial Metals Corporation

Re: Investigation of the Influence of Sediment Physical Characteristics on Sediment Toxicity Test Results

This memorandum provides a summary of an investigation of the influence of sediment physical characteristics, including total organic carbon (TOC) content and particle size, on sediment toxicity test results. The investigation is a follow-up to observations of effects on survival and growth in standard toxicity tests of *Chironomus dilutus* and *Hyalella azteca* (Environment Canada 1997, 2013) conducted on sediments influenced by Mount Polley mine tailings, as reported in an assessment undertaken in 2014 (Minnow 2015a).

Background

Characterization of the impact of the Mount Polley Mine tailings dam failure (August 4, 2014) on sediment quality of Polley Lake, Hazeltine Creek and Quesnel Lake included sediment toxicity testing using 10-day tests of the midge *C. dilutus* and 14-day tests of the amphipod *H. azteca* (Minnow 2015a; using approved biological test methods of Environment Canada 1997, 2013). This toxicity testing indicated effects to the survival and growth of both test organisms in tailings-affected sediments collected in Hazeltine Creek and in deep areas of Quesnel Lake, limited effects to the survival of *C. dilutus* (only) in near-field locations of Polley Lake, and to *C. dilutus* growth (only) in shallow areas of Quesnel Lake. Sediments collected from Hazeltine Creek and the deep areas of Quesnel Lake, in particular, were atypical of sediments generally present in aquatic environments, those collected from reference areas, and/or those from the same locations pre-event. Physical differences included uniform particle size, relatively high density, and relatively low TOC content. Chemical differences included elevated metal concentrations.

In Hazeltine Creek, Polley Lake, Quesnel Lake shallow and Quesnel Lake deep areas, negative correlations between sediment chemistry and toxicity test endpoints of survival and growth were observed (Minnow 2015a). However, in Hazeltine Creek and Quesnel Lake, the sediment and tailings mixtures differed from the naturally occurring sediments on the basis of the physical factors listed above, and positive correlations between sediment TOC content and toxicity test endpoints of survival and growth were also observed (Minnow 2015a). Therefore, the cause of the measured effects was not clear. Given this uncertainty, and the geochemical results indicating that the tailings were relatively inert (SRK 2015a,b), it was considered premature to attribute the effects solely to copper or other metals (Minnow 2015a; Golder 2015).

This purpose of this study was to address uncertainty identified in the initial sediment toxicity testing. A two step approach was used:

1. review the published literature regarding the influence of sediment organic carbon and sediment particle size distribution on *C. dilutus* and *H. azteca* toxicity test results; and
2. design and implement a study to test the influence of these variables as they relate to the sediments that have been impacted by the Mount Polley tailings.

Brief Literature Review

A brief literature review was undertaken, starting with the reference documents for the tests that were implemented (Biological Test Methods of Environment Canada 1997, 2013). This brief review indicated that relatively few studies have been undertaken that specifically investigate the influence of sediment particle size distribution and/or sediment organic matter content on the results of sediment toxicity tests. It also indicated that the studies that did investigate these influences did not investigate sediment as atypical as the Mount Polley tailings-affected sediments and that the studies were generally designed to determine if the tests met their performance criteria (control survival of $\geq 70\%$ for *C. dilutus* and $\geq 80\%$ for *H. azteca*).

The Biological Test Method Document for *C. tentans* (the former species name of *C. dilutus*) provides several references indicating that survival is affected by sediment organic matter content and that growth is affected by sediment particle size and by sediment organic matter content (Appendix A). They report that *C. tentans* and *C. riparius* can tolerate a wide range of substrates (e.g., Ingersoll and Nelson 1990; Ankley et al. 1994), but that *C. tentans* survival and growth were enhanced in coarser substrates (Ankley et al. 1994 and Bedard

1989, respectively). They report conflicting results on the influence of organic matter. Milani et al. (1996) reported that survival and growth of *C. riparius* was not influenced by organic carbon over a range from 0.6% to 8.8%, whereas Suedel et al. (1993) reported *C. tentans* intolerance to sediments with organic content less than 1% and Suedel and Rodgers (1994a) reported poor survival of *C. tentans* of 0.5% or lower. In comparison, sediments collected from the areas most impacted by Mount Polley mine tailings - Hazeltine Creek and Quesnel Lake - had TOC concentrations of 0.2% or lower (Minnow 2015a).

In addition to the findings cited in the Biological Test Method document, an independent review of the literature was undertaken. As indicated above, Suedel and Rodgers (1994a) found that *C. tentans* was tolerant (survival $\geq 80\%$) of all particle size regimes examined (i.e., 0 to 100% sand, 0 to 100% silt, and 0 to 60% clay). However, they also noted a significant positive correlation between *C. tentans* survival and percent silt and organic matter (Suedel and Rodgers 1994a). Similarly, Sibley et al. (1998) found a significant decrease in *C. tentans* survival in life cycle tests with exposure to 8 μm sediment, which is comparable to the grain size of clay. Even in studies that did not identify statistically significant effects of particle size on *C. tentans*, poorest survival occurred in clay samples (Suedel and Rodgers 1994a; Sibley et al. 1998). For example, Sibley et al. (1998) reported poorest survival at 20 days in fine sediment (8 μm), corroborated by other life cycle endpoints (total emergence, time to first emergence, rate of emergence, number of egg masses). Ankley et al. (1994) summarized results of 10-day tests of larval *C. tentans* held in 50 samples of uncontaminated Great Lakes sediment having particle sizes ranging from 95% clay to 100% sand and an organic carbon content from 0.3 to 8.1%, and suggested that growth might have been slightly influenced by grain size, with some improvement in growth in coarser sediments. Similarly, as indicated in the Biological Test Method document, an influence of particle size on growth was observed by Bedard (1989), who noted that growth of larval *C. tentans* was enhanced in the laboratory by coarser substrates with $>80\%$ sand. Overall, although findings are not in complete agreement among studies, several clearly indicate that that particle size distribution can influence the results of tests of *C. dilutus*.

The influence of organic matter on the growth of *C. tentans* is clearer than that of particle size. This is perhaps not surprising as it is required for food and for case building (e.g., Oliver 1971). For example, Suedel and Rodgers (1994a) documented a minimum organic matter requirement between 0.76% and 0.91% when *C. tentans* were fed daily during 10-day exposures. Suedel and Rodgers (1994a) also found poor (10 to 50%) survival rates for

C. tentans (fed daily) in tests of field-collected sediment from “relatively pristine areas” which were low (0.12 to 0.19%) in organic content, that organic content of 0.5% caused a significant reduction in percent survival, that only 33% of larvae survived in formulated control sediment with 0.0% organic content, and that larval *C. tentans* survived well if organic content was 3 to 5%.

The influence of particle size and organic carbon seems to be less well studied and less clear for *H. azteca* than for *C. dilutus*, which is consistent with their relative behaviours – *H. azteca* is largely epibenthic whereas *C. dilutus* is infaunal. The Biological Test Method Document for *H. azteca* (Environment Canada 2013) cites several studies that suggest tolerance to a wide range of particle size and organic content (Appendix A). For example, Ingersoll and Nelson (1990), Ankley et al. (1994) and Suedel and Rodgers (1994b) indicate that survival of *H. azteca* was greater than 80% over a wide range of particle sizes and organic content tested. The Biological Test Method document reports an influence of organic matter on tolerance to a surfactant (Cano et al. 1996), but this result is likely due to chemical sorption rather than a direct influence on the organism.

In addition to the findings cited in the Biological Test Method document, an independent review of the literature was undertaken. Ankley et al. (1994) covered a wide range of particle sizes and organic carbon content using natural sediments (e.g., from >90% clay to almost 100% sand and from 0.3% to 8.1% TOC), but only one sample had high clay content. Suedel and Rodgers (1994b) did not test sediment with more than 5% clay, but covered a wide range of organic matter content (0.13% to 7.8%) and concluded that *H. azteca* is a more appropriate organism than *C. tentans* for evaluating sediments with organic matter content <1.0%. However, as Ankley et al. (1994) state with respect to their study, these studies exhibited a limited response range for *H. azteca* and therefore the probability of identifying additional parameters influencing the assay results was low. This is largely because the studies were simply designed to determine whether the tests met acceptability criteria (survival \geq 80%) rather than to investigate potential differences due to physical factors. More recently, an effect of organic matter on the growth of *H. azteca* was demonstrated by Orr et al. (2004), who documented a significant decrease in length from exposure to sediment with low organic matter content (1.52%) and a clear trend of increasing length with increasing organic matter. Orr et al. (2004) suggest that, although amphipods are fed daily in sediment toxicity tests, food resources may limit growth in sediment with low organic matter content. Furthermore, although caution should be applied to extrapolating across species, it is notable that fine-grained uncontaminated sediments

have been found to impact survival of the marine amphipod *Rhepoxynius abronius* (Ott 1986; DeWitt et al. 1988), reportedly due to suffocation when burrowing is attempted (DeWitt et al. 1988).

Review of the available literature provides clear evidence that survival and growth of *C. dilutus* can be affected by sediment particle size distribution and organic matter content. In the case of *H. azteca*, there is no evidence in the scientific literature of an effect of sediment particle size distribution or organic matter content on survival, but there is clear evidence of an effect of sediment organic matter content on growth. However, there is evidence of an effect of fine particles on the survival of the marine amphipod *R. abronius*. Overall, the results of the literature review are summed up well by Suedel and Rodgers (1994a) observation that “sediment toxicity may be due to physical and biological characteristics as well as chemical contamination of sediments. The ability to distinguish between these effects would reduce the probability of concluding that a sediment is chemically toxic when it is not.”

Methods

Study Design

A simple investigation was designed to evaluate the influence of sediment TOC content and particle size distribution on toxicity test results using *C. dilutus* and *H. azteca*, and to verify previous results (Table 1). Key questions include:

- Does sediment TOC content affect the results of sediment toxicity tests?
- Does particle size distribution affect the results of sediment toxicity tests?
- Are results similar to those observed in 2014 (Minnow 2015a)?

The first question was asked because sediment TOC in certain tailings-influenced areas (e.g., Hazeltine Creek and Quesnel Lake) was much lower than reference or historical and below levels that have been observed (in the scientific literature) to adversely affect survival and/or growth. This question was addressed by adding TOC to the tailings affected sediment, to reference sediment and to controls (Table 1). The second question was asked because sediment particle size distribution in certain tailings-influenced areas (e.g., Hazeltine Creek and Quesnel Lake) differed substantially from reference or historical and may affect survival and/or growth. This question was addressed by adding a clay control to better represent the fine sediments of the Quesnel Lake profundal area (Table 1). The third question was addressed by comparing the results of sediment toxicity testing conducted in 2015 to those conducted in 2014.

Table 1: Sediment toxicity tests conducted for the investigation of the influence of total organic carbon and particle size ¹

Treatment	Test	
	<i>Chironomus dilutus</i>	<i>Hyalella azteca</i>
	10-day survival and growth ^{2,4}	14-day survival and growth ^{3,4}
Control ⁵	✓	✓
Control + 2% TOC ^{5,6}	✓	✓
Koalin Clay Control	✓	✓
Koalin Clay Control + 2% TOC ⁶	✓	✓
Field Reference	✓	✓
Field Reference + 2% TOC ⁶	✓	✓
Exposed	✓	✓
Exposed + 2% TOC ⁶	✓	✓
Exposed + Reference (50:50)	✓	✓

¹ tests were conducted on profundal sediment of Quesnel Lake (which is least spatially variable) - areas PNF (exposed) and PREF1 (reference)

² Environment Canada. 1997. Biological Test Method: Test for Survival and Growth in Sediment Using the Larvae of Freshwater Midges (*Chironomus tentans* or *Chironomus riparius*). Report EPS 1/RM/32. December 1997.

³ Environment Canada. 2013. Biological Test Method: Test for Survival and Growth in Sediment and Water Using the Freshwater Amphipod *Hyalella azteca*. Report EPS 1/RM/33. January 2013.

⁴ Note that all tests were run with five replicates with 10 organisms each. Replicates were field replicates, reflecting recent guidance for test application.

⁵ standard control sediment = sand

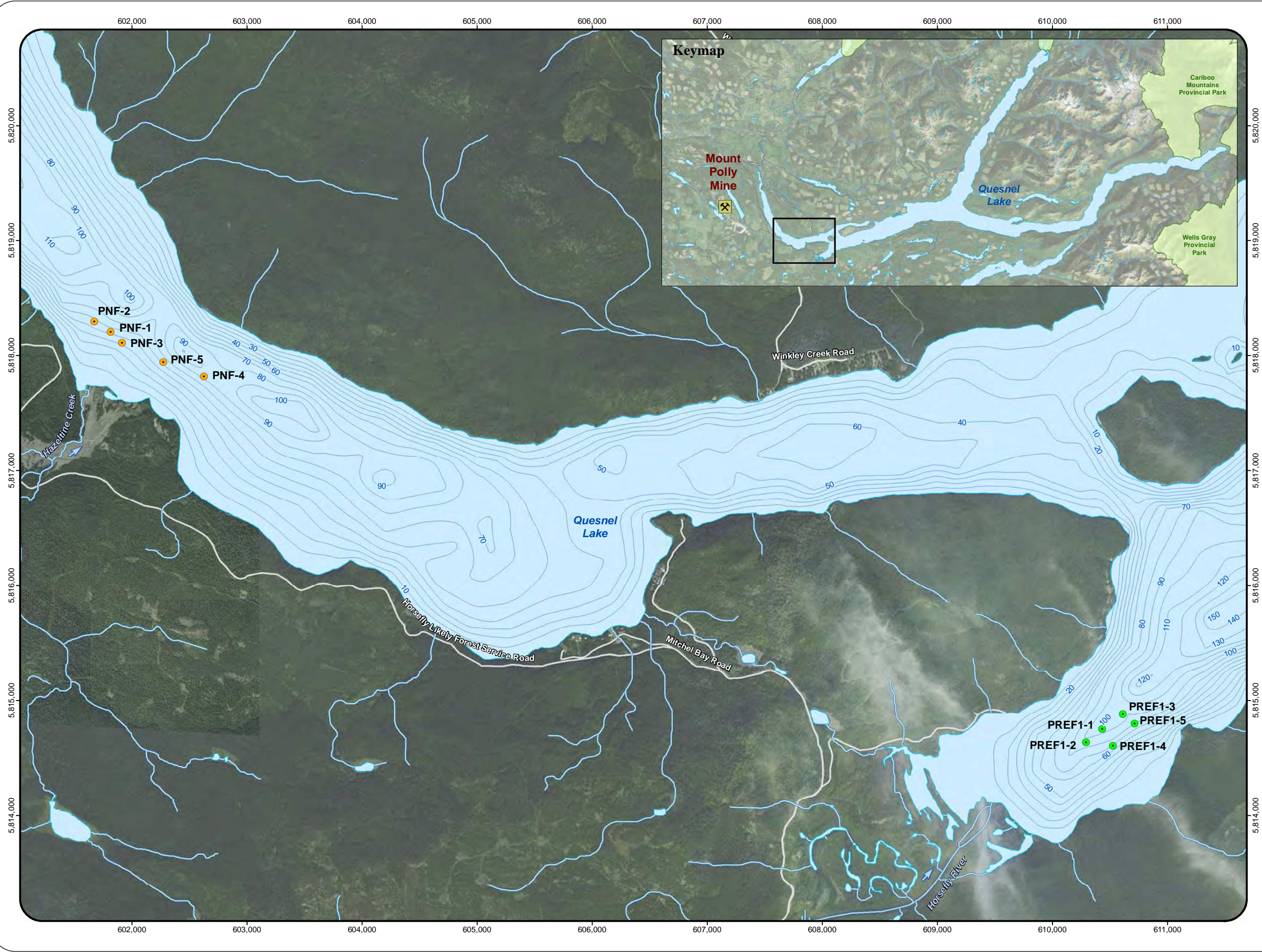
⁶ total organic carbon - as a combination of peat and fish food

Sampling

Sediment samples were collected from five exposed (tailings-impacted) stations (PNF) and five reference stations (PREF1) in Quesnel Lake at an approximate depth of 100 meters between August 13th and 26th 2015 (Figure 1). The sampling stations were the same as the Quesnel Lake profundal near-field and reference stations in 2014 (Minnow 2015a). Sediments were collected using a stainless steel petite ponar (15.24 cm x 15.24 cm; 0.023 m² sampling area) or a stainless steel standard ponar (22.86 cm x 22.86 cm; 0.052 m² sampling area) in accordance with technical guidance outlined in the British Columbia Field Sampling Manual (BCWLAP 2003) and the federal Technical Guidance Manual for EEM (Environment Canada 2012). Samples were collected with the assistance of a commercial line hauler (Ace Line Hauler - Brutus Plus 40). At each station, composite samples of the top three centimeters of surficial sediment of three to ten acceptable grabs (i.e., full to each edge of the sampler) were collected. Each grab was collected into a plastic tote and observed for completeness and any unusual characteristics. If the sample was deemed acceptable, surficial material to a depth of 3 centimeters was transferred to a second tote using a stainless steel spoon. Remaining sediment was discarded. The procedure was then repeated for all subsequent grabs. The material within the tote was homogenized using a stainless steel spoon and transferred into 500 mL glass sampling jars labeled with the project number, sample location and collection date. All sampling equipment was rinsed between stations using site water. Sediment samples were shipped to the toxicity testing laboratory (Nautilus Environmental) and to the analytical laboratory (ALS Environmental) at completion of the sampling program. Prior to shipment, samples were placed in a cooler with frozen ice packs and a chain-of custody form was prepared and packed with the samples. Coolers were shipped overnight for next day delivery.

Toxicity Testing

Upon receipt, Nautilus Environmental opened the coolers, measured temperature to verify the maintenance of cold samples, removed each sample from the coolers, logged the sample, and confirmed sample receipt with MPMC and Minnow. Toxicity testing of *C. dilutus* and *H. azteca* are outlined in detail in Nautilus 2016 (Appendix B). Briefly, Nautilus set up five field-replicate test vessels (i.e., with each replicate representing a sampling station) with each of nine treatments (Table 1). The TOC treatments (control+TOC, kaolin clay+TOC, field reference+TOC, and exposed+TOC) were created by amending the original sediments with a 50:50 mixture of peat moss and ground Tetramarin fish flakes to yield a



LEGEND

Sediment Sampling Location

- Exposed
- Reference
- Waterbody
- Quesnel Lake Bathymetry (10 m Intervals)
- Watercourse
- Roads
- Water Flow Direction

0 400 800 1,600
Meters

MAP INFORMATION
 Datum: NAD 83 Map Projection: UTM Zone 10U
 Data Source: Department of Natural Resources Canada. All rights reserved.
 Creation Date: January 2016
 Project No.: 2574

Figure 1: Quesnel Lake Profundal Sediment Toxicity Sampling Locations, Mount Polley Mine, 2015.



nominal TOC concentration of 2%. A treatment made up of a 1:1 mixture of exposed sediment and field reference sediment was also prepared and tested. The pH of the kaolin clay controls was low after adding the overlying water (~pH 4.5), and was adjusted to neutral pH using sodium hydroxide prior to addition of test organisms. Toxicity testing was conducted according to procedures described by Environment Canada (1997 and 2013). Statistical analyses for the tests were performed using CETIS (Tidepool Scientific Software 2013).

Data Analysis

In addition to the statistical analyses completed by Nautilus (2016), toxicity test results were evaluated using Analysis of Variance (ANOVA) and Kruskal-Wallis (the non-parametric equivalent test) to test for overall differences among treatment means, followed by post-hoc multiple contrasts. Due to small sample size (i.e., five replicates in accordance with the test methods), data could not be evaluated for normality. Therefore, the choice of transformation was evaluated based on homogeneity of variance. This resulted in a logit transformation being applied to survival data of both *H. azteca* and *C. dilutus* and a log_e transformation being applied to growth data for *H. azteca*. All transformations resulted in unequal variance of the *C. dilutus* growth dataset. ANOVA followed by either Bonferroni (equal variance) or Tamhane's (unequal variance) multiple contrast tests were performed using raw and transformed data. In addition, the non-parametric Kruskal-Wallis test followed by Mann-Whitney multiple contrast tests were also performed using raw data. Significance of all tests was established as a p-level of 0.05. Although parametric and non-parametric tests generally agreed, the non-parametric tests results were used for data interpretation when the two approaches did not yield the same result. This is consistent with recent recommendations for testing when the assumptions of parametric testing cannot be definitively demonstrated (e.g., Sawilowsky 2005). In addition, magnitudes of difference were calculated for all multiple contrast pairs as the mean of Treatment 2 minus the mean of Treatment 1 all divided by the mean of Treatment 1. It was then relativized by dividing by the standard deviation of Treatment 1. The minimum detectable effect size was calculated as per EEM guidance (Environment Canada 2012) and expressed in units of Treatment 1 standard deviations.

Relationships between toxicity test results and TOC concentrations were explored using plots, and simple linear regression was performed using SPSS statistical software and application of an uncorrected significance level $p=0.05$ and Bonferroni-corrected significance level of 0.0125 ($p=0.05/4$ endpoints). The latter p-value was applied to

minimize the risk of declaring false positive correlations since at least 5% of derived correlations would be expected to occur by chance alone at an uncorrected p-value of 0.05.

Results

Sediment Chemistry

Sediment chemistry data have been reported under separate cover (Minnow 2015b) and are also included in Appendix C. Briefly, sediments collected in 2015 were very similar to those collected in 2014 (Appendix Tables C.1 and C.2). Quesnel Lake profundal reference sediments were composed primarily of silt (70%), with only 11% clay and 20% sand (Appendix Table C.1). Quesnel Lake profundal near-field exposed sediments were also composed primarily of silt (58%), but the remainder was mostly clay (36%; Appendix Table C.2). TOC content of the exposed sediments (0.29%) was much lower than the reference sediment (1.82%; Appendix Tables C.1 and C.2) and lower than the TOC content observed by Suedel and Rodgers (1994a) to significantly reduce survival of *C. dilutus* (i.e., less than approximately 0.76% to 0.91%; see above). Sediment metal concentrations in the profundal near-field area in 2015 were very similar to those observed in 2014, with mean concentrations of arsenic, copper, iron, and manganese greater than both reference and the lower guidelines of the British Columbia working sediment quality guidelines (BCMOE 2015). Average concentrations of copper and manganese, and 95th percentile concentrations of iron, also exceed upper guidelines of the British Columbia working sediment quality guidelines (BCMOE 2015). However, previous investigations of Mount Polley tailings and tailings-influenced sediment have indicated that mobility and bioavailability of tailings-associated metals is low (SRK 2015a,b; Minnow 2015a), and the most recent geochemical investigation of tailings material indicates that non-sulphide copper is likely present as chlorite and is considered to be non-reactive (SRK 2015b).

Sediment Toxicity

***C. dilutus* Survival**

Survival of *C. dilutus* was $\geq 80\%$ in all treatments, indicating limited response overall (Table 2; Figure 2). A reduction of 20% is often applied as a threshold for a meaningful reduction in survival (e.g., Suter et al. 1995; Mebane 2010; Nautilus and Zajdlik 2011). Survival of *C. dilutus* in the exposed (failure-influenced) sediment (PNF; $86 \pm 11.4\%$) did not differ from the reference sediment, indicating no significant tailings-associated effect on survival (Table 2; Figure 2; Appendix Table D.2). This result differs from 2014 when *C. dilutus* survival in exposed sediment was significantly lower than reference (Minnow 2015a). Survival of *C.*

Table 2: Summary of sediment toxicity testing results, with statistical comparison to laboratory control and field reference

Sample ID	<i>Chironomus dilutus</i>			<i>Hyalella azteca</i>		
	Survival ± SD (%)	Average Dry Wt. ± SD (mg)		Survival ± SD (%)	Average Dry Wt. ± SD (mg)	
Control ¹	100.0 ± 0.0	2.15 ± 0.14		94.0 ± 5.5	0.24 ± 0.02	
Control + 2% TOC ^{1,2}	90.0 ± 10.0	3.11 ± 0.25		68.0 ± 13.0 ^{a,b}	0.13 ± 0.03 ^a	
Kaolin Clay Control	82.0 ± 4.5 ^a	1.88 ± 0.57 ^b		62.0 ± 8.4 ^{a,b}	0.06 ± 0.01 ^{a,b}	
Kaolin Clay Control + 2% TOC ²	80.0 ± 10.0 ^a	2.87 ± 0.63		90.0 ± 14.1	0.15 ± 0.02	
Field Reference	92.0 ± 4.5	2.65 ± 0.23		100.0 ± 0.0	0.22 ± 0.06	
Field Reference + 2% TOC ²	84.0 ± 20.7 ^a	4.49 ± 0.59		95.0 ± 5.5	0.24 ± 0.06	
Exposed	86.0 ± 11.4 ^a	1.61 ± 0.22 ^{a,b}		80.0 ± 15.8 ^b	0.09 ± 0.03 ^{a,b}	
Exposed + 2% TOC ²	92.0 ± 4.5	3.45 ± 0.19		90.0 ± 10.0	0.19 ± 0.04	
Exposed + Reference (50:50)	92.0 ± 4.5	2.25 ± 0.21		82.0 ± 19.2 ^b	0.16 ± 0.05	

^a indicates a treatment mean that is significantly different from the laboratory control (sand)

^b indicates a treatment mean that is significantly different from the field reference sediment

¹ standard control sediment = sand

² total organic carbon - as a combination of peat and fish food

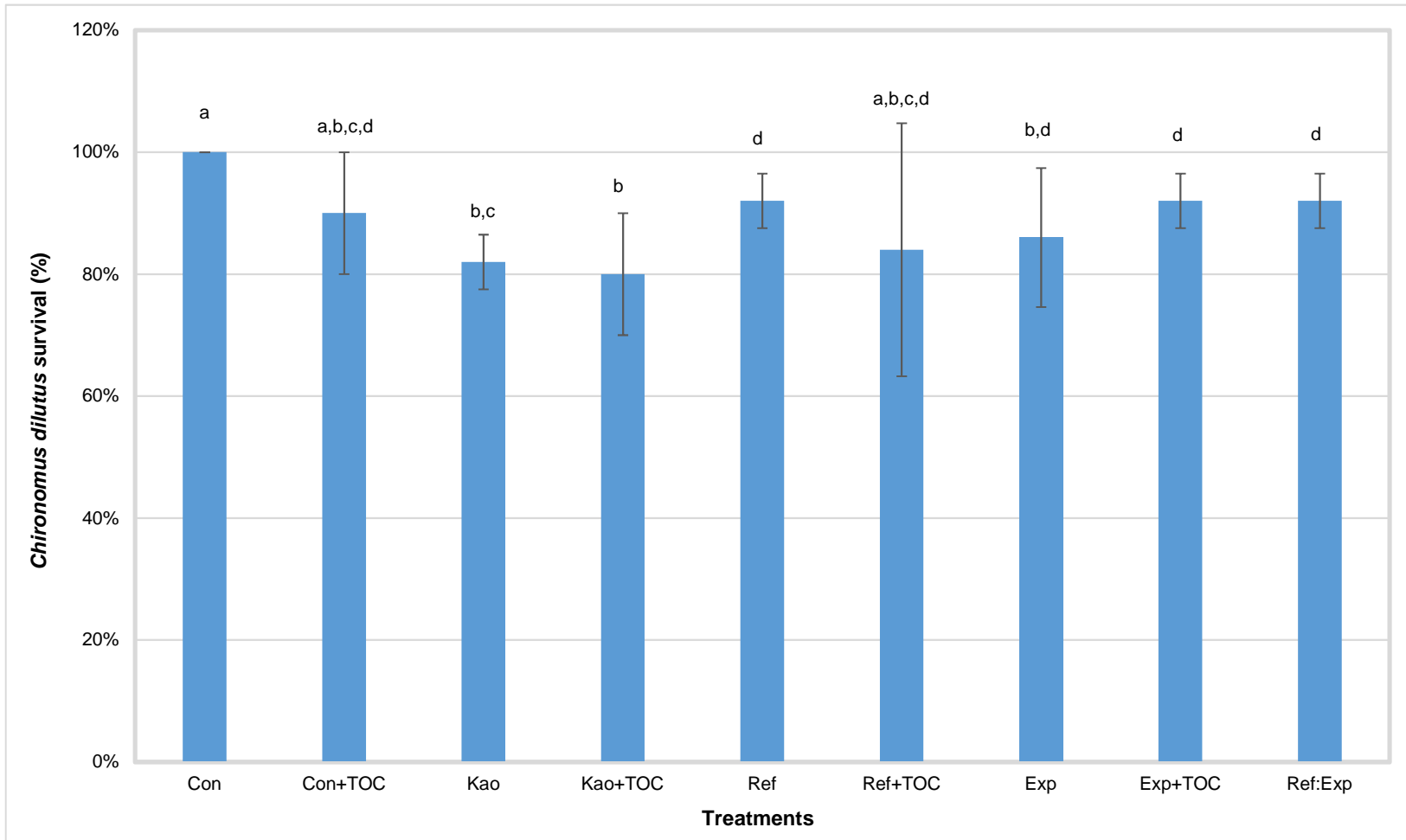


Figure 2: Survival of *Chironomus dilutus* in field and control sediments (mean \pm standard deviation)¹

¹ Letters above bars indicate significant differences

Note: Con = Laboratory Sand Control, Kao = Kaolin Clay, Ref = Reference, Exp = Exposure, and Ref:Exp = 50:50 ratio of Reference and Exposure

dilutus in the exposed sediment was significantly lower than in the laboratory control sediment, but this was true of most other treatments due to an absence of variability in the sand control, and suggests a potential influence of particle size on survival (and that the sand control alone is not appropriate for deriving conclusions of effect for this endpoint under these sediment physical characteristics).

Survival of *C. dilutus* in the exposed sediment ($86 \pm 11.4\%$) did not differ significantly from the kaolin clay control ($82 \pm 4.5\%$) nor the kaolin clay control with added TOC ($80 \pm 10\%$), but survival in kaolin clay tests were significantly lower than in laboratory control and field reference (Figure 2 and Appendix Table D.2). This suggests reduced survival in clay-sized particles, although an influence of pH (which drifted lower as also observed by Suedel and Rodgers [1994b] but was adjusted in the laboratory prior to organism addition) cannot be ruled out.

Amendment with 2% TOC resulted in an increase in *C. dilutus* survival in exposed sediment from $86 \pm 11.4\%$ to $92 \pm 4.5\%$, although the difference was not statistically significant (Figure 2 and Appendix Table D.2). Addition of TOC did not increase survival in any other treatment, although Nautilus (2016) indicated that TOC did not mix well with the control sediment nor with the kaolin clay. The 50:50 mix of exposed and reference sediment (intermediate, nominally 1% TOC) returned exactly the same survival as the exposure sediment + 2% TOC ($92 \pm 4.5\%$; Figure 2 and Appendix Table D.2).

C. dilutus Growth

Dry weight of *C. dilutus* was more variable among treatments than survival, indicating an apparent growth response (Table 2; Figure 3). Dry weight of *C. dilutus* in the exposed (i.e., failure-influenced) sediment (PNF; 1.61 ± 0.22 g) was significantly lower than in both the sand control (2.15 ± 0.14 g) and the field reference sediment (2.65 ± 0.23 g; Table 2; Figure 3; Appendix D.2), indicating an effect on growth as also observed in 2014 (Minnow 2015a). Dry weight in the exposed sediment (1.61 ± 0.22 g) did not differ significantly from the kaolin clay control (1.88 ± 0.57 g), the latter of which was also significantly lower than the field reference (Figure 3 and Appendix Table D.2). This suggests an effect of particle size and/or TOC. The fact that dry weight of the organisms exposed to the kaolin clay control was lower than those exposed to the field reference sediment but not the sand control suggests that TOC is the more likely cause of growth differences.

Amendment with 2% TOC resulted in statistically significant increases in *C. dilutus* growth in every sediment type (Figure 3 and Appendix Table D.2). This indicates a clear influence

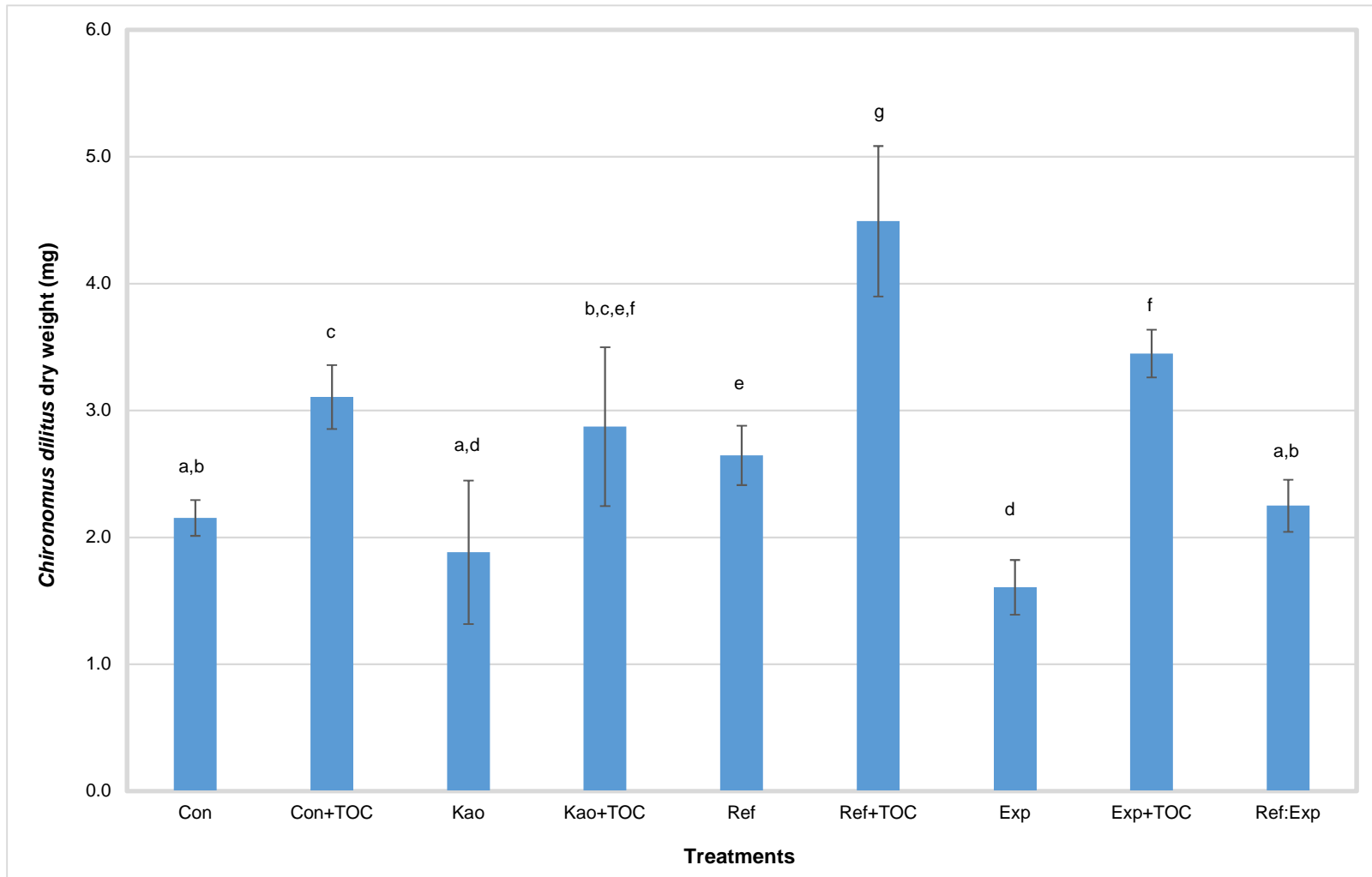


Figure 3: Dry weight (mg) growth of *Chironomus dilutus* in field and control sediments (mean \pm standard deviation)¹

¹ Letters above bars indicate significant differences

Note: Con = Laboratory Sand Control, Kao = Kaolin Clay, Ref = Reference, Exp = Exposure, and Ref:Exp = 50:50 ratio of Reference and Exposure

of TOC on *C. dilutus* growth even as organisms are fed daily in the tests. Importantly, the addition of 2% TOC to the low TOC exposure sediment resulted in a substantial increase in organism dry weight (from 1.61 ± 0.22 g to 3.45 ± 0.19 g) and resulted in a significantly greater dry weight relative to the control sediment and the field reference sediment. This strongly indicates that low TOC is a likely cause of growth differences in tests using *C. dilutus*. However, the addition of TOC can potentially reduce effects by two mechanisms: 1) the provision of additional food; and 2) the provision of additional binding for metals, rendering them unavailable (e.g., Sposito 1987; Campbell and Tessier 1996; Strom et al. 2011). Similar growth stimulation with TOC addition in exposed sediment, control sand, and kaolin clay suggest that provision of food is the dominant mechanism. This is also consistent with the geochemical finding that the tailings were relatively inert (SRK 2015a,b). The 50:50 mix of exposed and reference sediment caused intermediate growth stimulation relative to the 2% TOC addition, which is generally consistent with the hypothesis that growth rate is proportional to sediment TOC content over the range of conditions tested.

H. azteca Survival

Survival of *H. azteca* was more variable among treatments than survival of *C. dilutus*, indicating an apparent response, which was greatest in the laboratory control with added TOC and in the kaolin clay control (Table 2; Figure 4). Survival of *H. azteca* in the exposed (i.e., failure-influenced) sediment (PNF; $80 \pm 15.8\%$) was not reduced by more than 20% nor was it significantly lower than in the control sediment (clean sand; $94 \pm 5.5\%$; Table 2; Figure 4; Appendix Table D.2). However, it was significantly lower than in the field reference sediment ($100 \pm 0.0\%$), but this was true of most other treatments due to an absence of variability in the field reference. As with *C. dilutus*, the absence of a significant tailings-associated effect on survival of *H. azteca* differs from 2014 when survival in exposed sediment was significantly lower than reference (Minnow 2015a).

Survival of *H. azteca* in the exposed sediment ($80 \pm 15.8\%$) did not differ significantly from the kaolin clay control ($62 \pm 8.4\%$) nor the kaolin clay control with added TOC ($90 \pm 14.1\%$), but survival in the kaolin clay treatment was significantly lower than in the laboratory control and the field reference (Figure 4 and Appendix Table D.2). As noted for *C. dilutus*, this suggests reduced survival in clay-sized particles, although an influence of pH (which drifted lower as also observed by Suedel and Rodgers [1994b] but was adjusted in the laboratory prior to organism addition) cannot be ruled out.

Amendment with 2% TOC resulted in an increase in survival in exposed sediment from $80 \pm 15.8\%$ to $90 \pm 10\%$ (from significantly lower than the field reference sediment to

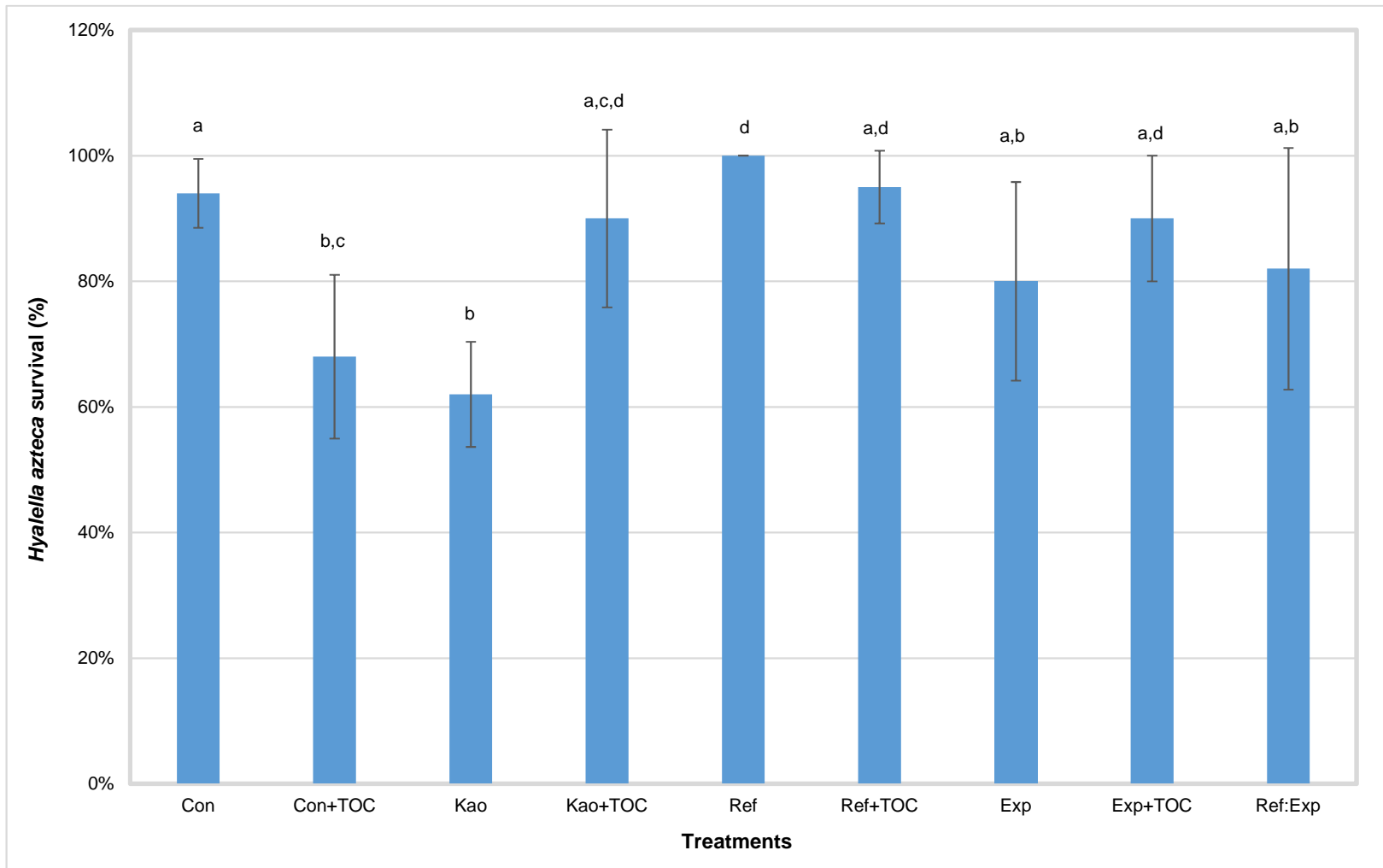


Figure 4: Survival of *Hyalella azteca* in field and control sediments (mean \pm standard deviation)¹

¹ Letters above bars indicate significant differences

Note: Con = Laboratory Sand Control, Kao = Kaolin Clay, Ref = Reference, Exp = Exposure, and Ref:Exp = 50:50 ratio of Reference and Exposure

statistically similar; Table 2) and in kaolin clay from $62 \pm 8.4\%$ to $90 \pm 14.1\%$, although only the latter difference was statistically significant (Figure 4 and Appendix Table D.2). Addition of TOC did not increase survival in laboratory control sediment or in the field reference sediment, although Nautilus (2016) indicated that TOC did not mix well with the control sediment nor with the kaolin clay. The improvement in survival with the addition of TOC to the low TOC sediment suggests that the influence of TOC supplementation on the survival of *H. azteca* may be restricted to conditions of very low TOC. This is consistent with the literature assessment that *H. azteca* is insensitive to TOC over normal test conditions (i.e., typical ranges of TOC), while still indicating a potential sensitivity under extremes of TOC that are not well studied in the literature.

H. azteca Growth

As observed with *C. dilutus*, dry weight of *H. azteca* was more variable among treatments than survival, indicating an apparent growth response (Table 2; Figure 4). Dry weight of *H. azteca* in the exposed (i.e., failure-influenced) sediment (PNF; 0.09 ± 0.03 g) was significantly lower than in both the sand control (0.24 ± 0.02 g) and the field reference sediment (0.22 ± 0.06 g; Table 2; Figure 5; Appendix Table D.2). This is the same as observed in 2014 (Minnow 2015a) and is also similar to the observations for *C. dilutus*, suggesting an effect on growth relative to control/reference sediments with moderate TOC and sand/silt substrate. Dry weight in the exposed sediment (0.09 ± 0.03 g) was significantly greater than in the kaolin clay control (0.06 ± 0.01 g), the latter of which was also significantly lower than in all other treatments (Figure 5 and Appendix Table D.2). This suggests an effect of substrate type as an important confounding factor; the lower dry weight of the kaolin clay control relative to the field reference and the sand control suggests particle size as a potential cause of growth differences.

Amendment with 2% TOC resulted in statistically significant increases in *H. azteca* growth in exposed sediment and kaolin clay, similar results in field reference sediment, and a statistically significant decrease in growth in the sand control (Figure 5 and Appendix Table D.2). As noted previously, Nautilus (2016) indicated that TOC did not mix well with the control sediment nor with the kaolin clay. The positive influence of TOC supplementation in the low TOC tests (exposure sediment and kaolin clay) indicates that low TOC is a likely cause of effects to the growth of *H. azteca*. As noted above, the addition of TOC can potentially reduce effects by two mechanisms (food availability, chemical bioavailability). However, the growth stimulation with TOC addition in both exposed sediment and kaolin clay suggest that provision of food is the dominant mechanism. The 50:50 mix of exposed

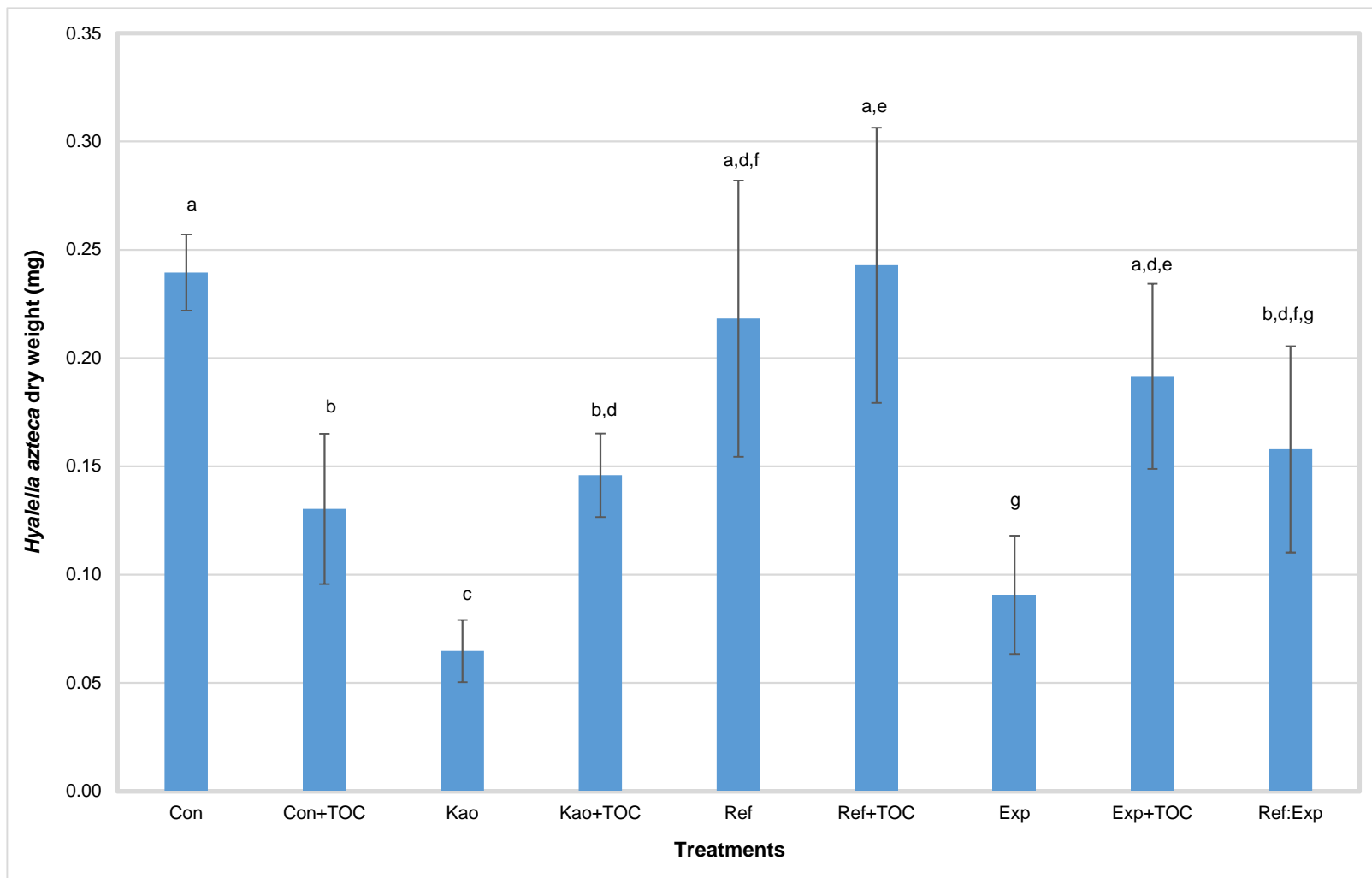


Figure 5: Dry weight (mg) growth of *Hyalella azteca* in field and control sediments (mean \pm standard deviation)¹

¹ Letters above bars indicate significant differences

Note: Con = Laboratory Sand Control, Kao = Kaolin Clay, Ref = Reference, Exp = Exposure, and Ref:Exp = 50:50 ratio of Reference and Exposure

and reference sediment (nominally 1% TOC) caused intermediate growth stimulation of the 2% TOC addition, which is generally consistent with the hypothesis that growth rate is proportional to TOC content over the range of conditions tested.

Regression Relationships

Sediment TOC content had a strong and statistically significant positive effect on the growth of *C. dilutus*, with TOC explaining approximately 91% of the variance in *C. dilutus* growth (Table 3; Figure 6). Statistically significant positive effects of sediment TOC content on the growth of *H. azteca* were not observed based on analysis of treatment means (Table 3; Figure 6), but strong and statistically significant positive effects on growth of *H. azteca* were observed when individual replicate/station results were evaluated (Table 3; Appendix Figures E.1 and E.2). No statistically significant effects of sediment copper (the primary POI representing the impact of the failure on sediment) on *C. dilutus* or *H. azteca* were observed based on analysis of treatment means (Table 3; Figure 7). However, weak negative effects of copper on *C. dilutus* growth and *H. azteca* survival and growth were observed in correlations that only included natural sediments (Table 3; Appendix Figures E.3 and E.4).

The absence of any strong relationships for survival of *C. dilutus* and *H. azteca* (Table 3; Figures 6 and 7) is consistent with the limited survival response. The strong positive relationships between sediment TOC and growth of both test organisms, coupled with weak negative relationships between sediment copper and test endpoints (present only when the controls were removed from the analysis), suggests that TOC is the dominant influence on the observed test organism growth. The fact that strong influences on growth were observed in TOC-deficient sediments and that the responses to TOC supplementation were similar in reference clay and failure-impacted sediment suggests that the influence of TOC was as a nutrition source.

Summary

Both the scientific literature and the results of this site-specific investigation indicate the importance of sediment physical characteristics in the interpretation of sediment toxicity tests. The effects to toxicity test organisms observed in 2014 were of uncertain cause, with the candidate mechanisms including both physical and chemical factors (both of which were identified as related to the tailings dam failure; Minnow 2015a; Golder 2015). The uncertainty identified following the testing in 2014 is consistent with observations from other studies (including the test method document for *C. tentans*) and is summed up by Suedel

Table 3: Regression of sediment toxicity test endpoints against total organic carbon (TOC) and copper

Analyte		Regression Statistic	<i>Chironomus dilutus</i>		<i>Hyalella azteca</i>	
			Survival	Growth	Survival	Growth
Mean (n = 9)	TOC	R ²	0.065	0.915	0.176	0.249
		p value	0.509	0.000	0.260	0.171
		direction	-	positive	-	-
	Copper	R ²	0.011	0.030	0.001	0.039
		p value	0.784	0.654	0.951	0.612
		direction	-	-	-	-
Individual (n=45 with Control) (n=25 without Control)	TOC	R ²	0.016	0.781	0.088	0.168
		p value	0.401	0.000	0.051	0.006
		direction	-	positive	-	positive
	TOC without Control ¹	R ²	0.006	0.902	0.140	0.466
		p value	0.724	0.000	0.072	0.000
		direction	-	positive	-	positive
	Copper	R ²	0.019	0.029	0.000	0.020
		p value	0.369	0.263	0.984	0.364
		direction	-	-	-	-
	Copper without Control ¹	R ²	0.029	0.191	0.185	0.248
		p value	0.412	0.029	0.036	0.013
		direction	-	negative	negative	negative

Indicates statistical significance at a p-value of 0.05

Indicates statistical significant Bonferroni-corrected p-value of 0.0125 (p=0.05/4 endpoints)

¹ Control treatments include: Sand Control, Sand Control + TOC, Kaolin Clay and Kaolin Clay + TOC

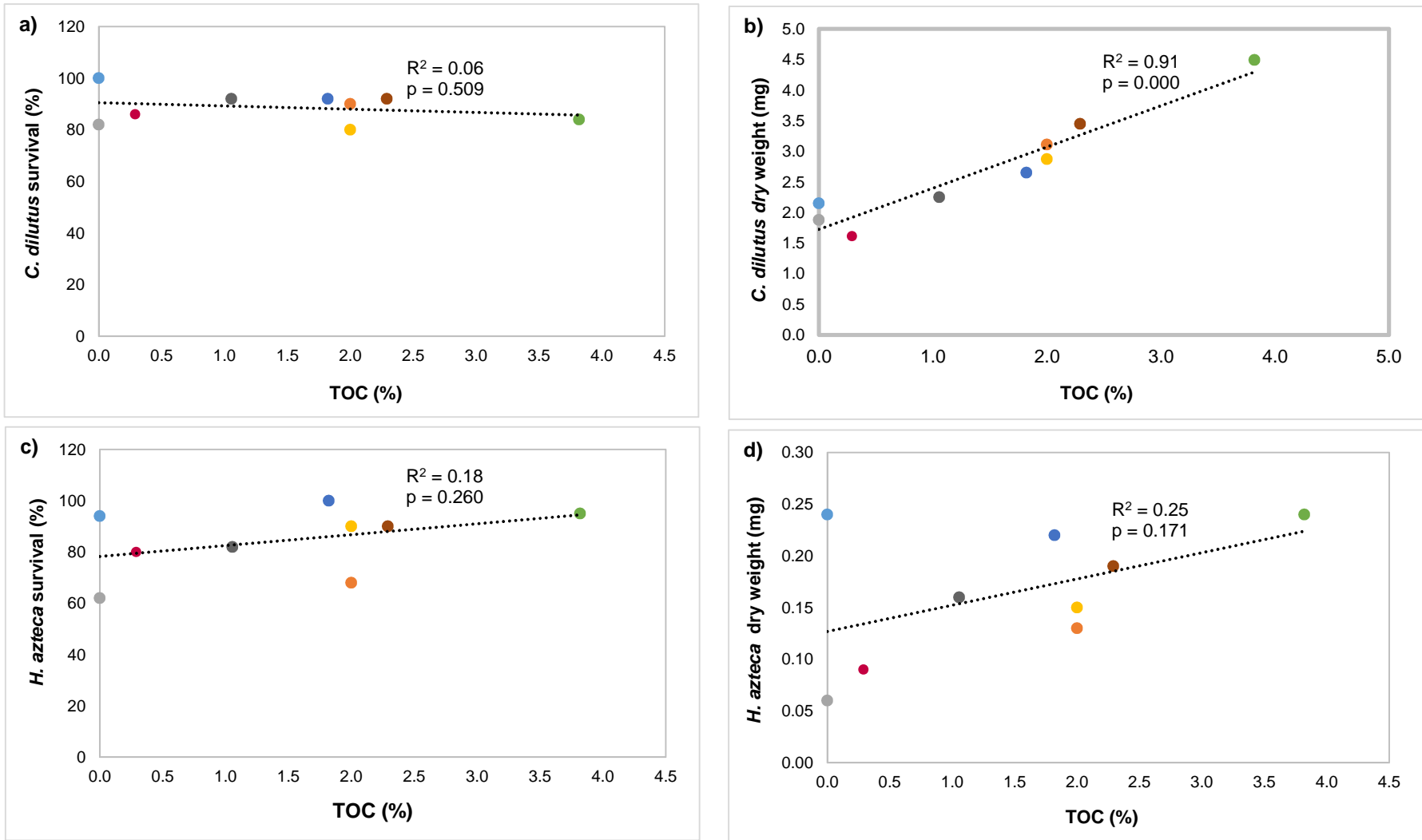


Figure 6: Regression of mean total organic carbon (TOC; %) versus a) *C. dilutus* survival (%), b) *C. dilutus* dry weight (mg), c) *H. azteca* survival (%) and d) *H. azteca* dry weight (mg).

● Con ● Con+TOC ● Kao ● Koa+TOC ● Ref ● Ref+TOC ● Exp ● Exp+TOC ● Exp:Ref

Note: Con = Laboratory Sand Control, Kao = Kaolin Clay, Ref = Reference, Exp = Exposure, and Ref:Exp = 50:50 ratio of Ref and Exp

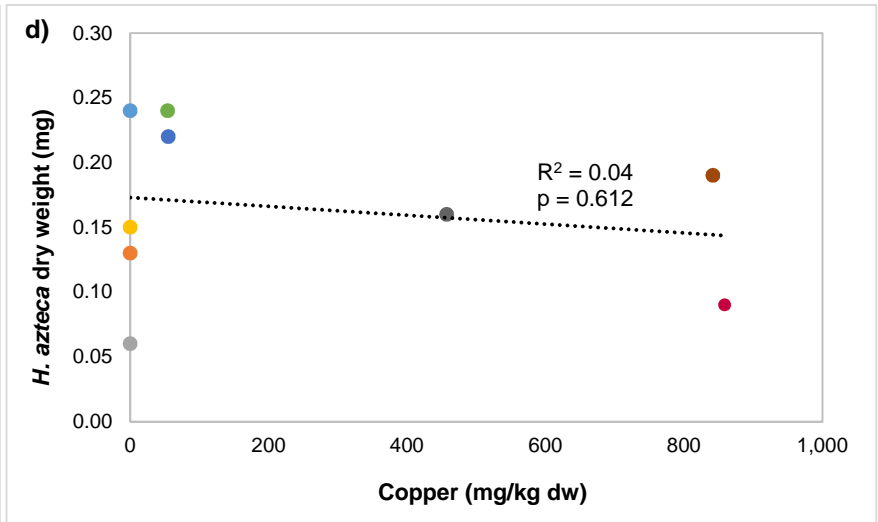
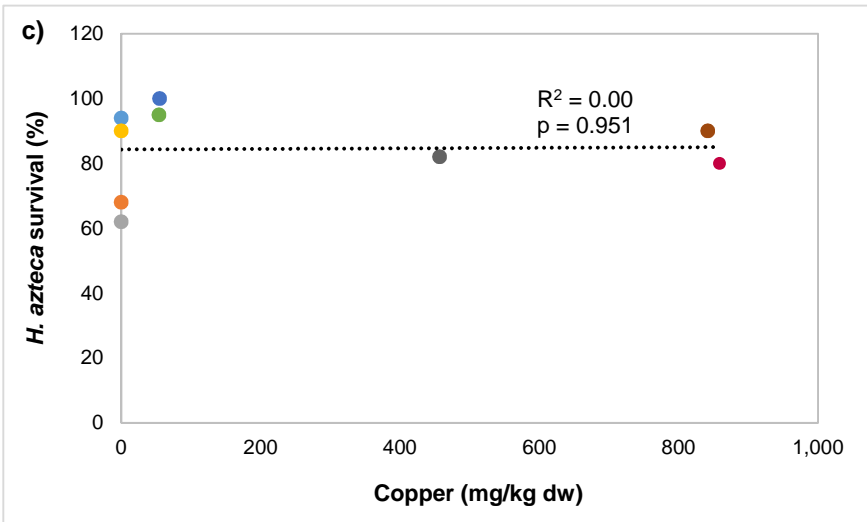
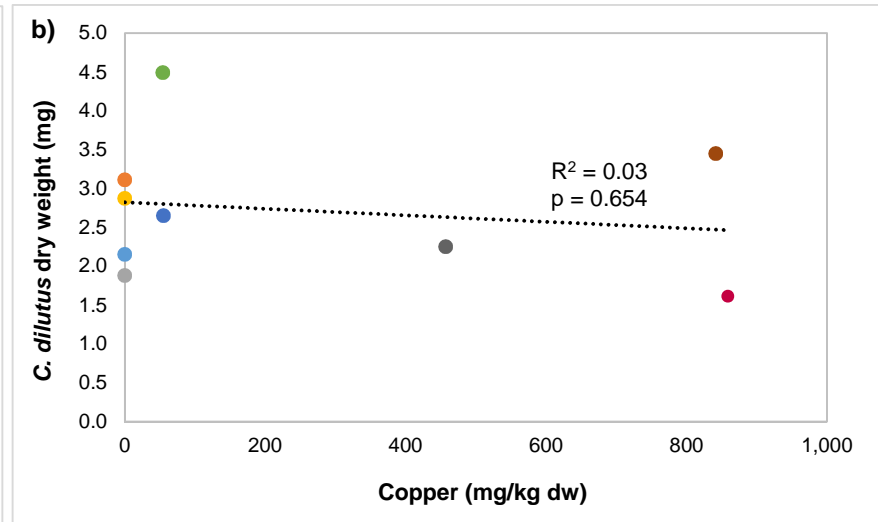
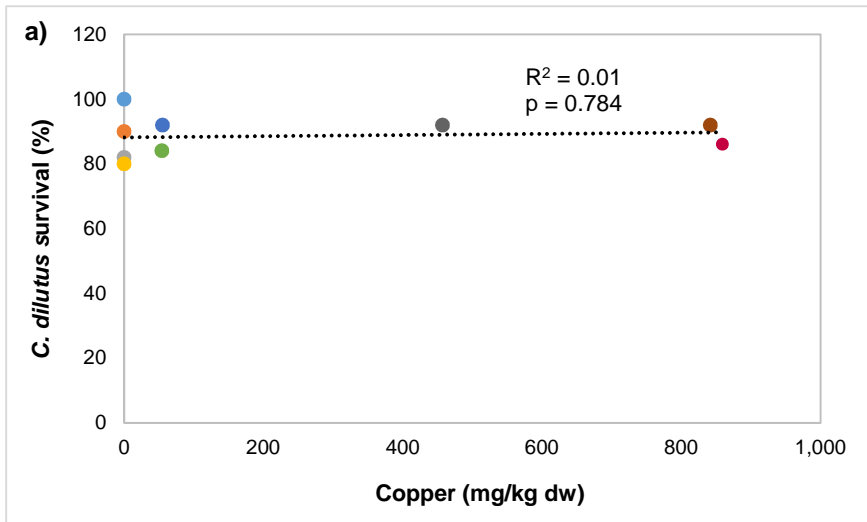


Figure 7: Regression of mean copper (mg/kg dw) versus a) *C. dilutus* survival (%), b) *C. dilutus* dry weight (mg), c) *H. azteca* survival (%) and d) *H. azteca* dry weight (mg).

● Con ● Con+TOC ● Kao ● Koa+TOC ● Ref ● Ref+TOC ● Exp ● Exp+TOC ● Exp:Ref

Note: Con = Laboratory Sand Control, Kao = Kaolin Clay, Ref = Reference, Exp = Exposure, and Ref:Exp = 50:50 ratio of Ref and Exp

and Rodgers (1994a) statement that “sediment toxicity may be due to physical and biological characteristics as well as chemical contamination of sediments, and the ability to distinguish between these effects would reduce the probability of concluding a sediment is chemically toxic when it is not.” Accordingly, additional testing was conducted in 2015 to elucidate the respective roles of these factors, as well as to confirm the general patterns of toxicity observed in Quesnel Lake sediments in the 2014 testing program.

This additional investigation of toxicity of Quesnel Lake failure-impacted sediments indicated no effect to the survival of either test organism (*C. tentans* and *H. azteca*), which differs from 2014. In contrast, effects on growth of both test organisms were confirmed in 2015, with growth apparently being the more sensitive test endpoint in the impacted sediment tested. Effects on growth of *C. tentans* and *H. azteca* were eliminated with the addition of TOC to concentrations similar to reference conditions, and comparisons of exposed sediments to a clay control indicated either no difference from the clay control (*C. dilutus*) or slightly greater growth than the clay control (*H. azteca*). This is consistent with previous findings that *C. dilutus* is intolerant of sediment with TOC lower than approximately 1% despite feeding of the test organisms (Suedel and Rodgers 1994a). The consistent positive response to TOC amendment in both exposed sediment and reference clay (uncontaminated but with high fines content) suggests that the response to TOC was through provision of food resources rather than through additional metal binding capacity. Strong positive relationships were observed between growth of both organisms and TOC whereas there were no strong relationships with copper. These observations are consistent with geochemical investigations of both Mount Polley tailings and tailings-influenced sediment, which indicated that mobility of tailings-associated metals is low (SRK 2015a,b).



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APPENDIX A

**EXCERPTS FROM THE
BIOLOGICAL TEST METHOD
DOCUMENTS**

APPENDIX A – Excerpts for the Biological Test Method Documents for Sediment Toxicity Tests of *Chironomus* (Environment Canada 1997) and *Hyaella* (Environment Canada 2013) on the Influence of Sediment Particle Size Distribution and Sediment Organic Matter Content on Toxicity Test Results

1) Excerpt from Biological Test Method: Test for Survival and Growth in Sediment Using the Larvae of Freshwater Midges (*Chironomus tentans* or *Chironomus riparius*) (Environment Canada 1997)

Larval *C. tentans* and *C. riparius* can tolerate a wide range of substrates. Ingersoll and Nelson (1990) reported that *C. riparius* could be reared in the laboratory in clean sediment with particle sizes ranging from >90% silt and clay to 100% sand, without detrimental effects on survival or growth. Bedard (1989) noted that growth of larval *C. tentans* was enhanced in the laboratory by coarser substrates with >80% sand. Results for 10-day tests with larval *C. tentans* held in 50 samples of uncontaminated Great Lakes sediment having particle sizes ranging from 95% clay to 100% sand and an organic carbon content from 0.3 to 8.1% suggested that growth might have been slightly influenced by grain size, with some improvement in growth in the coarser sediments (Ankley et al. 1994). Ten-day tests using larval, *C. riparius* held in samples of uncontaminated sediment with an organic carbon content ranging from 0.6 to 8.8% indicated that, within this range, the concentration of organic carbon did not influence survival or growth to a significant extent (Milani et al. 1996). In life cycle studies with laboratory formulated sediments, Suedel et al. (1993) found that *C. tentans* was tolerant of all particle size regimes examined (i.e., 0 to 100% sand, 0 to 100% silt, and 0 to 60% clay), but was intolerant of formulated control sediment with low (<1.0%) organic content. In 10-day studies with formulated control sediment, Suedel and Rodgers (1994a) found that larval *C. tentans* survived well if the organic content was 3 to 5%, whereas organics of 0.5% caused a significant reduction in percent survival and only 33% of larvae survived in formulated control sediment with 0.0% organics. Similar findings are reported in Suedel and Rodgers (1994b), together with results showing adequate (>80%) survival for fed *C. tentans* when held for 10 days in formulated sediment with 2.5% organics and particle sizes ranging from 100% sand to 100% silt. Suedel and Rodgers (1994b) also found poor (10 to 50%) survival rates for *C. tentans* fed daily during a 10-day exposure to several samples of field-collected sediment from "relatively pristine areas" which were low (0.12 to 0.19%) in organic content.

2) Excerpt from Biological Test Method: Test for Survival and Growth in Sediment and Water Using the Freshwater Amphipod *Hyalella azteca* (Environment Canada 2013)

The influence of natural physicochemical properties of sediments on the performance of *H. azteca* in sediment toxicity tests has been examined. Ingersoll and Nelson (1990) found that this species has an extremely wide tolerance of sediment grain size. In long-term exposures to clean sediments ranging from >90% silt- and clay-sized particles to 100% sand-sized particles, no detrimental effects on either survival or growth were noted. Similarly, Ankley et al. (1994) conducted 10-day *H. azteca* sediment assays using 50 uncontaminated samples of lake sediment with particle sizes ranging from 95% clay to 100% sand, and organic carbon content from 0.3 to 8.1%. These researchers found no correlation between amphipod survival rates and sediment characteristics including particle size, organic carbon content, or mineralogical composition, provided the animals were fed during the tests. In 10-day survival tests with laboratory-formulated or clean field-collected sediments, Suedel and Rodgers (1994a) determined that *H. azteca* was tolerant of all of the sediment particle size distributions (0 to 100% sand, 0 to 100% silt, and 0 to 60% clay) and ranges of organic carbon content (0.1 to 8.0%) examined. In 48-h tests with sediment spiked using a range of concentrations of alkylbenzene sulphonate, Cano et al. (1996) found that enriching the sediment with peat moss increased the acute lethal tolerance of *H. azteca* to this surfactant when total organic carbon content was >1.5%.

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Suedel, B.C., E. Deaver and J.H. Rodgers. 1993. Reducing Uncertainty in Laboratory Sediment Toxicity Tests. Society of Environmental Toxicology and Chemistry (SETAC) 14th Annual Meeting Platform Presentation 508. Houston, TX.

APPENDIX B

**2015 SEDIMENT TOXICITY
TESTING REPORT
(NAUTILUS 2016)**



Nautilus Environmental

**Freshwater sediment toxicity testing on samples
identified as PREF1, PREF1-TOC, PNF and PNF-TOC**

Samples collected August 14-24 2015

Final Report

Report date:
January 28, 2016

Submitted to:

Mount Polley Mining Corp.
Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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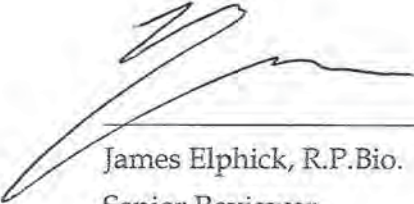
APPENDIX A – *Hyalella azteca* Toxicity Test Data

APPENDIX B – *Chironomus dilutus* Toxicity Test Data

SIGNATURE PAGE



Karen Lee, B.Sc.
Testing Manager



James Elphick, R.P.Bio.
Senior Reviewer

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental conducted freshwater sediment toxicity tests for Mount Polley Mining Corp. on samples identified as PREF1 and PNF. The samples were collected between August 14 to 24, 2015 and delivered to the laboratory in Burnaby, BC on August 28, 2015. Each sample was collected as five field replicates and transported in five 1-L glass jars; samples were received at temperatures ranging between 5.5 and 11.8°C. The samples were stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing. An aliquot of each of the samples was amended with total organic carbon (TOC), as described in Section 2 and both the amended and unamended samples were tested. A mixture of samples PREF1 and PNF was also tested.

14-d *Hyalella azteca* and 10-d *Chironomus dilutus* survival and growth sediment toxicity tests were conducted on the samples. This report describes the results of these toxicity tests. Copies of laboratory data sheets and printouts of statistical analyses for the tests are provided in Appendices A and B. The chain-of-custody form is provided in Appendix C.

2.0 METHODS

Aliquots of samples PREF1 and PNF were amended with total organic carbon (TOC), which consisted of a 50:50 mixture of peat moss and ground Tetramarin fish flakes. One gram of this mixture was stirred into 100 mL of sediment in each test vessel, prior to addition of the overlying water; this amendment rate was estimated to reflect 2% TOC (assuming a 50% moisture content). Amended samples were identified as PREF1 + 2% TOC and PNF + 2% TOC. Both amended and unamended samples were tested for toxicity. A 1:1 mixture of PREF1 and PNF was also prepared and tested without amendment of TOC; this treatment was identified as PREF1+PNF.

A TOC amended control was prepared similarly to that described for the samples using control sediment (which is a fine beach sand). In addition, Kaolin clay, which is comprised of very fine grain size, was also tested with and without TOC amendment to determine whether the test organisms could tolerate sediments with very fine grain size. The pH of the kaolin clay controls was low after adding the overlying water (~pH 4.5), and was adjusted to neutral pH using NaOH prior to addition of test organisms.

Methods for the toxicity tests are summarized in Tables 1 and 2. Testing was conducted according to procedures described by Environment Canada (1997 and 2013). Statistical analyses for the tests were performed using CETIS (Tidepool Scientific Software, 2013).

Ammonia concentrations were monitored three times per week on the reference sample PREF1 to ensure that concentrations did not exceed 0.2 mg/L N of un-ionized ammonia. The ammonia concentrations in the overlying water of the samples and control were measured by ALS Environmental (Burnaby, BC) and are provided in Appendices A and B.

Table 1. Summary of test conditions: *Hyalella azteca* survival and growth test.

Test organism	<i>Hyalella azteca</i>
Test organism source	Aquatic Research Organisms, NH
Test organism age	2 - 9 days old
Test type	Static
Test duration	14 days
Test vessel	375 mL glass container
Test volume	100 mL sediment; 175 mL overlying water
Test replicates	5 field replicates per sample
Number of organisms	10 per replicate
Control water	Moderately-hard synthetic water prepared from dechlorinated municipal water (recipe from Environment Canada [2013])
Test solution renewal	None
Test temperature	23 ± 1°C
Feeding	0.75 mL of YCT and 1.35 mg Tetramin per replicate daily
Light intensity	500 to 1000 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	Gentle aeration throughout test
Test protocol	Environment Canada (2013), EPS 1/RM/33
Statistical software	CETIS
Test endpoint	Survival and dry weight
Test acceptability criteria for controls	Mean control survival of ≥80% survival and ≥0.1 mg/amphipod dry weight
Reference toxicant	Sodium chloride

Table 2. Summary of test conditions: *Chironomus dilutus* survival and growth test.

Test organism	<i>Chironomus dilutus</i>
Test organism source	Aquatic BioSystems, Fort Collins, CO
Test organism age	3 rd Instar
Test type	Static
Test duration	10 days
Test vessel	375-mL glass containers
Test volume	100 mL sediment; 175 mL overlying water
Test replicates	5 field replicates per treatment
Number of organisms	10 per replicate
Control water	Moderately-hard synthetic water prepared from dechlorinated municipal water (recipe from Environment Canada [2013])
Test solution renewal	None
Test temperature	23 ± 1°C
Feeding	6.0 mg Tetramin in 1.5 mL suspension per replicate daily
Light intensity	500 – 1000 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	Gentle aeration throughout test
Test protocol	Environment Canada (1997), EPS 1/RM/32
Statistical software	CETIS
Test endpoint	Survival and dry weight
Test acceptability criteria for controls	Mean control survival ≥70% survival and ≥0.6 mg/worm dry weight
Reference toxicant	Potassium chloride

3.0 RESULTS

Results of the toxicity tests using *H. azteca* are provided in Table 3 and associated ammonia measurements are provided in Table 5. The TOC-amended control exhibited survival and growth that was significantly lower than the control. The added TOC did not mix well into the sandy control sediment, resulting in accumulation of the TOC on the surface of the sediment, where signs of degradation, such as apparent growth of mould, were noted. Ammonia concentrations in this treatment were elevated (34.8 mg/L, compared with 0.3 mg/L in the control), and likely contributed to the adverse effects that were observed; Borgman (1994) reported that ammonia above 1 mM (i.e., 14 mg/L) resulted in mortality to this species. The kaolin clay control also performed poorly relative to the control; however, amending the kaolin clay with TOC produced survival that was not statistically different from the control, although growth was still impaired in this treatment relative to the control. The kaolin clay treatments produced low pH throughout the test (~pH 5), which may have contributed to effects observed in these treatments.

Sample PREF1 did not exhibit adverse effects on survival or growth of *H. azteca* relative to the control in either unamended or TOC-amended samples. One of the replicates of the TOC-amended PREF1 samples produced no survival; however, this appears to have been an anomalous response in this replicate, since the remaining replicates produced an average of 95.0% survival. Consequently, this replicate was removed prior to calculating the mean and standard deviation response reported in Table 3.

Sample PNF exhibited a significant reduction in growth of *H. azteca* relative to the control and both survival and growth relative to the reference sediment, PREF1; however, PNF amended with TOC did not produce survival or growth that was significantly reduced relative to either the control or reference sediment. The mixture of PREF1 and PNF exhibited survival that was significantly reduced relative to the PREF1; growth in this sample was greater than that observed in the PNF sample and was not statistically different from the control or the reference sample.

Results of the toxicity tests using *C. dilutus* are provided in Table 4 and associated ammonia measurements are provided in Table 6. The kaolin clay controls (both with and without amended TOC) exhibited statistically significantly reduced survival relative to the control. The PNF sample and PREF1 with amended TOC also exhibited a statistically significant reduction in

survival relative to the control. However, none of the samples exhibited a statistically significant reduction in survival relative to the reference sediment, PREF1.

Growth of *C. dilutus* was reduced relative to the control in sample PNF, but not in PNF sample amended with TOC, or in any of the other samples. Growth was also reduced in sample PNF relative to the PREF1 sample.

Table 3. Results: *Hyalella azteca* survival and growth test.

Sample ID	Mean ± SD	
	Survival (%)	Dry Weight (mg)
Control Sediment	94.0 ± 5.5	0.24 ± 0.02
Control Sediment + 2% TOC	68.0 ± 13.0 *+	0.13 ± 0.03 *
Kaolin Clay Control	62.0 ± 8.4 *+	0.06 ± 0.01 *+
Kaolin Clay Control + 2% TOC	90.0 ± 14.1	0.15 ± 0.02
PREF1	100.0 ± 0.0	0.22 ± 0.06
PREF1 + 2% TOC ¹	95.0 ± 5.5	0.24 ± 0.06
PNF	80.0 ± 15.8 +	0.09 ± 0.03 *+
PNF + 2% TOC	90.0 ± 10.0	0.19 ± 0.04
PREF1 + PNF	82.0 ± 19.2 +	0.16 ± 0.05

(*) Asterisks indicate samples that are significantly different from the control sediment.

(+) Cross indicate samples that are significantly different from the reference sediment PREF1.

¹ Data for replicate C were excluded, since there was no survival in this replicate and this appeared to be an anomalous response

SD = Standard Deviation.

Table 4. Results: *Chironomus dilutus* survival and growth test.

Sample ID	Mean ± SD	
	Survival (%)	Dry Weight (mg)
Control Sediment	100.0 ± 0.0	2.15 ± 0.14
Control Sediment + 2% TOC	90.0 ± 10.0	3.11 ± 0.25
Kaolin Clay Control	82.0 ± 4.5 *	1.88 ± 0.57 +
Kaolin Clay Control + 2% TOC	80.0 ± 10.0 *	2.87 ± 0.63
PREF1	92.0 ± 4.5	2.65 ± 0.23
PREF1 + 2% TOC	84.0 ± 20.7 *	4.49 ± 0.59
PNF	86.0 ± 11.4 *	1.61 ± 0.22 *+
PNF + 2% TOC	92.0 ± 4.5	3.45 ± 0.19
PREF1 + PNF	92.0 ± 4.5	2.25 ± 0.21

(*) Asterisks indicate samples that are significantly different from the control sediment.

(+) Cross indicate samples that are significantly different from the reference sediment PREF1.

SD = Standard Deviation

Table 5. Summary of ammonia concentrations for the 14-d *H. azteca* toxicity test.

Sample ID	Overlying Water Total Ammonia (mg/L N)	
	Day 0	Day 14
Control Sediment	<0.0050	0.318
Control Sediment + 2% TOC	0.371	34.8
Kaolin Clay Control	0.105	2.68
Kaolin Clay Control + 2% TOC	0.402	5.10
PREF1	0.575	0.167
PREF1 + 2% TOC	1.37	14.8
PNF	0.0061	0.0192
PNF + 2% TOC	0.0106	22.9
PREF1 + PNF	0.329	0.0209

Table 6. Summary of ammonia concentrations for the 10-d *C. dilutus* toxicity test.

Sample ID	Overlying Water Total Ammonia (mg/L N)	
	Day 0	Day 10
Control Sediment	<0.0050	3.48
Control Sediment + 2% TOC	0.371	23.2
Kaolin Clay Control	0.105	2.27
Kaolin Clay Control + 2% TOC	0.402	3.61
PREF1	0.575	0.0722
PREF1 + 2% TOC	1.37	20.1
PNF	0.0061	0.0694
PNF + 2% TOC	0.0106	15.0
PREF1 + PNF	0.329	0.065

4.0 QA/QC

The health histories of the test organisms used in the exposures were acceptable and met the requirements of the Environment Canada protocols. The tests met all control acceptability criteria and water quality parameters remained within ranges specified in the protocols throughout the tests, with the exception of the kaolin clay samples, which required a pH adjustment prior to addition of the test organisms, as described in Section 2.0. Uncertainty associated with these tests is best described by the standard deviation (SD) around the mean.

The TOC did not mix well into the laboratory control sediment and formed clumps on the surface of the sediment, which then started to grow what appeared to be mould or fungus. This growth was associated with a drop in dissolved oxygen in the 24 hours prior to addition of the test organisms. A water change was conducted at test initiation to remove most of the clumps before the organisms were added into the test vessels.

Kaolin clay samples (with and without amended TOC) had low pH values (4.3 – 5.3) and were pH adjusted with 0.1M NaOH to a pH of 7.5 prior to addition of the test organisms. The pH had decreased by the following day but was not adjusted again.

Results of the reference toxicant tests conducted during the testing program are summarized in Table 7. Results of the *H. azteca* and *C. dilutus* tests fell within the range for acceptable organism performance (mean and two standard deviation range, based on historical results obtained by the laboratory with these tests). Thus, the sensitivity of the organisms used in the tests were appropriate. The *C. dilutus* reference toxicant test produced 80% survival in the control, which is lower than the ≥90% threshold for this test. However, the LC50 result fell within the acceptable range, and the survival in the control associated with the test itself was 100%. Consequently, the health of the test organisms was considered to be acceptable.

Table 7. Reference toxicant results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>H. azteca</i>	Survival (LC50): 5.3 g/L NaCl	5.2 (4.3 – 6.3)	10	September 18, 2015
<i>C. dilutus</i>	Survival (LC50): 6.7 g/L NaCl	4.5 (2.4 – 8.2)	35	September 18, 2015

SD = Standard Deviation, LC = Lethal Concentration, CV = Coefficient of Variation.

5.0 REFERENCES

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Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.7.16 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - *Hyalella azteca* Toxicity Test Data

Hyalella azteca Sediment Test Summary Sheet

Client: Mount Polley
 Work Order No.: 15671

Start Date: 18-Sep-15
 Set up by: KJL/KL

Sample Information:

Sample ID: Various - See Below
 Sample Date: Aug 14-19, 24, 2015
 Date Received: 28-Aug-15
 Sample Volume: 5x 500mL per sample

Test Organism Information:

Species: Hyalella azteca
 Supplier: Aquatic Research Organisms, NH
 Date received: 18-Sep-15
 Age or size (Day 0): 9-days

NaCl Reference Toxicant Results:

Reference Toxicant ID: HA101
 Stock Solution ID: n/a
 Date Initiated: 18-Sep-15

96-h LC50 (95% CL): 5.3 (4.6 - 6.0)

96-h LC50 Reference Toxicant Mean and Range: 5.2 (4.3 - 6.3) CV (%): 10

Test Results:

Sample ID	Survival ± SD (%)	Average Dry Wt. ± SD (mg)
Control Sediment	94.0 ± 5.5	0.24 ± 0.02
Control Sediment + 2% TOC	68.0 ± 13.0 ^{*,1}	0.13 ± 0.03 [*]
Kaolin Clay Control	62.0 ± 8.4 ^{*,1}	0.06 ± 0.01 ^{*,1}
Kaolin Clay Control + 2% TOC	90.0 ± 14.1	0.15 ± 0.02
PREF1	100.0 ± 0.0	0.22 ± 0.06
PREF1 + 2% TOC ²	95.0 ± 5.8	0.24 ± 0.06
PNF	80.0 ± 15.8 ¹	0.09 ± 0.03 ^{*,1}
PNF + 2% TOC	90.0 ± 10.0	0.19 ± 0.04
PREF1 + PNF (50:50)	82.0 ± 19.2 ¹	0.16 ± 0.05

* Samples that are significantly different from Control Sediment.

¹ Samples that are significantly different from the reference site PREF1

² Excluding replicate C

Reviewed by: JCh

Date reviewed: Dec 7/15

Chronic *H. azteca* Sediment Toxicity Test Data Sheet
Freshwater Sediment Water Quality

Client: Mount Polley
Work Order No.: 15671

Start Date: 18-Sep-15
Termination Date: 02-Oct-15
Test Organism: *Hyalella azteca*

Temperature (°C)

Sample ID	Day														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Control Sediment	23.0	23.0	23.0	22.5	22.5	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Cont. Sed + 2% TOC	23.0	23.0	23.0	22.0	22.5	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Kaolin Clay Control	23.0	23.0	23.0	22.5	22.5	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Kaolin Cont + 2% TOC	23.0	23.0	23.0	22.5	22.5	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
PREF	23.0	23.0	23.0	22.5	22.5	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
PREF + 2% TOC	23.0	23.0	23.0	22.5	22.5	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
PNF	23.0	23.0	23.0	22.5	22.5	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
PNF + 2% TOC	23.0	23.0	23.0	22.5	22.5	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
PREF + PNF	23.5	23.0	23.0	22.5	22.5	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Technician Initials	SSD	m	A	JW	JS	JS	JS	JS	m	n	JS	JS	JS	JS	JS

Conductivity (µS)

Sample ID	Day														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Control Sediment	408	419	429	436	443	450	460	475	473	485	491	503	511	517	527
Cont. Sed + 2% TOC	440	505	525	649	713	747	787	837	820	835	841	848	863	854	867
Kaolin Clay Control	370	382	392	403	409	416	429	433	426	439	442	446	451	458	453
Kaolin Cont + 2% TOC	410	432	454	467	476	485	492	503	485	495	495	509	513	523	532
PREF	408	402	409	403	396	391	388	380	389	393	390	396	401	399	411
PREF + 2% TOC	466	502	529	651	699	764	720	730	746	761	741	738	752	731	739
PNF	428	442	449	470	484	500	520	526	532	543	554	566	582	582	586
PNF + 2% TOC	519	671	712	825	829	772	758	771	770	790	826	839	862	865	872
PREF + PNF	456	469	482	497	506	520	531	538	534	545	550	556	556	564	564
Technician Initials	SSD	m	A	JW	JS	JS	JS	JS	m	n	JS	JS	JS	JS	JS

Comments:

① 22.0

Reviewed by:

JOK

Date Reviewed:

Oct. 21/15

Chronic *H. azteca* Sediment Toxicity Test Data Sheet
Freshwater Sediment Water Quality

Client: _____
Work Order No.: _____

Mount Polley _____
15671 _____

Start Date: 18-Sep-15 _____
Termination Date: 02-Oct-15 _____
Test Organism: *Hyalella azteca* _____

Dissolved oxygen (mg/L)

Sample ID	Day														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Control Sediment	7.3	7.9	7.7	7.9	7.6	7.9	8.1	8.0	7.9	8.0	7.6	8.1	7.9	7.9	7.9
Cont. Sed + 2% TOC ①	4.8	5.0	7.8	7.4	7.4	7.2	7.7	6.8	7.8	7.9	7.7	7.9	8.0	8.2	7.5
Kaolin Clay Control	7.2	8.1	7.7	7.9	7.6	7.7	8.0	7.8	7.8	7.9	8.0	8.2	8.1	7.7	7.7
Kaolin Cont + 2% TOC	7.3	8.0	7.7	7.9	7.4	7.4	7.9	7.8	7.9	8.0	8.0	8.1	8.1	7.9	7.9
PREF	7.0	8.1	7.6	7.9	7.4	7.6	7.9	7.8	7.8	7.9	7.9	8.0	8.0	7.9	7.9
PREF + 2% TOC	6.9	8.0	7.7	7.3	7.0	7.2	7.7	7.5	7.9	8.0	7.9	7.8	7.9	7.5	8.0
PNF	7.0	8.0	7.8	7.8	7.7	7.5	8.0	7.7	7.9	8.0	8.0	8.0	8.0	8.2	7.5
PNF + 2% TOC ②	6.7	7.9	7.7	7.5	7.1	7.2	7.8	7.6	7.9	7.9	8.0	8.0	8.0	8.0	7.9
PREF + PNF ③	6.9	7.9	7.7	8.1	7.5	7.6	8.1	7.9	7.8	7.9	8.0	8.1	8.0	7.7	7.9
Technician Initials	SSD	A	A	JW	JS	JS	JS	JS	A	A	JS	JS	JS	JS	KJL

pH

Sample ID	Day														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Control Sediment	7.6	7.6	7.9	7.9	7.7	7.7	7.6	7.6	7.9	7.9	7.8	7.6	7.5	7.4	7.2
Cont. Sed + 2% TOC	6.9	7.6	7.8	8.0	8.0	8.1	8.1	7.7	8.0	8.1	8.2	8.2	8.2	8.2	8.1
Kaolin Clay Control ④	5.3	5.4	5.2	4.7	4.9	4.7	4.7	4.7	5.3	5.4	5.0	5.0	5.0	5.0	5.0
Kaolin Cont + 2% TOC ⑤	4.3	5.2	5.4	5.5	5.8	5.9	6.1	6.2	6.6	6.3	6.0	5.3	4.8	4.5	4.3
PREF	7.7	7.6	7.7	7.8	7.7	7.5	7.6	7.5	7.8	7.9	7.6	7.5	7.4	7.5	7.4
PREF + 2% TOC	7.5	7.8	7.8	8.1	8.2	8.1	8.2	8.1	8.1	8.1	8.1	8.1	8.1	7.9	7.8
PNF	7.9	8.0	8.1	8.1	8.1	7.9	8.0	7.8	8.0	8.1	8.0	7.9	7.9	7.9	7.8
PNF + 2% TOC	7.7	8.1	8.1	8.3	8.3	8.2	8.2	8.2	8.2	8.2	8.3	8.3	8.2	8.3	8.2
PREF + PNF	8.0	8.2	8.2	8.1	8.1	7.9	8.1	8.1	8.2	8.1	8.1	8.0	7.9	7.5	7.9
Technician Initials	SSD	A	A	JW	JS	JS	JS	JS	A	A	JS	JS	JS	JS	JS

Comments:

① 7.4 ② several replicates checked ^{and water Δ} done ③ pH adj to 7.5
④ checked A-E replicates ⑤ 7.6

Reviewed by:

JGA

Date Reviewed:

Oct-21/15

H. azteca Sediment Toxicity Test Data Sheet
Freshwater Sediment 14-d Survival and Weight

Client: Mount Polley
 Work Order No: 15671
 Sample ID: Various - See Below

Start Date: 18-Sep-15
 Termination Date: 02-Oct-15
 Test Organism: *Hyalella azteca*

Sample ID	Pan No. <small>0.9g purple</small>	Rep	No. alive	No. dead	No. missing	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control Sediment	1	A	9	0	1	KJL	1021.67	1023.78	9	KL
	2	B	10	0	0		1041.41	1043.67	10	
	3	C	10	0	0		1021.68	1024.05	10	
	4	D	9	0	1		1045.10	1047.48 ⁵³	9	
	5	E	9	0	1		1031.78	1033.85	9	
Control Sed + 2% TOC	6	A	8 ⁰	0	2	EMM/KL	1015.39	1016.19	8 ²	
	7	B	5 ⁰	0	2 ⁰ 5	YKL	1020.22	1020.89	5	
	8	C	8 ⁰	0	2	KJL	1033.91	1034.74	8	
	9	D	7 ⁰	0	3	KJL	1000.58	1001.47	7	
	10	E	6 ⁰	0	4		995.76	996.88	6	
Kaolin Clay Control	11	A	6 ⁰	1	3	EMM	983.92	984.24	6	
	12	B	7 ⁰	1	2		981.99	982.61	7	
	13	C	7 ⁰	1	2		1021.12	1021.59	7	
	14	D	6 ⁰	0	4		988.27	988.62	6	
	15	E	5 ⁰	0	5		990.95	991.23	5	
Kaolin Clay Cont + 2% TOC	16	A	8 ⁰	0	2	EMM	1001.61	1002.73	8	
	17	B	10	0	0		1004.32	1005.62 ⁴⁵	10	
	18	C	10	0	0		1016.12	1017.76	10	
	19	D	7 ⁰	0	3		1014.94	1015.21 ⁸¹	7	
	20	E	10	0	0		1044.24	1045.92	10	

Comments: Checked by KJL (2) checked by YKL
Reweighed pans: 1-1023.90 17-1005.73

Reviewed by: JKL Date Reviewed: Oct-21/15

H. azteca Sediment Toxicity Test Data Sheet
Freshwater Sediment 14-d Survival and Weight

Client: Mount Polley
Work Order No: 15671
Sample ID: Various - See Below

Start Date: 18-Sep-15
Termination Date: 02-Oct-15
Test Organism: *Hyalella azteca*

Sample ID	Pan No. (Sample)	Rep	No. alive	No. dead	No. missing	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
PREF1	21	A	10	0	0	KJL	1023.50	1025.97	10	KL
	22	B	10	0	0		1026.74	1027.95	10	
	23	C	10	0	0		1030.50	1032.44	10	
	24	D	10	0	0		1023.75	1026.63	10	
	25	E	10	0	0		993.85	996.27 ^{KL}	10	
PREF1 + 2% TOC	26	A	10	0	0	KJL	975.14	977.33	10	
	27	B	9	1	0		1002.29	1005.33	9	
	28	C	10	0	10		1007.35	-	0	
	29	D	9	0	1		981.23	983.08	9	
	30	E	10	0	0		991.42	993.51	10	
PNF	31	A	7	1	2	KJL	999.29	999.71	7	
	32	B	8	0	2		1001.47	1002.06	8	
	33	C	10	0	0		981.22	982.16	10	
	34	D	6	0	4		980.36	980.92	6	
	35	E	9	0	1		985.00	985.986.19	9	
PNF + 2% TOC	36	A	8	0	2	YVL	984.74	986.37	8	
	37	B	9	0	1		979.72	981.88	9	
	38	C	10	0	0		980.00	982.19	10	
	39	D	8	0	2		988.65	989.91	8	
	40	E	10	0	0		997.31	998.55	10	

Comments: ① Other worms in sample checked by JW ② checked by YVL jar marked as seeded
 ③ check by K-SV ④ 1 organism lost in transfer
 Rereighed pans: 23-1032.48 35-986.28
 JOK

Reviewed by: _____ Date Reviewed: Oct. 21/15

H. azteca Sediment Toxicity Test Data Sheet
Freshwater Sediment 14-d Survival and Weight

Client: Mount Polley
Work Order No: 15671
Sample ID: Various - See Below

Start Date: 18-Sep-15
Termination Date: 02-Oct-15
Test Organism: *Hyalella azteca*

Sample ID	Pan No. <small>0918 purple</small>	Rep	No. alive	No. dead	No. missing	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
PREF + PNF	41	A	8 ↓	0	2	JUN	991.87	992.60	8	KL
	42	B	5 ↓	1	4		993.83	994.78	5	
	43	C	10	0	0		976.98	978.25	10	
	44	D	9	0	1		990.93	992.79	9	
	45	E	9	0	1	↓	983.20	984.77	9	↓
		A								
		B								
		C								
		D								
		E								
		A								
		B								
		C								
		D								
		E								
		A								
		B								
		C								
		D								
		E								

Comments: ① checked by KJL

Reviewed by: JUN

Date Reviewed: Oct. 21/15

Client: Mount Polley

W.O.#: 15670-671

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness		
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)
Sediment Control	02-Oct-15	50	2.0	2.1	38	50	6.6	132
Sed. Cont + 2% TOC	02-Oct-15	50	13.6	13.8	268	50	8.6	172
Kaolin Clay Control	02-Oct-15	50	0.7	0.3	2	50	5.1	102
Kaolin Cont + 2% TOC	02-Oct-15	50	0.715	0.325	20	50	4.5	99.0
PREF1	02-Oct-15	50	1.9	2.0	36	50	6.5	130
PREF1 + 2% TOC	02-Oct-15		4.9	5.1	94		10.5	210
PNF	02-Oct-15		4.6	4.8	88		10.2	204
PNF + 2% TOC	02-Oct-15		16.4	16.6	324		12.5	250
PREF + PNF	02-Oct-15	50 100	1.3	1.5	11.2 22		10.3	206

Notes:

Reviewed by: _____ Date Reviewed: _____

Client : Mount Polley
 W.O.: 15671

Table of PKa values

Temperature (°C)	TDS (mg/L)			Salinity (g/kg)		
	0	250	2000	10	20	30
12	9.662	9.699	9.754	9.788	9.819	9.837
15	9.564	9.601	9.655	9.688	9.719	9.737
18	9.465	9.502	9.557	9.588	9.619	9.636
20	9.401	9.438	9.492	9.523	9.554	9.571
22		9.391				
23	9.307	9.344	9.398	9.426	9.459	9.476
24		9.314				
25	9.246	9.283	9.337	9.366	9.397	9.414

In-house measured Ammonia

Date	Sample ID	Temperature (C)	pH	Total Ammonia Kit Reading (mg/L)	Dilution Factor	Total Ammonia (as N) (mg/L)	pKa	Unionized Ammonia (mg/L)
18-Sep-15	PREF1	23.0	7.7	0.85	1	0.85	9.344	0.018866
21-Sep-15	PREF1	22.5	7.8	1.60	1	1.60	9.391	0.040006
23-Sep-15	PREF1	22.0	7.5	0.58	1	0.58	9.391	0.007360
25-Sep-15	PREF1	22.0	7.5	0.24	1	0.24	9.391	0.003046
28-Sep-15	PREF1	22.0	7.6	0.24	1	0.24	9.391	0.003822
30-Sep-15	PREF1	22.0	7.4	0.24	1	0.24	9.391	0.002425

Jou
Oct. 30/15

Nautilus Environmental Sediment Toxicity Test - Water Quality Data For Ammonia

Client : Mount Polley Species : H. azteca
 Work Order No: 15671 Sample Type: Overlying ammonia
 Date Measured: See below

Date	Sample ID	Temperature (°C)	pH	Total Ammonia (mg/L)	Unionized Ammonia (mg/L) N	Tech Init
18-Sep-15	PREF1	23.0	7.6 7.7	0.85	0.01 ⁵ 89	SSD
21-Sep-15	PREF1	22.5	7.8	1.60	0.040	JW
23-Sep-15	PREF1	22.0	7.5	0.58	0.007	KJL
25-Sep-15	PREF1	22.0	7.5	0.24	0.003	JS
28-Sep-15	PREF1	22.0	7.6	0.24	0.004	JS
30-Sep-15	PREF1	22.0	7.4	0.24	0.002	JS

Comments: _____

Reviewed by: Jou

Date Reviewed: Oct 30/15

Sediment Description Data Sheet

Client: Mount Polley
 Work Order No.: 15670-671

Date: 17-Sep-15
 Test Organism: *H. azteca/C. dilutus*

Sample ID	Grain Size	Colour	Odour	Debris	Other	Initials
PREF1 (A)	wet clay	dark grey	none	organic material	-	KL
PREF1 (B)	wet clay	↓	↓	↓	-	↓
PREF1 (C)	wet clay	↓	↓	organic materials	-	↓
PREF1 (D)	Wet clay	↓	↓	-	red worms	↓
PREF1 (E)	wet clay	↓	↓	-	yellow worms	↓
PNF (A)	wet clay	light grey	-	-	-	↓
PNF (B)	↓	↓	-	organic materials	-	↓
PNF (C)	↓	↓	-	↓	-	↓
PNF (D)	↓	↓	-	↓	-	↓
PNF (E)	↓	↓	-	↓	clay is more clumpy	↓
PREF1 + TOC A	wet clay	dark grey	none	organic material	-	↓
B	↓	↓	↓	-	-	↓
C	↓	↓	↓	organic material	-	↓
D	↓	↓	↓	-	-	↓
E	↓	↓	↓	-	red worms	↓
					yellow worms	↓

Reviewed by: JKH Date Reviewed: Oct-21/15

Sediment Description Data Sheet

Client: Mount Polley
 Work Order No.: 15670-671

Date: Sept 17/15
 Test Organism: H. azteca/C. dilutus

Sample ID	Grain Size	Colour	Odour	Debris	Other	Initials
PNF-TOC A	wet clay	milky light grey	none	-	-	KL
B	↓	↓	↓	organic material	-	↓
C	↓	↓	↓	↓	-	↓
D	↓	↓	↓	↓	clay is more clumpy	↓
E	↓	↓	↓	↓	↓	↓

Reviewed by: Jon

Date Reviewed: Oct. 21/15

CETIS Summary Report

Report Date: 07 Dec-15 14:28 (p 1 of 2)
 Test Code: 15671 | 01-6410-1640

Hyalella 14-d Survival and Growth Sediment Test

Nautilus Environmental

Batch ID: 08-7542-4412	Test Type: Growth-Survival (14d)	Analyst: Karen Lee
Start Date: 18 Sep-15	Protocol: EC/EPS 1/RM/33	Diluent: Mod-Hard Synthetic Water
Ending Date: 02 Oct-15	Species: Hyalella azteca	Brine:
Duration: 14d 0h	Source: Aquatic Research Organisms, NH	Age: 9-d

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
Control Sedimen	03-9242-1052	18 Sep-15	18 Sep-15	NA	Mount Polley	
Cont Sed + TOC	17-8057-1827	18 Sep-15	18 Sep-15	NA		
Kaolin Clay Con	06-6374-3943	18 Sep-15	18 Sep-15	NA		
Kaolin Cont + T	08-6528-5353	18 Sep-15	18 Sep-15	NA		
PREF1	00-2699-0801	18 Aug-15	28 Aug-15 08:33	31d 0h (10.1 °C)		
PREF1 + 2% TOC	06-1063-2863	18 Aug-15	28 Aug-15 08:33	31d 0h (11 °C)		
PNF	15-4268-7402	14 Aug-15	28 Aug-15 08:33	35d 0h (5.5 °C)		
PNF + 2% TOC	11-9347-1965	14 Aug-15	28 Aug-15 08:33	35d 0h (8.6 °C)		
PREF1 + PNF	11-1409-1541	18 Sep-15	18 Sep-15	NA		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
Control Sedimen	Sediment Sample	Mount Polley	Control Sediment		
Cont Sed + TOC	Sediment Sample	Mount Polley	Control Sediment + 2% TOC		
Kaolin Clay Con	Sediment Sample	Mount Polley	Kaolin Clay Control		
Kaolin Cont + T	Sediment Sample	Mount Polley	Kaolin Control + 2% TOC		
PREF1	Sediment Sample	Mount Polley	PREF1		
PREF1 + 2% TOC	Sediment Sample	Mount Polley	PREF1 + 2% TOC		
PNF	Sediment Sample	Mount Polley	PNF		
PNF + 2% TOC	Sediment Sample	Mount Polley	PNF + 2% TOC		
PREF1 + PNF	Sediment Sample	Mount Polley	PREF1 + PNF (50:50)		

14d Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
Control Sedimen	5	0.94	0.872	1	0.9	1	0.02449	0.05477	5.83%	0.0%
Cont Sed + TOC	5	0.68	0.5181	0.8419	0.5	0.8	0.05831	0.1304	19.17%	27.66%
Kaolin Clay Con	5	0.62	0.5161	0.7239	0.5	0.7	0.03742	0.08367	13.49%	34.04%
Kaolin Cont + T	5	0.9	0.7244	1	0.7	1	0.06325	0.1414	15.71%	4.26%
PREF1	5	1	1	1	1	1	0	0	0.0%	-6.38%
PREF1 + 2% TOC	4	0.95	0.8581	1	0.9	1	0.02887	0.05774	6.08%	-1.06%
PNF	5	0.8	0.6037	0.9963	0.6	1	0.07071	0.1581	19.76%	14.89%
PNF + 2% TOC	5	0.9	0.7758	1	0.8	1	0.04472	0.1	11.11%	4.26%
PREF1 + PNF	5	0.82	0.5812	1	0.5	1	0.08602	0.1924	23.46%	12.77%

14d Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control Sedimen	0.9	1	1	0.9	0.9
Cont Sed + TOC	0.8	0.5	0.8	0.7	0.6
Kaolin Clay Con	0.6	0.7	0.7	0.6	0.5
Kaolin Cont + T	0.8	1	1	0.7	1
PREF1	1	1	1	1	1
PREF1 + 2% TOC	1	0.9	0.9	1	
PNF	0.7	0.8	1	0.6	0.9
PNF + 2% TOC	0.8	0.9	1	0.8	1
PREF1 + PNF	0.8	0.5	1	0.9	0.9

CETIS Summary Report

Report Date: 07 Dec-15 14:28 (p 2 of 2)
Test Code: 15671 | 01-6410-1640

Hyalella 14-d Survival and Growth Sediment Test

Nautilus Environmental

10d Survival Rate Binomials

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control Sedimen	9/10	10/10	10/10	9/10	9/10
Cont Sed + TOC	8/10	5/10	8/10	7/10	6/10
Kaolin Clay Con	6/10	7/10	7/10	6/10	5/10
Kaolin Cont + T	8/10	10/10	10/10	7/10	10/10
PREF1	10/10	10/10	10/10	10/10	10/10
PREF1 + 2% TOC	10/10	9/10	9/10	10/10	
PNF	7/10	8/10	10/10	6/10	9/10
PNF + 2% TOC	8/10	9/10	10/10	8/10	10/10
PREF1 + PNF	8/10	5/10	10/10	9/10	9/10

CETIS Analytical Report

Report Date: 07 Dec-15 14:28 (p 1 of 2)
 Test Code: 15671 | 01-6410-1640

Hyalella 14-d Survival and Growth Sediment Test

Nautilus Environmental

Analysis ID: 17-6454-4070	Endpoint: 10d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 07 Dec-15 14:28	Analysis: STP 2x2 Contingency Tables	Official Results: Yes
Batch ID: 08-7542-4412	Test Type: Growth-Survival (10d)	Analyst: Karen Lee
Start Date: 18 Sep-15	Protocol: EC/EPS 1/RM/33	Diluent: Mod-Hard Synthetic Water
Ending Date: 02 Oct-15	Species: Hyalella azteca	Brine:
Duration: 14d 0h	Source: Aquatic Research Organisms, NH	Age: 9-d

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
Control Sedimen	03-9242-1052	18 Sep-15	18 Sep-15	NA	Mount Polley	
Cont Sed + TOC	17-8057-1827	18 Sep-15	18 Sep-15	NA		
Kaolin Clay Con	06-6374-3948	18 Sep-15	18 Sep-15	NA		
Kaolin Cont + T	08-6528-5358	18 Sep-15	18 Sep-15	NA		
PREF1	00-2699-0801	18 Aug-15	28 Aug-15 08:33	31d 0h (10.1 °C)		
PREF1 + 2% TOC	06-1063-2868	18 Aug-15	28 Aug-15 08:33	31d 0h (11 °C)		
PNF	15-4268-7402	14 Aug-15	28 Aug-15 08:33	35d 0h (5.5 °C)		
PNF + 2% TOC	11-9347-1965	14 Aug-15	28 Aug-15 08:33	35d 0h (8.6 °C)		
PREF1 + PNF	11-1409-1541	18 Sep-15	18 Sep-15	NA		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
Control Sedimen	Sediment Sample	Mount Polley	Control Sediment		
Cont Sed + TOC	Sediment Sample	Mount Polley	Control Sediment + 2% TOC		
Kaolin Clay Con	Sediment Sample	Mount Polley	Kaolin Clay Control		
Kaolin Cont + T	Sediment Sample	Mount Polley	Kaolin Control + 2% TOC		
PREF1	Sediment Sample	Mount Polley	PREF1		
PREF1 + 2% TOC	Sediment Sample	Mount Polley	PREF1 + 2% TOC		
PNF	Sediment Sample	Mount Polley	PNF		
PNF + 2% TOC	Sediment Sample	Mount Polley	PNF + 2% TOC		
PREF1 + PNF	Sediment Sample	Mount Polley	PREF1 + PNF (50:50)		

Data Transform	Zeta	Alt Hyp	Trials	Seed	Test Result
Untransformed		C > T	NA	NA	

Fisher Exact/Bonferroni-Holm Test

Sample	vs	Sample	Test Stat	P-Value	P-Type	Decision(α:5%)
Control Sedimen		Cont Sed + TOC	0.000827	0.0058	Exact	Significant Effect
Control Sedimen		Kaolin Clay Con	8.96E-05	0.0007	Exact	Significant Effect
Control Sedimen		Kaolin Cont + T	0.3575	1.0000	Exact	Non-Significant Effect
Control Sedimen		PREF1	1	1.0000	Exact	Non-Significant Effect
Control Sedimen		PREF1 + 2% TOC	1	1.0000	Exact	Non-Significant Effect
Control Sedimen		PNF	0.03565	0.2139	Exact	Non-Significant Effect
Control Sedimen		PNF + 2% TOC	0.3575	1.0000	Exact	Non-Significant Effect
Control Sedimen		PREF1 + PNF	0.06062	0.3031	Exact	Non-Significant Effect

Data Summary

Sample Code	NR	R	NR + R	Prop NR	Prop R	%Effect
Control Sedimen Negative Contr	47	3	50	0.94	0.06	0.0%
Cont Sed + TOC	34	16	50	0.68	0.32	27.66%
Kaolin Clay Con	31	19	50	0.62	0.38	34.04%
Kaolin Cont + T	45	5	50	0.9	0.1	4.26%
PREF1	50	0	50	1	0	-6.38%
PREF1 + 2% TOC	38	2	40	0.95	0.05	-1.06%
PNF	40	10	50	0.8	0.2	14.89%
PNF + 2% TOC	45	5	50	0.9	0.1	4.26%
PREF1 + PNF	41	9	50	0.82	0.18	12.77%

Stats run excluding PREF1+2% TOC Rep C

CETIS Analytical Report

Report Date: 07 Dec-15 14:28 (p 2 of 2)
 Test Code: 15671 | 01-6410-1640

Hyaella 14-d Survival and Growth Sediment Test

Nautilus Environmental

Analysis ID: 17-6454-4070 Endpoint: 10d Survival Rate
 Analyzed: 07 Dec-15 14:28 Analysis: STP 2x2 Contingency Tables

CETIS Version: CETISv1.8.7
 Official Results: Yes

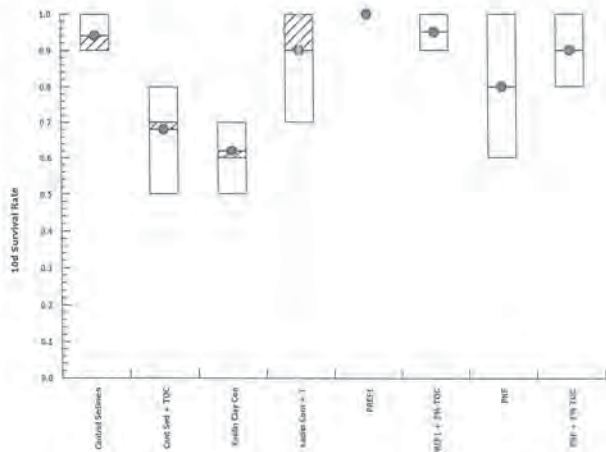
10d Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control Sedimen	0.9	1	1	0.9	0.9
Cont Sed + TOC	0.8	0.5	0.8	0.7	0.6
Kaolin Clay Con	0.6	0.7	0.7	0.6	0.5
Kaolin Cont + T	0.8	1	1	0.7	1
PREF1	1	1	1	1	1
PREF1 + 2% TOC	1	0.9	0.9	1	
PNF	0.7	0.8	1	0.6	0.9
PNF + 2% TOC	0.8	0.9	1	0.8	1
PREF1 + PNF	0.8	0.5	1	0.9	0.9

10d Survival Rate Binomials

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control Sedimen	9/10	10/10	10/10	9/10	9/10
Cont Sed + TOC	8/10	5/10	8/10	7/10	6/10
Kaolin Clay Con	6/10	7/10	7/10	6/10	5/10
Kaolin Cont + T	8/10	10/10	10/10	7/10	10/10
PREF1	10/10	10/10	10/10	10/10	10/10
PREF1 + 2% TOC	10/10	9/10	9/10	10/10	
PNF	7/10	8/10	10/10	6/10	9/10
PNF + 2% TOC	8/10	9/10	10/10	8/10	10/10
PREF1 + PNF	8/10	5/10	10/10	9/10	9/10

Graphics



CETIS Summary Report

Report Date: 07 Dec-15 15:04 (p 1 of 1)
 Test Code: 15671 | 01-6410-1640

Hyalella 14-d Survival and Growth Sediment Test

Nautilus Environmental

Batch ID: 08-7542-4412	Test Type: Growth-Survival (10d)	Analyst: Karen Lee
Start Date: 18 Sep-15	Protocol: EC/EPS 1/RM/33	Diluent: Mod-Hard Synthetic Water
Ending Date: 02 Oct-15	Species: Hyalella azteca	Brine:
Duration: 14d 0h	Source: Aquatic Research Organisms, NH	Age: 9-d

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
Control Sedimen	03-9242-1052	18 Sep-15	18 Sep-15	NA	Mount Polley	
Cont Sed + TOC	17-8057-1827	18 Sep-15	18 Sep-15	NA		
Kaolin Clay Con	06-6374-3948	18 Sep-15	18 Sep-15	NA		
Kaolin Cont + T	08-6528-5358	18 Sep-15	18 Sep-15	NA		
PREF1	00-2699-0801	18 Aug-15	28 Aug-15 08:33	31d 0h (10.1 °C)		
PREF1 + 2% TOC	06-1063-2868	18 Aug-15	28 Aug-15 08:33	31d 0h (11 °C)		
PNF	15-4268-7402	14 Aug-15	28 Aug-15 08:33	35d 0h (5.5 °C)		
PNF + 2% TOC	11-9347-1965	14 Aug-15	28 Aug-15 08:33	35d 0h (8.6 °C)		
PREF1 + PNF	11-1409-1541	18 Sep-15	18 Sep-15	NA		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
Control Sedimen	Sediment Sample	Mount Polley	Control Sediment		
Cont Sed + TOC	Sediment Sample	Mount Polley	Control Sediment + 2% TOC		
Kaolin Clay Con	Sediment Sample	Mount Polley	Kaolin Clay Control		
Kaolin Cont + T	Sediment Sample	Mount Polley	Kaolin Control + 2% TOC		
PREF1	Sediment Sample	Mount Polley	PREF1		
PREF1 + 2% TOC	Sediment Sample	Mount Polley	PREF1 + 2% TOC		
PNF	Sediment Sample	Mount Polley	PNF		
PNF + 2% TOC	Sediment Sample	Mount Polley	PNF + 2% TOC		
PREF1 + PNF	Sediment Sample	Mount Polley	PREF1 + PNF (50:50)		

Mean Dry Weight-mg Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
Control Sedimen	5	0.2395	0.2177	0.2613	0.226	0.27	0.007858	0.01757	7.34%	0.0%
Cont Sed + TOC	5	0.1303	0.08719	0.1734	0.1	0.1867	0.01553	0.03473	26.65%	45.59%
Kaolin Clay Con	5	0.06468	0.04688	0.08247	0.05333	0.08857	0.006408	0.01433	22.16%	72.99%
Kaolin Cont + T	5	0.1459	0.1219	0.1698	0.1243	0.168	0.008616	0.01927	13.21%	39.1%
PREF1	5	0.2182	0.139	0.2974	0.121	0.288	0.02851	0.06375	29.22%	8.89%
PREF1 + 2% TOC	4	0.2428	0.1417	0.344	0.2056	0.3378	0.03178	0.06355	26.17%	-1.4%
PNF	5	0.09066	0.05682	0.1245	0.06001	0.1322	0.01219	0.02725	30.06%	62.14%
PNF + 2% TOC	5	0.1916	0.1386	0.2447	0.1378	0.24	0.01911	0.04272	22.3%	19.99%
PREF1 + PNF	5	0.1579	0.09872	0.217	0.09125	0.2067	0.02131	0.04764	30.18%	34.08%

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control Sedimen	0.2344	0.226	0.237	0.27	0.23
Cont Sed + TOC	0.1	0.134	0.1037	0.1271	0.1867
Kaolin Clay Con	0.05333	0.08857	0.06715	0.05833	0.05599
Kaolin Cont + T	0.14	0.133	0.164	0.1243	0.168
PREF1	0.247	0.121	0.194	0.288	0.241
PREF1 + 2% TOC	0.219	0.3378	0.2056	0.209	
PNF	0.06001	0.07375	0.094	0.09333	0.1322
PNF + 2% TOC	0.2038	0.24	0.219	0.1575	0.1378
PREF1 + PNF	0.09125	0.19	0.127	0.2067	0.1744

CETIS Analytical Report

Report Date: 07 Dec-15 15:04 (p 1 of 2)
 Test Code: 15671 | 01-6410-1640

Hyalella 14-d Survival and Growth Sediment Test

Nautilus Environmental

Analysis ID: 15-4458-8629	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 07 Dec-15 15:04	Analysis: Nonparametric-Control vs Treatments	Official Results: Yes
Batch ID: 08-7542-4412	Test Type: Growth-Survival (14d)	Analyst: Karen Lee
Start Date: 18 Sep-15	Protocol: EC/EPS 1/RM/33	Diluent: Mod-Hard Synthetic Water
Ending Date: 02 Oct-15	Species: Hyalella azteca	Brine:
Duration: 14d 0h	Source: Aquatic Research Organisms, NH	Age: 9-d

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
Control Sedimen	03-9242-1052	18 Sep-15	18 Sep-15	NA	Mount Polley	
Cont Sed + TOC	17-8057-1827	18 Sep-15	18 Sep-15	NA		
Kaolin Clay Con	06-6374-3948	18 Sep-15	18 Sep-15	NA		
Kaolin Cont + T	08-6528-5358	18 Sep-15	18 Sep-15	NA		
PREF1	00-2699-0801	18 Aug-15	28 Aug-15 08:33	31d 0h (10.1 °C)		
PREF1 + 2% TOC	06-1063-2868	18 Aug-15	28 Aug-15 08:33	31d 0h (11 °C)		
PNF	15-4268-7402	14 Aug-15	28 Aug-15 08:33	35d 0h (5.5 °C)		
PNF + 2% TOC	11-9347-1965	14 Aug-15	28 Aug-15 08:33	35d 0h (8.6 °C)		
PREF1 + PNF	11-1409-1541	18 Sep-15	18 Sep-15	NA		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
Control Sedimen	Sediment Sample	Mount Polley	Control Sediment		
Cont Sed + TOC	Sediment Sample	Mount Polley	Control Sediment + 2% TOC		
Kaolin Clay Con	Sediment Sample	Mount Polley	Kaolin Clay Control		
Kaolin Cont + T	Sediment Sample	Mount Polley	Kaolin Control + 2% TOC		
PREF1	Sediment Sample	Mount Polley	PREF1		
PREF1 + 2% TOC	Sediment Sample	Mount Polley	PREF1 + 2% TOC		
PNF	Sediment Sample	Mount Polley	PNF		
PNF + 2% TOC	Sediment Sample	Mount Polley	PNF + 2% TOC		
PREF1 + PNF	Sediment Sample	Mount Polley	PREF1 + PNF (50:50)		

Data Transform	Zeta	Alt Hyp	Trials	Seed	Test Result
Untransformed	NA	C > T	NA	NA	

Nemenyi-Damico-Wolfe Test

Sample Code vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Control Sedimen	Cont Sed + TOC	416	387.4	1		0.0321	Asymp	Significant Effect
	Kaolin Clay Con	680	387.4	1		0.0001	Asymp	Significant Effect
	Kaolin Cont + T	352	387.4	1		0.0825	Asymp	Non-Significant Effect
	PREF1	92	387.4	1		0.7043	Asymp	Non-Significant Effect
	PREF1 + 2% TOC	54.5	410.9	1		0.8006	Asymp	Non-Significant Effect
	PNF	568	387.4	1		0.0017	Asymp	Significant Effect
	PNF + 2% TOC	178	387.4	1		0.4569	Asymp	Non-Significant Effect
	PREF1 + PNF	328	387.4	1		0.1123	Asymp	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Treatment Effect	Fligner-Wolfe	953		0.0015	Significant Overall Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1555197	0.01943996	8	12.13	<0.0001	Significant Effect
Error	0.05609059	0.001602588	35			
Total	0.2116103		43			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	15.02	20.09	0.0588	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9847	0.9295	0.8178	Normal Distribution

CETIS Analytical Report

Report Date: 07 Dec-15 15:04 (p 2 of 2)
 Test Code: 15671 | 01-6410-1640

Hyalella 14-d Survival and Growth Sediment Test

Nautilus Environmental

Analysis ID: 15-4458-8629 Endpoint: Mean Dry Weight-mg
 Analyzed: 07 Dec-15 15:04 Analysis: Nonparametric-Control vs Treatments

CETIS Version: CETISv1.8.7
 Official Results: Yes

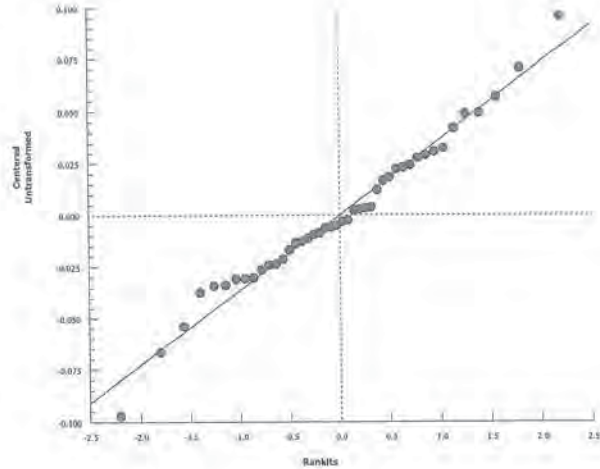
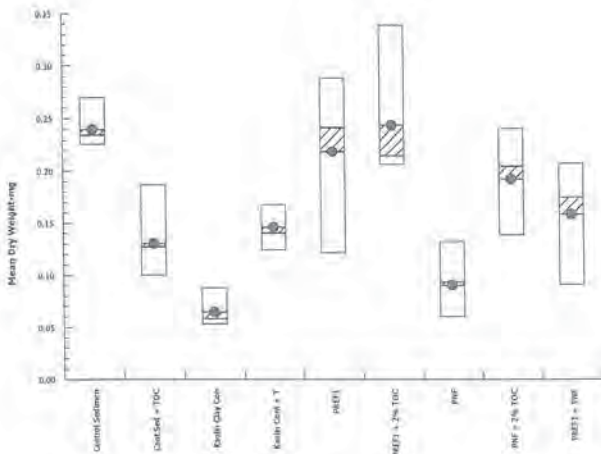
Mean Dry Weight-mg Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
Control Sedimen	5	0.2395	0.2177	0.2513	0.2344	0.226	0.27	0.007858	7.34%	0.0%
Cont Sed + TOC	5	0.1303	0.08719	0.1734	0.1271	0.1	0.1867	0.01553	26.65%	45.59%
Kaolin Clay Con	5	0.06468	0.04688	0.08247	0.05833	0.05333	0.08857	0.006408	22.16%	72.99%
Kaolin Cont + T	5	0.1459	0.1219	0.1698	0.14	0.1243	0.168	0.008616	13.21%	39.1%
PREF1	5	0.2182	0.139	0.2974	0.241	0.121	0.288	0.02851	29.22%	8.89%
PREF1 + 2% TOC	4	0.2428	0.1417	0.344	0.214	0.2056	0.3378	0.03178	26.17%	-1.4%
PNF	5	0.09066	0.05682	0.1245	0.09333	0.06001	0.1322	0.01219	30.06%	62.14%
PNF + 2% TOC	5	0.1916	0.1386	0.2447	0.2038	0.1378	0.24	0.01911	22.3%	19.99%
PREF1 + PNF	5	0.1579	0.09872	0.217	0.1744	0.09125	0.2067	0.02131	30.18%	34.08%

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control Sedimen	0.2344	0.226	0.237	0.27	0.23
Cont Sed + TOC	0.1	0.134	0.1037	0.1271	0.1867
Kaolin Clay Con	0.05333	0.08857	0.06715	0.05833	0.05599
Kaolin Cont + T	0.14	0.133	0.164	0.1243	0.168
PREF1	0.247	0.121	0.194	0.288	0.241
PREF1 + 2% TOC	0.219	0.3378	0.2056	0.209	
PNF	0.06001	0.07375	0.094	0.09333	0.1322
PNF + 2% TOC	0.2038	0.24	0.219	0.1575	0.1378
PREF1 + PNF	0.09125	0.19	0.127	0.2067	0.1744

Graphics



CETIS Analytical Report

Report Date: 07 Dec-15 14:30 (p 1 of 2)
 Test Code: 15671 | 01-6410-1640

Hyalella 14-d Survival and Growth Sediment Test

Nautilus Environmental

Analysis ID: 14-4840-7275	Endpoint: 10d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 07 Dec-15 14:30	Analysis: STP 2x2 Contingency Tables	Official Results: Yes
Batch ID: 08-7542-4412	Test Type: Growth-Survival (10d)	Analyst: Karen Lee
Start Date: 18 Sep-15	Protocol: EC/EPS 1/RM/33	Diluent: Mod-Hard Synthetic Water
Ending Date: 02 Oct-15	Species: Hyalella azteca	Brine:
Duration: 14d 0h	Source: Aquatic Research Organisms, NH	Age: 9-d

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
Cont Sed + TOC	17-8057-1827	18 Sep-15	18 Sep-15	NA	Mount Polley	
Kaolin Clay Con	06-6374-3943	18 Sep-15	18 Sep-15	NA		
Kaolin Cont + T	08-6528-5353	18 Sep-15	18 Sep-15	NA		
PREF1	00-2699-0801	18 Aug-15	28 Aug-15 08:33	31d 0h (10.1 °C)		
PREF1 + 2% TOC	06-1063-2863	18 Aug-15	28 Aug-15 08:33	31d 0h (11 °C)		
PNF	15-4268-7402	14 Aug-15	28 Aug-15 08:33	35d 0h (5.5 °C)		
PNF + 2% TOC	11-9347-1965	14 Aug-15	28 Aug-15 08:33	35d 0h (8.6 °C)		
PREF1 + PNF	11-1409-1541	18 Sep-15	18 Sep-15	NA		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
Cont Sed + TOC	Sediment Sample	Mount Polley	Control Sediment + 2% TOC		
Kaolin Clay Con	Sediment Sample	Mount Polley	Kaolin Clay Control		
Kaolin Cont + T	Sediment Sample	Mount Polley	Kaolin Control + 2% TOC		
PREF1	Sediment Sample	Mount Polley	PREF1		
PREF1 + 2% TOC	Sediment Sample	Mount Polley	PREF1 + 2% TOC		
PNF	Sediment Sample	Mount Polley	PNF		
PNF + 2% TOC	Sediment Sample	Mount Polley	PNF + 2% TOC		
PREF1 + PNF	Sediment Sample	Mount Polley	PREF1 + PNF (50:50)		

Data Transform	Zeta	Alt Hyp	Trials	Seed	Test Result
Untransformed		C > T	NA	NA	

Fisher Exact/Bonferroni-Holm Test

Sample	vs	Sample	Test Stat	P-Value	P-Type	Decision(α:5%)
PREF1		Cont Sed + TOC	3.66E-06	<0.0001	Exact	Significant Effect
PREF1		Kaolin Clay Con	2.3E-07	<0.0001	Exact	Significant Effect
PREF1		Kaolin Cont + T	0.02814	0.0844	Exact	Non-Significant Effect
PREF1		PREF1 + 2% TOC	0.1948	0.1948	Exact	Non-Significant Effect
PREF1		PNF	0.000593	0.0030	Exact	Significant Effect
PREF1		PNF + 2% TOC	0.02814	0.0844	Exact	Non-Significant Effect
PREF1		PREF1 + PNF	0.001317	0.0053	Exact	Significant Effect

Data Summary

Sample Code	NR	R	NR + R	Prop NR	Prop R	%Effect
Cont Sed + TOC	34	16	50	0.68	0.32	32.0%
Kaolin Clay Con	31	19	50	0.62	0.38	38.0%
Kaolin Cont + T	45	5	50	0.9	0.1	10.0%
PREF1 Reference Sed	50	0	50	1	0	0.0%
PREF1 + 2% TOC	38	2	40	0.95	0.05	5.0%
PNF	40	10	50	0.8	0.2	20.0%
PNF + 2% TOC	45	5	50	0.9	0.1	10.0%
PREF1 + PNF	41	9	50	0.82	0.18	18.0%

Stats run excluding PREF1+2% TOC Rep C

CETIS Analytical Report

Report Date: 07 Dec-15 14:30 (p 2 of 2)
 Test Code: 15671 | 01-6410-1640

Hyalella 14-d Survival and Growth Sediment Test

Nautilus Environmental

Analysis ID: 14-4840-7275
 Analyzed: 07 Dec-15 14:30

Endpoint: 10d Survival Rate
 Analysis: STP 2x2 Contingency Tables

CETIS Version: CETISv1.8.7
 Official Results: Yes

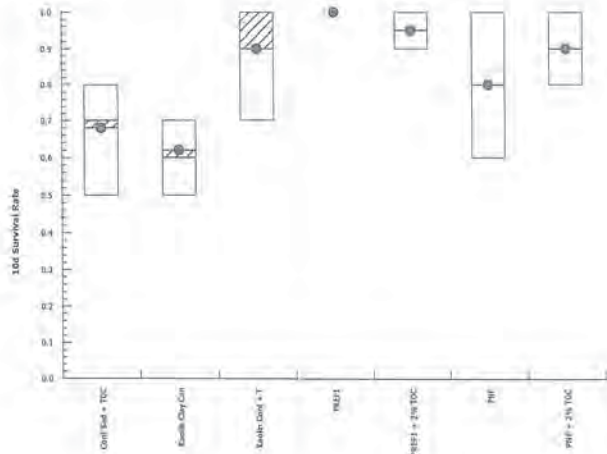
10d Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Cont Sed + TOC	0.8	0.5	0.8	0.7	0.6
Kaolin Clay Con	0.6	0.7	0.7	0.6	0.5
Kaolin Cont + T	0.8	1	1	0.7	1
PREF1	1	1	1	1	1
PREF1 + 2% TOC	1	0.9	0.9	1	
PNF	0.7	0.8	1	0.6	0.9
PNF + 2% TOC	0.8	0.9	1	0.8	1
PREF1 + PNF	0.8	0.5	1	0.9	0.9

10d Survival Rate Binomials

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Cont Sed + TOC	8/10	5/10	8/10	7/10	6/10
Kaolin Clay Con	6/10	7/10	7/10	6/10	5/10
Kaolin Cont + T	8/10	10/10	10/10	7/10	10/10
PREF1	10/10	10/10	10/10	10/10	10/10
PREF1 + 2% TOC	10/10	9/10	9/10	10/10	
PNF	7/10	8/10	10/10	6/10	9/10
PNF + 2% TOC	8/10	9/10	10/10	8/10	10/10
PREF1 + PNF	8/10	5/10	10/10	9/10	9/10

Graphics



CETIS Analytical Report

Report Date: 07 Dec-15 14:56 (p 1 of 2)
 Test Code: 15671 | 01-6410-1640

Hyalella 14-d Survival and Growth Sediment Test

Nautilus Environmental

Analysis ID: 16-0682-4742	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 07 Dec-15 14:56	Analysis: Nonparametric-Control vs Treatments	Official Results: Yes
Batch ID: 08-7542-4412	Test Type: Growth-Survival (10d)	Analyst: Karen Lee
Start Date: 18 Sep-15	Protocol: EC/EPS 1/RM/33	Diluent: Mod-Hard Synthetic Water
Ending Date: 02 Oct-15	Species: Hyalella azteca	Brine:
Duration: 14d 0h	Source: Aquatic Research Organisms, NH	Age: 9-d

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
Cont Sed + TOC	17-8057-1827	18 Sep-15	18 Sep-15	NA	Mount Polley	
Kaolin Clay Con	06-6374-3948	18 Sep-15	18 Sep-15	NA		
Kaolin Cont + T	08-6528-5358	18 Sep-15	18 Sep-15	NA		
PREF1	00-2699-0801	18 Aug-15	28 Aug-15 08:33	31d 0h (10.1 °C)		
PREF1 + 2% TOC	06-1063-2868	18 Aug-15	28 Aug-15 08:33	31d 0h (11 °C)		
PNF	15-4268-7402	14 Aug-15	28 Aug-15 08:33	35d 0h (5.5 °C)		
PNF + 2% TOC	11-9347-1965	14 Aug-15	28 Aug-15 08:33	35d 0h (8.6 °C)		
PREF1 + PNF	11-1409-1541	18 Sep-15	18 Sep-15	NA		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
Cont Sed + TOC	Sediment Sample	Mount Polley	Control Sediment + 2% TOC		
Kaolin Clay Con	Sediment Sample	Mount Polley	Kaolin Clay Control		
Kaolin Cont + T	Sediment Sample	Mount Polley	Kaolin Control + 2% TOC		
PREF1	Sediment Sample	Mount Polley	PREF1		
PREF1 + 2% TOC	Sediment Sample	Mount Polley	PREF1 + 2% TOC		
PNF	Sediment Sample	Mount Polley	PNF		
PNF + 2% TOC	Sediment Sample	Mount Polley	PNF + 2% TOC		
PREF1 + PNF	Sediment Sample	Mount Polley	PREF1 + PNF (50:50)		

Data Transform	Zeta	Alt Hyp	Trials	Seed	Test Result
Untransformed	NA	C > T	NA	NA	

Nemenyi-Damico-Wolfe Test

Sample Code vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
PREF1	Cont Sed + TOC	272	338	1		0.1337	Asymp	Non-Significant Effect
	Kaolin Clay Con	536	338	1		0.0007	Asymp	Significant Effect
	Kaolin Cont + T	208	338	1		0.2800	Asymp	Non-Significant Effect
	PREF1 + 2% TOC	-64.5	358.5	1		0.9539	Asymp	Non-Significant Effect
	PNF	424	338	1		0.0098	Asymp	Significant Effect
	PNF + 2% TOC	50	338	1		0.7703	Asymp	Non-Significant Effect
	PREF1 + PNF	184	338	1		0.3505	Asymp	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Treatment Effect	Fligner-Wolfe	732		0.0136	Significant Overall Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1223715	0.01748165	7	9.879	<0.0001	Significant Effect
Error	0.05485566	0.001769538	31			
Total	0.1772272		33			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	11.79	18.48	0.1075	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9883	0.9219	0.9512	Normal Distribution

Hyalella 14-d Survival and Growth Sediment Test

Nautilus Environmental

Analysis ID: 16-0682-4742 Endpoint: Mean Dry Weight-mg CETIS Version: CETISv1.8.7
 Analyzed: 07 Dec-15 14:56 Analysis: Nonparametric-Control vs Treatments Official Results: Yes

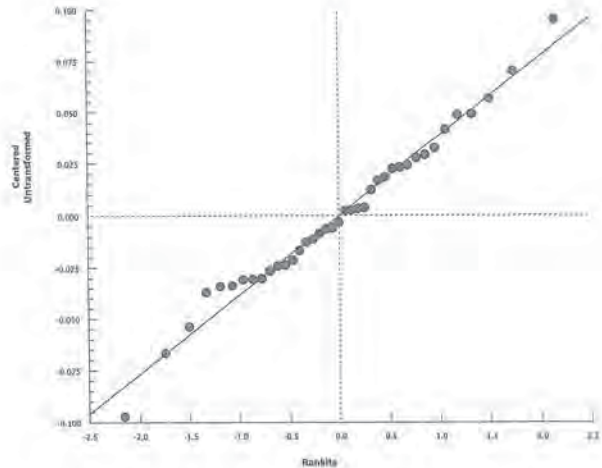
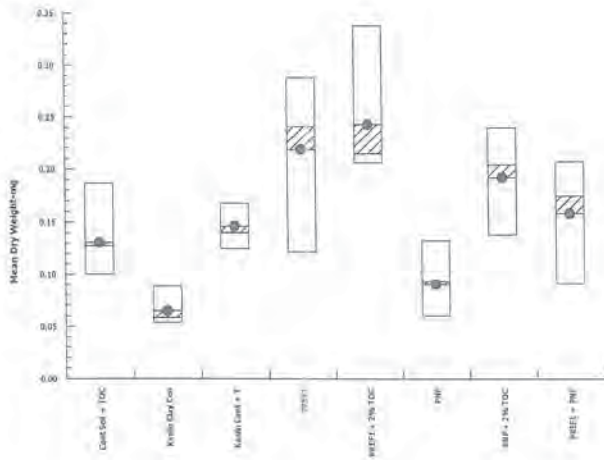
Mean Dry Weight-mg Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
Cont Sed + TOC	5	0.1303	0.08719	0.1734	0.1271	0.1	0.1867	0.01553	26.65%	0.0%
Kaolin Clay Con	5	0.06468	0.04688	0.08247	0.05833	0.05333	0.08857	0.006408	22.16%	50.37%
Kaolin Cont + T	5	0.1459	0.1219	0.1698	0.14	0.1243	0.168	0.008616	13.21%	-11.93%
PREF1	5	0.2182	0.139	0.2974	0.241	0.121	0.288	0.02851	29.22%	-67.44%
PREF1 + 2% TOC	4	0.2428	0.1417	0.344	0.214	0.2056	0.3378	0.03178	26.17%	-86.35%
PNF	5	0.09066	0.05682	0.1245	0.09333	0.06001	0.1322	0.01219	30.06%	30.43%
PNF + 2% TOC	5	0.1916	0.1386	0.2447	0.2038	0.1378	0.24	0.01911	22.3%	-47.04%
PREF1 + PNF	5	0.1579	0.09872	0.217	0.1744	0.09125	0.2067	0.02131	30.18%	-21.15%

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Cont Sed + TOC	0.1	0.134	0.1037	0.1271	0.1867
Kaolin Clay Con	0.05333	0.08857	0.06715	0.05833	0.05599
Kaolin Cont + T	0.14	0.133	0.164	0.1243	0.168
PREF1	0.247	0.121	0.194	0.288	0.241
PREF1 + 2% TOC	0.219	0.3378	0.2056	0.209	
PNF	0.06001	0.07375	0.094	0.09333	0.1322
PNF + 2% TOC	0.2038	0.24	0.219	0.1575	0.1378
PREF1 + PNF	0.09125	0.19	0.127	0.2067	0.1744

Graphics



APPENDIX B - *Chironomus dilutus* Toxicity Test Data

Chironomus dilutus Sediment Test Summary Sheet

Client: Mount Polley
 Work Order No.: 15670

Start Date: 18-Sep-15
 Set up by: KJL/KL

Sample Information:

Sample ID: Various - See Below
 Sample Date: Aug 14-19, 24, 2015
 Date Received: 28-Aug-15
 Sample Volume: 5x 500mL per sample

Test Organism Information:

Species: C. dilutus
 Supplier: Aquatic Biosystems, CO
 Date received: 18-Sep-15
 Age or size (Day 0): 3rd in-star

KCI Reference Toxicant Results:

Reference Toxicant ID: n/a
 Stock Solution ID: n/a
 Date Initiated: 18-Sep-15

96-h LC50 (95% CL): 6.7 (6.1 - 7.4)

96-h LC50 Reference Toxicant Mean and Range: 4.5 (2.4 - 8.2) CV (%): 35

Test Results:

Sample ID	Survival ± SD (%)	Average Dry Wt. ± SD (mg)
Control Sediment	100.0 ± 0.0	2.15 ± 0.14
Control Sediment + 2% TOC	90.0 ± 10.0	3.11 ± 0.25 ¹
Kaolin Clay Control	82.0 ± 4.5 [*]	1.88 ± 0.57 ¹
Kaolin Clay Control + 2% TOC	80.0 ± 10.0 [*]	2.87 ± 0.63
PREF1	92.0 ± 4.5	2.65 ± 0.23
PREF1 + 2% TOC	84.0 ± 20.7 [*]	4.49 ± 0.59
PNF	86.0 ± 11.4 [*]	1.61 ± 0.22 ^{*1}
PNF + 2% TOC	92.0 ± 4.5	3.45 ± 0.19
PREF1 + PNF (50:50)	92.0 ± 4.5	2.25 ± 0.21

* Samples that are significantly different from Control Sediment.

¹ Samples that are significantly different from the reference site PREF1

Reviewed by: JCh

Date reviewed: Dec 7/15

10-d Chironomid Sediment Toxicity Test Data Sheet
 Freshwater Sediment 10-d Water Quality

Client:
W.O #:

Mount Polley
15670

Start Date: 18-Sep-15
 Termination Date: 28-Sep-15
 Test Organism: C. dilutus

Temperature (°C)

Sample ID	Day										
	0	1	2	3	4	5	6	7	8	9	10
Control Sediment	23.0	23.0	23.0	22.5	22.5	22.0	22.0	22.0	22.0	22.0	22.0
Cont. Sed + 2% TOC	23.5	23.0	23.0	22.5	22.5	22.0	22.0	22.0	22.0	22.0	22.0
Kaolin Clay Control	23.5	23.0	23.0	22.5 ^{JS}	22.5	22.0	22.0	22.0	22.0	22.0	22.0
Kaolin Cont + 2% TOC	23.5	23.0	23.0	22.5 ^{JS}	22.5	22.0	22.0	22.0	22.0	22.0	22.0
PREF	23.5	23.0	23.0	22.5 ^{JS}	22.5	22.0	22.6	22.0	22.0	22.0	22.0
PREF + 2% TOC	23.5	23.0	23.0	22.5 ^{JS}	22.5	22.0	22.0	22.0	22.0	22.0	22.0
PNF	23.0	23.0	23.0	22.5	22.5	22.0	22.0	22.0	22.0	22.0	22.0
PNF + 2% TOC	23.0	23.0	23.0	22.5	22.5	22.0	22.0	22.0	22.0	22.0	22.0
PREF + PNF	23.0	23.0	23.0	22.5	22.5	22.0	22.0	22.0	22.0	22.0	22.0
Technician Initials	SSD	m	m	JW	JS	JS	JS	JS	m	m	JS

Conductivity (µS)

Sample ID	Day										
	0	1	2	3	4	5	6	7	8	9	10
Control Sediment	424	432	439	452	462	472	488	499	499	526	523
Cont. Sed + 2% TOC	450	484	512	611	673	713	744	759	806	820	806
Kaolin Clay Control	379	384	395	410	408	419	438	440	430	442	456
Kaolin Cont + 2% TOC	405	421	441	465	480	490	510	516	530	540	553 ^{JS}
PREF	407	400	396	390	385	378	375	371	375	378	372
PREF + 2% TOC	471	506	571	641	671	697	694	705	724	727	731
PNF	431	452	466	485	506	523	543	553	560	578	585
PNF + 2% TOC	533	686	745	838	784	786	789	773	776	800	807
PREF + PNF	460	470	481	479	503	516	532	540	534	548	556
Technician Initials	SSD	m	m	JW	JS	JS	JS	JS	m	m	JS

Comments:

Reviewed by:

Joh

Date Reviewed:

Oct-14/15

10-d Chironomid Sediment Toxicity Test Data Sheet
 Freshwater Sediment 10-d Water Quality

Client: Mount Polley
 W.O. #: 15670

Start Date: 18-Sep-15
 Termination Date: 28-Sep-15
 Test Organism: C. dilutus

Dissolved oxygen (mg/L)

Sample ID	Day										
	0	1	2	3	4	5	6	7	8	9	10
Control Sediment	8.0	8.0	7.7	7.9	7.6	7.7	8.0	7.9	7.8	7.9	8.4
Cont. Sed + 2% TOC	5.70	8.1	7.7	7.3	7.1	7.2	7.4	7.2	7.6	7.8	7.2
Kaolin Clay Control	7.5	8.0	7.8	8.0	7.5	7.7	8.0	8.0	7.8	7.9	8.2
Kaolin Cont + 2% TOC	7.7	8.0	7.6	7.9	7.5	7.7	7.9	8.0	7.9	7.8	7.9
PREF	7.7	7.9	7.7	7.6	7.7	7.6	7.7	7.7	7.8	7.9	8.0
PREF + 2% TOC	7.2	8.0	7.7	7.4	7.7	7.7	7.7	7.6	7.8	7.9	7.6
PNF	7.6	8.0	7.8	7.9	7.4	7.6	7.9	7.9	7.8	7.8	8.3
PNF + 2% TOC	7.2	8.0	7.7	7.2	7.0	7.2	7.6	7.8	7.7	7.9	7.8
PREF + PNF	7.1	8.1	7.9	7.8	7.5	7.7	8.0	7.0	7.8	7.9	8.3
Technician Initials	SSD	A	A	JW	JS	JS	JS	JS	A	A	JS

pH

Sample ID	Day										
	0	1	2	3	4	5	6	7	8	9	10
Control Sediment	7.8	8.1	8.0	7.8	7.8	7.6	7.8	7.8	8.0	8.0	7.8
Cont. Sed + 2% TOC	6.7	7.8	7.9	8.0	8.0	8.0	8.1	8.1	8.1	7.9	8.2
Kaolin Clay Control	4.50	5.1	5.2	4.5	4.7	4.7	4.7	4.7	5.3	5.4	5.1
Kaolin Cont + 2% TOC	4.50	5.3	5.7	6.0	6.1	5.9	5.8	5.8	6.3	6.5	5.2
PREF	7.7	7.9	7.9	7.7	7.6	7.3	7.75	7.3	7.7	7.8	7.2
PREF + 2% TOC	7.6	7.8	8.0	8.0	8.0	7.75	8.2	8.1	8.0	8.0	8.2
PNF	7.9	8.0	8.1	8.2	8.0	7.9	8.0	7.8	8.0	8.1	8.1
PNF + 2% TOC	7.7	8.0	8.2	8.2	8.1	8.1	8.2	8.2	8.1	8.2	8.3
PREF + PNF	7.7	8.1	8.2	8.1	8.0	7.9	8.0	8.0	8.1	8.1	8.1
Technician Initials	SSD	A	A	JW	JS	JS	JS	JS	A	A	JS

Comments:

① Several replicates checked; water A done ② pH adj to 7.5
 ③ several replicates checked

Reviewed by:

Jon

Date Reviewed:

Oct. 15/15

10-d Chironomid Sediment Toxicity Test Data Sheet

Freshwater Sediment 10-d Survival and Weight

Client: Mount Polley
 W.O. #: 15670
 Sample ID: Various

Start Date: 18-Sep-15
 Termination Date: 28-Sep-15
 Test Organism: *Chironomus dilutus*

Sample ID	Pan No. <small>0918 green</small>	Rep	No. alive	No. dead	No. missing	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control Sediment	1	A	10	0	0	KJL	1015.30	1039.12	10	KL
	2	B	100	0	0	↓	1023.66	1042.00	9	
	3	C	100	0	0	↓	1014.44	1034.10 ^{KL}	9	
	4	D	100	0	0	↓	1024.78	1043.18 ^{KL}	9	
	5	E	100	0	0	↓	1024 ^{KL} 1030.00	1046.90 ^{KL}	8	
Control Sed + 2% TOC	6	A	8 ^{KL} 9 ^{KL} 5 ^{KL} 5 ^{KL}	10	4	JW	1022.99	1040.73	6	
	7	B	10 ^{KL} 4 ^{KL}	0	0	KJL	1007.90	1022.88	5	
	8	C	100	0	0	JW	1005.66	1031.80	8	
	9	D	80	0	2	KJL	1027.09	1051.32 ^{KL}	7	
	10	E	9 ^{KL} 5 ^{KL}	0	0	JW	1010.99	1028.08	6	
Kaolin Clay Control	11	A	80	0	2	KJL	1031.00	1044.00	7	
	12	B	8	1	1	↓	1012.93	1020.42 ^{KL}	8	
	13	C	80	0	2	↓	1017.98	1034.72	7	
	14	D	9	0	1	↓	1039.93	1057.10 ^{KL} 1000.00	9	
	15	E	8	0	2	↓	1016.52 ^{KL}	1032.48 ^{KL}	8	
Kaolin Clay Cont + 2% TOC	16	A	7 ^{KL} 3 ^{KL}	0	3	KJL	1002.32	1021.99	7	
	17	B	9 ^{KL} 0 ^{KL}	0	1	↓	982.16	997.94	8	
	18	C	8 ^{KL} 0 ^{KL}	1	1	↓	998.17 ^{KL}	1020.31	6	
	19	D	9	0	1	↓	988.57	1013.29	9	
	20	E	7 ^{KL} 3 ^{KL}	0	3	↓	983.13	1005.14	7	↓

Comments: 01 pupae 2 pupae 0 checked by JW 4 5 pupae 5 3 pupae
 Reweighed pans: 5-1047-18 11-1044.06

Reviewed by: JW Date Reviewed: Oct-15/15

10-d Chironomid Sediment Toxicity Test Data Sheet

Freshwater Sediment 10-d Survival and Weight

Client: Mount Polley
 W.O. #: 15670
 Sample ID: Various

Start Date: 17-Sep-15
 Termination Date: 28-Sep-15
 Test Organism: *Chironomus dilutus*

Sample ID	Pan No. <small>10918 GREV</small>	Rep	No. alive	No. dead	No. missing	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
PREF1	21	A	9	0	1	KJL	974.16	997.66	9	KL
	22	B	9 ^①	0	1	↓	1014.05	1036.27	8	
	23	C	9 ^①	0	1	↓	1039.31	1059.27	8	
	24	D	10	0	0	↓	1031.35	1044.1055.11	10	
	25	E	9 ^①	0	1	↓	1010.69	1034.44	8	
PREF1 + 2% TOC	26	A	5 ^{①③}	1	4	JW	1005.91	1023.39	4	
	27	B	9	0	1	↓	1034.89	1082.13	9	
	28	C	10 ^①	0	0	↓	1005.90	1038.83	9	
	29	D	10 ^①	0	0	↓	1014.55	1053.76	9	
	30	E	8 ^{①③}	0	2	↓	1041.34 ¹⁴⁷	1060.65	4	
PNF	31	A	9	0	1	JW	1005.08	1019.37	9	
	32	B	10 ^①	0	0	↓	1035.61	1047.55	9	
	33	C	9	0	1	↓	1027.60	1041.09	9	
	34	D	7 ^{①③}	0	3	↓	1000.01	1011.35	6	
	35	E	8 ^③	0	2	↓	1014.28	1028.11	8	
PNF + 2% TOC	36	A	9 ^①	0	1	JW	1033.1032.94 1056.18	1056.18	7	
	37	B	10	0	0	JW	1016.64	1050.84	10	
	38	C	9	0	1	JW	997.59	1028.90	9	
	39	D	9	0	1	KJL	1018.38	1052.14	9	
	40	E	9 ^①	0	1	KJL	1040.41	1066.59	8	↓

Comments:

① 1 pupae checked by KJL ③ worms in sample ④ 4 pupae ⑤ 2 pupae
 Reweighed pans: 28-1039.08 38-1029.09

Reviewed by:

JW

Date Reviewed:

Oct-15/15

10-d Chironomid Sediment Toxicity Test Data Sheet

Freshwater Sediment 10-d Survival and Weight

Client: Mount Polley
 W.O. #: 15670
 Sample ID: Various

Start Date: 18-Sep-15
 Termination Date: 28-Sep-15
 Test Organism: Chironomus dilutus

Sample ID	Pan No. <i>0918 green</i>	Rep	No. alive	No. dead	No. missing	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
PREF + PNF	41	A	9	0	1	JW	1001.06	1021.25	9	KL
	42	B	9	0	1		1007.37	1029.03	9	
	43	C	9	0	1		1035.36	1053.40	9	
	44	D	10	0	0		1020.25	1041.20	10	
	45	E	9	0	1		1032.54 ^{1/2}	1055.06	9	
		A								
		B								
		C								
		D								
		E								
		A								
		B								
		C								
		D								
		E								
		A								
		B								
		C								
		D								
		E								

Comments: _____

Reviewed by: JW

Date Reviewed: Oct. 15/15

CETIS Summary Report

Report Date: 07 Dec-15 13:52 (p 1 of 2)
 Test Code: 15670 | 10-5755-4736

Chironomus 10-d Survival and Growth Sediment Test

Nautilus Environmental

Batch ID: 14-7488-6052 Test Type: Growth-Survival (10d) Analyst: Karen Lee
 Start Date: 18 Sep-15 Protocol: EC/EPS 1/RM/32 Diluent: Mod-Hard Synthetic Water
 Ending Date: 28 Sep-15 Species: Chironomus tentans Brine:
 Duration: 10d 0h Source: Aquatic Biosystems, CO Age: 3rd

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
Control Sedimen	03-9242-1052	18 Sep-15	18 Sep-15	NA	Mount Polley	
Cont Sed + TOC	17-8057-1827	18 Sep-15	18 Sep-15	NA		
Kaolin Clay Con	06-6374-3948	18 Sep-15	18 Sep-15	NA		
Kaolin Cont + T	08-6528-5358	18 Sep-15	18 Sep-15	NA		
PREF1	00-2699-0801	18 Aug-15	28 Aug-15 08:33	31d 0h (10.1 °C)		
PREF1 + 2% TOC	06-1063-2868	18 Aug-15	28 Aug-15 08:33	31d 0h (11 °C)		
PNF	15-4268-7402	14 Aug-15	28 Aug-15 08:33	35d 0h (5.5 °C)		
PNF + 2% TOC	11-9347-1965	14 Aug-15	28 Aug-15 08:33	35d 0h (8.6 °C)		
PREF1 + PNF	11-1409-1541	18 Sep-15	18 Sep-15	NA		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
Control Sedimen	Sediment Sample	Mount Polley	Control Sediment		
Cont Sed + TOC	Sediment Sample	Mount Polley	Control Sediment + 2% TOC		
Kaolin Clay Con	Sediment Sample	Mount Polley	Kaolin Clay Control		
Kaolin Cont + T	Sediment Sample	Mount Polley	Kaolin Control + 2% TOC		
PREF1	Sediment Sample	Mount Polley	PREF1		
PREF1 + 2% TOC	Sediment Sample	Mount Polley	PREF1 + 2% TOC		
PNF	Sediment Sample	Mount Polley	PNF		
PNF + 2% TOC	Sediment Sample	Mount Polley	PNF + 2% TOC		
PREF1 + PNF	Sediment Sample	Mount Polley	PREF1 + PNF (50:50)		

10d Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
Control Sedimen	5	1	1	1	1	1	0	0	0.0%	0.0%
Cont Sed + TOC	5	0.9	0.7758	1	0.8	1	0.04472	0.1	11.11%	10.0%
Kaolin Clay Con	5	0.82	0.7645	0.8755	0.8	0.9	0.02	0.04472	5.45%	18.0%
Kaolin Cont + T	5	0.8	0.6758	0.9242	0.7	0.9	0.04472	0.1	12.5%	20.0%
PREF1	5	0.92	0.8645	0.9755	0.9	1	0.02	0.04472	4.86%	8.0%
PREF1 + 2% TOC	5	0.84	0.5825	1	0.5	1	0.09274	0.2074	24.69%	16.0%
PNF	5	0.86	0.7184	1	0.7	1	0.05099	0.114	13.26%	14.0%
PNF + 2% TOC	5	0.92	0.8645	0.9755	0.9	1	0.02	0.04472	4.86%	8.0%
PREF1 + PNF	5	0.92	0.8645	0.9755	0.9	1	0.02	0.04472	4.86%	8.0%

10d Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control Sedimen	1	1	1	1	1
Cont Sed + TOC	0.8	1	1	0.8	0.9
Kaolin Clay Con	0.8	0.8	0.8	0.9	0.8
Kaolin Cont + T	0.7	0.9	0.8	0.9	0.7
PREF1	0.9	0.9	0.9	1	0.9
PREF1 + 2% TOC	0.5	0.9	1	1	0.8
PNF	0.9	1	0.9	0.7	0.8
PNF + 2% TOC	0.9	1	0.9	0.9	0.9
PREF1 + PNF	0.9	0.9	0.9	1	0.9

CETIS Summary Report

Report Date: 07 Dec-15 13:52 (p 2 of 2)
Test Code: 15670 | 10-5755-4736

Chironomus 10-d Survival and Growth Sediment Test

Nautilus Environmental

10d Survival Rate Binomials

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control Sedimen	10/10	10/10	10/10	10/10	10/10
Cont Sed + TOC	8/10	10/10	10/10	8/10	9/10
Kaolin Clay Con	8/10	8/10	8/10	9/10	8/10
Kaolin Cont + T	7/10	9/10	8/10	9/10	7/10
PREF1	9/10	9/10	9/10	10/10	9/10
PREF1 + 2% TOC	5/10	9/10	10/10	10/10	8/10
PNF	9/10	10/10	9/10	7/10	8/10
PNF + 2% TOC	9/10	10/10	9/10	9/10	9/10
PREF1 + PNF	9/10	9/10	9/10	10/10	9/10

CETIS Analytical Report

Report Date: 07 Dec-15 13:52 (p 1 of 2)
 Test Code: 15670 | 10-5755-4736

Chironomus 10-d Survival and Growth Sediment Test

Nautilus Environmental

Analysis ID: 21-0799-5766	Endpoint: 10d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 07 Dec-15 13:51	Analysis: STP 2x2 Contingency Tables	Official Results: Yes
Batch ID: 14-7488-6052	Test Type: Growth-Survival (10d)	Analyst: Karen Lee
Start Date: 18 Sep-15	Protocol: EC/EPS 1/RM/32	Diluent: Mod-Hard Synthetic Water
Ending Date: 28 Sep-15	Species: Chironomus tentans	Brine:
Duration: 10d 0h	Source: Aquatic Biosystems, CO	Age: 3rd

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
Control Sedimen	03-9242-1052	18 Sep-15	18 Sep-15	NA	Mount Polley	
Cont Sed + TOC	17-8057-1827	18 Sep-15	18 Sep-15	NA		
Kaolin Clay Con	06-6374-3948	18 Sep-15	18 Sep-15	NA		
Kaolin Cont + T	08-6528-5358	18 Sep-15	18 Sep-15	NA		
PREF1	00-2699-0801	18 Aug-15	28 Aug-15 08:33	31d 0h (10.1 °C)		
PREF1 + 2% TOC	06-1063-2868	18 Aug-15	28 Aug-15 08:33	31d 0h (11 °C)		
PNF	15-4268-7402	14 Aug-15	28 Aug-15 08:33	35d 0h (5.5 °C)		
PNF + 2% TOC	11-9347-1965	14 Aug-15	28 Aug-15 08:33	35d 0h (8.6 °C)		
PREF1 + PNF	11-1409-1541	18 Sep-15	18 Sep-15	NA		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
Control Sedimen	Sediment Sample	Mount Polley	Control Sediment		
Cont Sed + TOC	Sediment Sample	Mount Polley	Control Sediment + 2% TOC		
Kaolin Clay Con	Sediment Sample	Mount Polley	Kaolin Clay Control		
Kaolin Cont + T	Sediment Sample	Mount Polley	Kaolin Control + 2% TOC		
PREF1	Sediment Sample	Mount Polley	PREF1		
PREF1 + 2% TOC	Sediment Sample	Mount Polley	PREF1 + 2% TOC		
PNF	Sediment Sample	Mount Polley	PNF		
PNF + 2% TOC	Sediment Sample	Mount Polley	PNF + 2% TOC		
PREF1 + PNF	Sediment Sample	Mount Polley	PREF1 + PNF (50:50)		

Data Transform	Zeta	Alt Hyp	Trials	Seed	Test Result
Untransformed		C > T	NA	NA	

Fisher Exact/Bonferroni-Holm Test

Sample	vs	Sample	Test Stat	P-Value	P-Type	Decision(α:5%)
Control Sedimen		Cont Sed + TOC	0.02814	0.1126	Exact	Non-Significant Effect
Control Sedimen		Kaolin Clay Con	0.001317	0.0092	Exact	Significant Effect
Control Sedimen		Kaolin Cont + T	0.000593	0.0047	Exact	Significant Effect
Control Sedimen		PREF1	0.05873	0.1762	Exact	Non-Significant Effect
Control Sedimen		PREF1 + 2% TOC	0.002885	0.0173	Exact	Significant Effect
Control Sedimen		PNF	0.00624	0.0312	Exact	Significant Effect
Control Sedimen		PNF + 2% TOC	0.05873	0.1762	Exact	Non-Significant Effect
Control Sedimen		PREF1 + PNF	0.05873	0.1762	Exact	Non-Significant Effect

Data Summary

Sample Code	NR	R	NR + R	Prop NR	Prop R	%Effect
Control Sediment Negative Contr	50	0	50	1	0	0.0%
Cont Sed + TOC	45	5	50	0.9	0.1	10.0%
Kaolin Clay Con	41	9	50	0.82	0.18	18.0%
Kaolin Cont + T	40	10	50	0.8	0.2	20.0%
PREF1	46	4	50	0.92	0.08	8.0%
PREF1 + 2% TOC	42	8	50	0.84	0.16	16.0%
PNF	43	7	50	0.86	0.14	14.0%
PNF + 2% TOC	46	4	50	0.92	0.08	8.0%
PREF1 + PNF	46	4	50	0.92	0.08	8.0%

CETIS Analytical Report

Report Date: 07 Dec-15 13:52 (p 2 of 2)
 Test Code: 15670 | 10-5755-4736

Chironomus 10-d Survival and Growth Sediment Test

Nautilus Environmental

Analysis ID: 21-0799-5766
 Analyzed: 07 Dec-15 13:51

Endpoint: 10d Survival Rate
 Analysis: STP 2x2 Contingency Tables

CETIS Version: CETISv1.8.7
 Official Results: Yes

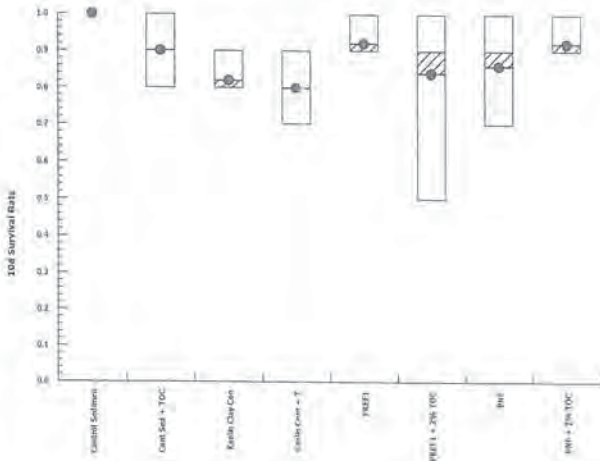
10d Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control Sedimen	1	1	1	1	1
Cont Sed + TOC	0.8	1	1	0.8	0.9
Kaolin Clay Con	0.8	0.8	0.8	0.9	0.8
Kaolin Cont + T	0.7	0.9	0.8	0.9	0.7
PREF1	0.9	0.9	0.9	1	0.9
PREF1 + 2% TOC	0.5	0.9	1	1	0.8
PNF	0.9	1	0.9	0.7	0.8
PNF + 2% TOC	0.9	1	0.9	0.9	0.9
PREF1 + PNF	0.9	0.9	0.9	1	0.9

10d Survival Rate Binomials

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control Sedimen	10/10	10/10	10/10	10/10	10/10
Cont Sed + TOC	8/10	10/10	10/10	8/10	9/10
Kaolin Clay Con	8/10	8/10	8/10	9/10	8/10
Kaolin Cont + T	7/10	9/10	8/10	9/10	7/10
PREF1	9/10	9/10	9/10	10/10	9/10
PREF1 + 2% TOC	5/10	9/10	10/10	10/10	8/10
PNF	9/10	10/10	9/10	7/10	8/10
PNF + 2% TOC	9/10	10/10	9/10	9/10	9/10
PREF1 + PNF	9/10	9/10	9/10	10/10	9/10

Graphics



CETIS Summary Report

Report Date: 07 Dec-15 13:56 (p 1 of 1)
 Test Code: 15670 | 10-5755-4736

Chironomus 10-d Survival and Growth Sediment Test

Nautilus Environmental

Batch ID: 14-7488-6052	Test Type: Growth-Survival (10d)	Analyst: Karen Lee
Start Date: 18 Sep-15	Protocol: EC/EPS 1/RM/32	Diluent: Mod-Hard Synthetic Water
Ending Date: 28 Sep-15	Species: Chironomus tentans	Brine:
Duration: 10d 0h	Source: Aquatic Biosystems, CO	Age: 3rd

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
Control Sedimen	03-9242-1052	18 Sep-15	18 Sep-15	NA	Mount Polley	
Cont Sed + TOC	17-8057-1827	18 Sep-15	18 Sep-15	NA		
Kaolin Clay Con	06-6374-3948	18 Sep-15	18 Sep-15	NA		
Kaolin Cont + T	08-6528-5358	18 Sep-15	18 Sep-15	NA		
PREF1	00-2699-0801	18 Aug-15	28 Aug-15 08:33	31d 0h (10.1 °C)		
PREF1 + 2% TOC	06-1063-2868	18 Aug-15	28 Aug-15 08:33	31d 0h (11 °C)		
PNF	15-4268-7402	14 Aug-15	28 Aug-15 08:33	35d 0h (5.5 °C)		
PNF + 2% TOC	11-9347-1965	14 Aug-15	28 Aug-15 08:33	35d 0h (8.6 °C)		
PREF1 + PNF	11-1409-1541	18 Sep-15	18 Sep-15	NA		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
Control Sedimen	Sediment Sample	Mount Polley	Control Sediment		
Cont Sed + TOC	Sediment Sample	Mount Polley	Control Sediment + 2% TOC		
Kaolin Clay Con	Sediment Sample	Mount Polley	Kaolin Clay Control		
Kaolin Cont + T	Sediment Sample	Mount Polley	Kaolin Control + 2% TOC		
PREF1	Sediment Sample	Mount Polley	PREF1		
PREF1 + 2% TOC	Sediment Sample	Mount Polley	PREF1 + 2% TOC		
PNF	Sediment Sample	Mount Polley	PNF		
PNF + 2% TOC	Sediment Sample	Mount Polley	PNF + 2% TOC		
PREF1 + PNF	Sediment Sample	Mount Polley	PREF1 + PNF (50:50)		

Mean Dry Weight-mg Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
Control Sedimen	5	2.153	1.978	2.329	2.038	2.382	0.06321	0.1413	6.56%	0.0%
Cont Sed + TOC	5	3.106	2.793	3.419	2.848	3.463	0.1127	0.2521	8.12%	-44.26%
Kaolin Clay Con	5	1.883	1.181	2.585	0.9413	2.391	0.2529	0.5654	30.03%	12.56%
Kaolin Cont + T	5	2.872	2.095	3.65	1.973	3.688	0.2801	0.6263	21.81%	-33.4%
PREF1	5	2.646	2.356	2.936	2.376	2.969	0.1045	0.2337	8.83%	-22.87%
PREF1 + 2% TOC	5	4.491	3.754	5.227	3.659	5.249	0.2653	0.5932	13.21%	-108.6%
PNF	5	1.606	1.339	1.874	1.327	1.89	0.09632	0.2154	13.41%	25.39%
PNF + 2% TOC	5	3.448	3.214	3.681	3.272	3.751	0.08412	0.1881	5.46%	-60.13%
PREF1 + PNF	5	2.249	1.994	2.504	2.004	2.496	0.09198	0.2057	9.15%	-4.45%

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control Sedimen	2.382	2.038	2.186	2.044	2.116
Cont Sed + TOC	2.957	2.996	3.268	3.463	2.848
Kaolin Clay Con	1.857	0.9413	2.391	2.23	1.994
Kaolin Cont + T	2.81	1.973	3.688	2.747	3.144
PREF1	2.611	2.778	2.495	2.376	2.969
PREF1 + 2% TOC	4.37	5.249	3.659	4.357	4.82
PNF	1.588	1.327	1.499	1.89	1.729
PNF + 2% TOC	3.317	3.42	3.479	3.751	3.272
PREF1 + PNF	2.243	2.407	2.004	2.095	2.496

CETIS Analytical Report

Report Date: 07 Dec-15 13:56 (p 1 of 2)
 Test Code: 15670 | 10-5755-4736

Chironomus 10-d Survival and Growth Sediment Test

Nautilus Environmental

Analysis ID: 00-0469-9499	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 07 Dec-15 13:56	Analysis: Nonparametric-Control vs Treatments	Official Results: Yes
Batch ID: 14-7488-6052	Test Type: Growth-Survival (10d)	Analyst: Karen Lee
Start Date: 18 Sep-15	Protocol: EC/EPS 1/RM/32	Diluent: Mod-Hard Synthetic Water
Ending Date: 28 Sep-15	Species: Chironomus tentans	Brine:
Duration: 10d 0h	Source: Aquatic Biosystems, CO	Age: 3rd

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
Control Sedimen	03-9242-1052	18 Sep-15	18 Sep-15	NA	Mount Polley	
Cont Sed + TOC	17-8057-1827	18 Sep-15	18 Sep-15	NA		
Kaolin Clay Con	06-6374-3948	18 Sep-15	18 Sep-15	NA		
Kaolin Cont + T	08-6528-5358	18 Sep-15	18 Sep-15	NA		
PREF1	00-2699-0801	18 Aug-15	28 Aug-15 08:33	31d 0h (10.1 °C)		
PREF1 + 2% TOC	06-1063-2868	18 Aug-15	28 Aug-15 08:33	31d 0h (11 °C)		
PNF	15-4268-7402	14 Aug-15	28 Aug-15 08:33	35d 0h (5.5 °C)		
PNF + 2% TOC	11-9347-1965	14 Aug-15	28 Aug-15 08:33	35d 0h (8.6 °C)		
PREF1 + PNF	11-1409-1541	18 Sep-15	18 Sep-15	NA		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
Control Sedimen	Sediment Sample	Mount Polley	Control Sediment		
Cont Sed + TOC	Sediment Sample	Mount Polley	Control Sediment + 2% TOC		
Kaolin Clay Con	Sediment Sample	Mount Polley	Kaolin Clay Control		
Kaolin Cont + T	Sediment Sample	Mount Polley	Kaolin Control + 2% TOC		
PREF1	Sediment Sample	Mount Polley	PREF1		
PREF1 + 2% TOC	Sediment Sample	Mount Polley	PREF1 + 2% TOC		
PNF	Sediment Sample	Mount Polley	PNF		
PNF + 2% TOC	Sediment Sample	Mount Polley	PNF + 2% TOC		
PREF1 + PNF	Sediment Sample	Mount Polley	PREF1 + PNF (50:50)		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	27.9%	

Steel Many-One Rank Sum Test

Sample Code vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Control Sedimen	Cont Sed + TOC	40	16	0	8	1.0000	Asymp	Non-Significant Effect
	Kaolin Clay Con	24	16	0	8	0.6276	Asymp	Non-Significant Effect
	Kaolin Cont + T	35	16	0	8	0.9992	Asymp	Non-Significant Effect
	PREF1	39	16	0	8	1.0000	Asymp	Non-Significant Effect
	PREF1 + 2% TOC	40	16	0	8	1.0000	Asymp	Non-Significant Effect
	PNF	15	16	0	8	0.0279	Asymp	Significant Effect
	PNF + 2% TOC	40	16	0	8	1.0000	Asymp	Non-Significant Effect
	PREF1 + PNF	31	16	0	8	0.9833	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	31.6401	3.955012	8	26.84	<0.0001	Significant Effect
Error	5.304462	0.1473462	36			
Total	36.94456		44			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	18.44	20.09	0.0181	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9201	0.9308	0.0043	Non-normal Distribution

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CETIS Analytical Report

Report Date: 07 Dec-15 13:56 (p 2 of 2)
 Test Code: 15670 | 10-5755-4736

Chironomus 10-d Survival and Growth Sediment Test

Nautilus Environmental

Analysis ID: 00-0469-9499 Endpoint: Mean Dry Weight-mg
 Analyzed: 07 Dec-15 13:56 Analysis: Nonparametric-Control vs Treatments

CETIS Version: CETISv1.8.7
 Official Results: Yes

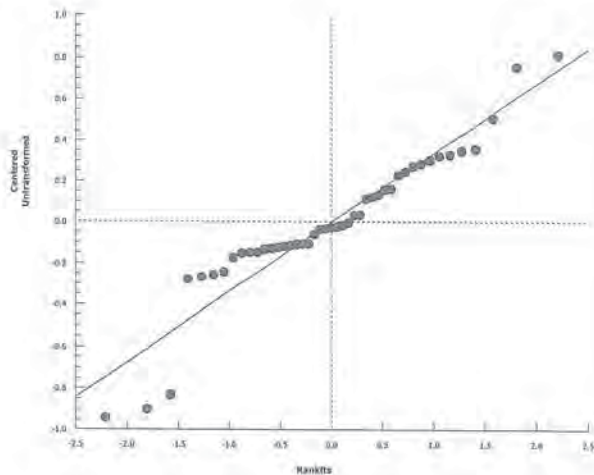
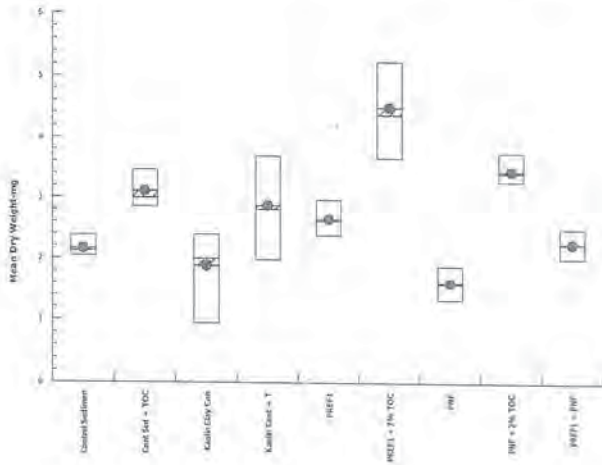
Mean Dry Weight-mg Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
Control Sedimen	5	2.153	1.978	2.329	2.116	2.038	2.382	0.06321	6.56%	0.0%
Cont Sed + TOC	5	3.106	2.793	3.419	2.996	2.848	3.463	0.1127	8.12%	-44.26%
Kaolin Clay Con	5	1.883	1.181	2.585	1.994	0.9413	2.391	0.2529	30.03%	12.56%
Kaolin Cont + T	5	2.872	2.095	3.65	2.81	1.973	3.688	0.2801	21.81%	-33.4%
PREF1	5	2.646	2.356	2.936	2.611	2.376	2.969	0.1045	8.83%	-22.87%
PREF1 + 2% TOC	5	4.491	3.754	5.227	4.37	3.659	5.249	0.2653	13.21%	-108.6%
PNF	5	1.606	1.339	1.874	1.588	1.327	1.89	0.09632	13.41%	25.39%
PNF + 2% TOC	5	3.448	3.214	3.681	3.42	3.272	3.751	0.08412	5.46%	-60.13%
PREF1 + PNF	5	2.249	1.994	2.504	2.243	2.004	2.496	0.09198	9.15%	-4.45%

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control Sedimen	2.382	2.038	2.186	2.044	2.116
Cont Sed + TOC	2.957	2.996	3.268	3.463	2.848
Kaolin Clay Con	1.857	0.9413	2.391	2.23	1.994
Kaolin Cont + T	2.81	1.973	3.688	2.747	3.144
PREF1	2.611	2.778	2.495	2.376	2.969
PREF1 + 2% TOC	4.37	5.249	3.659	4.357	4.82
PNF	1.588	1.327	1.499	1.89	1.729
PNF + 2% TOC	3.317	3.42	3.479	3.751	3.272
PREF1 + PNF	2.243	2.407	2.004	2.095	2.496

Graphics



CETIS Analytical Report

Report Date: 07 Dec-15 14:40 (p 1 of 2)
 Test Code: 15670 | 10-5755-4736

Chironomus 10-d Survival and Growth Sediment Test

Nautilus Environmental

Analysis ID: 15-6793-5403	Endpoint: 10d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 07 Dec-15 14:40	Analysis: STP 2x2 Contingency Tables	Official Results: Yes
Batch ID: 14-7488-6052	Test Type: Growth-Survival (10d)	Analyst: Karen Lee
Start Date: 18 Sep-15	Protocol: EC/EPS 1/RM/32	Diluent: Mod-Hard Synthetic Water
Ending Date: 28 Sep-15	Species: Chironomus tentans	Brine:
Duration: 10d 0h	Source: Aquatic Biosystems, CO	Age: 3rd

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
Cont Sed + TOC	17-8057-1827	18 Sep-15	18 Sep-15	NA	Mount Polley	
Kaolin Clay Con	06-6374-3948	18 Sep-15	18 Sep-15	NA		
Kaolin Cont + T	08-6528-5358	18 Sep-15	18 Sep-15	NA		
PREF1	00-2699-0801	18 Aug-15	28 Aug-15 08:33	31d 0h (10.1 °C)		
PREF1 + 2% TOC	06-1063-2868	18 Aug-15	28 Aug-15 08:33	31d 0h (11 °C)		
PNF	15-4268-7402	14 Aug-15	28 Aug-15 08:33	35d 0h (5.5 °C)		
PNF + 2% TOC	11-9347-1965	14 Aug-15	28 Aug-15 08:33	35d 0h (8.6 °C)		
PREF1 + PNF	11-1409-1541	18 Sep-15	18 Sep-15	NA		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
Cont Sed + TOC	Sediment Sample	Mount Polley	Control Sediment + 2% TOC		
Kaolin Clay Con	Sediment Sample	Mount Polley	Kaolin Clay Control		
Kaolin Cont + T	Sediment Sample	Mount Polley	Kaolin Control + 2% TOC		
PREF1	Sediment Sample	Mount Polley	PREF1		
PREF1 + 2% TOC	Sediment Sample	Mount Polley	PREF1 + 2% TOC		
PNF	Sediment Sample	Mount Polley	PNF		
PNF + 2% TOC	Sediment Sample	Mount Polley	PNF + 2% TOC		
PREF1 + PNF	Sediment Sample	Mount Polley	PREF1 + PNF (50:50)		

Data Transform	Zeta	Alt Hyp	Trials	Seed	Test Result
Untransformed		C > T	NA	NA	

Fisher Exact/Bonferroni-Holm Test

Sample	vs	Sample	Test Stat	P-Value	P-Type	Decision(α:5%)
PREF1		Cont Sed + TOC	0.5	1.0000	Exact	Non-Significant Effect
PREF1		Kaolin Clay Con	0.1168	0.7008	Exact	Non-Significant Effect
PREF1		Kaolin Cont + T	0.0739	0.5173	Exact	Non-Significant Effect
PREF1		PREF1 + 2% TOC	0.1783	0.8917	Exact	Non-Significant Effect
PREF1		PNF	0.2623	1.0000	Exact	Non-Significant Effect
PREF1		PNF + 2% TOC	0.6425	1.0000	Exact	Non-Significant Effect
PREF1		PREF1 + PNF	0.6425	1.0000	Exact	Non-Significant Effect

Data Summary

Sample Code	NR	R	NR + R	Prop NR	Prop R	%Effect
Cont Sed + TOC	45	5	50	0.9	0.1	2.17%
Kaolin Clay Con	41	9	50	0.82	0.18	10.87%
Kaolin Cont + T	40	10	50	0.8	0.2	13.04%
PREF1 Reference Sed	46	4	50	0.92	0.08	0.0%
PREF1 + 2% TOC	42	8	50	0.84	0.16	8.7%
PNF	43	7	50	0.86	0.14	6.52%
PNF + 2% TOC	46	4	50	0.92	0.08	0.0%
PREF1 + PNF	46	4	50	0.92	0.08	0.0%

CETIS Analytical Report

Report Date: 07 Dec-15 14:40 (p 2 of 2)
 Test Code: 15670 | 10-5755-4736

Chironomus 10-d Survival and Growth Sediment Test

Nautilus Environmental

Analysis ID: 15-6793-5403 Endpoint: 10d Survival Rate
 Analyzed: 07 Dec-15 14:40 Analysis: STP 2x2 Contingency Tables

CETIS Version: CETISv1.8.7
 Official Results: Yes

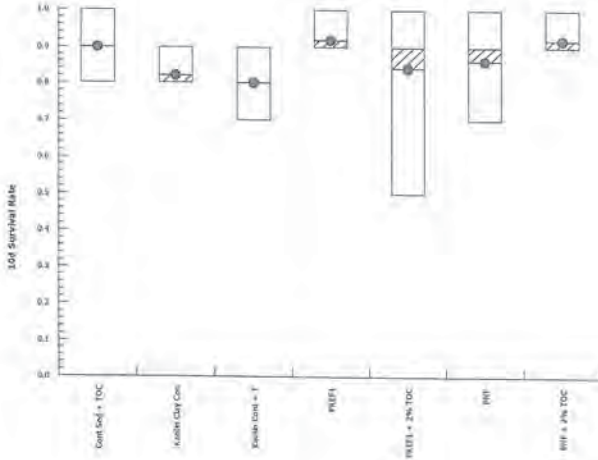
10d Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Cont Sed + TOC	0.8	1	1	0.8	0.9
Kaolin Clay Con	0.8	0.8	0.8	0.9	0.8
Kaolin Cont + T	0.7	0.9	0.8	0.9	0.7
PREF1	0.9	0.9	0.9	1	0.9
PREF1 + 2% TOC	0.5	0.9	1	1	0.8
PNF	0.9	1	0.9	0.7	0.8
PNF + 2% TOC	0.9	1	0.9	0.9	0.9
PREF1 + PNF	0.9	0.9	0.9	1	0.9

10d Survival Rate Binomials

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Cont Sed + TOC	8/10	10/10	10/10	8/10	9/10
Kaolin Clay Con	8/10	8/10	8/10	9/10	8/10
Kaolin Cont + T	7/10	9/10	8/10	9/10	7/10
PREF1	9/10	9/10	9/10	10/10	9/10
PREF1 + 2% TOC	5/10	9/10	10/10	10/10	8/10
PNF	9/10	10/10	9/10	7/10	8/10
PNF + 2% TOC	9/10	10/10	9/10	9/10	9/10
PREF1 + PNF	9/10	9/10	9/10	10/10	9/10

Graphics



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Dec. 7/15

CETIS Analytical Report

Report Date: 07 Dec-15 14:40 (p 1 of 2)
 Test Code: 15670 | 10-5755-4736

Chironomus 10-d Survival and Growth Sediment Test			Nautilus Environmental		
Analysis ID: 14-3584-3910	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7			
Analyzed: 07 Dec-15 14:40	Analysis: Nonparametric-Control vs Treatments	Official Results: Yes			
Batch ID: 14-7488-6052	Test Type: Growth-Survival (10d)	Analyst: Karen Lee			
Start Date: 18 Sep-15	Protocol: EC/EPS 1/RM/32	Diluent: Mod-Hard Synthetic Water			
Ending Date: 28 Sep-15	Species: Chironomus tentans	Brine:			
Duration: 10d 0h	Source: Aquatic Biosystems, CO	Age: 3rd			

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
Cont Sed + TOC	17-8057-1827	18 Sep-15	18 Sep-15	NA	Mount Polley	
Kaolin Clay Con	06-6374-3948	18 Sep-15	18 Sep-15	NA		
Kaolin Cont + T	08-6528-5358	18 Sep-15	18 Sep-15	NA		
PREF1	00-2699-0801	18 Aug-15	28 Aug-15 08:33	31d 0h (10.1 °C)		
PREF1 + 2% TOC	06-1063-2868	18 Aug-15	28 Aug-15 08:33	31d 0h (11 °C)		
PNF	15-4268-7402	14 Aug-15	28 Aug-15 08:33	35d 0h (5.5 °C)		
PNF + 2% TOC	11-9347-1965	14 Aug-15	28 Aug-15 08:33	35d 0h (8.6 °C)		
PREF1 + PNF	11-1409-1541	18 Sep-15	18 Sep-15	NA		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
Cont Sed + TOC	Sediment Sample	Mount Polley	Control Sediment + 2% TOC		
Kaolin Clay Con	Sediment Sample	Mount Polley	Kaolin Clay Control		
Kaolin Cont + T	Sediment Sample	Mount Polley	Kaolin Control + 2% TOC		
PREF1	Sediment Sample	Mount Polley	PREF1		
PREF1 + 2% TOC	Sediment Sample	Mount Polley	PREF1 + 2% TOC		
PNF	Sediment Sample	Mount Polley	PNF		
PNF + 2% TOC	Sediment Sample	Mount Polley	PNF + 2% TOC		
PREF1 + PNF	Sediment Sample	Mount Polley	PREF1 + PNF (50:50)		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	23.6%	

Steel Many-One Rank Sum Test									
Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
PREF1		Cont Sed + TOC	38	16	0	8	0.9999	Asymp	Non-Significant Effect
		Kaolin Clay Con	16	16	0	8	0.0430	Asymp	Significant Effect
		Kaolin Cont + T	32	16	0	8	0.9895	Asymp	Non-Significant Effect
		PREF1 + 2% TOC	40	16	0	8	1.0000	Asymp	Non-Significant Effect
		PNF	15	16	0	8	0.0251	Asymp	Significant Effect
		PNF + 2% TOC	40	16	0	8	1.0000	Asymp	Non-Significant Effect
		PREF1 + PNF	18	16	0	8	0.1094	Asymp	Non-Significant Effect

ANOVA Table						
Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	29.8511	4.264443	7	26.12	<0.0001	Significant Effect
Error	5.224552	0.1632673	32			
Total	35.07565		39			

Distributional Tests					
Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	14.12	18.48	0.0491	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9288	0.9236	0.0147	Normal Distribution

CETIS Analytical Report

Report Date: 07 Dec-15 14:40 (p 2 of 2)
 Test Code: 15670 | 10-5755-4736

Chironomus 10-d Survival and Growth Sediment Test

Nautilus Environmental

Analysis ID: 14-3584-3910 Endpoint: Mean Dry Weight-mg
 Analyzed: 07 Dec-15 14:40 Analysis: Nonparametric-Control vs Treatments

CETIS Version: CETISv1.8.7
 Official Results: Yes

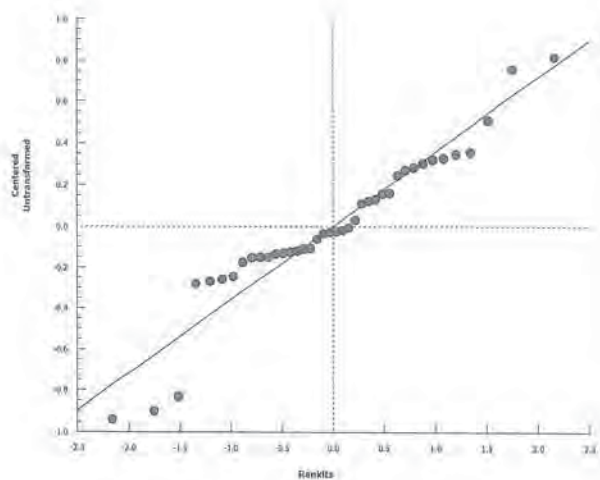
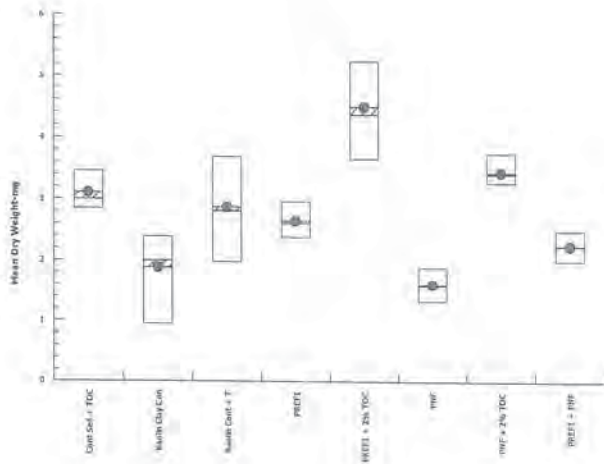
Mean Dry Weight-mg Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
Cont Sed + TOC	5	3.106	2.793	3.419	2.996	2.848	3.463	0.1127	8.12%	0.0%
Kaolin Clay Con	5	1.883	1.181	2.585	1.994	0.9413	2.391	0.2529	30.03%	39.39%
Kaolin Cont + T	5	2.872	2.095	3.65	2.81	1.973	3.688	0.2801	21.81%	7.53%
PREF1	5	2.646	2.356	2.936	2.611	2.376	2.969	0.1045	8.83%	14.83%
PREF1 + 2% TOC	5	4.491	3.754	5.227	4.37	3.659	5.249	0.2653	13.21%	-44.57%
PNF	5	1.606	1.339	1.874	1.588	1.327	1.89	0.09632	13.41%	48.28%
PNF + 2% TOC	5	3.448	3.214	3.681	3.42	3.272	3.751	0.08412	5.46%	-11.0%
PREF1 + PNF	5	2.249	1.994	2.504	2.243	2.004	2.496	0.09198	9.15%	27.6%

Mean Dry Weight-mg Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Cont Sed + TOC	2.957	2.996	3.268	3.463	2.848
Kaolin Clay Con	1.857	0.9413	2.391	2.23	1.994
Kaolin Cont + T	2.81	1.973	3.688	2.747	3.144
PREF1	2.611	2.778	2.495	2.376	2.969
PREF1 + 2% TOC	4.37	5.249	3.659	4.357	4.82
PNF	1.588	1.327	1.499	1.89	1.729
PNF + 2% TOC	3.317	3.42	3.479	3.751	3.272
PREF1 + PNF	2.243	2.407	2.004	2.095	2.496

Graphics



Client: Mowatt Polley
 W.O.#: 15670-671

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
Sediment Control	18-Sep-15	50	2.6	2.7	50	50	5.2	104	EC
Sed. Cont + 2% TOC	18-Sep-15	50	2.7	2.8	52	52	1.0	100	EC
Kaolin Clay Control	18-Sep-15	50	0.1	0.2	0	0	0.8	80	
Kaolin Cont + 2% TOC	18-Sep-15	50	0.2	0.3	2	2	3.7	74	
PREF1	18-Sep-15	50	2.8	2.9	54	54	6.2	174	
PREF1 + 2% TOC	18-Sep-15	50	3.7	3.8	72	72	7.1	142	
PNF	18-Sep-15	50	3.4	3.5	66	66	4.2	84	
PNF + 2% TOC	18-Sep-15	50	5.4	5.5	106	106	8.4	168	
PREF + PNF	18-Sep-15	50	4.1	4.2	80	80	2.6	62	↓
Sediment Control	28-Sep-15	50	3.1	3.3	58	58	7.3	146	JS
Sed. Cont + 2% TOC	28-Sep-15	50	3.1	3.3	56	56	9.3	186	JS
Kaolin Clay Control	28-Sep-15	50	0.1	0.2	0	0	5.4	108	JS
Kaolin Cont + 2% TOC	28-Sep-15	50	0.3	0.4	4	4	4.9	98	JS
PREF1	28-Sep-15	100	0.3	0.4	20	20	6.1	122	JS
PREF1 + 2% TOC	28-Sep-15	50	10.6	10.1	198	198	9.8	196	JS
PNF	28-Sep-15	50	5.3	5.4	104	104	10.5	210	JS
PNF + 2% TOC	28-Sep-15	50	13.2	13.4	262	262	10.8	216	JS
PREF + PNF	28-Sep-15	100	1.2	1.2	100	100	9.6	192	JS

Page

Page

Notes: 0 Diluted to 100 mL w/ D.I. water.

Reviewed by: JGA Date Reviewed: Oct. 14/15

APPENDIX C

SUPPORTING SEDIMENT CHEMISTRY DATA (FROM MINNOW 2015B)

Table C.1: Raw sediment quality data for Quesnel Lake profundal reference sampling area, Mount Polley Mine, 2015. Metals and total organic carbon data are based on the < 63µm fraction of sediment ¹.

Parameter	Units	BC WSQGs ²		Reference (PREF1)											
				PREF1-01	PREF1-02	PREF1-03	PREF1-04	PREF1-05	Mean	Median	Standard Deviation	Standard Error	Minimum	95th Percentile	Maximum
Date Sampled		Lower	Upper	18-Aug-15	24-Aug-15	19-Aug-15	24-Aug-15	24-Aug-15							
Physical Tests															
Moisture	%	-	-	52.6	-	53.3	-	54.2	53.4	53.3	0.8	0.5	52.6	54.1	54.2
pH (1:2 soil:water)	pH	-	-	7.36	-	6.69	-	7.01	7.02	7.01	0.34	0.19	6.69	7.3	7.36
Particle Size															
% Gravel (>2mm)	%	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.0	0.0	<0.10	<0.10	<0.10
% Sand (2.0mm - 0.063mm)	%	-	-	21.1	28.1	15.2	18.7	14.3	19.5	18.7	5.54	2.48	14.3	20.5	28.1
% Silt (0.063mm - 4µm)	%	-	-	67.7	62.5	73.0	71.7	74.3	69.8	71.7	4.79	2.14	62.5	74.2	74.3
% Clay (<4µm)	%	-	-	11.2	9.3	11.8	9.6	11.4	10.7	11.2	1.1	0.5	9.3	11.8	11.8
Texture	-	-	-	Silt loam	Silt loam	Silt loam	Silt loam	Silt loam	-	-	-	-	-	-	-
Organic / Inorganic Carbon (<63µm)															
Total Organic Carbon	%	-	-	1.76	-	1.71	-	1.98	1.82	1.76	0.14	0.08	1.71	1.96	1.98
Nutrients (Bulk sediment)															
Total Nitrogen by LECO	%	-	-	0.169	-	0.158	-	0.182	0.170	0.169	0.012	0.007	0.158	0.181	0.182
Metals (<63µm)															
Aluminum	mg/kg	-	-	16,900	-	17,300	-	15,500	16,567	16,900	945	546	15,500	17,260	17,300
Antimony	mg/kg	-	-	0.47	-	0.43	-	0.41	0.44	0.43	0.03	0.02	0.41	0.47	0.47
Arsenic	mg/kg	5.9	17	8.64	-	8.98	-	9.02	8.88	8.98	0.21	0.12	8.64	9.02	9.02
Barium	mg/kg	-	-	147	-	151	-	143	147	147	4.0	2.3	143	151	151
Beryllium	mg/kg	-	-	0.52	-	0.50	-	0.45	0.49	0.50	0.04	0.02	0.45	0.52	0.52
Bismuth	mg/kg	-	-	0.17	-	0.15	-	0.15	0.16	0.15	0.01	0.01	0.15	0.17	0.17
Boron	mg/kg	-	-	<10	-	<10	-	<10	<10	<10	0	0	<10	<10	<10
Cadmium	mg/kg	0.6	3.5	0.475	-	0.422	-	0.364	0.420	0.422	0.056	0.032	0.364	0.470	0.475
Calcium	mg/kg	-	-	8,780	-	8,840	-	8,620	8,747	8,780	114	66	8,620	8,834	8,840
Chromium	mg/kg	37.3	90	60.1	-	59.5	-	53.6	57.7	59.5	3.6	2.1	53.6	60.0	60.1
Cobalt	mg/kg	-	-	15.2	-	15.0	-	13.4	14.5	15.0	1.0	0.6	13.4	15.2	15.2
Copper	mg/kg	36	197	59	-	56	-	50	55	56	5	3	50	59	59
Iron	mg/kg	21,200	43,766	32,300	-	32,700	-	28,900	31,300	32,300	2,088	1,206	28,900	32,660	32,700
Lead	mg/kg	35	91.3	8.06	-	7.51	-	7.39	7.65	7.51	0.36	0.21	7.39	8.01	8.06
Lithium	mg/kg	-	-	15.5	-	15.2	-	12.6	14.4	15.2	1.6	0.9	12.6	15.5	15.5
Magnesium	mg/kg	-	-	8,410	-	8,660	-	7,380	8,150	8,410	678	392	7,380	8,635	8,660
Manganese	mg/kg	460	1,100	477	-	479	-	516	491	479	22	13	477	512	516
Mercury	mg/kg	0.17	0.49	0.0627	-	0.0515	-	0.0594	0.0579	0.0594	0.0058	0.0033	0.0515	0.0624	0.0627
Molybdenum	mg/kg	-	-	1.20	-	1.02	-	1.01	1.08	1.02	0.11	0.06	1.01	1.18	1.20
Nickel	mg/kg	16	75	41.2	-	40.1	-	36.1	39.1	40.1	2.7	1.5	36.1	41.1	41.2
Phosphorus	mg/kg	-	-	1,150	-	1,190	-	1,200	1,180	1,190	26	15	1,150	1,199	1,200
Potassium	mg/kg	-	-	1,550	-	1,570	-	1,430	1,517	1,550	76	44	1,430	1,568	1,570
Selenium	mg/kg	-	-	1.10	-	0.93	-	0.88	0.97	0.93	0.12	0.07	0.88	1.08	1.10
Silver	mg/kg	0.5	-	0.238	-	0.216	-	0.189	0.214	0.216	0.025	0.014	0.189	0.236	0.238
Sodium	mg/kg	-	-	470	-	520	-	500	497	500	25	15	470	518	520
Strontium	mg/kg	-	-	82.0	-	84.5	-	88.9	85.1	84.5	3.5	2.0	82.0	88.5	88.9
Sulfur (S)-Total	mg/kg	-	-	1,400	-	1,300	-	800	1,167	1,300	321	186	800	1,390	1,400
Thallium	mg/kg	-	-	0.194	-	0.171	-	0.158	0.174	0.171	0.018	0.011	0.158	0.192	0.194
Tin	mg/kg	-	-	0.49	-	0.46	-	0.41	0.45	0.46	0.04	0.02	0.41	0.49	0.49
Titanium	mg/kg	-	-	1,160	-	1,190	-	1,040	1,130	1,160	79	46	1,040	1,187	1,190
Uranium	mg/kg	-	-	1.57	-	1.43	-	1.39	1.46	1.43	0.09	0.05	1.39	1.56	1.57
Vanadium	mg/kg	-	-	73.0	-	72.3	-	64.9	70.1	72.3	4.5	2.6	64.9	72.9	73.0
Zinc	mg/kg	123	315	85.1	-	82.6	-	71.6	79.8	82.6	7.2	4.1	71.6	84.9	85.1

Value is > British Columbia Working Sediment Quality Guideline - Lower Guideline.

¹ Reported moisture, pH, and total nitrogen data are based on bulk sediment. Data reported as less than the method detection limit (MDL) were used at the MDL for the calculation of summary statistics. Summary statistics are reported as < MDL if all the data used in their calculation were < MDL.

² British Columbia Working Sediment Quality Guidelines (BCMOE 2015)

Table C.2: Raw sediment quality data for Quesnel Lake profundal exposed sampling area, Mount Polley Mine, 2015. Metals and total organic carbon data are based on the < 63µm fraction of sediment ¹.

Parameter	Units	BC WSQGs ²		Reference 95th Percentile	Exposed (PNF1)											
					PNF-01	PNF-02	PNF-03	PNF-04	PNF-05	Mean	Median	Standard Deviation	Standard Error	Minimum	95th Percentile	Maximum
Date Sampled		Lower	Upper		17-Aug-15	14-Aug-15	15-Aug-15	15-Aug-15	16-Aug-15							
Physical Tests																
Moisture	%	-	-	54.1	63.5	64.7	55.0	33.9	29.0	49.2	55.0	16.7	7.5	29.0	64.5	64.7
pH (1:2 soil:water)	pH	-	-	7.33	8.26	8.38	8.51	8.55	8.53	8.45	8.51	0.12	0.06	8.26	8.5	8.55
Particle Size																
% Gravel (>2mm)	%	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0	0	<0.10	<0.10	<0.10
% Sand (2.0mm - 0.063mm)	%	-	-	20.51	1.41	1.67	1.83	1.90	28.2	7.0	1.8	11.9	5.3	1.4	22.9	28.2
% Silt (0.063mm - 4µm)	%	-	-	74.2	44.1	48.5	54.7	81.7	58.7	57.5	54.7	14.6	6.5	44.1	77.1	81.7
% Clay (<4µm)	%	-	-	11.8	54.5	49.9	43.5	16.4	13.1	35.5	43.5	19.4	8.7	13.1	53.6	54.5
Texture	-	-	-	-	Silty clay	Silty clay	Silty clay loam	Silt	Silt loam	-	-	-	-	-	-	-
Organic / Inorganic Carbon (<63µm)																
Total Organic Carbon	%	-	-	1.96	0.42	0.52	0.25	<0.10	0.18	0.29	0.25	0.17	0.08	<0.10	0.51	0.52
Nutrients (Bulk sediment)																
Total Nitrogen by LECO	%	-	-	0.181	0.064	0.055	0.043	0.027	0.028	0.043	0.043	0.016	0.007	0.027	0.062	0.064
Metals (<63µm)																
Aluminum	mg/kg	-	-	17,260	33,300	34,500	28,800	17,700	18,300	26,520	28,800	8,065	3,607	17,700	34,260	34,500
Antimony	mg/kg	-	-	0.47	0.61	0.66	0.57	0.43	0.50	0.55	0.57	0.09	0.04	0.43	0.65	0.66
Arsenic	mg/kg	5.9	17	9.02	16.2	17.0	16.1	13.4	14.1	15.4	16.1	1.5	0.7	13.4	16.8	17.0
Barium	mg/kg	-	-	151	298	306	286	193	190	255	286	58	26	190	304	306
Beryllium	mg/kg	-	-	0.52	1.17	1.22	1.02	0.69	0.70	0.96	1.02	0.25	0.11	0.69	1.21	1.22
Bismuth	mg/kg	-	-	0.17	0.16	0.17	0.14	<0.10	<0.10	0.13	0.14	0.03	0.01	<0.10	0.17	0.17
Boron	mg/kg	-	-	<10	12	13	12	<10	<10	11	12	1.3	0.6	<10	13	13
Cadmium	mg/kg	0.6	3.5	0.470	0.230	0.244	0.210	0.144	0.156	0.197	0.210	0.045	0.020	0.144	0.241	0.244
Calcium	mg/kg	-	-	8,834	33,000	34,900	30,700	28,100	29,100	31,160	30,700	2,792	1,249	28,100	34,520	34,900
Chromium	mg/kg	37.3	90	60.0	23.5	25.0	22.5	14.3	19.1	20.9	22.5	4.3	1.9	14.3	24.7	25.0
Cobalt	mg/kg	-	-	15.2	32.7	35.0	26.1	15.9	17.8	25.5	26.1	8.6	3.8	15.9	34.5	35.0
Copper	mg/kg	36	197	59	1,110	1,190	904	536	557	859	904	304	136	536	1,174	1,190
Iron	mg/kg	21,200	43,766	32,660	38,700	41,200	38,600	35,100	49,500	40,620	38,700	5,418	2,423	35,100	47,840	49,500
Lead	mg/kg	35	91.3	8.01	12.3	12.7	11.1	6.47	6.94	9.90	11.1	2.98	1.33	6.47	12.6	12.7
Lithium	mg/kg	-	-	15.5	39.7	41.2	30.5	18.2	19.2	29.8	30.5	10.9	4.9	18.2	40.9	41.2
Magnesium	mg/kg	-	-	8,635	23,100	25,000	17,900	10,200	10,400	17,320	17,900	6,916	3,093	10,200	24,620	25,000
Manganese	mg/kg	460	1,100	512	1,250	1,310	1,090	716	801	1,033	1,090	265	119	716	1,298	1,310
Mercury	mg/kg	0.17	0.49	0.062	0.116	0.114	0.0935	0.0751	0.0783	0.0954	0.0935	0.0192	0.0086	0.0751	0.116	0.116
Molybdenum	mg/kg	-	-	1.18	4.64	4.82	4.15	3.17	3.47	4.05	4.15	0.72	0.32	3.17	4.78	4.82
Nickel	mg/kg	16	75	41.1	24.6	25.5	22.1	13.4	15.3	20.2	22.1	5.5	2.5	13.4	25.3	25.5
Phosphorus	mg/kg	-	-	1,199	1,080	1,180	1,310	1,650	1,540	1,352	1,310	240	107	1,080	1,628	1,650
Potassium	mg/kg	-	-	1,568	3,190	3,140	3,150	1,890	1,830	2,640	3,140	713	319	1,830	3,182	3,190
Selenium	mg/kg	-	-	1.08	1.54	1.61	1.29	0.82	0.87	1.23	1.29	0.37	0.16	0.82	1.60	1.61
Silver	mg/kg	0.5	-	0.236	0.441	0.462	0.378	0.269	0.295	0.369	0.378	0.086	0.038	0.269	0.458	0.462
Sodium	mg/kg	-	-	518	1,590	1,650	1,670	1,050	1,020	1,396	1,590	331	148	1,020	1,666	1,670
Strontium	mg/kg	-	-	88.5	241	242	231	172	172	212	231	36	16	172	242	242
Sulfur (S)-Total	mg/kg	-	-	1,390	1,800	1,700	1,500	1,400	1,400	1,560	1,500	182	81	1,400	1,780	1,800
Thallium	mg/kg	-	-	0.192	0.067	0.065	0.066	<0.050	<0.050	0.060	0.065	0.009	0.004	<0.05	0.067	0.067
Tin	mg/kg	-	-	0.49	2.31	2.47	2.01	1.41	1.76	1.99	2.01	0.42	0.19	1.41	2.44	2.47
Titanium	mg/kg	-	-	1,187	2,310	2,420	2,070	1,420	1,760	1,996	2,070	410	183	1,420	2,398	2,420
Uranium	mg/kg	-	-	1.56	1.54	1.59	1.42	1.13	1.27	1.39	1.42	0.19	0.09	1.13	1.58	1.59
Vanadium	mg/kg	-	-	72.9	128	136	132	127	189	142	132	26	12	127	178	189
Zinc	mg/kg	123	315	84.9	125	131	100	58.9	65.2	96.0	100	33.2	14.8	58.9	130	131

Value is > British Columbia Working Sediment Quality Guideline - Lower Guideline.

Value is > British Columbia Working Sediment Quality Guideline - Upper Guideline.

bold text - Value is greater than the reference 95th percentile

¹ Reported moisture, pH, and total nitrogen data are based on bulk sediment. Data reported as less than the method detection limit (MDL) were used at the MDL for the calculation of summary statistics. Summary statistics are reported as < MDL if all the data used in their calculation were < MDL.

² British Columbia Working Sediment Quality Guidelines (BCMSE 2015)

APPENDIX D

STATISTICAL CONTRASTS OF TOXICITY TEST RESULTS

Table D.1: Analysis of Variance (ANOVA) Results for Toxicity Test Endpoints

Test	Endpoint	Parametric (ANOVA)								Non-Parametric (Kruskal-Wallis)	
		Transformation:								Rank	
		Raw		Arcsine		Logit		Log _e			
		equal variance	P value	equal variance	P value	equal variance	P value	equal variance	P value	equal variance	P value
<i>Hyalella azteca</i>	Survival	0.018	0.000	0.003	0.000	0.000	0.004	0.021	0.000	NA	0.002
	Growth	0.024	0.000	0.110	0.000	0.208	0.000	0.208	0.000	NA	0.000
<i>Chironomus dilutus</i>	Survival	0.002	0.063	0.010	0.022	0.000	0.013	0.003	0.110	NA	0.024
	Growth	0.127	0.000	0.166	0.000	0.065	0.000	0.062	0.000	NA	0.000



yellow indicates equal variance



pink indicates statistical significance at p=0.05

grey text = transformation not recommended for data interpretation

Table D.2: Post-Hoc Multiple Contrast Results for Toxicity Test Endpoints (p-values)

Treatment 1	Treatment 2	<i>Chironomus dilutus</i>				<i>Hyalella azteca</i>			
		Survival		Growth		Survival		Growth	
		Logit	None	None	None	Logit	None	Log _e	None
		Parametric	Non-Para ¹	Parametric	Non-Para ¹	Parametric	Non-Para ¹	Parametric	Non-Para ¹
	Test:	Tamhane's	Mann-Whitney	Bonferroni	Mann-Whitney	Tamhane's	Mann-Whitney	Bonferroni	Mann-Whitney
Control	Control+TOC	0.930	0.053	0.013	0.009	0.927	0.008	0.010	0.009
	Kaolin Clay	0.000	0.004	1.000	0.465	0.886	0.008	0.000	0.009
	Kaolin Clay+TOC	0.001	0.005	0.194	0.117	1.000	0.910	0.107	0.009
	Reference	0.443	0.014	1.000	0.016	0.928	0.050	1.000	0.917
	Reference+TOC	0.936	0.054	0.000	0.009	1.000	0.777	1.000	0.221
	Exposed	0.459	0.018	1.000	0.009	1.000	0.126	0.000	0.009
	Exposed+TOC	0.443	0.014	0.000	0.009	1.000	0.502	1.000	0.076
	Reference+Exposed	0.443	0.014	1.000	0.465	1.000	0.214	0.223	0.009
Control+TOC	Control	0.930	0.053	0.013	0.009	0.927	0.008	0.010	0.009
	Kaolin Clay	0.999	0.155	0.000	0.009	1.000	0.389	0.003	0.009
	Kaolin Clay+TOC	0.998	0.161	1.000	0.347	0.889	0.053	1.000	0.347
	Reference	1.000	0.734	1.000	0.028	0.000	0.005	0.108	0.047
	Reference+TOC	1.000	0.827	0.000	0.009	0.970	0.013	0.022	0.014
	Exposed	1.000	0.588	0.000	0.009	1.000	0.242	0.839	0.047
	Exposed+TOC	1.000	0.734	1.000	0.047	0.982	0.023	0.638	0.028
	Reference+Exposed	1.000	0.734	0.042	0.009	1.000	0.136	1.000	0.465
Kaolin Clay	Control	0.000	0.004	1.000	0.465	0.886	0.008	0.000	0.009
	Control+TOC	0.999	0.155	0.000	0.009	1.000	0.389	0.003	0.009
	Kaolin Clay+TOC	1.000	0.734	0.009	0.047	0.846	0.013	0.000	0.009
	Reference	1.000	0.015	0.120	0.016	0.000	0.005	0.000	0.009
	Reference+TOC	1.000	0.369	0.000	0.009	0.954	0.013	0.000	0.014
	Exposed	1.000	0.429	1.000	0.175	1.000	0.069	1.000	0.047
	Exposed+TOC	1.000	0.015	0.000	0.009	0.963	0.008	0.000	0.009
	Reference+Exposed	1.000	0.015	1.000	0.117	1.000	0.091	0.000	0.009
Kaolin Clay+TOC	Control	0.001	0.005	0.194	0.117	1.000	0.910	0.107	0.009
	Control+TOC	0.998	0.161	1.000	0.347	0.889	0.053	1.000	0.347
	Kaolin Clay	1.000	0.734	0.009	0.047	0.846	0.013	0.000	0.009
	Reference	1.000	0.045	1.000	0.347	0.999	0.136	0.886	0.117
	Reference+TOC	1.000	0.393	0.000	0.016	1.000	0.787	0.192	0.014
	Exposed	1.000	0.381	0.000	0.009	1.000	0.278	0.102	0.016
	Exposed+TOC	1.000	0.045	0.836	0.076	1.000	0.910	1.000	0.117
	Reference+Exposed	1.000	0.045	0.523	0.117	1.000	0.448	1.000	0.465
Reference	Control	0.443	0.014	1.000	0.016	0.928	0.050	1.000	0.917
	Control+TOC	1.000	0.734	1.000	0.028	0.000	0.005	0.108	0.047
	Kaolin Clay	1.000	0.015	0.120	0.016	0.000	0.005	0.000	0.009
	Kaolin Clay+TOC	1.000	0.045	1.000	0.347	0.999	0.787	0.886	0.117
	Reference+TOC	1.000	0.735	0.000	0.009	0.999	0.091	1.000	0.806
	Exposed	1.000	0.345	0.005	0.009	0.462	0.019	0.000	0.016
	Exposed+TOC	1.000	1.000	0.078	0.009	0.930	0.053	1.000	0.347
	Reference+Exposed	1.000	1.000	1.000	0.047	0.479	0.018	1.000	0.117
Reference+TOC	Control	0.936	0.054	0.000	0.009	1.000	0.777	1.000	0.221
	Control+TOC	1.000	0.827	0.000	0.009	0.970	0.013	0.022	0.014
	Kaolin Clay	1.000	0.369	0.000	0.009	0.954	0.013	0.000	0.014
	Kaolin Clay+TOC	1.000	0.393	0.000	0.016	1.000	0.787	0.192	0.014
	Reference	1.000	0.735	0.000	0.009	0.999	0.091	1.000	0.806
	Exposed	1.000	0.830	0.000	0.009	1.000	0.128	0.000	0.014
	Exposed+TOC	1.000	0.735	0.005	0.016	1.000	0.432	1.000	0.268
	Reference+Exposed	1.000	0.735	0.000	0.009	1.000	0.193	0.376	0.027
Exposed	Control	0.459	0.018	1.000	0.009	1.000	0.126	0.000	0.009
	Control+TOC	1.000	0.588	0.000	0.009	1.000	0.242	0.839	0.047
	Kaolin Clay	1.000	0.429	1.000	0.175	1.000	0.069	1.000	0.047
	Kaolin Clay+TOC	1.000	0.381	0.000	0.009	1.000	0.278	0.102	0.016
	Reference	1.000	0.345	0.005	0.009	0.462	0.019	0.000	0.016
	Reference+TOC	1.000	0.830	0.000	0.009	1.000	0.128	0.000	0.014
	Exposed+TOC	1.000	0.345	0.000	0.009	1.000	0.283	0.001	0.009
	Reference+Exposed	1.000	0.345	0.431	0.009	1.000	0.750	0.047	0.076
Exposed+TOC	Control	0.443	0.014	0.000	0.009	1.000	0.502	1.000	0.076
	Control+TOC	1.000	0.734	1.000	0.047	0.982	0.023	0.638	0.028
	Kaolin Clay	1.000	0.015	0.000	0.009	0.963	0.008	0.000	0.009
	Kaolin Clay+TOC	1.000	0.045	0.836	0.076	1.000	0.910	1.000	0.117
	Reference	1.000	1.000	0.078	0.009	0.930	0.053	1.000	0.347
	Reference+TOC	1.000	0.735	0.005	0.016	1.000	0.432	1.000	0.268
	Exposed	1.000	0.345	0.000	0.009	1.000	0.283	0.001	0.009
	Reference+Exposed	1.000	1.000	0.001	0.009	1.000	0.588	1.000	0.251
Reference+Exposed	Control	0.443	0.014	1.000	0.465	1.000	0.214	0.223	0.009
	Control+TOC	1.000	0.734	0.042	0.009	1.000	0.136	1.000	0.465
	Kaolin Clay	1.000	0.015	1.000	0.117	1.000	0.091	0.000	0.009
	Kaolin Clay+TOC	1.000	0.045	0.523	0.117	1.000	0.448	1.000	0.465
	Reference	1.000	1.000	1.000	0.047	0.479	0.018	1.000	0.117
	Reference+TOC	1.000	0.735	0.000	0.009	1.000	0.193	0.376	0.027
	Exposed	1.000	0.345	0.431	0.009	1.000	0.750	0.047	0.076
	Exposed+TOC	1.000	1.000	0.001	0.009	1.000	0.588	1.000	0.251

pink indicates statistical significance at p=0.05
 red text = recommended statistical result for data interpretation
¹ non-parametric test

Table D.3: Magnitude of Difference and Minimum Detectable Effect size expressed in number of treatment 1 standard deviations.

Treatment 1	Treatment 2	<i>Chironomus dilutus</i>				<i>Hyalella azteca</i>			
		Survival		Growth		Survival		Growth	
		MOD ¹	MDE ²	MOD ¹	MDE ²	MOD ¹	MDE ²	MOD ¹	MDE ²
Transformation:		Logit		None		Logit		Log _e	
Control	Control+TOC	-	SD = 0	3.1	-	-0.2	-	6.3	-
	Kaolin Clay	SD = 0	-	-	6.8	-0.2	-	13.1	-
	Kaolin Clay+TOC	SD = 0	-	-	7.4	-	2.5	5.0	-
	Reference	SD = 0	-	1.6	-	0.2	-	-	1.6
	Reference+TOC	-	SD = 0	7.7	-	-	2.4	-	5.4
	Exposed	SD = 0	-	1.8	-	-	2.3	9.9	-
	Exposed+TOC	SD = 0	-	4.3	-	-	2.4	-	5.7
	Reference+Exposed	SD = 0	-	-	2.9	-	2.2	-	4.5
Control+TOC	Control	-	SD = 0	3.1	-	-0.2	-	6.3	-
	Kaolin Clay	-	1.6	1.6	-	-	1.9	1.3	-
	Kaolin Clay+TOC	-	1.7	-	4.4	-	12.0	-	1.9
	Reference	-	2.1	0.6	-	17.1	-	1.0	-
	Reference+TOC	-	2.4	1.8	-	10.0	-	1.2	-
	Exposed	-	2.1	1.9	-	-	9.9	0.7	-
	Exposed+TOC	-	2.1	0.4	-	7.9	-	0.8	-
	Reference+Exposed	-	2.1	1.1	-	-	9.8	-	2.8
Kaolin Clay	Control	SD = 0	-	-	6.8	-0.2	-	13.1	-
	Control+TOC	-	1.6	1.6	-	-	1.9	1.3	-
	Kaolin Clay+TOC	-	3.5	0.9	-	30.6	-	1.5	-
	Reference	3.7	-	0.7	-	48.7	-	2.1	-
	Reference+TOC	-	20.2	2.5	-	29.1	-	2.3	-
	Exposed	-	15.6	-	1.8	-	16.8	0.6	-
	Exposed+TOC	3.7	-	1.5	-	23.4	-	1.9	-
	Reference+Exposed	3.7	-	-	1.7	-	16.6	1.5	-
Kaolin Clay+TOC	Control	SD = 0	-	-	7.4	-	2.5	5.0	-
	Control+TOC	-	1.7	-	4.4	-	12.0	-	1.9
	Kaolin Clay	-	3.5	0.9	-	30.6	-	1.5	-
	Reference	2.1	-	-	-0.1	-	0.1	-	1.4
	Reference+TOC	-	10.9	0.9	-	-	2.2	1.9	-
	Exposed	-	8.4	0.7	-	-	2.1	2.0	-
	Exposed+TOC	2.1	-	-	1.7	-	2.2	-	3.3
	Reference+Exposed	2.1	-	-	1.7	-	2.1	-	4.5
Reference	Control	SD = 0	-	1.6	-	0.2	-	-	8.0
	Control+TOC	-	2.1	0.6	-	17.1	-	1.0	-
	Kaolin Clay	3.7	-	0.7	-	48.7	-	2.1	-
	Kaolin Clay+TOC	2.1	-	-	1.7	-	1.6	-	4.5
	Reference+TOC	-	2.8	3.0	-	-	SD = 0	-	2.0
	Exposed	-	2.4	1.7	-	SD = 0	-	1.7	-
	Exposed+TOC	-	2.3	1.3	-	-	SD = 0	-	2.0
	Reference+Exposed	-	2.3	0.6	-	SD = 0	-	-	2.3
Reference+TOC	Control	SD = 0	-	7.7	-	-	2.4	-	5.4
	Control+TOC	-	2.4	1.8	-	10.0	-	1.2	-
	Kaolin Clay	-	20.2	2.5	-	29.1	-	2.3	-
	Kaolin Clay+TOC	-	10.9	0.9	-	-	2.2	1.9	-
	Reference	-	2.8	3.0	-	-	SD = 0	-	2.0
	Exposed	-	2.1	1.1	-	-	2.7	2.9	-
	Exposed+TOC	-	2.0	0.4	-	-	2.9	-	2.8
	Reference+Exposed	-	2.0	0.8	-	-	2.6	1.3	-
Exposed	Control	SD = 0	-	1.8	-	-	2.3	9.9	-
	Control+TOC	-	2.1	1.9	-	-	9.9	0.7	-
	Kaolin Clay	-	15.6	-	1.8	-	16.8	0.6	-
	Kaolin Clay+TOC	-	8.4	0.7	-	-	2.1	2.0	-
	Reference	-	2.4	1.7	-	SD = 0	-	1.7	-
	Reference+TOC	-	2.1	1.1	-	-	2.7	2.9	-
	Exposed+TOC	-	2.2	5.3	-	-	2.5	1.1	-
	Reference+Exposed	-	2.2	1.9	-	-	2.3	0.8	-
Exposed+TOC	Control	SD = 0	-	4.3	-	-	2.4	-	5.7
	Control+TOC	-	2.1	0.4	-	7.9	-	0.8	-
	Kaolin Clay	3.7	-	1.5	-	23.4	-	1.9	-
	Kaolin Clay+TOC	2.1	-	-	1.7	-	2.2	-	3.3
	Reference	-	2.3	1.3	-	-	SD = 0	-	2.0
	Reference+TOC	-	2.0	0.4	-	-	2.9	-	2.8
	Exposed	-	2.2	5.3	-	-	2.5	1.1	-
	Reference+Exposed	-	2.3	1.8	-	-	2.2	-	2.9
Reference+Exposed	Control	SD = 0	-	-	2.9	-	2.2	4.5	-
	Control+TOC	-	2.1	1.1	-	-	9.8	-	2.8
	Kaolin Clay	3.7	-	-	1.7	-	16.6	1.5	-
	Kaolin Clay+TOC	2.1	-	-	1.7	-	2.1	-	4.5
	Reference	-	2.3	0.6	-	SD = 0	-	-	2.3
	Reference+TOC	-	2.0	0.8	-	-	2.6	1.3	-
	Exposed	-	2.2	1.9	-	-	2.3	0.8	-
	Exposed+TOC	-	2.3	1.8	-	-	2.2	-	2.9

¹ Magnitude of Difference

² Minimum Detectable Effect size

SD = 0 identifies when the standard deviation of treatment 1 was 0 (i.e., all five replicates had the same value).

APPENDIX E

**SUPPLEMENTARY
REGRESSION PLOTS**

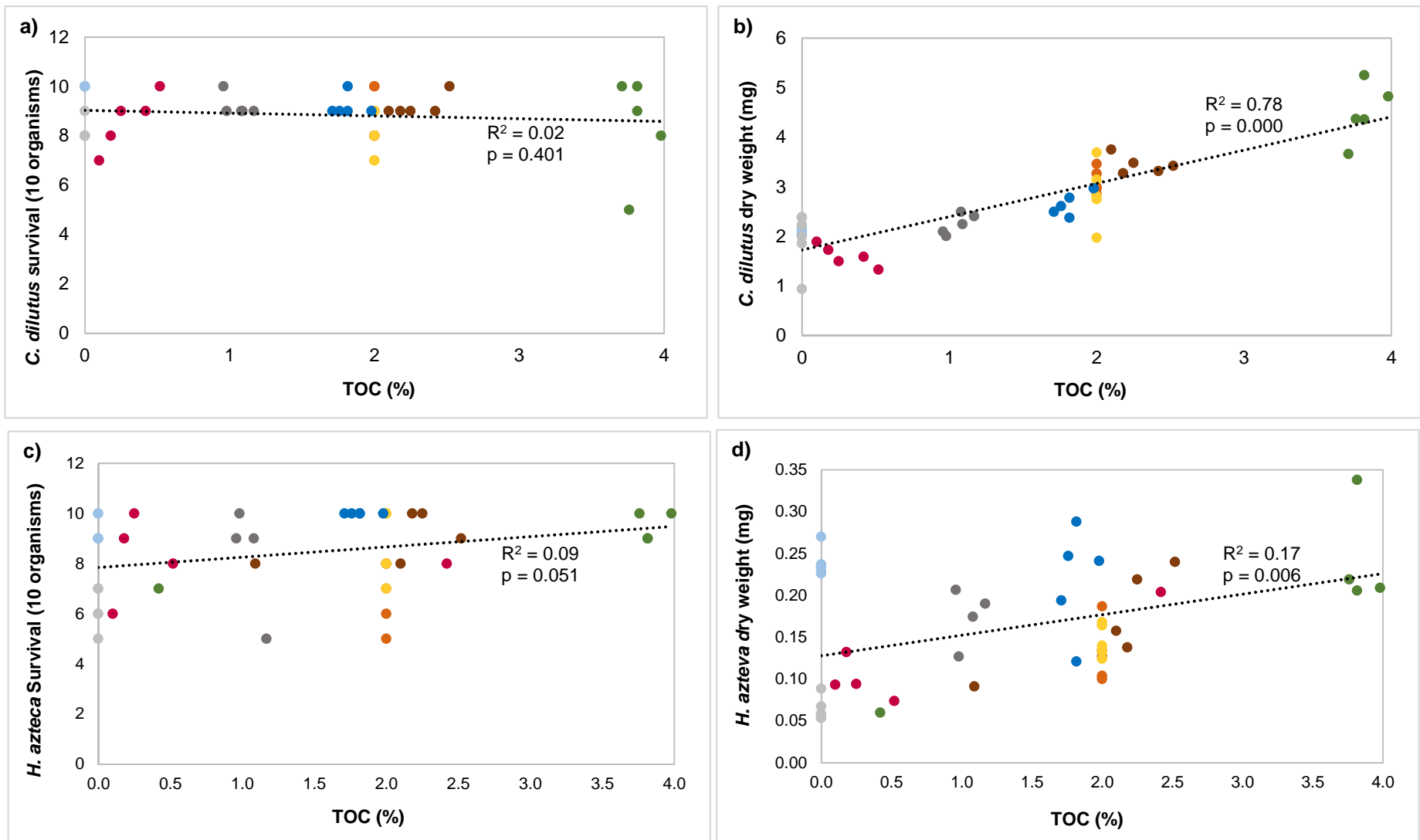


Figure E.1: Regression lines of individual total organic carbon (TOC; %) versus a) *C. dilutus* survival (10 organisms), b) *C. dilutus* dry weight (mg), c) *H. azteca* survival (10 organisms) and d) *H. azteca* dry weight (mg).

● Con ● Con+TOC ● Kao ● Kao+TOC ● Ref ● Ref+TOC ● Exp ● Exp+TOC ● Exp:Ref

Note: Con = Sand Control, Kao = Kaolin Clay, Ref = Reference, Exp = Exposure and Ref:Exp = 50:50 ratio between Ref and Exp

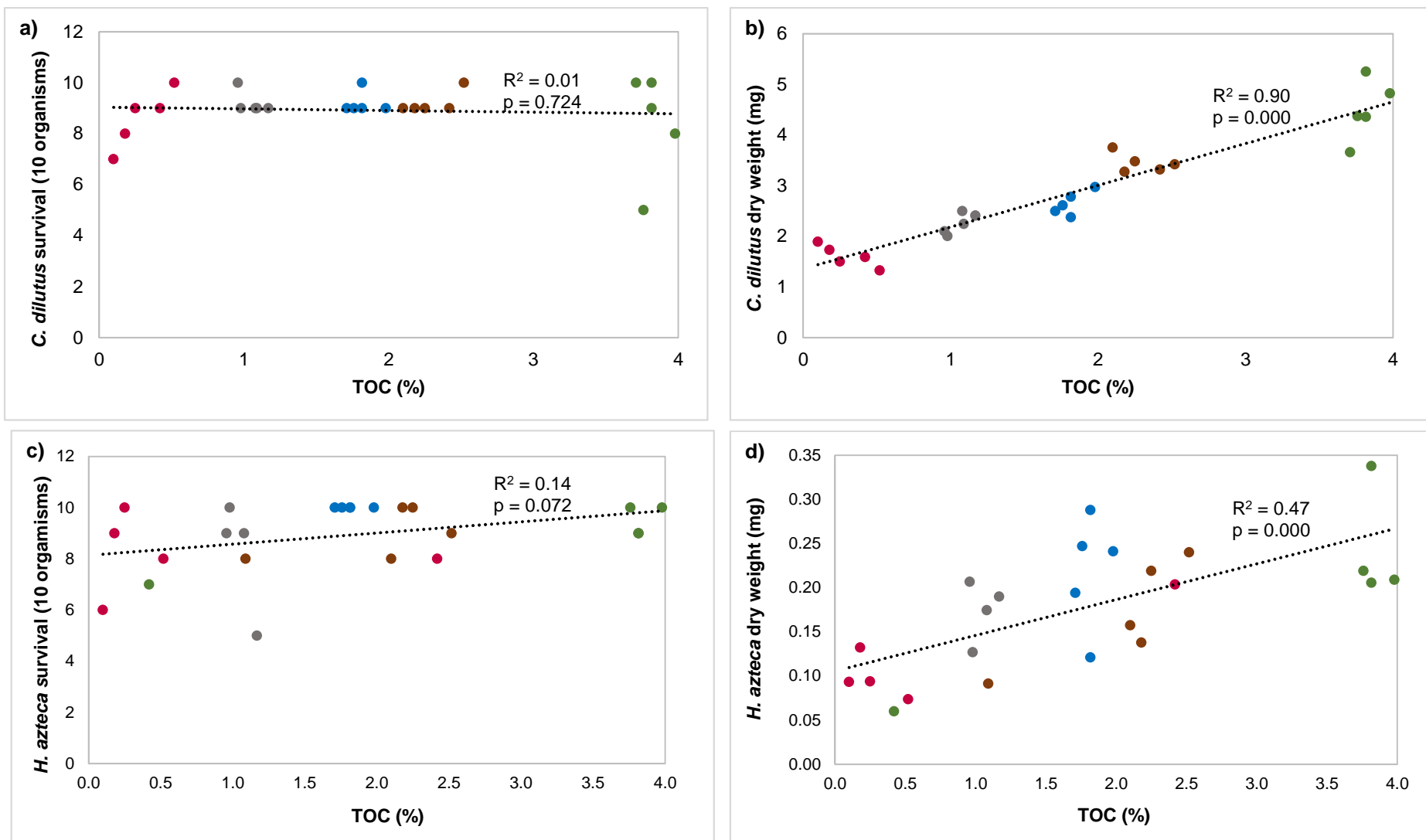


Figure E.2: Regression lines of individual total organic carbon (TOC; %) without controls versus a) *C. dilutus* survival (10 organisms), *C. dilutus* dry weight (mg), c) *H. azteca* survival (10 organisms) and d) *H. azteca* dry weight (mg).

● Ref ● Ref+TOC ● Exp ● Exp+TOC ● Exp:Ref

Note: Con = Ref = Reference, Exp = Exposure and Ref:Exp = 50:50 ratio between Ref and Exp

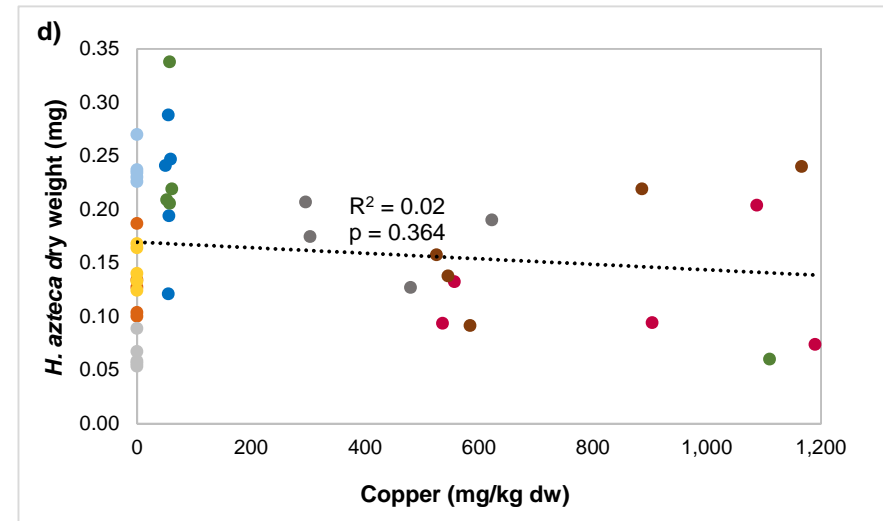
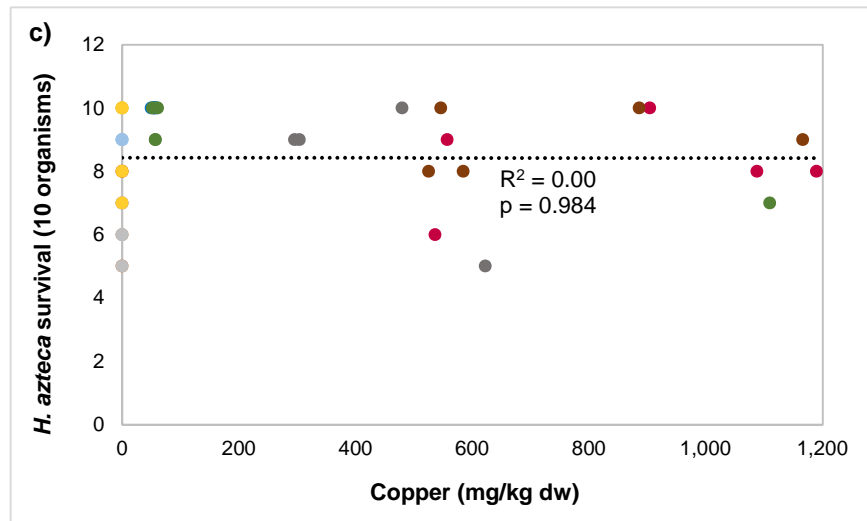
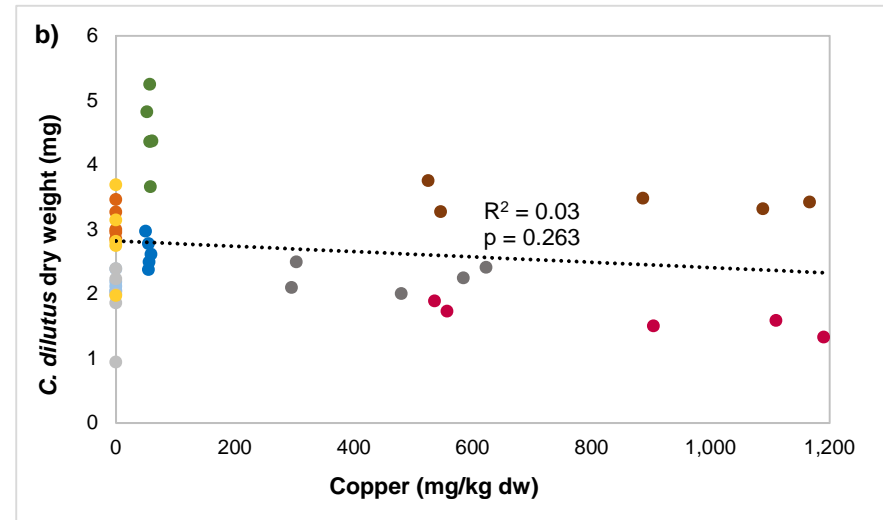
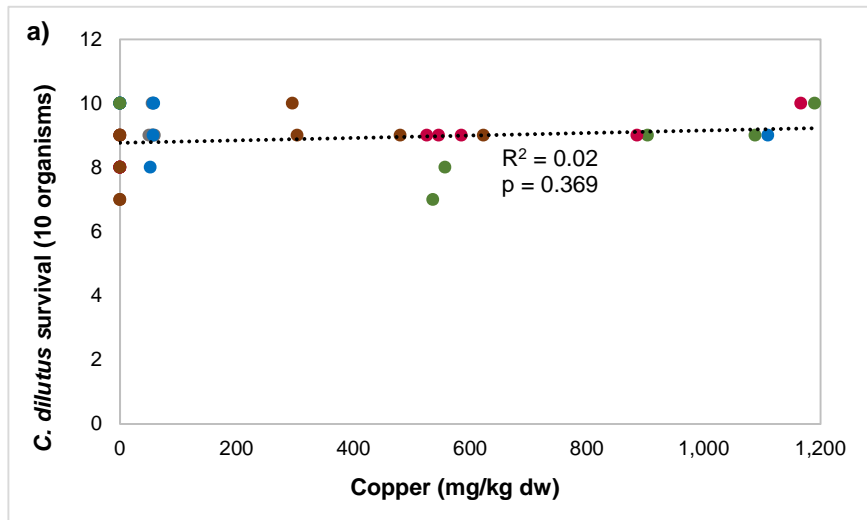


Figure E.3: Regression lines of individual Copper (mg) versus a) *C. dilutus* survival (10 organisms), b) *C. dilutus* dry weight (mg), c) *H. azteca* survival (10 organisms) and d) *H. azteca* dry weight (mg).

● Con ● Con+TOC ● Kao ● Koa+TOC ● Ref ● Ref+TOC ● Exp ● Exp+TOC ● Exp:Ref

Note: Con = Sand Control, Kao = Kaolin Clay, Ref = Reference, Exp = Exposure and Ref:Exp = 50:50 ratio between Ref and Exp

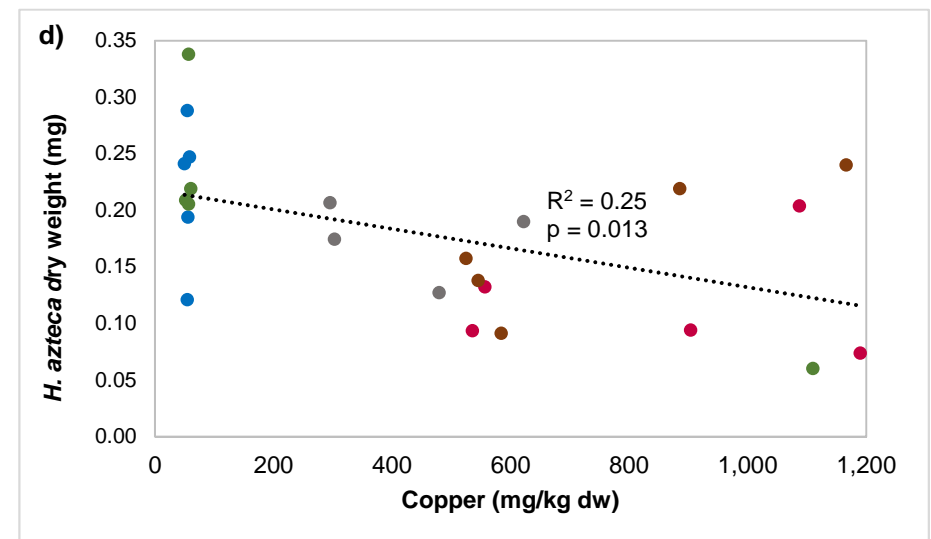
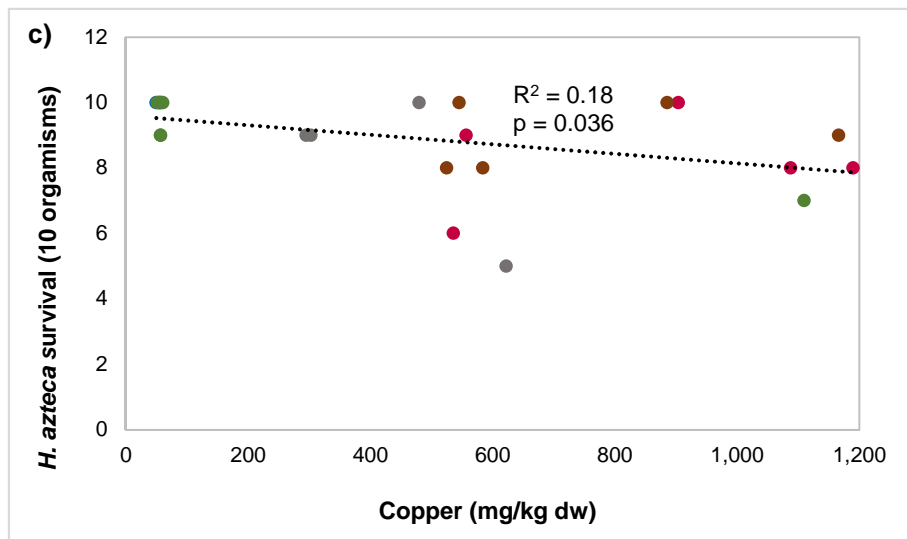
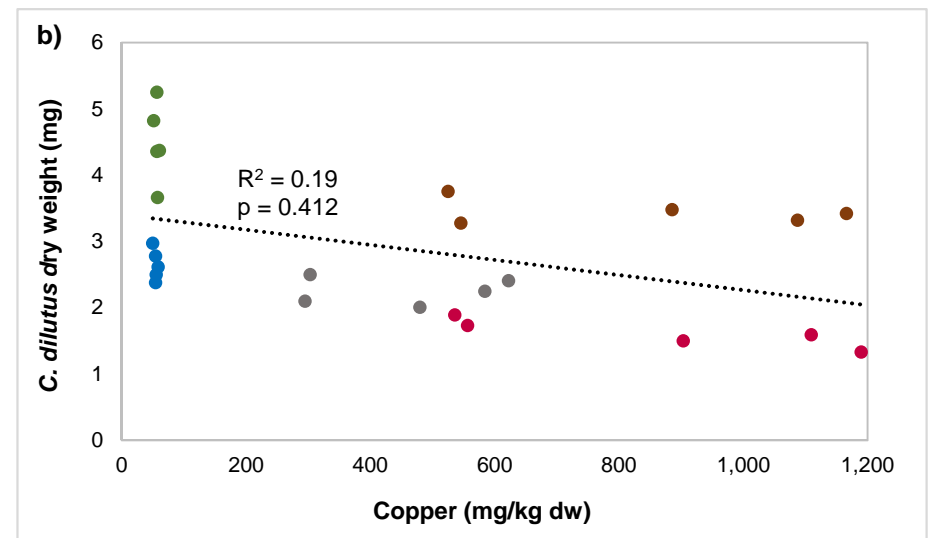
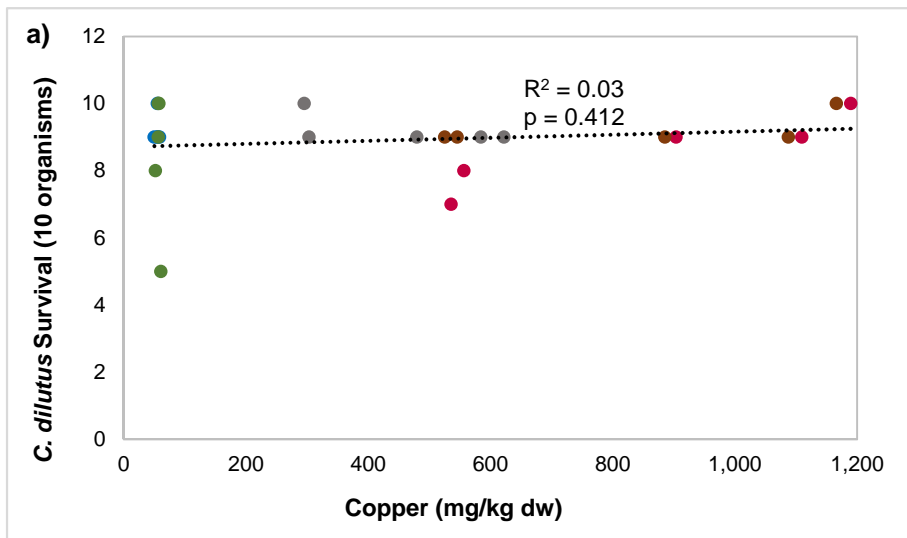


Figure E.4: Regression lines of individual TOC (%) without controls versus a) *C. dilutus* survival (10 organisms), b) *C. dilutus* dry weight (mg), c) *H. azteca* survival (10 organisms) and d) *H. azteca* dry weight (mg).

● Ref ● Ref+TOC ● Exp ● Exp+TOC ● Exp:Ref

Note: Con = Sand Control, Kao = Kaolin Clay, Ref = Reference, Exp = Exposure and Ref:Exp = 50:50 ratio between Ref and Exp

Memorandum

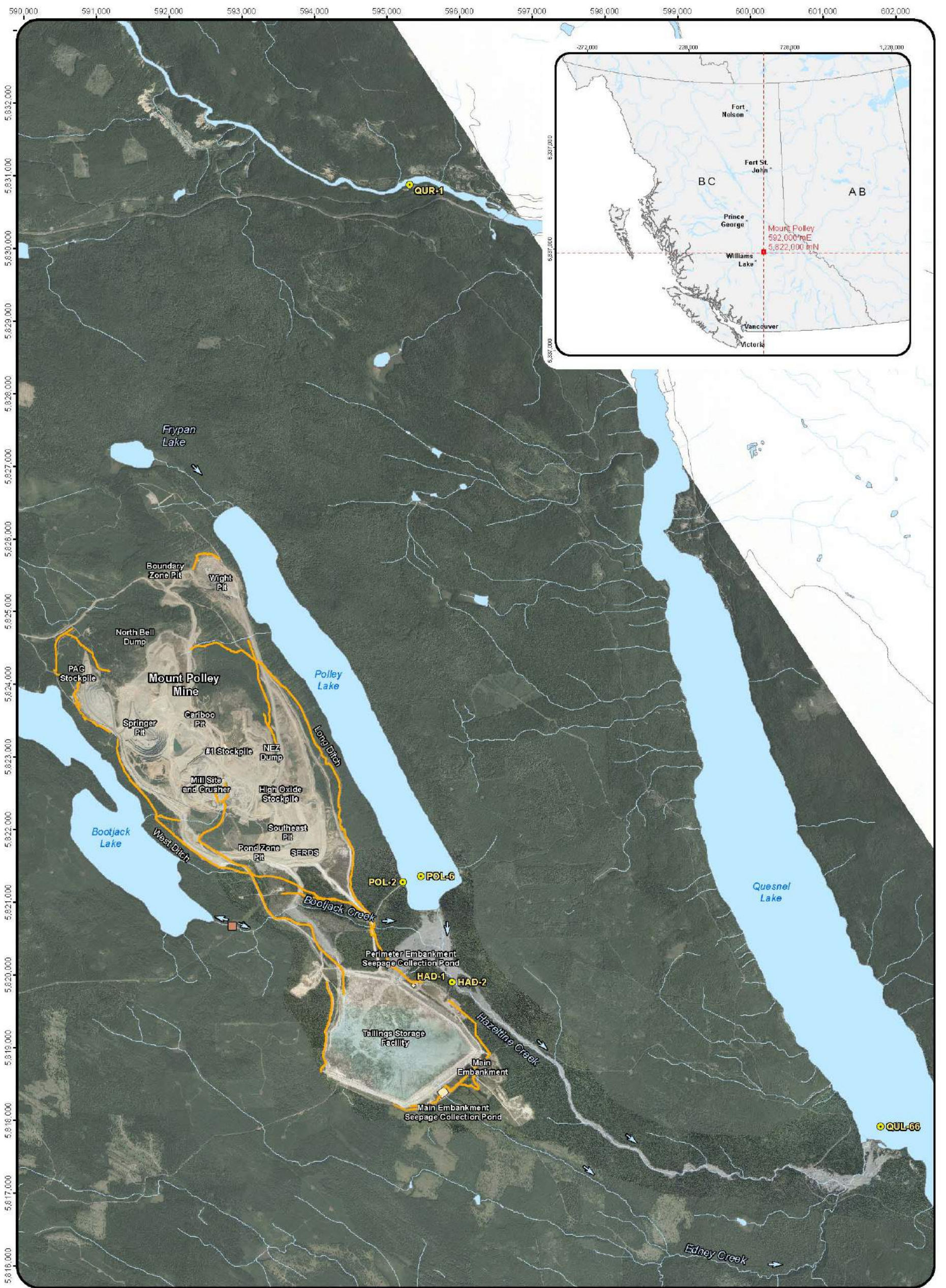
Date: January 9, 2015
To: Dale Reimer, Mount Polley Mining Corporation
From: Pierre Stecko, Minnow Environmental Inc.
Cc: Colleen Hughes, Mount Polley Mining Corporation
Lee Nikl, Golder Associates

Re: Summary and Interpretation of Water Toxicity Tests

This memorandum provides a brief summary and interpretation of toxicity test results associated with water samples collected in initial response to the Mount Polley Mine tailings dam breach (which occurred on August 4th 2014). This toxicity testing was conducted on samples collected from Polley Lake, the Hazeltine Discharge (Polley Lake water piped to Hazeltine Creek), Quesnel Lake, and the Quesnel River in August and September 2014 (Figure 1). Based on the results and interpretation of these tests, recommendations for additional toxicity testing are also provided.

Methods

Toxicity testing included lethal and sub-lethal tests recommended under the federal Metal Mining Effluent Regulations (MMER; Government of Canada 2014). All tests were conducted by a laboratory (Nautilus Environmental) accredited by the Canadian Association for Laboratory Accreditation (CALA). Tests were conducted under standard protocols (Environment Canada's Biological Test Methods). Tests of lethality included 96-hour acute lethality to rainbow trout (Environment Canada 2007a) and 48-hour acute lethality to *Daphnia magna* (Environment Canada 2000). Sublethal tests included the test of fathead minnow larval survival and growth (Environment Canada 2011), the test of *Ceriodaphnia dubia* (invertebrate) survival and reproduction (Environment Canada 2007b), the test of *Lemna minor* (plant) growth (Environment Canada 2007c) and the test of *Pseudokirchneriella subcapitata* (algae) growth (Environment Canada 2007d). Samples were collected using grab techniques in accordance with provincial and federal guidance (BCWLAP 2003; BCMOE 2012; Environment Canada 2012) and were supported by field meter measurements and concurrent water samples, which were submitted to a CALA accredited analytical laboratory (ALS Environmental) for chemical analysis.



MAP INFORMATION
 Map Projection NAD 83 UTM Zone 10N
 Data Source: Department of Natural Resources Canada. All rights reserved.
 Created By: J. Wilson
 Creation Date: October 2014
 Project No.: 2542

- Features**
- Toxicity Sampling Location
 - Bootjack Creek Dam
 - Water Collection Ditch
 - Embankment Pond
 - Waterbody
 - Watercourse
 - Road
 - Water Flow Direction

Figure 1:
Toxicity Sampling Locations, Mount Polley Mine Site

Created by:

Results

A total of 53 toxicity tests were conducted on water samples collected by the Mount Polley Mining Corporation (MPMC) between August 9th and September 30th 2014 (Table 1; Appendix A). No acute toxicity was observed, no effects to invertebrate survival were observed (in sublethal tests), and no effects on growth of plants or algae were observed. In a small number of tests (9 of 53), some biological responses were indicated. All toxicity test results are discussed below, by test type, including an examination of the reported responses in relation to concurrent water quality (Table 2).

Acute Toxicity Testing - Rainbow trout and Daphnia magna

Acute testing of rainbow trout (*Oncorhynchus mykiss*) and *Daphnia magna* (a copper-sensitive [USEPA 2007] microcrustacean of the Order Cladocera, often referred to as a water flea) indicated no lethality in any of the waters tested (Table 1).

Survival and Growth - Fathead minnow

Tests of survival and growth of fathead minnow (*Pimephales promelas*) indicated an effect on survival in one test out of 12 tests in total; an LC50 (median lethal concentration) of 84.1% at HAD-2 (the outlet of the second pipe conveying water from Polley Lake to Hazeltine Creek) on September 3, 2014 (Table 1). All other tests of fathead minnow indicated median lethal concentrations (LC50s) and median concentrations causing growth inhibition (IC50s) of greater than 100%. Growth inhibition, as evaluated using total biomass, was observed with the 25th percentile endpoint (IC25; Table 1) in two tests of the Hazeltine Discharge (of Polley Lake water discharged to Hazeltine Creek) and in one test of Quesnel River water. Examination of the toxicity test data (Appendix A) indicated that these apparent inhibitions were associated with low level mortality (fewer organisms result in lower total biomass per test chamber) and that consideration of individual dry weight data indicated no inhibition of individual biomass (Table 1). Examination of water quality data associated with the tests (i.e., from samples collected at the same location and time as the test water) did not indicate water quality conditions that would be expected to adversely affect aquatic life. Total copper was the only analyte that was elevated relative to the applicable BCWQG for the protection of aquatic life in waters where effects to fathead minnow were observed (i.e., total copper was elevated at HAD-1 and HAD-2 but not at QUR-1; Table 2; see Appendix B for reference values supporting applicable BCWQG). However, total metals do not effectively represent bioavailable metals (Allen 1993; Bergman et al 1997; Markich et al. 2001; ICMM and Eurometaux 2005). Dissolved

Table 1: Summary of Water Toxicity Testing in Support of MPMC Dam Breach Impact Assessment - August and September, 2014

Test	Location	Sample ID	Sample Date	LC50 (% v/v) ¹ (Median Lethal Concentration)	IC25 (% v/v) ¹ (25th Percentile Inhibitory Concentration)	IC50 (% v/v) ¹ (Median Inhibitory Concentration)
96-h rainbow trout survival (LC50)	Polley Lake	POL-2	August 9/2014	>100	-	-
	Polley Lake	POL-6-12M	September 30/2014	>100	-	-
	Hazeltine Discharge	HAD-1	August 13/2014	>100	-	-
	Hazeltine Discharge	HAD-1	August 20/2014	>100	-	-
	Quesnel Lake	QUL66-40m	August 21/2014	>100	-	-
	Quesnel Lake	QUL-66-40m-140828	August 28/2014	>100	-	-
	Quesnel River	QUR-1	August 6/2014	>100	-	-
48-h <i>Daphnia magna</i> survival (LC50)	Polley Lake	POL-2	August 9/2014	>100	-	-
	Polley Lake	POL-6-14M-140916	September 16/2014	>100	-	-
	Hazeltine Discharge	HAD-1	August 13/2014	>100	-	-
	Hazeltine Discharge	HAD-1	August 20/2014	>100	-	-
	Quesnel Lake	QUL66-40m	August 21/2014	>100	-	-
	Quesnel Lake	QUL-66-40m-140828	August 28/2014	>100	-	-
	Quesnel River	QUR-1	August 6/2014	>100	-	-
7-d fathead minnow survival and growth	Polley Lake	POL-6-14M-140916	September 16/2014	>100	>100	>100
	Hazeltine Discharge	HAD-1	August 13/2014	>100	>100	>100
	Hazeltine Discharge	HAD-1	August 20/2014	>100	>100	>100
	Hazeltine Discharge	HAD-1-140827	August 27/2014	>100	71.6 (47.0 - 98.8); >100 ²	>100
	Hazeltine Discharge	HAD-2-140903	September 3/2014	84.1 (52.1-100)	24.2 (na ³ - 100); >100 ²	>100
	Hazeltine Discharge	HAD-1-140910	September 10/2014	>100	>100	>100
	Quesnel Lake	QUL66-40m	August 21/2014	>100	>100	>100
	Quesnel Lake	QUL-66-40m-140828	August 28/2014	>100	>100	>100
	Quesnel Lake	QUL-66-45m-140903	September 3/2014	>100	>100	>100
	Quesnel Lake	QUL-66-48m-140910	September 10/2014	>100	>100	>100
	Quesnel Lake	QUL-66-40m-140916	September 16/2014	>100	>100	>100
Quesnel River	QUR-1	August 22/2014	>100	75.9 (24.9 - na ³); >100 ²	>100	
7-d <i>Ceriodaphnia dubia</i> survival and reproduction	Polley Lake	POL-2	August 9/2014	>100	>100	>100
	Polley Lake	POL-6-14M-140916	September 16/2014	>100	3.8 (na - 5.6)	5.3 (3.7 - 7.5)
	Hazeltine Discharge	HAD-1	August 13/2014	>100	>100	>100
	Hazeltine Discharge	HAD-1	August 20/2014	>100	>100	>100
	Hazeltine Discharge	HAD-1-140827	August 27/2014	>100	>100	>100
	Hazeltine Discharge	HAD-2-140903	September 3/2014	>100	>100	>100
	Hazeltine Discharge	HAD-1-140910	September 10/2014	>100	>100	>100
	Quesnel Lake	QUL66-40m	August 21/2014	>100	3.9 (2.4 - 6.3)	9.8 (7.0 - 20.1)
	Quesnel Lake	QUL-66-40m-140828	August 28/2014	>100	3.0 (1.4 - 4.0)	5.3 (4.3 - 9.0)
	Quesnel Lake	QUL-66-45m-140903	September 3/2014	>100	1.8 (0.9 - 6.4)	13.6 (9.0 - 53.8)
	Quesnel Lake	QUL-66-48m-140910	September 10/2014	>100	<1.56	2.5 (1.3 - 4.5)
	Quesnel Lake	QUL-66-40m-140916	September 16/2014	>100	<1.56	7.3 (5.3 - 10.0)
	Quesnel River	QUR-1	August 6/2014	>100	>100	>100
Quesnel River	QUR-1	August 22/2014	>100	>100	>100	
7-d <i>Lemna minor</i> growth inhibition	Polley Lake	POL-6-14M-140916	September 16/2014	-	>97	>97
	Hazeltine Discharge	HAD-1	August 20/2014	-	>97	>97
	Quesnel Lake	QUL66-40m	August 21/2014	-	>97	>97
	Quesnel Lake	QUL-66-40m-140828	August 28/2014	-	>97	>97
	Quesnel River	QUR-1	August 22/2014	-	>97	>97
72-h <i>Pseudokirchneriella subcapitata</i> growth inhibition	Polley Lake	POL-6-14M-140916	September 16/2014	-	>95.2	>95.2
	Hazeltine Discharge	HAD-1	August 13/2014	-	>95.2	>95.2
	Hazeltine Discharge	HAD-1	August 20/2014	-	>95.2	>95.2
	Quesnel Lake	QUL66-40m	August 21/2014	-	>95.2	>95.2
	Quesnel Lake	QUL-66-40m-140828	August 28/2014	-	>95.2	>95.2
	Quesnel River	QUR-1	August 22/2014	-	>95.2	>95.2

¹ effect concentration; in instances where an effect was observed, 95% confidence limits are also provided (where calculable)

² in instances where an effect to fathead minnow growth is reported, IC25 values are provided for both total biomass (first number) and individual dry weight (second number)

³ na = not applicable; could not be calculated

highlight indicates a reported effect

copper (which is better characterized as “filtered” [$<0.45 \mu\text{m}$] copper) better represents bioavailable copper and was below corresponding guideline levels. In fact, the dissolved copper concentration associated with the test for which an effect on survival was reported would have been $2.59 \mu\text{g/L}$ (84.1% v/v effect concentration [Table 1] x $3.08 \mu\text{g/L}$ dissolved copper [Table 2]), which is well below the corresponding guideline and would not explain acute lethality to fathead minnow, suggesting that the test result may be an anomaly. Furthermore, dissolved copper may remain an overestimate of bioavailable copper due to the presence of small particles, colloids and complexation with dissolved ligands such as dissolved organic carbon (e.g., Morel 1983; Pagenkopf 1983; Markich et al. 2001; Grosell 2012). Biotic ligand modeling (BLM), which combines a geochemical model, a metal-organic matter binding model and a toxicological model to account for the key factors that influence the bioavailability and toxicity of a number of metals (DiToro et al. 2001; Niyogi and Wood 2004; USEPA 2007; Erickson 2013; Smith 2014) indicated that:

- 1) copper-associated lethality to fathead minnow would only be expected at dissolved copper concentrations greater than approximately $680 \mu\text{g/L}$ in the Hazeltine Discharge and $166 \mu\text{g/L}$ in the Quesnel River (actual toxic units of 0.003 and 0.004, respectively; see Appendix C); and
- 2) lowest chronic effects associated with dissolved copper (i.e., effects to the most sensitive species and life stage) would not be expected at concentrations below $9.3 \mu\text{g/L}$ in the Hazeltine Discharge and $6.9 \mu\text{g/L}$ in the Quesnel River (see Appendix C).

Due to a lack of concordance between the toxicity test results and water chemistry, there is no apparent cause of the effects observed in three fathead minnow tests. Nevertheless, because biological responses were observed, it is appropriate to undertake confirmatory testing (see recommendation section below).

Survival and Reproduction - Ceriodaphnia dubia

Tests of survival and reproduction of *C. dubia* (also a copper-sensitive cladoceran; USEPA 2007) indicated no lethality. However, all Quesnel Lake deep water samples were observed to impair *C. dubia* reproduction (Table 1). The Quesnel Lake deep water samples are characterized by turbidity and total suspended solids (47.5 to 111 NTU and 20.7 to 40.6 mg/L , respectively; Table 2) greater than applicable BCWQG, which in turn, result in elevated total concentrations of a number of metals (total chromium, total copper, total iron, and total vanadium were greater than BCWQG in three or more samples; Table

2). However, as previously indicated, total metals do not effectively represent bioavailable metals. Concentrations of dissolved chromium, dissolved iron and dissolved vanadium were all below the corresponding BCWQG, whereas concentrations of dissolved copper were greater than the 30-d (chronic) guideline for total copper (but lower than the maximum [acute] guideline), with concentrations in samples accompanying the toxicity tests ranging from 5.01 to 6.20 µg/L (at 100% v/v; Table 2). To investigate the potential that copper was responsible for the observed reproductive impairment, BLMs were applied and indicate that risk ratios (the concentration of dissolved copper relative to predicted no-effect concentrations) are near unity (1.0) for the Quesnel Lake deep water samples (up to 1.09; Appendix C). This comparison is somewhat conservative because dissolved copper concentrations include copper associated with particles and colloids smaller than 0.45 µm in diameter whereas the BLM does not account for small particulates and colloids. However, this comparison does not explain impairment at the low concentrations observed (i.e., IC25s of <1.6% to 3.9% v/v and IC50s of 2.5% to 13.6% v/v; Table 1). Additional testing is recommended to verify the response and further explore potential cause (if the response is verified), including the possible influence of suspended solids on this filter feeding organism (see recommendation section below). Verification is partially justified due to the potential for false positive results, which are not uncommon in tests of *C. dubia* (USEPA 2001, 2002).

The only other observation of impaired reproduction in *C. dubia* was for the Polley Lake deep water sample (14 meter depth collected on September 16th, 2014; Table 1). Concentrations of most analytes in this sample were below applicable BCWQGs, with the exception of low dissolved oxygen (0.2 mg/L), elevated nitrite (0.22 mg/L, which was greater than the maximum [acute] guideline of 0.06 mg/L applicable to low chloride water such as those of Polley Lake) and slightly elevated total copper (but not dissolved copper; Table 2). The elevated nitrite concentration is consistent with reduced conditions evident based on low dissolved oxygen concentrations. Although toxicity tests are conducted on oxygenated waters (Appendix A), nitrite is generally considered to oxidize to nitrate at a rate sufficiently slow that the majority of nitrite initially present in the test water would remain through testing (e.g., Kroupova et al. 2008). To investigate the potential that nitrite was responsible for the observed reproductive impairment, a search of nitrite toxicity to cladoceran reproduction was undertaken (using the United States Environmental Protection Agency's ECOTOX database and other online resources) and yielded few results. A recent evaluation of the effects of nitrite to aquatic animals indicated reproductive impairment (25th percentile effective concentration) in *C. dubia* at 1.9 mg/L

(USEPA 2010). Given that this concentration is well above the nitrite concentration in the Polley Lake sample of September 16th 2014 (i.e., 0.22 mg/L at 100% v/v), nitrite does not explain impairment at the low concentrations observed (i.e., IC25 of 3.8% v/v and IC50 of 5.3% v/v; Table 1).

Plant Growth Inhibition - Lemna minor and Pseudokirchneriella subcapitata

Testing of the growth of the aquatic plant *L. minor* and the algae *P. subcapitata* indicated no impairment of growth in any water, even the deep, turbid waters collected in Quesnel Lake (Table 1).

Summary

Overall, toxicity testing conducted in waters affected by the Mount Polley tailings dam breach indicated few adverse effects. No acute toxicity was observed, no effects to *C. dubia* survival were observed, and no effects on growth of plants or algae were observed. However, some biological responses were observed and it is therefore recommended that those samples are retested to confirm whether these were true toxic responses or potential artifacts of the testing procedures.

Reported effects to fathead minnow did not corroborate well with water chemistry results. Impaired reproduction of *C. dubia* was only observed when exposed to waters collected from depth in Quesnel Lake and Polley Lake. These waters were of the poorest quality of any samples collected. The Quesnel Lake samples had elevated turbidity (47.5 to 111 NTU), suspended solids (20.7 to 40.6 mg/L), total metals, and dissolved copper (5.01 to 6.20 µg/L). In Polley Lake, water collected from depth (14 meters) had low dissolved oxygen concentrations (0.2 mg/L) and elevated concentrations of nitrite (0.22 mg/L). It is noted that the oxygen levels in Polley Lake have been restored since testing. Neither copper concentrations in the Quesnel Lake deep samples, nor nitrite in the Polley Lake deep sample were sufficient to explain the reproductive inhibition of *C. dubia* observed at low sample concentrations (IC25s of <1.5% to 3.9% v/v) and additional testing is recommended to verify the responses and explore potential causes.

Recommendations for Toxicity Testing

Based on the toxicity data collected in August and September 2014 as part of initial response monitoring, the following recommendations are provided to verify responses, optimize testing, and reduce or eliminate uncertainties (Table 3):

Table 3: Recommended Water Toxicity Testing Program for Mount Polley, Fall and Winter 2014/2015

A) Surveillance Monitoring

Location	Tests	Frequency ¹
Polley Lake or Hazeltine Discharge	7-d fathead minnow survival and growth ²	bi-monthly ³
	7-d <i>Ceriodaphnia dubia</i> survival and reproduction	bi-monthly ³
Quesnel Lake	7-d fathead minnow survival and growth ²	bi-monthly ³
	7-d <i>Ceriodaphnia dubia</i> survival and reproduction	bi-monthly ³
Quesnel River	7-d fathead minnow survival and growth ⁴	monthly
	7-d <i>Ceriodaphnia dubia</i> survival and reproduction	monthly

¹ frequency to be re-evaluated in spring of 2015 following receipt and interpretation of results from November 2014 to March 2015

² on the first month of testing, augment with 7-d test of rainbow trout survival and growth

³ every second month, as permitted by safety considerations

⁴ on the first two months of testing, augment with 7-d test of rainbow trout survival and growth and rainbow trout embryo-alevin (EA) test

B) Investigations

Investigation	Tests	Location	Timing
inhibition of <i>Ceriodaphnia dubia</i> reproduction	7-d <i>Ceriodaphnia dubia</i> survival and reproduction	Quesnel Lake QUL-66 at a minimum of 3 vertical strata ¹	as soon as possible
lethality and growth inhibition of fathead minnow	7-d fathead minnow survival and growth and 7-d rainbow trout survival and growth	Polley Lake and Quesnel River	as soon as possible

¹ minimum of 3 vertical strata corresponding with high, medium and low turbidity (near bottom, middle and near surface, but actual depth will change with lake mixing); test both the whole sample and filtered sample (0.45 µm)

- Discontinue acute lethality testing (rainbow trout and *D. magna*) as well as the sub-lethal testing of *L. minor* (plant) and *P. subcapitata* (algae) as no effects have been observed in these tests. Consideration should be given to developing a trigger by which the plant and algae tests would be conducted (e.g., based on confirmed effects to fish or invertebrates);
- Augment the fish tests (of fathead minnow) with testing of rainbow trout early life stages when high quality rainbow trout of appropriate life stage are available. Recommended tests are the 7-day survival and growth test (Lazorchak and Smith 2007) at all proposed surveillance monitoring locations (Table 3) and the embryo-alevin test (Environment Canada 1998) in the Quesnel River (Table 3).
- Investigate the equivocal results of the fathead minnow testing using the new sublethal toxicity test data for both fathead minnow and rainbow trout.
- Verify reproductive inhibition of *C. dubia* in turbid waters and investigate the cause of any observed effects with a view to determining apparent thresholds if the response is verified. Test *C. dubia* under a range of total suspended solids/turbidity (as occurs in Quesnel Lake and which may be lower than in August and September 2014) and initially in both unfiltered and filtered samples to potentially allow the characterization of site-specific thresholds.
- Continue to collect water quality samples from at least one deep location in Polley Lake to characterize seasonal cycling of dissolved oxygen and nitrite concentrations. Data should be carefully examined to determine if/when elevated nitrite concentrations occur.

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APPENDIX A

Toxicity Test Reports (Nautilus Environmental)

CONTENTS OF APPENDIX A

- Part 1: Toxicity testing on a sample identified as QUR-1: Sample collected August 6, 2014 (Report date: August 11, 2014)
- Part 2: Toxicity testing on a sample identified as QUR-1: Sample collected August 6, 2014 (Report date: August 21, 2014)
- Part 3: Toxicity testing on a sample identified as POL-2: Sample collected August 9, 2014 (Report date: August 15, 2014)
- Part 4: Toxicity testing on a sample identified as POL-2: Sample collected August 9, 2014 (Report date August 26, 2014)
- Part 5: Toxicity testing on a sample identified as HAD-1: Sample collected August 13, 2014 (Report date August 18, 2014)
- Part 6: Toxicity testing on a sample identified as HAD-1: Sample collected August 13, 2014 (Report date September 30, 2014; Revised December 4, 2014)
- Part 7: Toxicity testing on a sample identified as HAD-1: Sample collected August 20, 2014 (Report date August 26, 2014)
- Part 8: Toxicity testing on a sample identified as HAD-1: Sample collected August 20, 2014 (Report date October 9, 2014; Revised December 4, 2014)
- Part 9: Toxicity testing on a sample identified as QUL66-40m: Sample collected August 21, 2014 (Report date October 9, 2014; Revised December 4, 2014)
- Part 10: Toxicity testing on a sample identified as QUL66-40m: Sample collected August 21, 2014 (Report date August 26, 2014)
- Part 11: Toxicity testing on a sample identified as QUR-1: Sample collected August 22, 2014 (Report date August 29, 2014)
- Part 12: Toxicity testing on a sample identified as QUR-1: Sample collected August 22, 2014 (Report date October 21, 2014; Revised December 4, 2014)

- Part 13: Toxicity testing on a sample identified as HAD-1-140827: Sample collected August 27, 2014 (Report date October 21, 2014; Revised December 4, 2014)
- Part 14: Data Report – Toxicity testing on a sample identified as QUL-66-40m-140828: Sample collected August 28, 2014 (Report date September 3, 2014)
- Part 15: Toxicity testing on a sample identified as QUL66-40m-140828: Sample collected August 28, 2014 (Report date October 21, 2014; Revised December 4, 2014)
- Part 16: Toxicity testing on samples identified as HAD-2-140903 and QUL-66-45m-140903: Samples collected September 3, 2014 (Report date October 24, 2014; Revised December 4, 2014)
- Part 17: Toxicity testing on samples identified as HAD-1-140910 and QUL-66-48m-140910: Samples collected September 10, 2014 (Report date October 24, 2014; Revised December 4, 2014)
- Part 18: Toxicity testing on a sample identified as QUL-66-40m-140916: Samples collected September 16, 2014 (Report date October 24, 2014)
- Part 19: Toxicity testing on a sample identified as POL-6-14m-140916: Samples collected September 16, 2014 (Report date September 23, 2014)
- Part 20: Toxicity testing on a sample identified as POL-6-14m-140916: Samples collected September 16, 2014 (Report date October 24, 2014)
- Part 21: Toxicity testing on a sample identified as POL-6-12m: Samples collected September 30, 2014 (Report date October 17, 2014)

PART 1

Toxicity testing on a sampled identified as QUR-1: Sample collected August 6, 2014 (Report date: August 11, 2014)



Mount Polley Mining Corporation
ATTN: Colleen Hughes
Box 12
Likely, BC
VOL 1N0

Report Date: August 11, 2014
Work Order: 14512 - 513

Data Report

Species: Rainbow trout (*Oncorhynchus mykiss*)
Protocol: EPS 1/RM/13 (Second Ed. with 2007 amendments)

Species: *Daphnia magna*
Protocol: EPS 1/RM/14 (Second Ed. 2000)

Table 1. Results for the 96-h rainbow trout acute toxicity test.

Sample ID	Collection Date and Time	96-h LC50 (%v/v)
QUR-1	August 6, 2014 @ N/A	>100

Table 2. Results for the 48-h *Daphnia magna* acute toxicity test.

Sample ID	Collection Date and Time	48-h LC50 (%v/v)
QUR-1	August 6, 2014 @ N/A	>100

Tests met performance criteria and there were no deviations from the test methods. The results relate only to the sample tested.

Yvonne Lam, B.Sc.
Laboratory Biologist

Reviewed By:
Julianna Kalocai, M.Sc., R.P.Bio
QA Officer

Rainbow Trout Summary Sheet

Client: Mount Polley Mining Start Date/Time: Aug. 7, 2014 @ 1400
Work Order No.: 14512 Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: we QURH QUR-1
Sample Date: Aug. 6, 2014
Date Received: Aug. 7, 2014
Sample Volume: 2 x 20L
Other: alr

Test Validity Criteria:
≥ 90% control survival
WQ Ranges:
T (°C) = 15 ± 1; DO (mg/L) = 7.0 to 10.3; pH = 5.5 to 8.5

Dilution Water:

Type: Dechlorinated Municipal Tap Water
Hardness (mg/L CaCO₃): 9
Alkalinity (mg/L CaCO₃): 12

Test Organism Information:

Batch No.: 062414
Source: Vancouver Island Trout Hatchery
No. Fish/Volume (L): 10/12
Loading Density (g/L): 0.35
Mean Length ± SD (mm): 37 ± 4 Range: 33 - 45
Mean Weight ± SD (g): 0.42 ± 0.15 Range: 0.27 - 0.68

NaNO₂ Reference Toxicant Results:

Reference Toxicant ID: RTNT65
Stock Solution ID: 14NT01
Date Initiated: Aug. 1/14
96-h LC50 (95% CL): 4.1 (3.4 - 4.8) mg/L NaNO₂

Reference Toxicant Mean and Historical Range: 5.2 (2.0 - 13.6) mg/L NaNO₂
Reference Toxicant CV (%): 62

Test Results: The 96-h LC50 TS estimated to be >100% (v/v)

Reviewed by: JGU Date reviewed: Aug. 11/14

96-Hour Rainbow Trout Toxicity Test Data Sheet

Client/Project#: Mount Polley Mining Corporation
 Sample I.D.: WQ QUR-1
 W.O. #: 14512
 RBT Batch #: 062414
 Date Collected/Time: August 6/14 @ N/A
 Date Setup/Time: August 7/14 @ 1700
 Sample Setup By: JBF

 D.O. meter: 1/2/14
 pH meter: 1/2/13
 Cond. Meter: 1/2/13

Number Fish/Volume: 10/12
 7-d % Mortality: 0.25
 Total Pre-aeration Time (mins): 30
 Aeration rate adjusted to 6.5 ± 1 mL/min/L? (Y/N): Y

Undiluted Sample WQ			
Parameters	Initial WQ	Adjustment	30 min WQ
Temp °C	15.5	/	15.0
pH	8.1		7.8
D.O. (mg/L)	10.0		9.9
Cond. (µS/cm)	97		97

Concentration	# Survivors							Temperature (°C)					Dissolved Oxygen (mg/L)					pH					Conductivity (µS/cm)		
	(% v/v)	1	2	4	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
control				10	10	10	10	10	15.0	14.5	14.5	14.5	14.5	9.9	9.6	9.8	9.7	9.8	7.1	7.0	6.9	7.0	6.9	39	42
6.25				10	10	10	10	10	15.0	14.5	14.5	14.5	14.5	10.0	9.7	9.9	9.8	9.7	7.6	7.1	7.1	7.1	7.0	40	44
12.5				10	10	10	10	10	15.0	14.5	14.5	14.5	14.5	10.0	9.7	9.9	9.8	9.7	7.5	7.2	7.3	7.4	7.2	43	47
25				10	10	10	10	10	15.0	15.0	14.5	14.5	14.5	10.0	9.7	9.8	9.7	9.7	7.5	7.2	7.4	7.5	7.3	52	56
50				10	10	10	10	10	15.0	15.0	14.5	14.5	14.5	9.9	9.6	9.9	9.7	9.8	7.6	7.4	7.5	7.7	7.4	68	73
100				10	10	10	10	10	15.0	15.0	14.5	14.5	14.5	9.9	9.7	9.9	9.7	9.8	7.8	7.5	7.9	7.6	7.5	97	102
Initials				BTL	m	m	WNL	JBF	BTL	m	m	WNL	JBF	BTL	m	m	WNL	JBF	BTL	m	m	WNL	JBF	WNL	

WQ Ranges: T (°C) = 15 ± 1; DO (mg/L) = 7.0 to 10.3; pH = 5.5 to 8.5

Sample Description/Comments: clear

Fish Description at 96 h all fish appear ok Number of Stressed Fish at 96 h 0

Other Observations: _____

Reviewed by: JG Date Reviewed: Aug. 11/14

Daphnia magna Summary Sheet

Client: Mount Polley
Work Order No.: 14513

Start Date/Time: Aug. 7/14 @ 1400
Test Species: Daphnia magna
Set up by: _____

Sample Information:

Sample ID: QUR-1
Sample Date: Aug 6/14
Date Received: Aug. 7/14
Sample Volume: 2 x 20L

Test Validity Criteria:

≥ 90% mean control survival (no more than 2 mortalities in any control replicate)

WQ Ranges:

T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

Test Organism Information:

Broodstock No.: 0722/4A+B
Age of young (Day 0): <24 h
Avg No. young per brood in previous 7 d: 16
Mortality (%) in previous 7 d: 0
Days to first brood: 9

NaCl Reference Toxicant Results:

Reference Toxicant ID: Dm124
Stock Solution ID: 14Na01
Date Initiated: Aug 5/14
48-h LC50 (95% CL): 3.9 (2.8-5.5) g/L NaCl

Reference Toxicant Mean and Historical Range: 4.0 (3.7-4.3) g/L NaCl
Reference Toxicant CV (%): 4

Test Results:

The 48-h LC50 is estimated to be >100% (v/v).

Reviewed by:

JGU

Date reviewed:

Aug. 11/14

Freshwater Acute 48 Hour Toxicity Test Data Sheet

Client: Mount Polley
 Sample ID: QA-QUR-1
 Work Order No.: 14513

Start Date/Time: Aug 7, 2014 @ 1400
 No. Organisms/volume: 10/200mL
 Test Organism: D. magna
 Set up by: MLC

DO meter: 3 pH meter: 3 Conductivity meter: 3

Concentration (% v/v)	Number of Live Organisms Rep	Number of Live Organisms		No. Immobilized	Temperature (°C)			Dissolved oxygen (mg/L)			pH			Conductivity (µS/cm)	
		24	48		0	24	48	0	24	48	0	24	48	0	48
Control	A	10	10	0	20.0	19.5	19.5	8.3	8.3	8.2	8.2	8.2	8.1	355	359
	B														
	C														
	D														
0.25	A	10	10	0	20.0	19.5	19.5	8.4	8.3	8.2	8.2	8.2	8.2	343	351
	B														
	C														
	D														
12.5	A	10	10	0	20.0	19.5	19.5	8.4	8.3	8.3	8.2	8.2	8.2	325	329
	B														
	C														
	D														
25	A	10	10	0	20.0	19.5	19.5	8.5	8.3	8.2	8.2	8.2	8.2	292	298
	B														
	C														
	D														
50	A	10	10	0	20.0	19.5	19.5	8.6	8.4	8.2	8.1	8.3	8.2	228	233
	B														
	C														
	D														
100	A	10	10	0	20.0	19.5	19.6	8.6	8.4	8.2	8.1	8.4	8.3	98	103
	B														
	C														
	D														
Technician Initials		MLC	MLC	MLC	MLC	MLC	MLC	MLC	MLC	MLC	MLC	MLC	MLC	MLC	MLC

WQ Ranges: T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

	Hardness*	Alkalinity*
Conc.	*(mg/L as CaCO ₃)	
Control (MHW)	100	72
Highest conc.	40	40

	Initial WQ	Adjustment	Adjusted WQ
Temp (°C)	20.0		
DO (mg/L)	8.6		
pH	8.1		
Cond (µS/cm)	98		

Sample Description: clear no colour
 Comments: Batch#: 0722141148 7-d previous # young/brood: 168 Day of 1st Brood: 9 Previous 7-d % Mortality: 0
 Reviewed by: Joh Date reviewed: Aug. 11/14

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

Date Aug 6/14 Page 1 of 1

Sample Collection By:							ANALYSES REQUIRED										Receipt Temperature (°C)									
Report to:		Invoice to:					RBT LC 50	4512	Daphnia (LC50)	4513	7-d Cerio 14524															
Company		Mount Polley Mining Corporation																								
Address																										
City/Prov/Postal Code																										
Contact		Colleen Hughes																								
Phone																										
Email																										
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS																				
1	8/6/2014		water	Carboy	2							X	X	X												7.7
2																										
3																										
4																										
5																										
6																										
7																										
8																										
9																										
10																										

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)		RELIQUISHED BY (COURIER)	
Client:	Total # Containers:	2	Signature:			Signature:	
P.O. No.: 6400067506190	Good Condition?	Y	Print:			Print:	
Shipped Via:	Matches Schedule?	Y	Company:			Company:	
SPECIAL INSTRUCTIONS/COMMENTS: Cost Code 6400067 508190 ✓ ① client requested sample name change			RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)		
			Signature:		Signature: <i>Jacob Frank</i>		
			Print:		Print: Jacob Frank		
			Company:		Company: Nautilus ENV.		
		Time/Date:		Time/Date: August 7/14 @ 0830			

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 2

Toxicity testing on a sample identified as QUR-1: Sample collected August 6, 2014 (Report date: August 21, 2014)



Nautilus Environmental

Toxicity testing on a sample identified as QUR-1

Sample collected August 6, 2014

Final Report

Report date: August 21, 2014

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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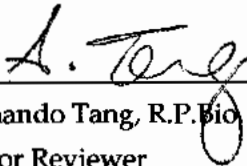
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- APPENDIX A - Toxicity Test Data
- APPENDIX B - Chain of Custody Form

SIGNATURE PAGE



Krysta Pearcy, B.Sc.
Testing Manager



Armando Tang, R.P. Bio
Senior Reviewer

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted a toxicity test for Mount Polley Mining Corporation on a sample identified as QUR-1. The sample was collected on August 6, 2014 and delivered to the laboratory in Burnaby, BC on August 7, 2014. The sample was transported in two 20-L plastic carboys and coolers. The sample was received at a temperature of 9.7°C and was stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing.

This report describes the results of the toxicity test conducted on sample QUR-1 using *Ceriodaphnia dubia*. Copies of laboratory data sheets and printouts of statistical analyses for the test are provided in Appendix A. The chain of custody form is provided in Appendix B.

2.0 METHODS

Methods for the toxicity test using *C. dubia* are summarized in Table 1. Testing was conducted according to procedures described by Environment Canada (2007). Statistical analyses for the test were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house culture
Test organism age	<24 h old neonates produced within 12 h
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20 mL test tube
Test volume	15 mL
Test replicates	10 test replicates per treatment
Number of organisms	1 per replicate
Control water	20% Perrier water
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	<i>Pseudokirchneriella subcapitata</i> and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada, (2007) EPS 1/RM/21
Statistical software	CETIS (2013)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods
Reference toxicant	Sodium chloride

3.0 RESULTS

Results of the toxicity test conducted on sample QUR-1 using *C. dubia* are provided in Table 2. No adverse effects on survival or reproduction were observed, resulting in LC50, IC25 and IC50 values of >100%.

Table 2. Results: *Ceriodaphnia dubia* survival and reproduction test.

Concentration (% v/v)	Survival (%)	Reproduction (Mean ± SD)
Control	100	18.8 ± 4.0
1.56	100	19.6 ± 3.4
3.12	100	18.8 ± 4.3
6.25	100	20.6 ± 2.2
12.5	100	18.7 ± 3.3
25	100	20.7 ± 2.7
50	100	21.9 ± 2.8
100	100	23.1 ± 3.8
Test endpoint		
LC50	>100	--
IC25	--	>100
IC50	--	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

4.0 QA/QC

The health history of the test organisms used in the exposure was acceptable and met the requirements of the Environment Canada protocol. The test met all control acceptability criteria and water quality parameters remained within ranges specified in the protocol throughout the test. There were no deviations from the test methodology. Uncertainty associated with this test is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

Results of the reference toxicant test conducted during the testing program are summarized in Table 3. Results for this test fell within the range for organism performance of mean and two standard deviation range, based on historical results obtained by the laboratory with this test. Thus, the sensitivity of the organisms used in this test was appropriate.

Table 3. Reference toxicant test results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>C. dubia</i>	LC50 = 1.8 g/L NaCl	1.8 (1.2 - 2.7) g/L NaCl	22	August 8, 2014
	IC50 = 1.4 g/L NaCl	1.3 (0.9 - 1.9) g/L NaCl	19	

5.0 REFERENCES

Environment Canada. 2007. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. EPS 1/RM/21, February 2007.

Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.7.16 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: Mount Pooley
 Work Order No.: 14521

Start Date/Time: Aug 9/14 @ 1045h
 Set up by: ALD

Sample Information:

Sample ID: QUR-1
 Sample Date: Aug 6/14
 Date Received: Aug 7/14
 Sample Volume: 2x20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 073114
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 20
 Mortality (%) in previous 7 d: 5
 Individual female # used ≥ 8 young on test day: 2, 3, 5, 6, 7, 8, 9, 10

NaCl Reference Toxicant Results:

Reference Toxicant ID: Ca 116
 Stock Solution ID: 1M NaCl
 Date Initiated: Aug 8/14

7-d LC50 (95% CL): 1.8 (1.5-2.2) g/L NaCl
 7-d IC50 (95% CL): 1.4 (1.0-2.1) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.8 (1.2-2.7) g/L NaCl CV (%): 22
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.3 (0.9-1.9) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		7100
IC50 % (v/v) (95% CL)		7100

Reviewed by: JGU

Date reviewed: Aug. 18/14

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: MOUNT POLEY
 Sample ID: W20001 GUR-1
 Work Order #: 14521

Start Date & Time: AUG 9 /14 @ 1045L
 Stop Date & Time: Aug 16/14 @ 115H
 Test Species: Ceriodaphnia dubia

Concentration Control	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.0	7.5	8.2	7.3	8.1	7.4	8.0	7.2	8.0	7.6	8.0	7.4	8.1	6.9
pH	7.9	7.7	7.9	7.7	8.0	7.8	7.9	7.8	8.0	7.8	8.0	7.8	8.0	7.6
Cond. (µS/cm)	210	209		210		208		217		216		217		220
Initials	A	A		EMM		EMM		EMM		EMM		EMM		EMM

Concentration (VIV) 1.56%	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.5	25.0	25.0	25.0
DO (mg/L)	8.0	7.5	8.1	7.2	8.1	7.6	8.1	7.3	8.2	7.7	7.9	7.5	8.2	7.1
pH	8.0	7.8	8.0	7.8	8.0	7.9	7.9	7.8	8.1	7.8	8.1	7.8	8.1	7.7
Cond. (µS/cm)	207	207		209		207		214		215		216		219
Initials	A	A		EMM		EMM		EMM		EMM		EMM		EMM

Concentration (VIV) 12.5%	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.5	25.0	25.0	25.0
DO (mg/L)	8.0	7.4	8.1	7.2	8.1	7.6	8.1	7.2	8.2	7.6	7.9	7.5	8.2	7.1
pH	7.9	7.9	7.9	7.8	8.0	7.9	7.9	7.8	8.2	7.8	8.1	7.9	8.1	7.7
Cond. (µS/cm)	193	196		195		195		203		204		205		207
Initials	A	A		EMM		EMM		EMM		EMM		EMM		EMM

Concentration (VIV) 100%	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.5	25.0	25.0	25.0	25.0	25.0
DO (mg/L)	8.0	7.3	8.1	7.1	8.2	7.5	8.1	7.2	8.1	7.6	8.0	7.4	8.1	7.2
pH	7.9	8.0	7.8	7.6	7.7	7.6	7.7	7.1	7.7	7.2	7.8	7.3	7.8	7.4
Cond. (µS/cm)	100	101		99		99		99		99		99		102
Initials	A	A		EMM		EMM		EMM		EMM		EMM		EMM

	Control	100% (VIV)		
Hardness*	100	50		
Alkalinity*	80	52		

Analysts: EMM, AWD
 Reviewed by: JGL
 Date reviewed: Aug. 18/14

* mg/L as CaCO3

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5

Sample Description: clear ①

Comments: Broodboard Used: 073114

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: MOUNT POLEY
 Sample ID: GURH-GUR-1
 Work Order: 14521

Start Date & Time: AUG 9 / 14 @ 1045h
 Stop Date & Time: AUG 16 / 14 @ 1115h
 Set up by: EDM AND JW

0% (v/v)

Days	Concentration: Control												Init	Concentration: 1.56												Init	Concentration: 3.12												Init
	A	B	C	D	E	F	G	H	I	J	A	B		C	D	E	F	G	H	I	J	A	B	C	D		E	F	G	H	I	J							
1	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/					
2	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/					
3	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/					
4	3	3	2	3	4	4	3	4	3	4	3	4	4	4	3	4	3	4	3	4	3	4	3	4	3	3	4	3	3	3	2	4	3	3					
5	6	5	7	6	7	3	6	6	4	8	7	8	5	6	8	8	7	4	9	6	7	7	7	2	6	7	8	6	5	7	5	7	8						
6	/	/	/	/	9	/	/	/	/	/	/	/	/	/	/	/	9	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/					
7	10	9	10	12	13	12	9	9	11	11	11	11	7	11	10	12	11	10	8	9	10	10	10	6	11	10	9	10	9	10	10	12	12						
8																																							
Total	19	17	19	21	24	12	22	18	13	23	EMM	16	21	21	24	21	13	23	17	19	21	EMM	8	20	20	21	19	17	20	17	23	23							

Days	Concentration: 6.25												Init	Concentration: 12.5												Init	Concentration: 25												Init
	A	B	C	D	E	F	G	H	I	J	A	B		C	D	E	F	G	H	I	J	A	B	C	D		E	F	G	H	I	J							
1	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/						
2	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/						
3	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/						
4	3	3	3	4	3	3	3	4	2	3	3	3	4	6	4	4	2	4	3	3	3	3	3	3	3	3	3	4	4	3	4	3	3						
5	7	7	5	7	6	6	6	8	6	8	8	8	4	6	6	5	5	7	6	7	3	7	7	6	7	4	6	8	7	8	6	7	6						
6	/	/	/	/	/	/	/	/	/	/	/	/	6	/	/	/	/	/	/	9	/	/	/	/	/	/	11	/	/	/	/	/	/	/					
7	9	12	10	11	13	10	10	9	11	14	14	14	11	10	13	8	8	10	9	11	10	10	10	10	11	11	10	13	11	12	12	11	11						
8																																							
Total	19	22	18	22	22	19	19	21	19	25	EMM	21	19	23	17	15	21	18	21	12	20	EMM	19	21	15	19	25	21	23	22	21	20							

Days	Concentration: 50												Init	Concentration: 100												Init	Concentration:												Init
	A	B	C	D	E	F	G	H	I	J	A	B		C	D	E	F	G	H	I	J	A	B	C	D		E	F	G	H	I	J							
1	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/						
2	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/						
3	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/						
4	3	3	4	2	4	3	3	4	2	3	3	3	3	2	3	3	4	4	3	3	4	4																	
5	7	8	8	7	6	7	8	8	5	8	8	8	7	8	8	4	5	9	9	8	9	9																	
6	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	11	12	/	/	/	/	/	/																
7	11	12	13	12	8	12	13	14	10	11	11	11	10	12	12	12	11	13	11	12	13	13																	
8																																							
Total	21	23	25	21	18	22	24	26	17	22	EMM	20	22	23	15	24	24	26	22	24	26	EMM																	

Notes: X = mortality.

Sample Description: 1
 Comments: Total # Young only based on the first 3 broods. Fourth and subsequent broods not included in total count.

Reviewed by: JGh Date reviewed: Aug. 18 / 14

CETIS Analytical Report

Report Date: 17 Aug-14 15:15 (p 1 of 2)
 Test Code: 14521 | 11-1468-1977

Ceriodaphnia 7-d Survival and Reproduction Test			Nautilus Environmental
Analysis ID: 14-4343-3185	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7	
Analyzed: 17 Aug-14 15:15	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes	
Batch ID: 19-0847-7675	Test Type: Reproduction-Survival (7d)	Analyst: Emma Marus	
Start Date: 09 Aug-14 10:45	Protocol: EPA/821/R-02-013 (2002)	Diluent: 20% Perrier Water	
Ending Date: 16 Aug-14 11:15	Species: Ceriodaphnia dubia	Brine:	
Duration: 7d 1h	Source: In-House Culture	Age: <24h	
Sample ID: 07-2370-0418	Code: 2B22CAC2	Client: Mount Polley	
Sample Date: 06 Aug-14	Material: Water Sample	Project:	
Receive Date: 07 Aug-14 08:30	Source: Mount Polley (MT POLLEY)		
Sample Age: 83h (9.7 °C)	Station: QUR-1		

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	872214	200	Yes	Two-Point Interpolation

Test Acceptability Criteria				
Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

7d Survival Rate Detail											
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 17 Aug-14 15:15 (p 2 of 2)
 Test Code: 14521 | 11-1468-1977

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

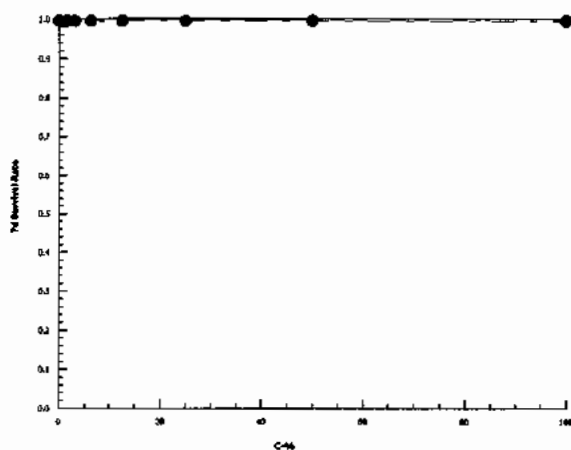
Analysis ID: 14-4343-3185 Endpoint: 7d Survival Rate
 Analyzed: 17 Aug-14 15:15 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 17 Aug-14 15:16 (p 1 of 2)
 Test Code: 14521 | 11-1468-1977

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 06-7733-5867 Endpoint: Reproduction
 Analyzed: 17 Aug-14 15:15 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

Batch ID: 19-0847-7675 Test Type: Reproduction-Survival (7d)
 Start Date: 09 Aug-14 10:45 Protocol: EPA/821/R-02-013 (2002)
 Ending Date: 16 Aug-14 11:15 Species: Ceriodaphnia dubia
 Duration: 7d 1h Source: In-House Culture

Analyst: Emma Marus
 Diluent: 20% Perrier Water
 Brine:
 Age: <24h

Sample ID: 07-2370-0418 Code: 2B22CAC2
 Sample Date: 06 Aug-14 Material: Water Sample
 Receive Date: 07 Aug-14 08:30 Source: Mount Polley (MT POLLEY)
 Sample Age: 83h (9.7 °C) Station: QUR-1

Client: Mount Polley
 Project:

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	2014709	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	18.8	15 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	18.8	12	24	1.263	3.994	21.25%	0.0%
1.56		10	19.6	13	24	1.067	3.373	17.21%	-4.26%
3.12		10	18.8	8	23	1.365	4.315	22.95%	0.0%
6.25		10	20.6	18	25	0.6864	2.171	10.54%	-9.57%
12.5		10	18.7	12	23	1.044	3.302	17.66%	0.53%
25		10	20.7	15	25	0.857	2.71	13.09%	-10.11%
50		10	21.9	17	26	0.9	2.846	13.0%	-16.49%
100		10	23.1	15	29	1.206	3.814	16.51%	-22.87%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	19	17	19	21	24	12	22	18	13	23
1.56		16	21	21	24	21	13	23	17	19	21
3.12		8	20	20	21	19	17	20	17	23	23
6.25		19	22	18	22	22	19	19	21	19	25
12.5		21	19	23	17	15	21	18	21	12	20
25		19	21	15	19	25	22	23	22	21	20
50		21	23	25	21	18	22	24	26	17	22
100		20	22	23	15	29	24	26	22	24	26

CETIS Analytical Report

Report Date: 17 Aug-14 15:16 (p 2 of 2)
Test Code: 14521 | 11-1468-1977

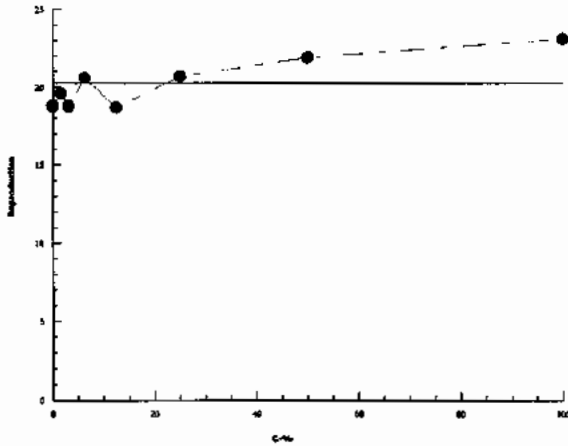
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 06-7733-5867 Endpoint: Reproduction
Analyzed: 17 Aug-14 15:15 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 17 Aug-14 15:18 (p 1 of 2)
 Test Code: 14521 | 11-1468-1977

Ceriodaphnia 7-d Survival and Reproduction Test				Nautilus Environmental			
Analysis ID: 03-4442-9967	Endpoint: Reproduction	CETIS Version: CETISv1.8.7		Official Results: Yes			
Analyzed: 17 Aug-14 15:18	Analysis: Nonparametric-Control vs Ord. Treatments	Batch ID: 19-0847-7675		Analyst: Emma Marus	Diluent: 20% Perrier Water		
Start Date: 09 Aug-14 10:45	Protocol: EPA/821/R-02-013 (2002)	Test Type: Reproduction-Survival (7d)		Brine:	Age: <24h		
Ending Date: 16 Aug-14 11:15	Species: Ceriodaphnia dubia	Source: In-House Culture		Client: Mount Polley	Project:		
Duration: 7d 1h	Source: Mount Polley (MT POLLEY)	Sample ID: 07-2370-0418		Code: 2B22CAC2			
Sample Date: 06 Aug-14	Material: Water Sample	Sample Date: 06 Aug-14		Material: Water Sample			
Receive Date: 07 Aug-14 08:30	Station: QUR-1	Receive Date: 07 Aug-14 08:30		Source: Mount Polley (MT POLLEY)			
Sample Age: 83h (9.7 °C)		Sample Age: 83h (9.7 °C)		Station: QUR-1			

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU
Untransformed	NA	C < T	NA	NA	100	>100	NA	1

Shirley Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		1.56	0.1694	1.645		18	>0.05	Asymp	Non-Significant Effect
		3.12	0.01708	1.716		18	>0.05	Asymp	Non-Significant Effect
		6.25	0.2173	1.739		18	>0.05	Asymp	Non-Significant Effect
		12.5	-0.09633	1.75		18	>0.05	Asymp	Non-Significant Effect
		25	0.2112	1.756		18	>0.05	Asymp	Non-Significant Effect
		50	0.305	1.76		18	>0.05	Asymp	Non-Significant Effect
		100	0.4122	1.763		18	>0.05	Asymp	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	18.8	15 - NL	Yes	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	181.95	25.99286	7	2.271	0.0380	Significant Effect
Error	824	11.44444	72			
Total	1005.95		79			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	5.81	18.48	0.5620	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9504	0.9579	0.0036	Non-normal Distribution

Reproduction Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	10	18.8	15.94	21.66	19	12	24	1.253	21.25%	0.0%
1.56		10	19.6	17.19	22.01	21	13	24	1.067	17.21%	-4.26%
3.12		10	18.8	15.71	21.89	20	8	23	1.365	22.95%	0.0%
6.25		10	20.6	19.05	22.15	20	18	25	0.6864	10.54%	-9.57%
12.5		10	18.7	16.34	21.06	19.5	12	23	1.044	17.66%	0.53%
25		10	20.7	18.76	22.64	21	15	25	0.857	13.09%	-10.11%
50		10	21.9	19.86	23.94	22	17	26	0.9	13.0%	-16.49%
100		10	23.1	20.37	25.83	23.5	15	29	1.206	16.51%	-22.87%

CETIS Analytical Report

Report Date: 17 Aug-14 15:18 (p 2 of 2)
 Test Code: 14521 | 11-1468-1977

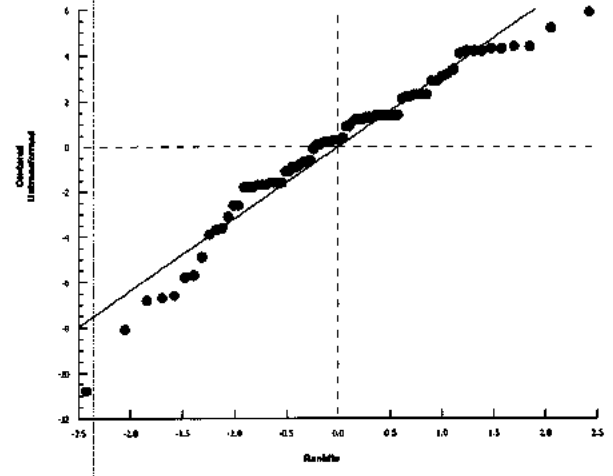
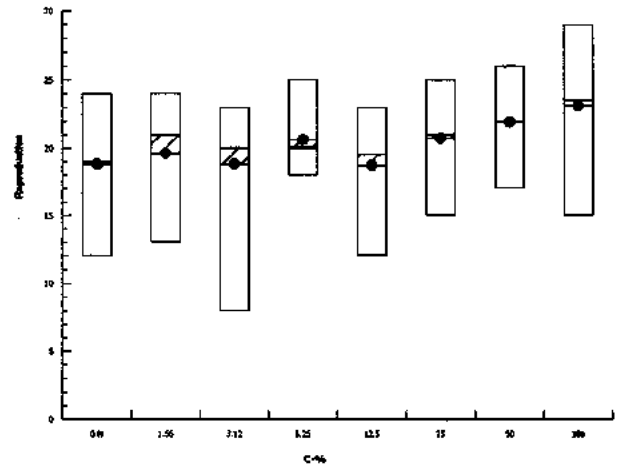
Ceriodaphnia 7-d Survival and Reproduction Test **Nautilus Environmental**

Analysis ID: 03-4442-9967 Endpoint: Reproduction CETIS Version: CETISv1.8.7
 Analyzed: 17 Aug-14 15:18 Analysis: Nonparametric-Control vs Ord. Treatments Official Results: Yes

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	19	17	19	21	24	12	22	18	13	23
1.56		16	21	21	24	21	13	23	17	19	21
3.12		8	20	20	21	19	17	20	17	23	23
6.25		19	22	18	22	22	19	19	21	19	25
12.5		21	19	23	17	15	21	18	21	12	20
25		19	21	15	19	25	22	23	22	21	20
50		21	23	25	21	18	22	24	26	17	22
100		20	22	23	15	29	24	26	22	24	26

Graphics



Client: Mt. Polley

W.O.#: 14521

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/LCaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
QUR-1	Aug 9/14	50	1.8	2.0	32	50	2.5	50	EMM
20% Permev (tl)	AUG 9/14	50	4.2	4.4	EMM 80	50	5.0	100	EMM

Notes: _____

Reviewed by: JGW

Date Reviewed: Aug. 18/14

APPENDIX B - Chain of Custody Form

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

Date Aug 6/14 Page 1 of 1

Sample Collection By:							ANALYSES REQUIRED										Receipt Temperature (°C)							
Report to:		Invoice to:					RBT LC 50 14512	Daphnia (LC50) 14513	7-d Cerio 14524															
Company		Mount Polley Mining Corporation																						
Address																								
City/Prov/Postal Code																								
Contact		<u>Colleen Hughes</u>																						
Phone																								
Email																								
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS																		
1 QUR-1 <u>QUR-2</u>	8/6/2014		water	Carboy	2					X	X	X												9.7
2 <u>QUR-1</u>																								
3																								
4																								
5																								
6																								
7																								
8																								
9																								
10																								
PROJECT INFORMATION		SAMPLE RECEIPT			RELIQUISHED BY (CLIENT)			RELIQUISHED BY (COURIER)																
Client:		Total # Containers:	2		Signature:			Signature:																
P.O. No.: <u>6400067506190</u>		Good Condition?	Y		Print:			Print:																
Shipped Via:		Matches Schedule?	Y		Company:			Company:																
					Time/Date:			Time/Date:																
SPECIAL INSTRUCTIONS/COMMENTS:					RECEIVED BY (COURIER)			RECEIVED BY (LABORATORY)																
Cost Code 6400067 506190 ✓ Ⓞ client requested sample name change					Signature:			Signature: <u>Jacob Frank</u>																
					Print:			Print: <u>Jacob Frank</u>																
					Company:			Company: <u>Nautilus ENV.</u>																
					Time/Date:			Time/Date: <u>August 7/14 @ 0830</u>																

PART 3

**Toxicity testing on a sample identified as POL-2: Sample collected August 9, 2014
(Report date: August 15, 2014)**



Mount Polley Mining Corporation
ATTN: Colleen Hughes
Box 12
Likely, BC
VOL 1N0

Report Date: August 15, 2014
Work Order: 14522 - 523

Data Report

Species: Rainbow trout (*Oncorhynchus mykiss*)
Protocol: EPS 1/RM/13 (Second Ed. with 2007 amendments)

Species: *Daphnia magna*
Protocol: EPS 1/RM/14 (Second Ed. 2000)

Table 1. Results for the 96-h rainbow trout acute toxicity test.

Sample ID	Collection Date and Time	96-h LC50 (%v/v)
POL-2	August 9, 2014 @ 1330h	>100

Table 2. Results for the 48-h *Daphnia magna* acute toxicity test.

Sample ID	Collection Date and Time	48-h LC50 (%v/v)
POL-2	August 9, 2014 @ 1330h	>100

Tests met performance criteria and there were no deviations from the test methods. The results relate only to the sample tested.

Yvonne Lam, B.Sc.
Laboratory Biologist

Reviewed By:
Julianna Kalocai, M.Sc., R.P.Bio
QA Officer

Rainbow Trout Summary Sheet

Client: Mount Polley Mining Corp.

Start Date/Time: August 11/14 @ 1345

Work Order No.: 14522

Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: POL-2
Sample Date: August 9/14 @ 1330
Date Received: August 11/14 @ 0845
Sample Volume: 2 x 20L
Other: N/A

Test Validity Criteria:

≥ 90% control survival
WQ Ranges:
T (°C) = 15 ± 1; DO (mg/L) = 7.0 to 10.3; pH = 5.5 to 8.5

Dilution Water:

Type: Dechlorinated Municipal Tap Water
Hardness (mg/L CaCO₃): 9
Alkalinity (mg/L CaCO₃): 12

Test Organism Information:

Batch No.: 062414
Source: Vancouver Island Trout Farm
No. Fish/Volume (L): 10/12
Loading Density (g/L): 0.32
Mean Length ± SD (mm): 36 ± 4 Range: 27 - 43
Mean Weight ± SD (g): 0.39 ± 0.15 Range: 0.22 - 0.64

NaNO₂ Reference Toxicant Results:

Reference Toxicant ID: RTNE65
Stock Solution ID: 14NE01
Date Initiated: August 1/14
96-h LC50 (95% CL): 4.1 (3.4 - 4.8) mg/L NaNO₂

Reference Toxicant Mean and Historical Range: 5.2 (2.0 - 13.6) mg/L NaNO₂
Reference Toxicant CV (%): 62

Test Results: The 96-h LC50 is >100% (N/A).

Reviewed by: JGw

Date reviewed: Aug 15/14

96-Hour Rainbow Trout Toxicity Test Data Sheet

Client/Project#: Mount Polley Mining Corporation
 Sample I.D.: POL-2
 W.O. #: 14522
 RBT Batch #: 061114
 Date Collected/Time: 09/08/2014 @ 13:30
 Date Setup/Time: 11/08/2014 @ 13:45
 Sample Setup By: BTL

 D.O. meter: 1/2/3/4
 pH meter: 1/2/3
 Cond. Meter: 1/2/3

Number Fish/Volume: 10/12L
 7-d % Mortality: 0.1
 Total Pre-aeration Time (mins): 30
 Aeration rate adjusted to 6.5 ± 1 mL/min/L? (Y/N): Y

Undiluted Sample WQ			
Parameters	Initial WQ	Adjustment	30 min WQ
Temp °C	15.0	/	15.0
pH	8.9	/	8.9
D.O. (mg/L)	8.2	/	9.1
Cond. (µS/cm)	195	/	194

Concentration (% v/v)	# Survivors							Temperature (°C)					Dissolved Oxygen (mg/L)					pH					Conductivity (µS/cm)	
	1	2	4	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
Control				10	10	10	10	15.0	14.5	14.0	14.0	13.5	9.8	9.6	9.5	9.9	10.0	7.0	6.9	7.3	6.7	6.7	35	41
6.25				10	10	10	10	14.5	14.5	14.0	14.0	14.0	9.8	9.9	9.5	10.0	10.0	7.2	7.3	7.3	6.9	6.8	46	51
12.5				10	10	10	10	14.5	14.5	14.0	14.0	14.0	9.8	9.9	9.7	10.1	10.0	7.3	7.4	7.4	7.0	6.9	57	62
25				10	10	10	10	14.5	14.5	14.0	14.5	14.0	9.7	9.8	9.8	10.0	10.1	7.6	7.5	7.5	7.1	7.1	78	84
50				10	10	10	10	14.5	14.5	14.0	14.5	14.5	9.7	9.8	9.8	9.9	10.1	8.3	7.6	7.7	7.4	7.3	118	123
100				10	10	10	10	15.0	14.5	14.0	14.5	14.5	9.1	9.7	9.7	9.9	10.0	8.9	7.9	7.9	7.7	7.6	194	204
Initials				JBF	JBF	JBF	JBF	BTL	JBF	JBF	JBF	JBF	BTL	JBF	JBF	JBF	JBF	BTL	JBF	JBF	JBF	JBF	BTL	JBF

WQ Ranges: T (°C) = 15 ± 1; DO (mg/L) = 7.0 to 10.3; pH = 5.5 to 8.5

Sample Description/Comments: Mild turbidity, yellowish tint.

Fish Description at 96 h All fish appear OK Number of Stressed Fish at 96 h 0

Other Observations: _____

Reviewed by: JGB

Date Reviewed: Aug 15/14

Daphnia magna Summary Sheet

Client: Mount Polley
Work Order No.: 14523

Start Date/Time: August 11, 2014 @ 1145
Test Species: Daphnia magna
Set up by: MM

Sample Information:

Sample ID: POL-2
Sample Date: August 9, 2014
Date Received: August 11, 2014
Sample Volume: 2 x 20L

Test Validity Criteria:

≥ 90% mean control survival (no more than 2 mortalities in any control replicate)

WQ Ranges:

T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

Test Organism Information:

Broodstock No.: 072214B
Age of young (Day 0): <24 h
Avg No. young per brood in previous 7 d: 18
Mortality (%) in previous 7 d: 0
Days to first brood: 10

NaCl Reference Toxicant Results:

Reference Toxicant ID: DM124
Stock Solution ID: 14NaCl
Date Initiated: Aug. 5, 2014
48-h LC50 (95% CL): 3.9 (2.8 - 5.5) g/L NaCl

Reference Toxicant Mean and Historical Range: 4.0 (3.7 - 4.3) g/L NaCl

Reference Toxicant CV (%): 4

Test Results: The 48-h LC50 is estimated to be >100% (v/v)

Reviewed by: JOU

Date reviewed: Aug. 15/14

Freshwater Acute 48 Hour Toxicity Test Data Sheet

Client: Mount Rolley
 Sample ID: POL-2
 Work Order No.: 14523

Start Date/Time: Aug 11 2014 @ 11:45
 No. Organisms/volume: 10/200mL
 Test Organism: D. magna
 Set up by: MM

DO meter: 3 pH meter: 3 Conductivity meter: 2/3

Concentration (% v/v)	Number of Live Organisms Rep	Number of Live Organisms		No. Immobilized	Temperature (°C)			Dissolved oxygen (mg/L)			pH			Conductivity (µS/cm)	
		24	48		48	0	24	48	0	24	48	0	24	48	0
Control	A	10	10	0	19.5	20.0	20.0	8.5	8.6	8.5	8.1	8.1	8.0	354	376
	B														
	C														
	D														
6.25	A	9	9	0	19.5	20.0	20.0	8.5	8.4	8.6	8.2	8.1	8.0	342	355
	B														
	C														
	D														
12.5	A	10	10	0	20.0	20.0	20.0	8.5	8.3	8.5	8.2	8.1	8.0	332	346
	B														
	C														
	D														
25	A	10	10	0	20.0	20.0	20.0	8.5	8.3	8.5	8.4	8.2	8.1	312	324
	B														
	C														
	D														
50	A	10	10	0	20.0	20.0	20.0	8.2	8.3	8.4	8.6	8.2	8.1	274	282
	B														
	C														
	D														
100	A	10	10	0	20.0	20.0	20.0	7.6	8.1	8.4	8.9	8.4	8.2	195	208
	B														
	C														
	D														
Technician Initials		MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM

WQ Ranges: T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

	Hardness*	Alkalinity*
Conc.	*(mg/L as CaCO ₃)	
Control (MHW)	100	72
Highest conc.	92	60

	Initial WQ	Adjustment	Adjusted WQ
Temp (°C)	20.0		
DO (mg/L)	7.6		
pH	8.9		
Cond (µS/cm)	195		

Sample Description: light yellow colour, slight particulates
 Comments: Batch#: 072214B 7-d previous # young/brood: 18 Day of 1st Brood: 10 Previous 7-d % Mortality: 0
 Reviewed by: JGB Date reviewed: Aug 15/14

Client: Mt. Polley

W.O.#: 14523

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
POL-2	Aug. 11/14	50	3.2	3.4	60	50	4.6	92	YHL
MHW	↓	50	3.7	3.8	72	50	5.0	100	YHL

Notes: _____

Reviewed by: JGU

Date Reviewed: Aug. 15/14

COPY

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

Date 09/08/2014 Page 1 of 1

wo# 14522
 wo# 14523
 wo# 14524
 99h RBT LC50
 48 h Daphnia Magna LC50
 7 Day C. Dubia
 20140809

ANALYSES REQUIRED

Sample Collection By:	Katie McMahon		Invoice to:		
Report to:			Company:	Mount Polley Mining Corporation	
Address:	Box 12		Address:	Box 12	
City/Prov/Postal Code:	Likely BC VOL 1N0		City/Prov/Postal Code:	Likely BC VOL 1N0	
Contact:	Colleen Hughes/ Deb McMillan		Contact:	Colleen Hughes/	
Phone:	(250) 790-2617		Phone:	(250) 790-2617	
Email:	chughes@mountpolley.com dmcmillan@minnow.ca		Email:	chughes@mountpolley.com	

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS								
POL-2	09/08/2014	13:30	water	20L	2		X	X	X					

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)		RELIQUISHED BY (COURIER)	
Client: Mount Polley Mining Corporation		Total # Containers:	wo# 2	Signature:		Signature:	
P.O. No.:		Good Condition?	Y	Print:		Print:	
Shipped Via: Greyhound		Matches Schedule?	Y	Company:		Company:	
SPECIAL INSTRUCTIONS/COMMENTS: Cost Code 6400067 506190 ① Confirmed w/ client possible w/				RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)	
				Signature:		Signature: <i>[Signature]</i>	
				Print:		Print: Vonne Lee	
				Company:		Company: Nautilus	
				Time/Date:		Time/Date: Aug. 11/14 @ 0845	

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 4

**Toxicity testing on a sample identified as POL-2: Sample collected August 9, 2014
(Report date August 26, 2014)**



Nautilus Environmental

Toxicity testing on a sample identified as POL-2

Sample collected August 9, 2014

Final Report

Report date: August 26, 2014

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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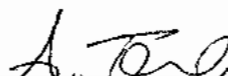
- APPENDIX A - Toxicity Test Data
- APPENDIX B - Chain of Custody Form

SIGNATURE PAGE



Krysta Pearcy, B.Sc.

Testing Manager



Armando Tang, R.P.Bio.

Senior Reviewer

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted a toxicity test for Mount Polley Mining Corporation on a sample identified as POL-2. The sample was collected on August 9, 2014 and delivered to the laboratory in Burnaby, BC on August 11, 2014. The sample was transported in two 20-L plastic carboys and coolers. The sample was received at a temperature of 17.6°C and was stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing.

This report describes the results of the toxicity test conducted on sample POL-2 using *Ceriodaphnia dubia*. Copies of laboratory data sheets and printouts of statistical analyses for the test are provided in Appendix A. The chain of custody form is provided in Appendix B.

2.0 METHODS

Methods for the toxicity test using *C. dubia* are summarized in Table 1. Testing was conducted according to procedures described by Environment Canada (2007). Statistical analyses for the test were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house culture
Test organism age	<24 h old neonates produced within 12 h
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20 mL test tube
Test volume	15 mL
Test replicates	10 test replicates per treatment
Number of organisms	1 per replicate
Control water	20% Perrier water
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	<i>Pseudokirchneriella subcapitata</i> and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada, (2007) EPS 1/RM/21
Statistical software	CETIS (2013)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods
Reference toxicant	Sodium chloride

3.0 RESULTS

Results of the toxicity test conducted on sample POL-2 using *C. dubia* are provided in Table 2. No adverse effects on survival or reproduction were observed, resulting in LC50, IC25 and IC50 values of >100%.

Table 2. Results: *Ceriodaphnia dubia* survival and reproduction test.

Concentration (% v/v)	Survival (%)	Reproduction (Mean ± SD)
Control	100	19.9 ± 2.9
1.56	100	17.6 ± 3.9
3.12	100	19.8 ± 3.2
6.25	90	18.0 ± 4.9
12.5	100	21.3 ± 4.9
25	100	20.8 ± 2.6
50	100	19.5 ± 7.3
100	100	20.6 ± 4.1
Test endpoint		
LC50	>100	--
IC25	--	>100
IC50	--	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

4.0 QA/QC

The health history of the test organisms used in the exposure was acceptable and met the requirements of the Environment Canada protocol. The test met all control acceptability criteria and water quality parameters remained within ranges specified in the protocol throughout the test. There were no deviations from the test methodology. Uncertainty associated with this test is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

Results of the reference toxicant test conducted during the testing program are summarized in Table 3. Results for this test fell within the range for organism performance of mean and two standard deviation range, based on historical results obtained by the laboratory with this test. Thus, the sensitivity of the organisms used in this test was appropriate.

Table 3. Reference toxicant test results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>C. dubia</i>	LC50 = 1.8 g/L NaCl	1.8 (1.2 - 2.7) g/L NaCl	22	August 8, 2014
	IC50 = 1.4 g/L NaCl	1.3 (0.9 - 1.9) g/L NaCl	19	

5.0 REFERENCES

Environment Canada. 2007. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. EPS 1/RM/21, February 2007.

Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.7.16 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: Mt Polley
 Work Order No.: 14524

Start Date/Time: Aug 11/14 @ 0930h
 Set up by: EMM

Sample Information:

Sample ID: ROL-2
 Sample Date: August 9/14
 Date Received: August 11/14
 Sample Volume: 2x20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 073114
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 25
 Mortality (%) in previous 7 d: 5
 Individual female # used ≥ 8 young on test day: 1, 2, 8, 9, 13, 17, 19

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd116
 Stock Solution ID: 14NaCl
 Date Initiated: August 8/14

7-d LC50 (95% CL): 1.8 (1.5 - 2.2) g/L NaCl
 7-d IC50 (95% CL): 1.4 (1.0 - 2.1) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.8 (1.2 - 2.7) g/L NaCl CV (%): 22
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.3 (0.9 - 1.9) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	7100
IC25 % (v/v) (95% CL)	7100	7100
IC50 % (v/v) (95% CL)	7100	7100

Reviewed by: JGL

Date reviewed: Aug. 20/14

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: MT. Palley
 Sample ID: POL-2
 Work Order #: 14524

Start Date & Time: Aug 11/14 @ 09:30h
 Stop Date & Time: Aug 13/14 @ 14:00h
 Test Species: Ceriodaphnia dubia

Concentration	Days															
	0		1		2		3		4		5		6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Control																
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.1	7.8	8.0	7.9	8.0	7.5	8.0	7.4	8.1	7.2	8.0	7.6	8.1	7.2	7.2	
pH	8.0	7.8	7.9	7.8	8.0	7.8	8.0	7.8	8.0	7.6	8.0	7.8	8.1	7.7	7.7	
Cond. (µS/cm)	210	208		217		216		217		215		216		214		
Initials	EMM	EMM		EMM		EMM		EMM		EMM		EMM		EMM		

Concentration (VIV) 1.56%	Days															
	0		1		2		3		4		5		6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.1	7.7	8.1	7.9	8.2	7.4	7.9	7.5	8.1	7.1	8.1	7.3	8.0	7.0	7.0	
pH	8.0	7.8	8.0	7.8	8.0	7.9	8.1	7.8	7.9	7.7	8.0	7.6	7.9	7.7	7.7	
Cond. (µS/cm)	209	207		216		215		217		216		215		215		
Initials	EMM	EMM		EMM		EMM		EMM		EMM		EMM		EMM		

Concentration (VIV) 12.5%	Days															
	0		1		2		3		4		5		6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.1	7.7	8.1	7.9	8.2	7.4	7.9	7.5	8.2	7.1	8.2	7.3	8.0	7.0	7.0	
pH	8.0	8.0	8.1	7.9	8.2	7.9	8.2	7.8	8.0	7.7	8.2	7.7	8.1	7.7	7.7	
Cond. (µS/cm)	205	204		214		213		214		215		213		214		
Initials	EMM	EMM		EMM		EMM		EMM		EMM		EMM		EMM		

Concentration (VIV) 100%	Days															
	0		1		2		3		4		5		6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.5	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.0	7.8	8.1	8.0	8.2	7.5	8.0	7.4	8.2	6.9	8.2	7.2	7.9	6.9	6.9	
pH	8.7	8.1	8.8	7.9	8.8	7.7	8.7	7.9	8.6	7.7	8.7	7.6	8.5	7.7	7.7	
Cond. (µS/cm)	195	196		199		198		199		201		200		204		
Initials	EMM	EMM		EMM		EMM		EMM		EMM		EMM		EMM		

	Control	100% (VIV)		
Hardness*	100	84		
Alkalinity*	80	64		

Analysts: EMM, AWD
KLP
 Reviewed by: JGL
 Date reviewed: Aug. 20/14

* mg/L as CaCO3
 WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5
 Sample Description: clear, slightly yellow 65µ

Comments: Broodboard Used: 073114

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt. Palen
 Sample ID: FOC-7
 Work Order: 14524

Start Date & Time: Aug 11/14 @ 0930h
 Stop Date & Time: Aug 18/14 @ 1400h
 Set up by: Emin

90 (WIV)

Days	Concentration: <u>Control</u>											Init	Concentration: <u>1.56</u>											Init	Concentration: <u>3.12</u>											Init
	A	B	C	D	E	F	G	H	I	J	A		B	C	D	E	F	G	H	I	J	A	B		C	D	E	F	G	H	I	J				
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	
3	✓	✓	✓	✓	✓	✓	✓	3	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	3	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	
4	✓	✓	4	3	✓	4	2	✓	4	3	✓	EMM	3	3	4	2	3	4	✓	3	3	4	✓	EMM	4	4	3	3	✓	4	2	3	4	3	EMM	
5	5	4	✓	7	4	7	5	7	6	6	✓	EMM	6	7	7	✓	6	7	5	5	6	✓	EMM	6	6	✓	7	4	7	5	✓	8	7	EMM		
6	7	6	7	8	7	✓	7	8	✓	✓	✓	EMM	8	✓	8	✓	✓	9	✓	✓	7	✓	EMM	✓	8	6	9	9	✓	9	6	8	✓	EMM		
7	11	13	8	✓	12	11	✓	✓	10	10	✓	EMM	✓	10	✓	11	✓	11	✓	11	9	✓	EMM	12	✓	11	✓	13	10	✓	10	✓	✓	EMM		
8																																				
Total	23	23	19	18	23	22	14	18	20	19	✓	✓	17	20	19	13	9	22	17	19	20	20	✓	✓	22	18	20	19	26	21	14	22	18	18	✓	

Days	Concentration: <u>6.25</u>											Init	Concentration: <u>12.5</u>											Init	Concentration: <u>25</u>											Init
	A	B	C	D	E	F	G	H	I	J	A		B	C	D	E	F	G	H	I	J	A	B		C	D	E	F	G	H	I	J				
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM		
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM		
3	✓	✓	2	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM		
4	4	2	✓	3	3	3	2	4	3	3	✓	EMM	3	3	4	3	3	✓	2	3	3	4	✓	EMM	4	✓	3	3	3	3	2	3	3	2	EMM	
5	7	6	6	6	7	7	4	6	8	7	✓	EMM	5	7	6	8	8	5	5	7	✓	7	✓	EMM	7	4	8	7	8	6	6	8	8	7	EMM	
6	9	✓	6	✓	✓	✓	✓	8	9	7	✓	EMM	✓	✓	✓	✓	7	✓	✓	9	✓	EMM	✓	6	9	7	✓	10	✓	✓	✓	10	EMM			
7	✓	11	✓	12	12	13	✓	✓	✓	✓	✓	EMM	✓	11	12	14	12	12	14	13	12	11	✓	EMM	13	10	✓	✓	12	✓	11	14	11	✓	EMM	
8																																				
Total	20	19	14	21	22	23	6	18	20	17	✓	✓	8	21	22	25	23	24	21	23	24	22	✓	✓	24	20	22	17	23	19	19	25	22	19	✓	

Days	Concentration: <u>50</u>											Init	Concentration: <u>100</u>											Init	Concentration: <u> </u>											Init
	A	B	C	D	E	F	G	H	I	J	A		B	C	D	E	F	G	H	I	J	A	B		C	D	E	F	G	H	I	J				
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											EMM		
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											EMM		
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											EMM		
4	3	3	4	✓	3	2	4	3	3	5	✓	EMM	3	✓	3	3	3	4	✓	3	3	3	✓	EMM											EMM	
5	6	7	6	4	✓	8	9	4	6	9	✓	EMM	7	5	7	6	7	9	6	8	7	5	✓	EMM											EMM	
6	✓	✓	10	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	8	✓	✓	9	✓	✓	✓	✓	✓	EMM											EMM		
7	11	12	✓	✓	✓	14	12	13	13	14	✓	EMM	12	✓	13	11	✓	15	12	10	14	10	✓	EMM											EMM	
8																																				
Total	20	22	20	11	3	24	25	20	22	28	✓	✓	22	13	23	20	19	28	18	21	24	18	✓	✓											EMM	

Notes: X = mortality.

Sample Description: low clear, slightly yellow

Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JGC

Date reviewed: Aug. 20/14

CETIS Analytical Report

Report Date: 20 Aug-14 09:54 (p 1 of 2)
 Test Code: 14524 | 07-8353-4278

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 17-6447-0552	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 20 Aug-14 9:52	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 17-8466-9685	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 11 Aug-14 09:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 18 Aug-14 14:00	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 4h	Source: In-House Culture	Age: <24h
Sample ID: 12-8535-0942	Code: 4C9CE61E	Client: Mount Polley
Sample Date: 09 Aug-14 13:30	Material: Water Sample	Project:
Receive Date: 11 Aug-14 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 44h (17.6 °C)	Station: POL-2	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1175322	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	0	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 20 Aug-14 09:54 (p 2 of 2)
Test Code: 14524 | 07-8353-4278

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 17-6447-0552
Analyzed: 20 Aug-14 9:52

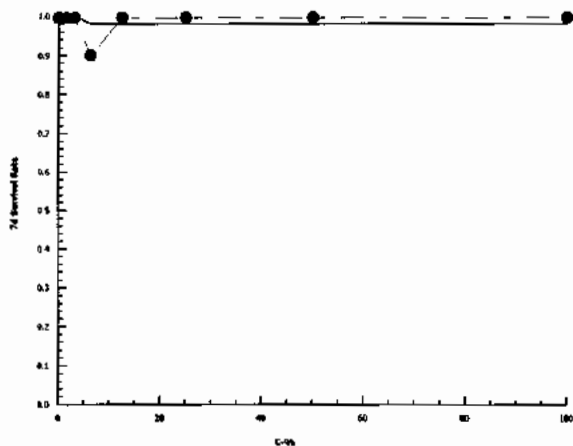
Endpoint: 7d Survival Rate
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 20 Aug-14 09:54 (p 1 of 2)
 Test Code: 14524 | 07-8353-4278

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 12-1939-0225	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 20 Aug-14 9:53	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 17-8466-9685	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 11 Aug-14 09:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 18 Aug-14 14:00	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 4h	Source: In-House Culture	Age: <24h
Sample ID: 12-8535-0942	Code: 4C9CE61E	Client: Mount Polley
Sample Date: 09 Aug-14 13:30	Material: Water Sample	Project:
Receive Date: 11 Aug-14 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 44h (17.6 °C)	Station: POL-2	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	881135	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	19.9	14	23	0.9244	2.923	14.69%	0.0%
1.56		10	17.6	9	22	1.231	3.893	22.12%	11.56%
3.12		10	19.8	14	26	1.02	3.225	16.29%	0.5%
6.25		10	18	6	23	1.563	4.944	27.47%	9.55%
12.5		10	21.3	8	25	1.535	4.855	22.79%	-7.04%
25		10	20.8	17	25	0.8138	2.573	12.37%	-4.52%
50		10	19.5	3	28	2.311	7.307	37.47%	2.01%
100		10	20.6	13	28	1.284	4.061	19.71%	-3.52%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	23	23	19	18	23	22	14	18	20	19
1.56		17	20	19	13	9	22	17	19	20	20
3.12		22	18	20	19	26	21	14	22	18	18
6.25		20	19	14	21	22	23	6	18	20	17
12.5		8	21	22	25	23	24	21	23	24	22
25		24	20	20	17	23	19	19	25	22	19
50		20	22	20	11	3	24	25	20	22	28
100		22	13	23	20	19	28	18	21	24	18

CETIS Analytical Report

Report Date: 20 Aug-14 09:54 (p 2 of 2)

Test Code: 14524 | 07-8353-4278

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 12-1939-0225

Endpoint: Reproduction

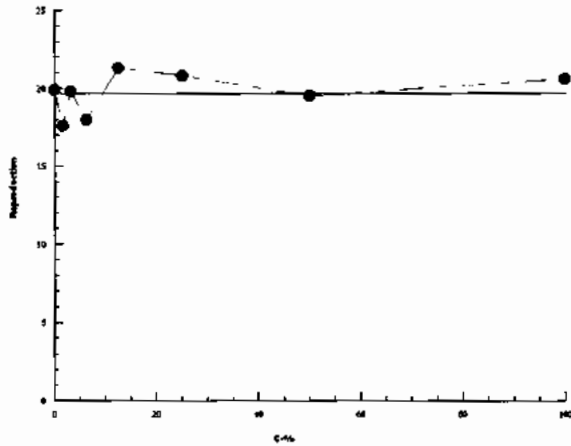
CETIS Version: CETISv1.8.7

Analyzed: 20 Aug-14 9:53

Analysis: Linear Interpolation (ICPIN)

Official Results: Yes

Graphics



Client: Mt. Polley

W.O.#: 14584

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
POL-2	Aug 11/14	50	3.3	3.4	64	50	4.2	84	EMM
20% Pemeo Ctrl	Aug 11/14	50	4.2	4.4	80	50	5.0	100	EMM

Notes: _____

Reviewed by: JGU

Date Reviewed: Aug. 20/14

APPENDIX B - Chain of Custody Form

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

Date 09/08/2014 Page 1 of 1

Sample Collection By: Katie McMahan	Report to:	Invoice to:
Company: Mount Polley Mining Corporation	Mount Polley Mining Corporation	Mount Polley Mining Corporation
Address: Box 12	Box 12	Box 12
City/Prov/Postal Code: Likely BC V0L 1N0	Likely BC V0L 1N0	Likely BC V0L 1N0
Contact: Colleen Hughes/ Deb McMillan	Colleen Hughes/ Deb McMillan	Colleen Hughes/ Deb McMillan
Phone: (250) 790-2617	(250) 790-2617	(250) 790-2617
Email: chughes@mountpolley.com dmcmillan@minnow.ca	chughes@mountpolley.com	chughes@mountpolley.com

14522
 14523
 14524
 96h RBT LCSD
 48 h Daphnia Magna LCSD
 7 Day C. Dubia

ANALYSES REQUIRED										Receipt Temperature (°C)
1	2	3	4	5	6	7	8	9	10	
X	X	X								16

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS
POL-2	09/08/2014	13:30	water	20L	2	

PROJECT INFORMATION	SAMPLE RECEIPT	RELIQUINSHED BY (CLIENT)	RELIQUINSHED BY (COURIER)
Client: Mount Polley Mining Corporation	Total # Containers: <i>2</i>	Signature:	Signature:
P.O. No.:	Good Condition? <i>Y</i>	Print:	Print:
Shipped Via: Greyhound	Matches Schedule? <i>Y</i>	Company:	Company:
SPECIAL INSTRUCTIONS/COMMENTS: Cost Code 6400067 506190 <i>Confirmed w/ client 08/11/14 ml</i>	RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)
	Signature:		Signature: <i>[Signature]</i>
	Print:		Print: <i>Yvonne Lee</i>
	Company:		Company: <i>Nautilus</i>
		Time/Date:	Time/Date: <i>Aug 11/14 @ 0845</i>

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 5

Toxicity testing on sampled identified as HAD-1: Sample collected August 13, 2014 (Report date August 18, 2014)



Mount Polley Mining Corporation
ATTN: Colleen Hughes
Box 12
Likely, BC
VOL 1N0

Report Date: August 18, 2014
Work Order: 14535 - 536

Data Report

Species: Rainbow trout (*Oncorhynchus mykiss*)
Protocol: EPS 1/RM/13 (Second Ed. with 2007 amendments)

Species: *Daphnia magna*
Protocol: EPS 1/RM/14 (Second Ed. 2000)

Table 1. Results for the 96-h rainbow trout acute toxicity test.

Sample ID	Collection Date and Time	96-h LC50 (%v/v)
HAD-1	August 13, 2014 @ 1127h	>100

Table 2. Results for the 48-h *Daphnia magna* acute toxicity test.

Sample ID	Collection Date and Time	48-h LC50 (%v/v)
HAD-1	August 13, 2014 @ 1127h	>100

Tests met performance criteria and there were no deviations from the test methods. The results relate only to the sample tested.

Yvonne Lam, B.Sc.
Laboratory Biologist

Reviewed By:
Julianna Kalocai, M.Sc., R.P.Bio
QA Officer

Rainbow Trout Summary Sheet

Client: Mount Polley Mining Corporation

Start Date/Time: August 14/14 @ 1400

Work Order No.: 14535

Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: HAD-1
Sample Date: August 13/14 @ 1127
Date Received: August 14/14 @ 0900
Sample Volume: 3 x 20L
Other: N/A

Test Validity Criteria:

≥ 90% control survival

WQ Ranges:

T (°C) = 15 ± 1; DO (mg/L) = 7.0 to 10.3; pH = 5.5 to 8.5

Dilution Water:

Type: Dechlorinated Municipal Tap Water
Hardness (mg/L CaCO₃): 9
Alkalinity (mg/L CaCO₃): 12

Test Organism Information:

Batch No.: 062414
Source: Vancouver Island Trout Farm
No. Fish/Volume (L): 10/12
Loading Density (g/L): 0.45
Mean Length ± SD (mm): 39 ± 4 Range: 33 - 46
Mean Weight ± SD (g): 0.54 ± 0.18 Range: 0.25 - 0.87

NaNO₂ Reference Toxicant Results:

Reference Toxicant ID: RTN65
Stock Solution ID: 14N601
Date Initiated: August 1/14
96-h LC50 (95% CL): 4.1 (3.4 - 4.8) mg/L NaNO₂

Reference Toxicant Mean and Historical Range: 5.2 (2.0 - 13.6) mg/L NaNO₂
Reference Toxicant CV (%): 62

Test Results: The 96-h LC50 is > 100% (N/A).

Reviewed by: JGU

Date reviewed: Aug. 18/14

96-Hour Rainbow Trout Toxicity Test Data Sheet

Client/Project#: Mount Polley Mining Corporation
 Sample I.D. HAD-1
 W.O. # 14535
 RBT Batch #: 062414
 Date Collected/Time: August 13/14 @ 1127
 Date Setup/Time: August 14/14 @ 1400
 Sample Setup By: JBF

Number Fish/Volume: 10/12
 7-d % Mortality: 0.00
 Total Pre-aeration Time (mins): 30
 Aeration rate adjusted to 6.5 ± 1 mL/min/L? (Y/N): Y

D.O. meter: 1/2/14
 pH meter: 1/2/13
 Cond. Meter: 1/2/13

Undiluted Sample WQ			
Parameters	Initial WQ	Adjustment	30 min WQ
Temp °C	15.0	/	15.0
pH	9.2	/	9.1
D.O. (mg/L)	8.8	/	9.8
Cond. (µS/cm)	194	/	195

Concentration (% v/v)	# Survivors							Temperature (°C)					Dissolved Oxygen (mg/L)					pH					Conductivity (µS/cm)	
	1	2	4	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
Control				10	10	10	10	15.5	14.5	14.5	14.5	14.0	9.8	10.0	9.8	9.7	9.8	6.8	7.1	6.9	7.0	7.1	35	41
6.25				10	10	10	10	15.0	14.5	14.5	14.5	14.0	10.0	9.9	9.7	9.8	9.8	6.9	6.9	7.0	7.1	6.8	46	55
12.5				10	10	10	10	15.0	14.5	14.5	14.5	14.0	9.9	9.9	9.7	9.8	9.7	7.3	7.0	7.1	7.2	7.0	55	66
25				10	10	10	10	15.0	14.5	14.5	14.5	14.0	9.8	10.0	9.8	9.7	9.8	7.9	7.3	7.3	7.5	7.4	74	88
50				10	10	10	10	15.0	14.5	14.5	14.5	14.0	9.7	9.9	9.8	9.8	9.9	8.7	7.6	7.5	7.6	7.4	117	125
100				10	10	10	10	15.0	14.5	14.5	14.5	14.0	9.8	9.9	9.8	9.8	9.9	9.1	7.8	7.7	7.8	7.7	195	210
Initials				JBF			JBF	JBF	JBF	JBF		JBF	JBF	JBF			JBF	JBF	JBF			JBF	JBF	JBF

WQ Ranges: T (°C) = 15 ± 1; DO (mg/L) = 7.0 to 10.3; pH = 5.5 to 8.5

Sample Description/Comments: clear, yellow

Fish Description at 96 h All fish OK Number of Stressed Fish at 96 h 0

Other Observations: _____

Reviewed by: JGL

Date Reviewed: Aug. 18/14

Daphnia magna Summary Sheet

Client: Mount Polley
Work Order No.: 14536

Start Date/Time: August 14, 2014 @ 1045
Test Species: Daphnia magna
Set up by: WML

Sample Information:

Sample ID: HAD-1
Sample Date: August 13, 2014
Date Received: August 14, 2014
Sample Volume: 3 x 20L

Test Validity Criteria:

≥ 90% mean control survival (no more than 2 mortalities in any control replicate)

WQ Ranges:

T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

Test Organism Information:

Broodstock No.: 073014A
Age of young (Day 0): <24h
Avg No. young per brood in previous 7 d: 15
Mortality (%) in previous 7 d: 0
Days to first brood: 9

NaCl Reference Toxicant Results:

Reference Toxicant ID: Dm124
Stock Solution ID: 14NA01
Date Initiated: August 5, 2014
48-h LC50 (95% CL): 3.9 (2.8-5.5) g/L NaCl
Reference Toxicant Mean and Historical Range: 4.0 (3.7-4.3) g/L NaCl
Reference Toxicant CV (%): 4

Test Results: The 48-h LC50 is estimated to be >100% (1/v).

Reviewed by: JGH

Date reviewed: Aug 18/14

Freshwater Acute 48 Hour Toxicity Test Data Sheet

Client: Mount Polley
 Sample ID: HAD-11
 Work Order No.: 14536

Start Date/Time: Aug 14 2014 @ 1045
 No. Organisms/volume: 10/200mL
 Test Organism: D. magna
 Set up by: YML

DO meter: 3 pH meter: 3 Conductivity meter: 3

Concentration (% v/v)	Number of Live Organisms Rep	Number of Live Organisms		No. Immobilized	Temperature (°C)			Dissolved oxygen (mg/L)			pH			Conductivity (µS/cm)	
		24	48		0	24	48	0	24	48	0	24	48	0	48
Control	A	10	10	0	19.5	20.0	20.0	8.9	8.6	8.5	8.2	8.1	8.1	350	369
	B														
	C														
	D														
6.25	A	10	10	0	19.5	20.0	20.0	8.9	8.6	8.6	8.3	8.1	8.1	342	359
	B														
	C														
	D														
12.5	A	10	10	0	19.5	20.0	20.0	8.8	8.7	8.5	8.5	8.2	8.1	326	381
	B														
	C														
	D														
25	A	10	10	0	19.0	20.0	20.0	8.6	8.6	8.5	8.6	8.4	8.3	306	321
	B														
	C														
	D														
50	A	10	10	0	18.5	20.0	20.0	8.4	8.6	8.5	8.9	8.5	8.4	278	290
	B														
	C														
	D														
100	A	10	10	0	18.0	20.0	20.0	8.6	8.6	8.6	9.1	8.9	8.5	195	211
	B														
	C														
	D														
Technician Initials		Y	Y	Y	YML	Y	Y	YML	Y	Y	YML	Y	Y	YML	Y

WQ Ranges: T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

	Hardness*	Alkalinity*
Conc.	*(mg/L as CaCO ₃)	
Control (MHW)	98	72
Highest conc.	92	72

	Initial WQ	Adjustment	Adjusted WQ
Temp (°C)	18.0		
DO (mg/L)	8.6		
pH	9.1		
Cond (µS/cm)	195		

Sample Description: clear no colour
 Comments: 0730148
 Batch#: 0730148 7-d previous # young/brood: 15 Day of 1st Brood: 9 Previous 7-d % Mortality: 0
 Reviewed by: JOU Date reviewed: Aug. 18/14

Client: MT. Polley

W.O.#: 14536

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/LCaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	Technician
HAD-1	aug 14	50	3.8	4.0	72	50	4.6	92	EMM
MHW	aug 14	50	3.7	3.8	72	50	4.9	98	EMM

Notes: _____

Reviewed by: JG

Date Reviewed: Aug. 18/14

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

Date 13/08/2014 Page 1 of 1

Sample Collection By: Katie McMahan			ANALYSES REQUIRED					
Report to:	Invoice to:		96h RBT LCO	48 h Daphnia magna LCOs	7 Day Ceriodaphnia dubia	7 day fathead Minnow	72h algal growth	Receipt Temperature (°C)
Company	Mount Polley Mining Corporation	Mount Polley Mining Corporation						
Address	Box 12	Box 12						
City/Prov/Postal Code	Likely BC V0L 1N0	Likely BC V0L 1N0						
Contact	Colleen Hughes Deb McMillan	Colleen Hughes/						
Phone	(250) 790-2617	(250) 790-2617						
Email	chughes@mountpolley.com dmcmillan@minnow.ca	chughes@mountpolley.com						

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	96h RBT LCO	48 h Daphnia magna LCOs	7 Day Ceriodaphnia dubia	7 day fathead Minnow	72h algal growth	Receipt Temperature (°C)
1 HAD-1	13/08/2014	11:27	water	20L	3		X	X	X	X	X	15.5
2												
3												
4												
5							14 535	14 536	14 537	14 538	14 539	
6												
7												
8												
9												
10												

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)		RELIQUISHED BY (COURIER)			
Client: Mount Polley Mining Corporation		Total # Containers:	3	Signature: <i>Katie McMahan</i>		Signature:			
P.O. No.:		Good Condition?	Y	Print: Katie McMahan		Print:			
Shipped Via: Greyhound		Matches Schedule?	N	Company: MPMC		Company:			
SPECIAL INSTRUCTIONS/COMMENTS: Cost Code 6400067 506190				Time/Date: 13/08/2014 17:00		Time/Date:			
		RECEIVED BY (COURIER)				RECEIVED BY (LABORATORY)			
		Signature:				Signature: <i>Jacob Frank</i>			
		Print:				Print: Jacob Frank			
				Company:		Company: Nautilus ENVU.			
				Time/Date:		Time/Date: August 14/14 @ 0900			

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 6

Toxicity testing on a sampled identified as HAD-1: Sample collected August 13, 2014 (Report date September 30, 2014; Revised December 4, 2014)



Nautilus Environmental

Toxicity testing on a sample identified as HAD-1

Sample collected August 13, 2014

Final Report

Report date: September 30, 2014, revised December 4, 2014

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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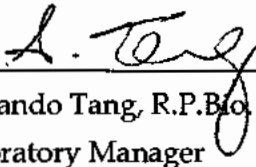
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- APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data
- APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data
- APPENDIX C - *Pseudokirchneriella subcapitata* Toxicity Test Data
- APPENDIX D - Chain of Custody Form

SIGNATURE PAGE



Krysta Pearcy, B.Sc.
Laboratory Biologist



Armando Tang, R.P.Bio
Laboratory Manager

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted toxicity tests for Mount Polley Mining Corporation on a sample identified as HAD-1. The sample was collected on August 13, 2014 and delivered to the laboratory in Burnaby, BC on August 14, 2014. The sample was transported in three 20-L plastic carboys and coolers. The sample was received at a temperature of 15.5°C and was stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing. The following sub-lethal toxicity tests were performed on the sample:

- *Ceriodaphnia dubia* survival and reproduction
- 7-d fathead minnow (*Pimephales promelas*) survival and growth
- 72-h algal (*Pseudokirchneriella subcapitata*) growth inhibition

This report describes the results of these toxicity tests. Copies of laboratory data sheets and printouts of statistical analyses for each test are provided in Appendices A to C. The chain-of-custody form is provided in Appendix D. This report was revised from an earlier version to incorporate data for dry weight of fathead minnows, in addition to biomass.

2.0 METHODS

Methods for the toxicity tests are summarized in Tables 1 to 3. Testing was conducted according to procedures described by the Environment Canada protocols (2007a, 2007b and 2011). Statistical analyses for all tests were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house culture
Test organism age	<24 h old neonates produced within 12 h
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20 mL test tube
Test volume	15 mL
Test replicates	10 test replicates per treatment
Number of organisms	1 per replicate
Control water	20% Perrier water
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	<i>Pseudokirchneriella subcapitata</i> and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada, (2007a) EPS 1/RM/21
Statistical software	CETIS (2013)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods
Reference toxicant	Sodium chloride

Table 2. Summary of test conditions: fathead minnow (*Pimephales promelas*) survival and growth test.

Test organism	<i>Pimephales promelas</i>
Test organism source	Aquatic BioSystems, Fort Collins, CO
Test organism age	<24 hours
Test type	Static renewal
Test duration	7 days
Test vessel	375-mL glass containers
Test volume	250 mL
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control water	Moderately-hard water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	Twice a day with newly hatched brine shrimp (<i>Artemia nauplii</i>)
Light intensity	100 – 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test protocol	Environment Canada (2011), EPS 1/RM/22
Statistical software	CETIS (2013)
Test endpoint	Survival and biomass
Test acceptability criteria for controls	≥80% survival, ≥250 µg mean dry weight
Reference toxicant	Sodium Chloride

Table 3. Summary of test conditions: *Pseudokirchneriella subcapitata* growth inhibition test.

Test organism	<i>Pseudokirchneriella subcapitata</i> , strain UTCC #37
Test organism source	In-house culture, obtained from Canadian Phycological Culture Center, and originally isolated from Nitelva River, Norway.
Test organism age	3- to 7-day old culture in logarithmic growth phase
Test type	Static
Test duration	72 hours
Test vessel	Microplate
Test volume	220 µL
Test replicates	4 replicates per treatment; 8 replicates for control
Number of organisms	10,000 cells/mL
Control water	Deionized water with supplemented nutrients
Test solution renewal	None
Test temperature	24 ± 2°C
Feeding	None
Light intensity	3600 to 4400 lux
Photoperiod	24 hours light
Aeration	None
Test protocol	Environment Canada (2007b), EPS1/RM/25
Statistical software	CETIS (2013)
Test endpoint	Algal cell growth inhibition
Test acceptability criteria for controls	≥ 16-fold increase in number of algal cells; CV ≤ 20%; no trend when analyzed using Mann-Kendall test
Reference toxicant	Zinc

3.0 RESULTS

There were no adverse effects observed on survival and reproduction of *C. dubia* (Table 4), survival and growth of fathead minnow (Table 5), or cell yield of *P. subcapitata* (Table 6). The LC and IC values were therefore greater than the highest concentration tested for each of these endpoints in all toxicity tests. In addition, stimulation was observed in the *C. dubia* and *P. subcapitata* tests. For *C. dubia*, reproduction enhancement was observed in the four highest concentrations and ranged from 2.6 to 21.1%. For *P. subcapitata*, algal stimulation was observed in most concentrations and ranged from 9.6 to 282.2%.

Table 4. Results: *Ceriodaphnia dubia* survival and reproduction test.

Concentration (% v/v)	Survival (%)	Reproduction (mean ± SD)	Stimulation (%)
Control	100	19.4 ± 3.6	--
1.56	100	19.2 ± 4.9	--
3.12	90	16.9 ± 8.3	--
6.25	100	18.4 ± 5.1	--
12.5	100	19.9 ± 6.4	2.6
25	100	21.3 ± 4.1	9.8
50	100	22.3 ± 2.7	15.0
100	100	23.5 ± 4.4*	21.1
Test endpoint (% v/v)			
LC50	>100	--	--
IC25	--	>100	--
IC50	--	>100	--

SD = Standard Deviation, LC= Lethal Concentration, IC= Inhibition Concentration.

*Indicates reproduction that were significantly greater than the control.

Table 5. Results: fathead minnow (*Pimephales promelas*) survival and growth test.

Concentration (% v/v)	Mean ± SD		
	Survival (%)	Biomass (µg)	Dry Weight (µg)
Control	100.0 ± 0.0	904.3 ± 98.1	904.3 ± 98.1
1.6	96.7 ± 5.8	836.3 ± 55.6	865.7 ± 43.1
3.1	96.7 ± 5.8	803.7 ± 70.5	830.7 ± 33.2
6.25	100.0 ± 0.0	854.0 ± 121.0	854.0 ± 121.0
12.5	96.7 ± 5.8	829.7 ± 25.8	860.6 ± 62.7
25	93.3 ± 5.8	801.7 ± 36.8	859.6 ± 22.4
50	90.0 ± 10.0	815.0 ± 91.3	906.0 ± 31.8
100	90.0 ± 10.0	811.7 ± 68.9	904.4 ± 49.1
Test endpoint (% v/v)			
LC50	>100	--	
IC25	--	>100	>100
IC50	--	>100	>100

SD = Standard Deviation, LC= Lethal Concentration, IC= Inhibition Concentration.

Table 6. Results: *Pseudokirchneriella subcapitata* growth inhibition test.

Concentration (% v/v)	Cell Density (x 10 ⁴ cells/mL) (Mean ± SD)	Stimulation (%)
Control	36.5 ± 4.0	--
1.5	30.2 ± 3.9	--
3.0	46.8 ± 5.0	28.1
6.0	40.0 ± 3.2	9.6
11.9	73.0 ± 7.0*	100.0
23.8	112.8 ± 12.8*	208.9
47.6	139.5 ± 20.5*	282.2
95.2	125.0 ± 12.4*	242.5
Test endpoint (% v/v)		
IC25	>95.2	--
IC50	>95.2	--

SD = Standard Deviation, IC= Inhibition Concentration.

*Indicates cell yield that were significantly greater than the control.

4.0 QA/QC

The health history of the test organisms used in the exposures was acceptable and met the requirements of the Environment Canada protocols. The tests met all control acceptability criteria and water quality parameters remained within ranges specified in the protocols throughout the tests. There were no deviations from the test methodologies. Uncertainty associated with these tests is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

Results of the reference toxicant tests conducted during the testing program are summarized in Table 7. Results for these tests fell within the range for organism performance of mean and two standard deviation range, based on historical results obtained by the laboratory with these tests. Thus, the sensitivity of the organisms used in these tests was appropriate.

Table 7. Reference toxicant results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>C. dubia</i>	Survival (LC50): 1.8 g/L NaCl	1.8 (1.2 - 2.7)	22	August 8, 2014
	Reproduction (IC50): 1.4 g/L NaCl	1.3 (0.9 - 1.9)	19	
<i>P. promelas</i>	Survival (LC50): 4.0 g/L NaCl	4.6 (3.4 - 6.3)	17	August 15, 2014
	Biomass (IC50): 3.1 g/L NaCl	4.2 (3.1 - 5.8)	17	
<i>P. subcapitata</i>	Growth (IC50) 28.9 µg/L Zn	25.1 (14.8 - 42.7)	30	August 14, 2014

SD = Standard Deviation, CV = Coefficient of Variation, IC = Inhibition Concentration, LC = Lethal Concentration.

5.0 REFERENCES

- Environment Canada. 2007a. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. Report EPS 1/RM/21, Second Edition, February 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 74 pp.
- Environment Canada. 2007b. Biological test method: growth inhibition test using the freshwater alga. Environmental Protection Series, Report EPS 1/RM/25. Second Edition, March 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 53 pp.
- Environment Canada. 2011. Biological test method: test of larval growth and survival using fathead minnows. Environmental Protection Series, Report EPS 1/RM/22. February 2011,. Environment Canada, Environmental Protection, Conservation and Protection, Ottawa, ON. 73 pp.
- Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.4.29 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: MT Bailey
 Work Order No.: 14537

Start Date/Time: August 14/14 @ 1045h
 Set up by: APR EMM

Sample Information:

Sample ID: HA0-1
 Sample Date: Aug 13/14
 Date Received: Aug 14/14
 Sample Volume: 3 x 20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 080614B
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 21
 Mortality (%) in previous 7 d: 5
 Individual female # used ≥ 8 young on test day: 1, 2, 3, 5, 6, 7, 8, 9, 10

NaCl Reference Toxicant Results:

Reference Toxicant ID: Cd 116
 Stock Solution ID: 14 NaCl
 Date Initiated: August 8/14

7-d LC50 (95% CL): 1.8 (1.5 - 2.2) g/L NaCl
 7-d IC50 (95% CL): 1.4 (1.0 - 2.1) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.8 (1.2 - 2.7) g/L NaCl CV (%): 22
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.3 (0.9 - 1.9) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	7100
IC25 % (v/v) (95% CL)	7100	7100
IC50 % (v/v) (95% CL)	7100	7100

Reviewed by: JOH

Date reviewed: Sep. 16/14

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Ht. Polley
 Sample ID: HAD-1
 Work Order #: 14537

Start Date & Time: Aug 14/14 @ 1045h
 Stop Date & Time: Aug 20/14 @ 1045h
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		6		7 ⁶
Control	init	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.5	24.5	25.5	24.5		24.0	25.0
DO (mg/L)	8.0	7.9	8.1	7.5	8.0	7.2	8.1	7.3	7.8	7.5	8.0		8.0	7.3
pH	8.0	7.8	8.0	7.6	8.0	7.4	8.1	7.8	8.1	7.9	8.0		7.9	7.7
Cond. (µS/cm)	216	217		215			215		212		212		212	213
Initials	EMM	EMM		EMM			EMM		KLP		KLP		EMM	EMM

Concentration (V/V)	Days													
	0	1		2		3		4		5		6		7 ⁶
1.56%	init	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.5	24.5	25.5	24.5		24.0	25.0
DO (mg/L)	7.9	7.9	8.2	7.6	8.2	7.1	8.1	7.2	7.8	7.5	7.8		8.0	7.2
pH	7.8	7.8	7.9	7.8	8.0	7.8	8.1	7.8	8.1	7.8	8.1		8.1	7.8
Cond. (µS/cm)	213	214		215		214	214		214		214		214	214
Initials	EMM	EMM		EMM		EMM	EMM		KLP		KLP		EMM	EMM

Concentration (V/V)	Days													
	0	1		2		3		4		5		6		7 ⁶
12.5%	init	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.5	25.0	25.5	24.5		24.0	25.0
DO (mg/L)	7.9	7.3	8.2	7.5	8.2	7.0	8.1	7.2	7.8	7.5	7.8		7.9	7.2
pH	7.9	7.9	8.1	7.9	8.2	8.0	8.2	7.8	8.1	7.8	8.1		8.2	7.8
Cond. (µS/cm)	213	214		214			213		212		211		212	213
Initials	EMM	EMM		EMM		EMM	EMM		KLP		KLP		EMM	EMM

Concentration (V/V)	Days													
	0	1		2		3		4		5		6		7 ⁶
100%	init	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.5	25.0	24.5	25.0	24.0	25.0	24.0	25.5	25.5	25.5	24.5		24.0	25.0
DO (mg/L)	7.8	7.9	8.1	7.3	8.2	7.1	8.2	7.1	8.0	7.3	8.3		8.0	7.4
pH	8.7	7.8	8.7	7.9	8.7	7.8	8.5	7.8	8.7	7.8	8.8		8.8	7.8
Cond. (µS/cm)	194	197		200			199		197		196		197	198
Initials	EMM	EMM		EMM		EMM	EMM		KLP		KLP		EMM	EMM

	Control	100% (V/V)
Hardness*	100	97
Alkalinity*	78	77

Analysts: EMM, AWD
KLP
 Reviewed by: JGU
 Date reviewed: Jan 16/14

* mg/L as CaCO₃

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5

Sample Description: clear, slightly yellow

Comments: Broodboard Used: 020614B

Chronic Freshwater Toxicity Test
C. dubia Reproduction Data

Client: Mt. Palley
Sample ID: HAD-1
Work Order: 19537

Start Date & Time: Aug 14/14 10:45h
Stop Date & Time: Aug 20/14 05:10h
Set up by: EMM

% (v/v)

Days	Concentration: Control												Concentration: 1.56												Concentration: 3.12											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
3	4	✓	4	✓	3	✓	✓	3	3	✓	EMM	✓	✓	✓	✓	✓	✓	4	✓	✓	3	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
4	✓	2	✓	4	✓	3	4	✓	3	✓	UP	4	5	4	4	4	4	✓	4	4	✓	UP	✓	5	4	3	4	5	6	3	3	✓	UP			
5	8	8	7	6	7	✓	7	5	8	6	UP	7	✓	✓	8	8	✓	6	6	7	7	UP	✓	✓	6	5	X	✓	11	7	8	6	UP			
6	11	10	12	10	9	8	8	9	12	10	EMM	12	11	12	13	11	9	10	11	✓	14	EMM	3	10	10	11	✓	12	13	12	12	10	EMM			
7																																				
8																																				
Total	23	20	23	20	19	11	19	17	23	19	EMM	23	16	16	25	23	13	20	21	11	24	EMM	3	15	20	19	4*	17	30	22	23	16	EMM			

Days	Concentration: 6.25												Concentration: 12.5												Concentration: 25											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
3	3	✓	4	✓	3	✓	✓	✓	4	✓	EMM	3	3	✓	2	✓	✓	✓	3	✓	4	EMM	✓	✓	3	✓	✓	✓	✓	✓	2	✓	EMM			
4	✓	5	✓	3	3	✓	✓	✓	3	✓	UP	✓	✓	4	✓	3	4	3	✓	4	✓	UP	4	3	✓	8	4	6	✓	✓	✓	8	UP			
5	6	✓	7	6	8	7	3	6	8	✓	UP	4	8	9	2	7	8	7	8	9	8	UP	8	8	8	8	✓	8	2	9	9	11	UP			
6	9	11	13	10	14	11	10	10	11	6	EMM	4	10	11	2	12	10	10	11	11	15	EMM	14	13	14	10	12	9	9	✓	13	✓	EMM			
7																																				
8																																				
Total	18	16	24	19	25	21	13	16	23	9	EMM	11	21	24	6	22	22	20	22	24	27	EMM	26	29	25	24	20	21	17	13	24	19	EMM			

Days	Concentration: 50												Concentration: 100												Concentration:											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM														
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM														
3	4	✓	3	✓	✓	✓	4	4	3	3	EMM	4	4	✓	✓	4	3	4	2	4	EMM															
4	✓	3	✓	1	6	4	✓	✓	✓	✓	UP	✓	✓	5	5	3	✓	✓	✓	✓	✓	UP														
5	9	7	8	10	✓	9	7	7	10	7	UP	8	7	7	8	9	9	7	8	8	6	UP														
6	11	10	11	11	13	9	9	14	15	11	EMM	13	13	10	13	11	15	17	12	✓	14	EMM														
7																																				
8																																				
Total	24	20	22	22	19	22	20	25	28	21	EMM	25	24	22	26	23	28	27	24	12	24	EMM														

Notes: X = mortality.

Sample Description: clear, slightly yellow

Comments: Total # Young only based on the first 3 broods. Fourth and subsequent broods not included in total count.

Reviewed by: JLW

Date reviewed: Sept. 16/14

CETIS Analytical Report

Report Date: 20 Aug-14 13:57 (p 1 of 2)
 Test Code: 14537 | 00-8516-5837

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 08-3348-5598	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 20 Aug-14 13:56	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 14-7745-4013	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 14 Aug-14 10:45	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 20 Aug-14 10:45	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 0h	Source: In-House Culture	Age: <24h
Sample ID: 01-6690-2189	Code: 9F2B9AD	Client: Mount Polley
Sample Date: 13 Aug-14 11:27	Material: Water Sample	Project:
Receive Date: 14 Aug-14 09:00	Source: Mount Polley (MT POLLEY)	
Sample Age: 23h (15.5 °C)	Station: HAD-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	439246	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	0	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 20 Aug-14 13:57 (p 2 of 2)
 Test Code: 14537 | 00-8516-5837

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 08-3348-5598
 Analyzed: 20 Aug-14 13:56

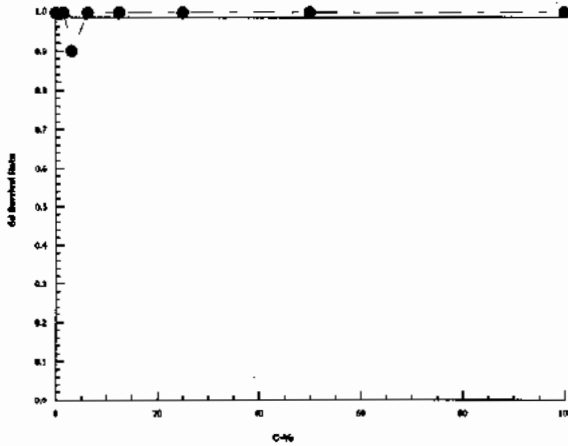
Endpoint: 6d Survival Rate
 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 20 Aug-14 13:57 (p 1 of 2)
 Test Code: 14537 | 00-8516-5837

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 16-3654-3223	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 20 Aug-14 13:57	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 14-7745-4013	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 14 Aug-14 10:45	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 20 Aug-14 10:45	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 0h	Source: In-House Culture	Age: <24h
Sample ID: 01-6690-2189	Code: 9F2B9AD	Client: Mount Polley
Sample Date: 13 Aug-14 11:27	Material: Water Sample	Project:
Receive Date: 14 Aug-14 09:00	Source: Mount Polley (MT POLLEY)	
Sample Age: 23h (15.5 °C)	Station: HAD-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1693512	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	19.4	11	23	1.137	3.596	18.54%	0.0%
1.56		10	19.2	11	25	1.548	4.894	25.49%	1.03%
3.12		10	16.9	3	30	2.61	8.252	48.83%	12.89%
6.25		10	18.4	9	25	1.607	5.082	27.62%	5.16%
12.5		10	19.9	6	27	2.03	6.42	32.26%	-2.58%
25		10	21.3	13	26	1.3	4.111	19.3%	-9.79%
50		10	22.3	19	28	0.857	2.71	12.15%	-14.95%
100		10	23.5	12	28	1.4	4.428	18.84%	-21.13%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	23	20	23	20	19	11	19	17	23	19
1.56		23	16	16	25	23	13	20	21	11	24
3.12		3	15	20	19	4	17	30	22	23	16
6.25		18	16	24	19	25	21	13	16	23	9
12.5		11	21	24	6	22	22	20	22	24	27
25		26	24	25	24	20	21	17	13	24	19
50		24	20	22	22	19	22	20	25	28	21
100		25	24	22	26	23	28	27	24	12	24

CETIS Analytical Report

Report Date: 20 Aug-14 13:57 (p 2 of 2)

Test Code: 14537 | 00-8516-5837

Ceriodaphnia 7-d Survival and Reproduction Test

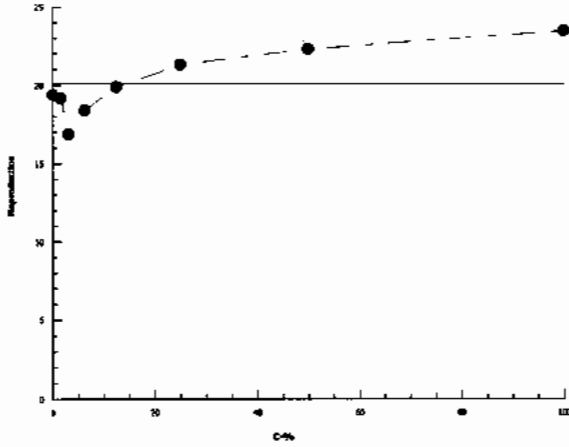
Nautilus Environmental

Analysis ID: 16-3654-3223
Analyzed: 20 Aug-14 13:57

Endpoint: Reproduction
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 20 Aug-14 13:58 (p 1 of 2)
 Test Code: 14537 | 00-8516-5837

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 11-2174-5892	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 20 Aug-14 13:57	Analysis: Nonparametric-Control vs Treatments	Official Results: Yes
Batch ID: 14-7745-4013	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 14 Aug-14 10:45	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 20 Aug-14 10:45	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 0h	Source: In-House Culture	Age: <24h
Sample ID: 01-6690-2189	Code: 9F2B9AD	Client: Mount Polley
Sample Date: 13 Aug-14 11:27	Material: Water Sample	Project:
Receive Date: 14 Aug-14 09:00	Source: Mount Polley (MT POLLEY)	
Sample Age: 23h (15.5 °C)	Station: HAD-1	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C < T	NA	NA	28.6%	50	100	70.71	2

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		1.56	101.5	74	3	18	0.7961	Asymp	Non-Significant Effect
		3.12	116.5	74	4	18	0.9868	Asymp	Non-Significant Effect
		6.25	111	74	2	18	0.9561	Asymp	Non-Significant Effect
		12.5	90.5	74	2	18	0.4299	Asymp	Non-Significant Effect
		25	86	74	3	18	0.2801	Asymp	Non-Significant Effect
		50	81.5	74	2	18	0.1623	Asymp	Non-Significant Effect
		100*	68.5	74	1	18	0.0167	Asymp	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	323.0875	46.15536	7	1.71	0.1201	Non-Significant Effect
Error	1942.9	26.98472	72			
Total	2265.988		79			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	14.15	18.48	0.0486	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9299	0.9579	0.0003	Non-normal Distribution

Reproduction Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	10	19.4	16.83	21.97	19.5	11	23	1.137	18.54%	0.0%
1.56		10	19.2	15.7	22.7	20.5	11	25	1.548	25.49%	1.03%
3.12		10	16.9	11	22.8	18	3	30	2.61	48.83%	12.89%
6.25		10	18.4	14.76	22.04	18.5	9	25	1.607	27.62%	5.16%
12.5		10	19.9	15.31	24.49	22	6	27	2.03	32.26%	-2.58%
25		10	21.3	18.36	24.24	22.5	13	26	1.3	19.3%	-9.79%
50		10	22.3	20.36	24.24	22	19	28	0.857	12.15%	-14.95%
100		10	23.5	20.33	26.67	24	12	28	1.4	18.84%	-21.13%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	23	20	23	20	19	11	19	17	23	19
1.56		23	16	16	25	23	13	20	21	11	24
3.12		3	15	20	19	4	17	30	22	23	16
6.25		18	16	24	19	25	21	13	16	23	9
12.5		11	21	24	6	22	22	20	22	24	27
25		26	24	25	24	20	21	17	13	24	19
50		24	20	22	22	19	22	20	25	28	21
100		25	24	22	26	23	28	27	24	12	24

Jan 16/11

CETIS Analytical Report

Report Date: 20 Aug-14 13:58 (p 2 of 2)
Test Code: 14537 | 00-8516-5837

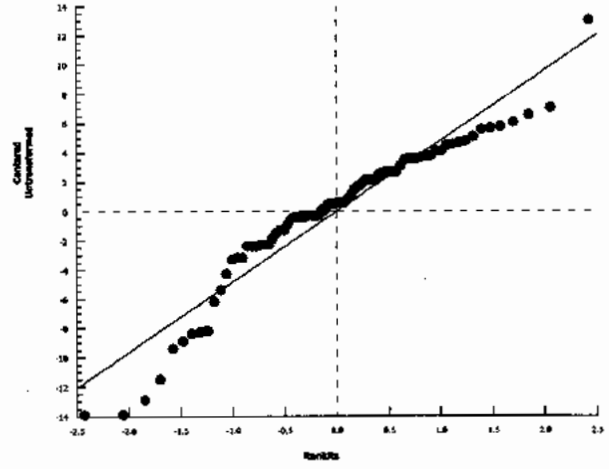
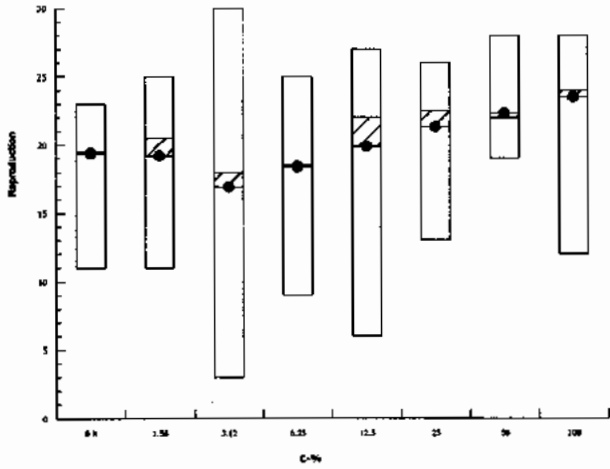
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 11-2174-5892 Endpoint: Reproduction
Analyzed: 20 Aug-14 13:57 Analysis: Nonparametric-Control vs Treatments

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Client: Mt Polley

W.O.#: 14537

Hardness and Alkalinity Datasheet

Alkalinity						Hardness			
Sample ID	Sample Date	Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	Technician
HAD-1	aug 14/14	50	3.8	4.0	72	50	4.6	92	Emm
20% Permer	aug 14/14	50	4.1	4.3	78	50	5.0	100	Emm

Notes: _____

Reviewed by: JGU

Date Reviewed: sep. 16/14

APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

Fathead Minnow Test Summary Sheet
(7-d *Pimephales promelas* Survival and Growth Test)

Client: Mount Polley
Work Order No.: 14538

Start Date/Time: Aug 15/14 @ 1800h
Test Species: P. promelas

Sample Information:

Sample ID: HAD-1
Sample Date: Aug 13/14
Date Received: Aug 14/14
Sample Volume: 3x 20L

Dilution Water (initial water quality):

Type: Moderately Hard water
Temperature (°C): 24.0
pH: 8.1
Dissolved Oxygen (mg/L): 7.9
Hardness (mg/L CaCO₃): 92
Alkalinity (mg/L CaCO₃): 58

Test Validity Criteria:

The test is invalid if:

- 1) for the control solutions, the combined and cumulative incidence of any mortalities, or fish showing loss of equilibrium or other signs of atypical swimming behavior, is >20%
- 2) the average dry weight of the surviving control fish does not attain 250 ug when the fish are dried and weighed.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4; pH = 6.5 to 8.5

Test Organism Information:

Batch No.: 081514
Source: Aquatic Biosystems, CO
Age: 24hr

NaCl Reference Toxicant Results:

Reference Toxicant ID: PP89
Stock Solution ID: n/a
Date Initiated: Aug 15/14
7-d EC50 (95% CL): 3.9 (3.4-5.4) 5.0L 3.9 (2.4-4.5) 4.0 (3.5-4.6) g/L NaCl
7-d IC50 (95% CL): 3.1 (2.9-3.4) g/L NaCl

Survival:

Reference Toxicant Mean and Historical Range: 4.6 (3.4-6.3) g/L NaCl CV(%): 17

Biomass:

Reference Toxicant Mean and Historical Range: 4.2 (3.1-5.8) g/L NaCl CV(%): 17

Test Results:

	Survival	Biomass
LC25 % (v/v) (95% CL)	>100	
LC50 % (v/v) (95% CL)	>100	
IC25 % (v/v) (95% CL)		>100
IC50 % (v/v) (95% CL)		7(00)

Reviewed by: Jou

Date reviewed: Sep. 18/14

**7-d Chronic Freshwater Toxicity Test
Initial and Final Water Quality Measurements**

Client: Mount Polley
 Sample ID: HAD-1
 Work Order #: 14538

Start Date & Time: Aug 15/14 @ 1800h
 Stop Date & Time: Aug 22/14 @ 1700h
 Test Species: Pimephales promelas

Concentration Control	Days														
	0		1		2		3		4		5		6		7
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.5	25.0	25.5	25.0	26.0	24.5	26.0	24.0	26.0	24.0	26.0	24.5	24.0	24.0
DO (mg/L)	7.9	6.5	8.1	6.0	7.9	4.2	8.0	5.2	8.1	5.5	7.9	5.3	7.8	4.5	4.5
pH	8.1	7.8	8.1	7.7	8.1	7.6	8.1	7.5	8.2	7.6	8.0	7.7	8.2	7.5	7.5
Cond. (µS/cm)	339		338		337		342		348		320		327		343
Initials	JAB		A		A		JW/KJL		JW/KJL		JW/KJL		KJL		JW

Concentration 1.56	Days														
	0		1		2		3		4		5		6		7
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.5	25.0	25.5	25.0	26.0	24.5	26.0	24.5	26.0	24.0	26.0	24.0	24.0	24.0
DO (mg/L)	8.0	6.4	8.0	5.9	7.9	4.1	7.9	5.9	8.2	5.1	8.0	5.8	7.9	5.0	5.0
pH	8.3	7.9	8.1	7.8	8.1	7.5	8.1	7.6	8.0	7.6	8.0	7.8	8.2	7.6	7.6
Cond. (µS/cm)	338		337		338		344		347		323		324		345
Initials	JAB		A		A		JW/KJL		JW/KJL		JW/KJL		KJL		JW

Concentration 12.5	Days														
	0		1		2		3		4		5		6		7
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.5	25.0	25.5	25.0	26.0	24.5	26.0	24.5	26.0	24.0	26.0	24.0	24.0	24.0
DO (mg/L)	8.0	6.4	8.0	5.8	8.0	4.8	7.9	5.0	8.2	5.6	7.8	5.0	7.9	4.6	4.6
pH	8.3	7.9	8.2	7.8	8.3	7.6	8.2	7.5	8.2	7.6	8.2	7.6	8.3	7.5	7.5
Cond. (µS/cm)	326		324		225		329		330		307		309		339
Initials	JAB		A		A		JW/KJL		JW/KJL		JW/KJL		KJL		JW

Concentration 100	Days														
	0		1		2		3		4		5		6		7
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.5	25.5	25.5	25.0	26.0	24.5	26.0	25.5	26.0	24.0	26.0	24.0	24.0	24.0
DO (mg/L)	8.0	6.2	7.9	5.6	8.0	4.6	8.0	5.2	8.2	5.0	8.0	4.9	7.9	4.9	4.9
pH	8.9	8.1	8.8	8.0	8.9	7.6	9.0	7.6	8.9	7.6	8.9	7.6	8.9	7.6	7.6
Cond. (µS/cm)	217		200		199		201		202		202		200		219
Initials	JAB		A		A		JW/KJL		JW/KJL		JW/KJL		KJL		JW

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6.5 to 8.5

DO meter: 3 pH meter: 3 Conductivity meter: 3

	Control	100% (v/v)		
Hardness*	92	92		
Alkalinity*	258	72		

Analysts: KJL, JW, AWJ

Reviewed by: JW

Date reviewed: sep. 17/14

* mg/L as CaCO₃

Sample Description: clear, slightly yellow

Comments: _____

7-d Fathead Minnow Toxicity Test Daily Survival

Client: Mount Polley
 Sample ID: HAD-1
 Work Order #: 14538

Start Date & Time: Aug 15/14 @ 1800h
 Stop Date & Time: Aug 22/14 @ 1700h
 Test Species: Pimephales promelas

Concentration % (v/v)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	10	10	10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
1.56	A			10	10	10	10	10	
	B			10	10	10	9	10	
	C			10	10	10	10	10	
3.1	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			9	9	9	9	9	
6.25	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
12.5	A			9	9	9	9	9	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
25	A			10	9	9	9	9	
	B			10	10	10	10	10	
	C			10	10	9	9	9	
50	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	8	8	8	8	
100	A			9	9	9	9	9	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
	A								
	B								
	C								
	A								
	B								
	C								
Tech Initials		A	~	FJC	WZ	KJL	KJL	JW	

Comments: _____

Reviewed by: JGU

Date reviewed: Sept. 17/14

Fathead Minnow Toxicity Test Data Sheet

Dry Weight Data

Client: Mount Polley

Start Date & Time: Aug 15/14 @ 1800h

Sample ID: HAD-1

Termination Date & Time: Aug 22/14 @ 1700h

Work Order No.: 14538

Concentration % (v/v)	Rep	HC Pan No. blue	No. alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control	A	1	10	JW	1066.03	1075.12	10	KJL
	B	2	10		1028.67	1038.67	10	
	C	3	10		1006.38 ⁴¹	1014.45	10	
1.56	A	4	10		1027.50	1035.67	10	
	B	5	9		1044.47	1052.40	9	
	C	6	10		1060.59	1069.50	10	
3.1	A	7	10		1020.56	1029.25	10	
	B	8	10		1041.45 ⁵⁰	1049.63	10	
	C	9	9		1025.45	1033.24	9	
6.25	A	10	10		1036.23	1043.54	10	
	B	11	10		1036.67	1045.25	10	
	C	12	10		1027.18	1036.91	10	
12.5	A	13	9		1031.66	10340.00	9	
	B	14	10		1043.51	1052.04	10	
	C	15	10		1044.26	1052.28	10	
25	A	16	9		1030.18	1037.86	9	
	B	17	10		1023.31	1031.78 ²	10	
	C	18	9		1021.14	1029.10	9	
50	A	19	9		1009.08	1016.91	9	
	B	20	10		1062.06	1071.24	10	
	C	21	8		1036.91	1044.35	8	
100	A	22	8		1041.62	1049.29	8	
	B	23	9		1040.53	1048.30	9	
	C	24	10	✓	1030.66	1039.57	10	✓

Comments: Reweighed pans: 8-1049.57 16-1037.84

Reviewed by: JG

Date Reviewed: Sept. 17/14

CETIS Analytical Report

Report Date: 25 Aug-14 17:22 (p 1 of 2)
 Test Code: 14538 | 17-5516-0947

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 12-2951-3512	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 25 Aug-14 17:22	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 13-4388-6785	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 15 Aug-14 18:00	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 22 Aug-14 17:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 01-6690-2189	Code: 9F2B9AD	Client: Mount Polley
Sample Date: 13 Aug-14 11:27	Material: Water Sample	Project:
Receive Date: 14 Aug-14 09:00	Source: Mount Polley (MT POLLEY)	
Sample Age: 55h (15.5 °C)	Station: HAD-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1153604	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	17.73	N/A	129.1	5.639	0.7745	NA
EC10	100	N/A	N/A	1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	3	1	1	1	0	0	0.0%	0.0%	30	30
1.56		3	0.9667	0.9	1	0.03333	0.05773	5.97%	3.33%	29	30
3.1		3	0.9667	0.9	1	0.03333	0.05773	5.97%	3.33%	29	30
6.25		3	1	1	1	0	0	0.0%	0.0%	30	30
12.5		3	0.9667	0.9	1	0.03333	0.05773	5.97%	3.33%	29	30
25		3	0.9333	0.9	1	0.03333	0.05773	6.19%	6.67%	28	30
50		3	0.9	0.8	1	0.05774	0.1	11.11%	10.0%	27	30
100		3	0.9	0.8	1	0.05774	0.1	11.11%	10.0%	27	30

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	1	1	1
1.56		1	0.9	1
3.1		1	1	0.9
6.25		1	1	1
12.5		0.9	1	1
25		0.9	1	0.9
50		0.9	1	0.8
100		0.8	0.9	1

CETIS Analytical Report

Report Date: 25 Aug-14 17:22 (p 2 of 2)
Test Code: 14538 | 17-5516-0947

Fathead Minnow 7-d Larval Survival and Growth Test

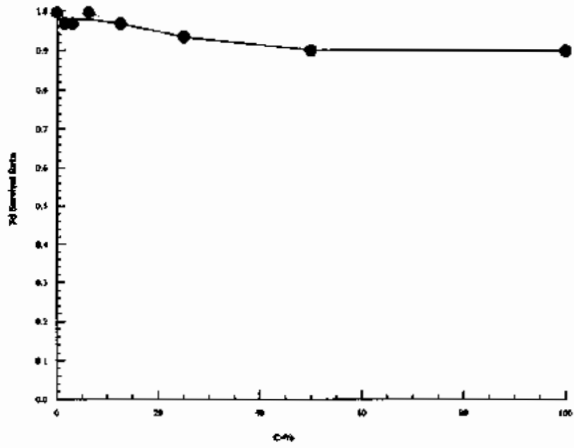
Nautilus Environmental

Analysis ID: 12-2951-3512 Endpoint: 7d Survival Rate CETIS Version: CETISv1.8.7
Analyzed: 25 Aug-14 17:22 Analysis: Linear Interpolation (ICPIN) Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	10/10	10/10	10/10
1.56		10/10	9/10	10/10
3.1		10/10	10/10	9/10
6.25		10/10	10/10	10/10
12.5		9/10	10/10	10/10
25		9/10	10/10	9/10
50		9/10	10/10	8/10
100		8/10	9/10	10/10

Graphics



CETIS Analytical Report

Report Date: 18 Sep-14 14:26 (p 1 of 2)
 Test Code: 14538 | 17-5516-0947

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 14-9469-8044	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 18 Sep-14 14:26	Analysis: Nonlinear Regression	Official Results: Yes
Batch ID: 13-4388-6785	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 15 Aug-14 18:00	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 22 Aug-14 17:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 01-6690-2189	Code: 9F2B9AD	Client: Mount Polley
Sample Date: 13 Aug-14 11:27	Material: Water Sample	Project:
Receive Date: 14 Aug-14 09:00	Source: Mount Polley (MT POLLEY)	
Sample Age: 55h (15.5 °C)	Station: HAD-1	

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Log-Logistic EV [Y=A/(1+(X/D)^C)]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
17	53.72	-100.2	-97.91	0.0789	Yes	0.1864	2.852	0.9636	Non-Significant Lack of Fit

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.001204	N/A	3273000	83060	0.0000305	NA
IC10	89.31	6.02E-05	250900	1.12	0.0003986	1664000
IC15	92520	N/A	5.08E+15	0.001081	1.97E-14	NA
IC20	17240000	N/A	7.20E+27	0.0000058	1.388E-26	NA
IC25	12930000	N/A	N/A	0.0000000	NA	NA
IC40	42610000	N/A	N/A	0.0000000	NA	NA
IC50	1.872E+16	N/A	N/A	5.342E-15	NA	NA

→ 100% (v14)

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.9043	0.25 - NL	Yes	Passes Acceptability Criteria

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	0.9045	0.03992	0.8262	0.9827	22.66	<0.0001	Significant Parameter
C	0.06663	0.152	-0.2312	0.3645	0.4385	0.6655	Non-Significant Parameter
D	1.87E+16	1.46E+18	-2.8E+18	2.89E+18	0.0128	0.9899	Non-Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	0.018974	0.018974	1	3.97	0.0595	Non-Significant
Lack of Fit	0.005524	0.001105	5	0.1864	0.9636	Non-Significant
Pure Error	0.094856	0.005929	16			
Residual	0.10038	0.00478	21			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	5.029	14.07	0.6564	Equal Variances
	Mod Levene Equality of Variance	1.304	3.5	0.3566	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9662	0.9169	0.5749	Normal Distribution
	Anderson-Darling A2 Normality	0.2936	2.492	0.6314	Normal Distribution

Fathead Minnow 7-d Larval Survival and Growth Test

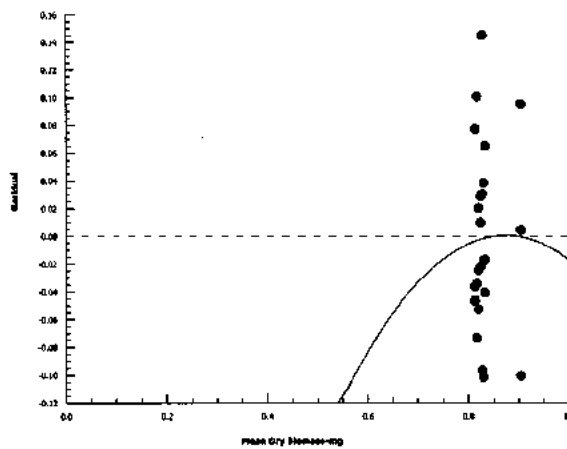
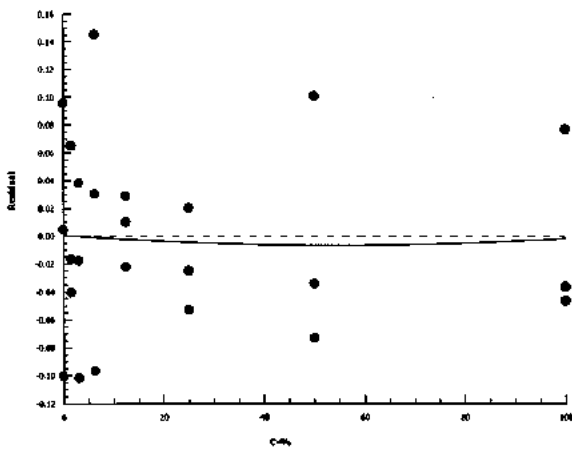
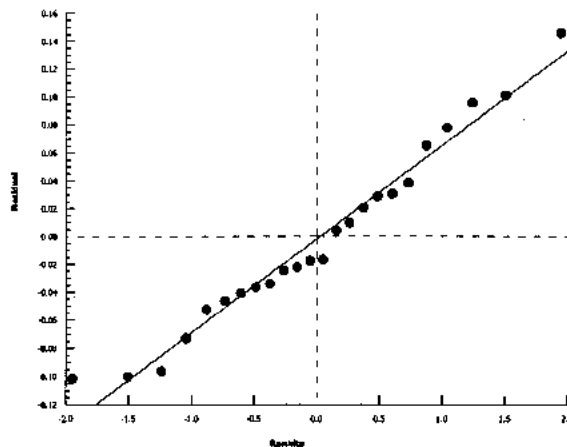
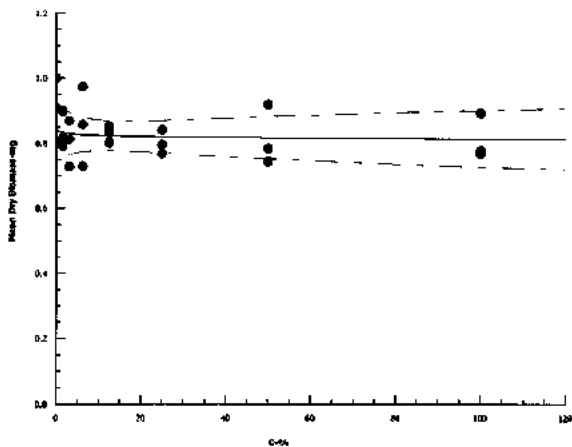
Nautilus Environmental

Analysis ID: 14-9469-8044 Endpoint: Mean Dry Biomass-mg CETIS Version: CETISv1.8.7
 Analyzed: 18 Sep-14 14:26 Analysis: Nonlinear Regression Official Results: Yes

Mean Dry Biomass-mg Summary			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.9043	0.804	1	0.05663	0.09808	10.85%	0.0%
1.56		3	0.8363	0.793	0.899	0.03209	0.05558	6.65%	7.52%
3.1		3	0.8037	0.729	0.869	0.04068	0.07046	8.77%	11.13%
6.25		3	0.854	0.731	0.973	0.06989	0.121	14.17%	5.57%
12.5		3	0.8297	0.802	0.853	0.01488	0.02577	3.11%	8.26%
25		3	0.8017	0.768	0.841	0.02126	0.03683	4.59%	11.35%
50		3	0.815	0.744	0.918	0.05272	0.09131	11.2%	9.88%
100		3	0.8117	0.767	0.891	0.03977	0.06888	8.49%	10.25%

Mean Dry Biomass-mg Detail				
C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.909	1	0.804
1.56		0.817	0.793	0.899
3.1		0.869	0.813	0.729
6.25		0.731	0.858	0.973
12.5		0.834	0.853	0.802
25		0.768	0.841	0.796
50		0.783	0.918	0.744
100		0.767	0.777	0.891

Graphics 3P Log-Logistic EV [Y=A/(1+(X/D)^C)]



CETIS Analytical Report

Report Date: 25 Aug-14 17:22 (p 1 of 2)
 Test Code: 14538 | 17-5516-0947

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 01-6530-1663	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 25 Aug-14 17:22	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 13-4388-6785	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 15 Aug-14 18:00	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 22 Aug-14 17:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 01-6690-2189	Code: 9F2B9AD	Client: Mount Polley
Sample Date: 13 Aug-14 11:27	Material: Water Sample	Project:
Receive Date: 14 Aug-14 09:00	Source: Mount Polley (MT POLLEY)	
Sample Age: 55h (15.5 °C)	Station: HAD-1	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	17.8%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	1.56	1.082	2.558	0.161	4	0.4463	CDF	Non-Significant Effect
	3.1	1.601	2.558	0.161	4	0.2391	CDF	Non-Significant Effect
	6.25	0.8006	2.558	0.161	4	0.5757	CDF	Non-Significant Effect
	12.5	1.188	2.558	0.161	4	0.3992	CDF	Non-Significant Effect
	25	1.633	2.558	0.161	4	0.2288	CDF	Non-Significant Effect
	50	1.421	2.558	0.161	4	0.3033	CDF	Non-Significant Effect
	100	1.474	2.558	0.161	4	0.2835	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.9043	0.25 - NL	Yes	Passes Acceptability Criteria
PMSD	0.1778	0.12 - 0.3	Yes	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02449831	0.003499758	7	0.5903	0.7546	Non-Significant Effect
Error	0.09485604	0.005928502	16			
Total	0.1193543		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	5.029	18.48	0.6564	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9752	0.884	0.7930	Normal Distribution

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	3	0.9043	0.6607	1.148	0.909	0.804	1	0.05663	10.85%	0.0%
1.56		3	0.8363	0.6983	0.9744	0.817	0.793	0.899	0.03209	6.65%	7.52%
3.1		3	0.8037	0.6286	0.9787	0.813	0.729	0.869	0.04068	8.77%	11.13%
6.25		3	0.854	0.5533	1.155	0.858	0.731	0.973	0.06989	14.17%	5.57%
12.5		3	0.8297	0.7656	0.8937	0.834	0.802	0.853	0.01488	3.11%	8.26%
25		3	0.8017	0.7102	0.8932	0.796	0.768	0.841	0.02126	4.59%	11.35%
50		3	0.815	0.5882	1.042	0.783	0.744	0.918	0.05272	11.2%	9.88%
100		3	0.8117	0.6406	0.9828	0.777	0.767	0.891	0.03977	8.49%	10.25%

CETIS Analytical Report

Report Date: 25 Aug-14 17:22 (p 2 of 2)
 Test Code: 14538 | 17-5516-0947

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

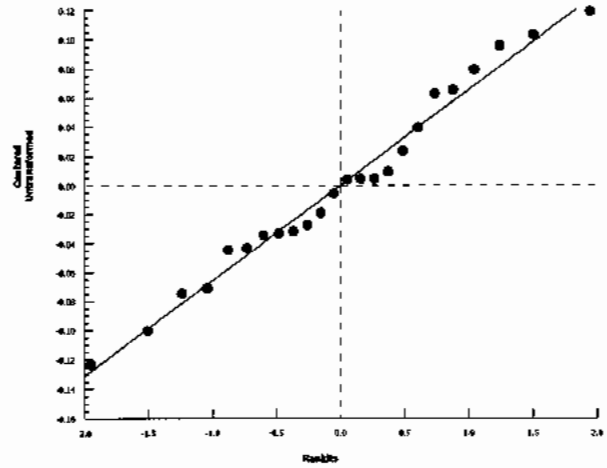
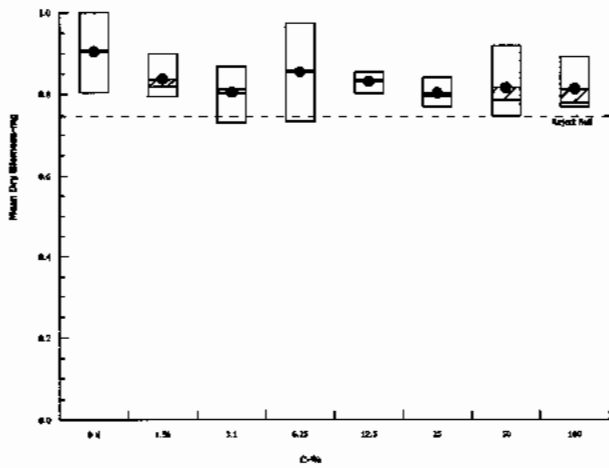
Analysis ID: 01-6530-1663 Endpoint: Mean Dry Biomass-mg
 Analyzed: 25 Aug-14 17:22 Analysis: Parametric-Control vs Treatments

CETIS Version: CETISv1.8.7
 Official Results: Yes

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.909	1	0.804
1.56		0.817	0.793	0.899
3.1		0.869	0.813	0.729
6.25		0.731	0.858	0.973
12.5		0.834	0.853	0.802
25		0.768	0.841	0.796
50		0.783	0.918	0.744
100		0.767	0.777	0.891

Graphics



CETIS Analytical Report

Report Date: 18 Sep-14 16:28 (p 1 of 2)
 Test Code: 14538 | 17-5516-0947

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 07-3523-4398	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 18 Sep-14 16:28	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 13-4388-6785	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 15 Aug-14 18:00	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 22 Aug-14 17:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 01-6690-2189	Code: 9F2B9AD	Client: Mount Polley
Sample Date: 13 Aug-14 11:27	Material: Water Sample	Project:
Receive Date: 14 Aug-14 09:00	Source: Mount Polley (MT POLLEY)	
Sample Age: 55h (15.5 °C)	Station: HAD-1	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	15.3%	100	>100	NA	1

Dunnnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		1.56	0.7144	2.558	0.138	4	0.6151	CDF	Non-Significant Effect
		3.1	1.362	2.558	0.138	4	0.3262	CDF	Non-Significant Effect
		6.25	0.9309	2.558	0.138	4	0.5154	CDF	Non-Significant Effect
		12.5	0.8097	2.558	0.138	4	0.5715	CDF	Non-Significant Effect
		25	0.8276	2.558	0.138	4	0.5633	CDF	Non-Significant Effect
		50	-0.0307	2.558	0.138	4	0.8824	CDF	Non-Significant Effect
		100	-0.00050	2.558	0.138	4	0.8751	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			1.0000	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01678377	0.002397682	7	0.5468	0.7871	Non-Significant Effect
Error	0.07016481	0.004385301	16			
Total	0.08694859		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	7.736	18.48	0.3564	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9832	0.884	0.9461	Normal Distribution

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	3	0.9043	0.6607	1.148	0.909	0.804	1	0.05663	10.85%	0.0%
1.56		3	0.8657	0.7586	0.9728	0.8811	0.817	0.899	0.02489	4.98%	4.27%
3.1		3	0.8307	0.7481	0.9132	0.813	0.81	0.869	0.01919	4.0%	8.15%
6.25		3	0.854	0.5533	1.155	0.858	0.731	0.973	0.06989	14.17%	5.57%
12.5		3	0.8606	0.7049	1.016	0.853	0.802	0.9267	0.03618	7.28%	4.84%
25		3	0.8596	0.804	0.9152	0.8533	0.841	0.8844	0.01293	2.6%	4.95%
50		3	0.906	0.8271	0.9849	0.918	0.87	0.93	0.01833	3.5%	-0.18%
100		3	0.9044	0.7824	1.026	0.891	0.8633	0.9588	0.02834	5.43%	0.0%

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

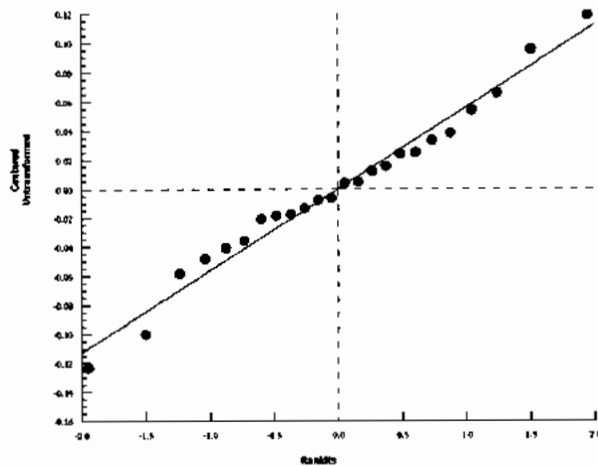
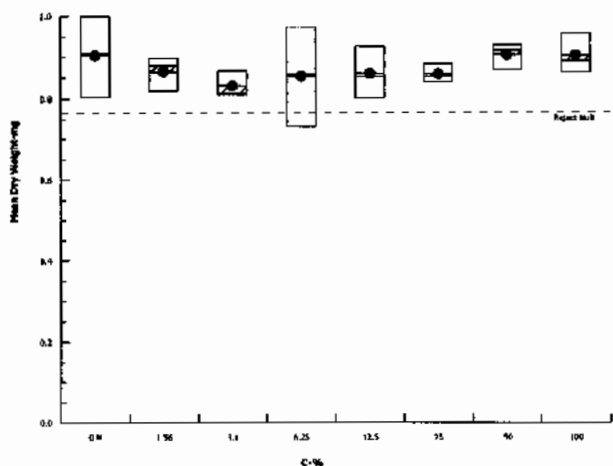
Analysis ID: 07-3523-4398 Endpoint: Mean Dry Weight-mg
 Analyzed: 18 Sep-14 16:26 Analysis: Parametric-Control vs Treatments

CETIS Version: CETISv1.8.7
 Official Results: Yes

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.909	1	0.804
1.56		0.817	0.8811	0.899
3.1		0.869	0.813	0.81
6.25		0.731	0.858	0.973
12.5		0.9267	0.853	0.802
25		0.8533	0.841	0.8844
50		0.87	0.918	0.93
100		0.9588	0.8633	0.891

Graphics



CETIS Analytical Report

Report Date: 19 Nov-14 12:14 (p 1 of 2)
 Test Code: 14538 | 17-5516-0947

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 19-7993-5569	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 18 Nov-14 16:08	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 13-4388-6785	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 15 Aug-14 18:00	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 22 Aug-14 17:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 01-6690-2189	Code: 9F2B9AD	Client: Mount Polley
Sample Date: 13 Aug-14 11:27	Material: Water Sample	Project:
Receive Date: 14 Aug-14 09:00	Source: Mount Polley (MT POLLEY)	
Sample Age: 55h (15.5 °C)	Station: HAD-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	366408	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.9043	0.804	1	0.05663	0.09808	10.85%	0.0%
1.56		3	0.8657	0.817	0.899	0.02489	0.04311	4.98%	4.27%
3.1		3	0.8307	0.81	0.869	0.01919	0.03323	4.0%	8.15%
6.25		3	0.854	0.731	0.973	0.06989	0.121	14.17%	5.57%
12.5		3	0.8606	0.802	0.9267	0.03618	0.06267	7.28%	4.84%
25		3	0.8596	0.841	0.8844	0.01293	0.02239	2.6%	4.95%
50		3	0.906	0.87	0.93	0.01833	0.03175	3.5%	-0.18%
100		3	0.9044	0.8633	0.9588	0.02834	0.04909	5.43%	0.0%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.909	1	0.804
1.56		0.817	0.8811	0.899
3.1		0.869	0.813	0.81
6.25		0.731	0.858	0.973
12.5		0.9267	0.853	0.802
25		0.8533	0.841	0.8844
50		0.87	0.918	0.93
100		0.9588	0.8633	0.891

CETIS Analytical Report

Report Date: 19 Nov-14 12:14 (p 2 of 2)

Test Code: 14538 | 17-5516-0947

Fathead Minnow 7-d Larval Survival and Growth Test

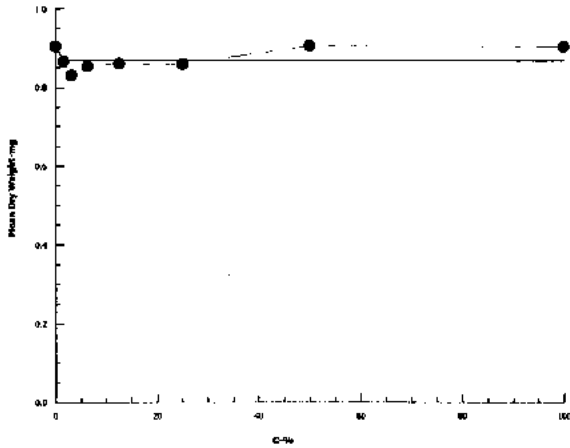
Nautilus Environmental

Analysis ID: 19-7993-5569
Analyzed: 18 Nov-14 16:08

Endpoint: Mean Dry Weight-mg
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Client: Mount Polley

W.O.#: 14538

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
HAD-1	Aug 14/14	50	3.8	4.0	72	50	4.6	92	EMM
M+IW 080614	Aug 11/14	50	3.0	3.1	58	50	4.6	92	EMM

Notes: _____

Reviewed by: JGM

Date Reviewed: Sept. 17/14

APPENDIX C - *Pseudokirchneriella subcapitata* Toxicity Test Data

Pseudokirchneriella subcapitata Summary Sheet

Client: Mt. Polley
Work Order No.: 14539

Start Date: Aug 14/14 @ 1500h
Set up by: EMM

Sample Information:

Sample ID: HAD-1
Sample Date: Aug 13/14
Date Received: Aug 14/14
Sample Volume: 3x20L

Test Organism Information:

Culture Date: Aug 8, 2014
Age of culture (Day 0): 6 days

Zinc Reference Toxicant Results:

Reference Toxicant ID: SC117
Stock Solution ID: 147201
Date Initiated: Aug 14/14
72-h IC50 (95% CL): 28.9 (21.2 - 33.7) µg/L Zn

72-h IC50 Reference Toxicant Mean and Range: 25.1 (14.8 - 42.7) µg/L Zn CV (%): 30

Test Results:	Algal Growth
IC25 %(v/v) (95% CL)	<u>795.2</u>
IC50 %(v/v) (95% CL)	<u>795.2</u>

Reviewed by: JGW

Date reviewed: Sep-16/14

72-h Algal Growth Inhibition Toxicity Test Water Quality Measurements

Client: Mt. Polley Setup by: EMM
 Sample ID: HAD-1 Test Date/Time: Aug 14 2 15 00h
 Work Order No.: 14539 Test Species: Pseudokirchneriella subcapitata

Culture Date: Aug 8/14 Age of Culture: 6d Culture Health: Good
 Culture Count: 1692 2730 Average: 711 Culture Cell Density (c1): 711 x 10⁴ cells/mL

$$v1 = \frac{220,000 \text{ cells/mL} \times 100 \text{ mL}}{(c1) 711 \times 10^4 \text{ cells/mL}} = 3.0 \text{ mL}$$

Time Zero Counts: 1 19 223 Average: 21

No. of Cells/mL: 21 x 10⁴ Initial Density: # cells/mL + 220 μL x 10 μL = 9545 cells/mL

Concentration %(v/v)	Water Quality Measurements					Microplates rotated 2X per day?			
	pH	Temp (°C)				0 h	24 h	48 h	72 h
		0 h	0 h	24 h	48 h				
Control	6.9	24.0	25.5	25.5	25.5	✓	✓	✓	✓
1.5	7.0	24.0	25.5	25.5	25.5	✓	✓	✓	✓
3.0	7.0	24.0	25.5	25.5	25.5	✓	✓	✓	✓
6.0	7.1	24.5	25.5	25.5	25.5	✓	✓	✓	✓
11.9	7.2	24.5	25.5	25.5	25.5	✓	✓	✓	✓
23.8	8.0	25.0	25.5	25.5	25.5	✓	✓	✓	✓
47.6	8.3	25.0	25.5	25.5	25.5	✓	✓	✓	✓
95.2	8.6	25.5	25.5	26.5	25.5	✓	✓	✓	✓
Initials	EMM	EMM	EMM	EMM	EMM	EMM	EMM	EMM	EMM

Initial control pH: Well 1: 7.0 Well 2: 7.0

Final control pH: Well 1: 6.8 Well 2: 6.8

Light intensity (lux): 4000 Date measured: Aug 14/14

Sample Description: clear, slightly yellow

Comments: _____

Reviewed: JGH Date reviewed: Sept. 15/14

***Pseudokirchneriella subcapitata* Toxicity Test Data Sheet**
72-h Algal Cell Counts

Client: Mt. Polley Start Date/Time: Aug 14/14 @ 1500h
 Work Order #: 14539 Termination Date: Aug 17/14 @ 1500h
 Sample ID: HAD-1 Test set up by: EMM

Concentration	Rep	Count 1	Count 2	Count 3	Count 4	Comments	Initials
Control	A	38					EMM
	B	42					
	C	31					
	D	39					
	E	43					
	F	35					
	G	34					
	H	38					
1.5	A	29					
	B	35					
	C	25	29				
	D	34					
3.0	A	41					
	B	52					
	C	47					
	D	51					
6.0	A	39					
	B	47					
	C	45					
	D	38					
11.9	A	65					
	B	79					
	C	80					
	D	72					
23.8	A	110					
	B	128					
	C	98					
	D	119					
47.6	A	115					
	B	134					
	C	162					
	D	151					
95.2	A	141					
	B	114					
	C	131					
	D	118					

Comments: _____

Reviewed by: JGK Date Reviewed: sep-15/14

***Pseudokirchneriella subcapitata* Algal Counts**

Client: Mt. Polley Start Date/Time: 14-Aug-14 1500
 WO#: 14539 Termination Date: 17-Aug-14 1500
 Sample ID: HAD-1

Initial Cell Density: 9545 cell/mL 210000
 0.22
 0.01

Concentration % v/v	Rep	Count 1 (x 10 ⁴)	Count 2 (x 10 ⁴)	Count 3 (x 10 ⁴)	Count 4 (x 10 ⁴)	Mean (x 10 ⁴)	Cell Yield (x 10 ⁴) cell/mL		9545.455
Control	A	38				38	37.0	mean	36.5
	B	42				42	41.0	SD	4.035556
	C	31				31	30.0	CV	11.04257
	D	39				39	38.0		
	E	43				43	42.0		
	F	35				35	34.0		
	G	34				34	33.0		
	H	38				38	37.0		
1.5	A	29				29	28.0		
	B	35				35	34.0		
	C	25	29			27	26.0		
	D	34				34	33.0		
3	A	41				41	40.0		
	B	52				52	51.0		
	C	47				47	46.0		
	D	51				51	50.0		
6	A	39				39	38.0		
	B	42				42	41.0		
	C	45				45	44.0		
	D	38				38	37.0		
11.9	A	65				65	64.0		
	B	79				79	78.0		
	C	80				80	79.0		
	D	72				72	71.0		
23.8	A	110				110	109.0		
	B	128				128	127.0		
	C	98				98	97.0		
	D	119				119	118.0		
47.6	A	115				115	114.0		
	B	134				134	133.0		
	C	162				162	161.0		
	D	151				151	150.0		
95.2	A	141				141	140.0		
	B	114				114	113.0		
	C	131				131	130.0		
	D	118				118	117.0		

JGL
 Sep-15/14

CETIS Analytical Report

Report Date: 17 Aug-14 14:51 (p 1 of 2)
 Test Code: 14539 | 00-0362-3238

EC Alga Growth Inhibition Test			Nautilus Environmental		
Analysis ID: 17-8592-9495	Endpoint: Cell Yield	CETIS Version: CETISv1.8.7			
Analyzed: 17 Aug-14 14:51	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes			
Batch ID: 21-1184-0477	Test Type: Cell Growth	Analyst: Emma Marus			
Start Date: 14 Aug-14 15:00	Protocol: EC/EPS 1/RM/25	Diluent: Deionized Water + nutrients			
Ending Date: 17 Aug-14 15:00	Species: Pseudokirchneriella subcapitata	Brine:			
Duration: 72h	Source: In-House Culture	Age: 6d			
Sample ID: 01-6690-2189	Code: 9F2B9AD	Client: Mount Polley			
Sample Date: 13 Aug-14 11:27	Material: Water Sample	Project:			
Receive Date: 14 Aug-14 09:00	Source: Mount Polley (MT POLLEY)				
Sample Age: 28h (15.5 °C)	Station: HAD-1				

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	51591	200	Yes	Two-Point Interpolation

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>95.2	N/A	N/A	<1.05	NA	NA
IC10	>95.2	N/A	N/A	<1.05	NA	NA
IC15	>95.2	N/A	N/A	<1.05	NA	NA
IC20	>95.2	N/A	N/A	<1.05	NA	NA
IC25	>95.2	N/A	N/A	<1.05	NA	NA
IC40	>95.2	N/A	N/A	<1.05	NA	NA
IC50	>95.2	N/A	N/A	<1.05	NA	NA

Cell Yield Summary			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	8	36.5	30	42	1.427	4.036	11.06%	0.0%
1.5		4	30.25	26	34	1.931	3.862	12.77%	17.12%
3		4	46.75	40	51	2.496	4.992	10.68%	-28.08%
6		4	40	37	44	1.581	3.162	7.91%	-9.59%
11.9		4	73	64	79	3.488	6.976	9.56%	-100.0%
23.8		4	112.8	97	127	6.408	12.82	11.37%	-208.9%
47.6		4	139.5	114	161	10.27	20.53	14.72%	-282.2%
95.2		4	125	113	140	6.178	12.36	9.89%	-242.5%

Cell Yield Detail									
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	37	41	30	38	42	34	33	37
1.5		28	34	26	33				
3		40	51	46	50				
6		38	41	44	37				
11.9		64	78	79	71				
23.8		109	127	97	118				
47.6		114	133	161	150				
95.2		140	113	130	117				

QA: *JGK*
Jan-15/14

CETIS Analytical Report

Report Date: 17 Aug-14 14:51 (p 2 of 2)
Test Code: 14539 | 00-0362-3238

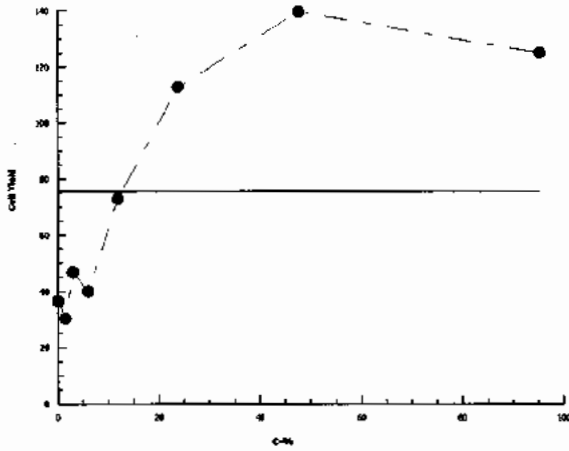
EC Alga Growth Inhibition Test

Nautilus Environmental

Analysis ID: 17-8592-9495 Endpoint: Cell Yield
Analyzed: 17 Aug-14 14:51 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 17 Sep-14 15:14 (p 1 of 2)
 Test Code: 14539 | 00-0362-3238

EC Alga Growth Inhibition Test

Nautilus Environmental

Analysis ID: 18-0473-1174	Endpoint: Cell Yield	CETIS Version: CETISv1.8.7
Analyzed: 17 Sep-14 15:14	Analysis: Nonparametric-Multiple Comparison	Official Results: Yes
Batch ID: 21-1184-0477	Test Type: Cell Growth	Analyst: Emma Marus
Start Date: 14 Aug-14 15:00	Protocol: EC/EPS 1/RM/25	Diluent: Deionized Water + nutrients
Ending Date: 17 Aug-14 15:00	Species: Pseudokirchneriella subcapitata	Brine:
Duration: 72h	Source: In-House Culture	Age: 6d
Sample ID: 01-6690-2189	Code: 9F2B9AD	Client: Mount Polley
Sample Date: 13 Aug-14 11:27	Material: Water Sample	Project:
Receive Date: 14 Aug-14 09:00	Source: Mount Polley (MT POLLEY)	
Sample Age: 28h (15.5 °C)	Station: HAD-1	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C < T	NA	NA	42.4%	6	11.9	8.45	16.67

Wilcoxon/Bonferroni Adj Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		1.5	38	NA	2	10	1.0000	Exact	Non-Significant Effect
		3	12	NA	0	10	0.0566	Exact	Non-Significant Effect
		6	18	NA	3	10	0.7071	Exact	Non-Significant Effect
		11.9*	10	NA	0	10	0.0141	Exact	Significant Effect
		23.8*	10	NA	0	10	0.0141	Exact	Significant Effect
		47.6*	10	NA	0	10	0.0141	Exact	Significant Effect
		95.2*	10	NA	0	10	0.0141	Exact	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			0.7195	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	59781.05	8540.15	7	91.09	<0.0001	Significant Effect
Error	2625.25	93.75893	28			
Total	62406.3		35			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	20.4	18.48	0.0048	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.9634	0.9166	0.2727	Normal Distribution

Cell Yield Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	8	36.5	33.13	39.87	37	30	42	1.427	11.06%	0.0%
1.5		4	30.25	24.1	36.4	30.5	26	34	1.931	12.77%	17.12%
3		4	46.75	38.81	54.69	48	40	51	2.496	10.68%	-28.08%
6		4	40	34.97	45.03	39.5	37	44	1.581	7.91%	-9.59%
11.9		4	73	61.9	84.1	74.5	64	79	3.488	9.56%	-100.0%
23.8		4	112.8	92.36	133.1	113.5	97	127	6.408	11.37%	-208.9%
47.6		4	139.5	106.8	172.2	141.5	114	161	10.27	14.72%	-282.2%
95.2		4	125	105.3	144.7	123.5	113	140	6.178	9.89%	-242.5%

CETIS Analytical Report

Report Date: 17 Sep-14 15:14 (p 2 of 2)
 Test Code: 14539 | 00-0362-3238

EC Alga Growth Inhibition Test

Nautilus Environmental

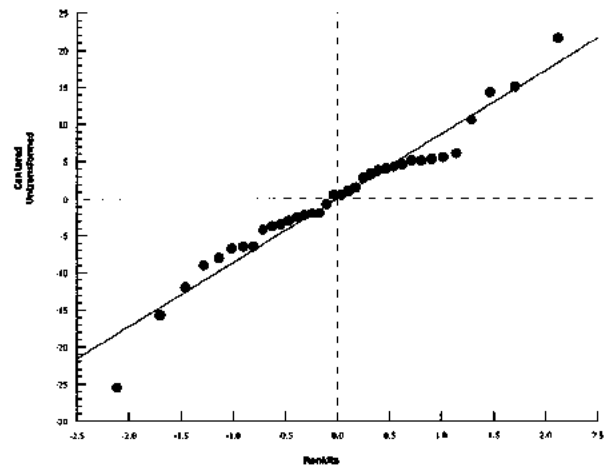
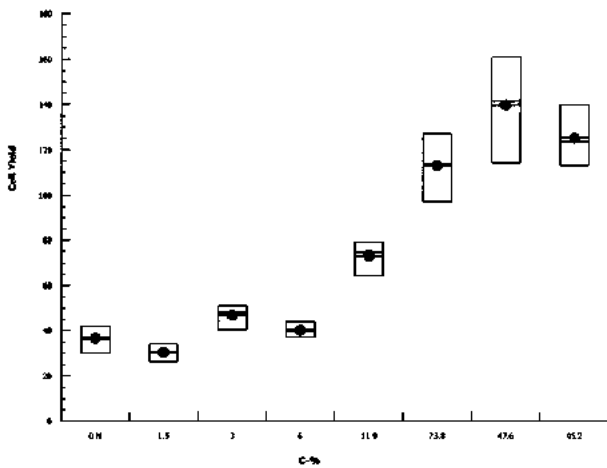
Analysis ID: 18-0473-1174 Endpoint: Cell Yield
 Analyzed: 17 Sep-14 15:14 Analysis: Nonparametric-Multiple Comparison

CETIS Version: CETISv1.8.7
 Official Results: Yes

Cell Yield Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	37	41	30	38	42	34	33	37
1.5		28	34	26	33				
3		40	51	46	50				
6		38	41	44	37				
11.9		64	78	79	71				
23.8		109	127	97	118				
47.6		114	133	161	150				
95.2		140	113	130	117				

Graphics



APPENDIX D - Chain of Custody Form

Sample Collection By: Katie McMahan			ANALYSES REQUIRED				
Report to:	Invoice to:						Receipt Temperature (°C)
Company: Mount Polley Mining Corporation	Mount Polley Mining Corporation						
Address: Box 12	Box 12						
City/Prov/Postal Code: Likely BC V0L 1N0	Likely BC V0L 1N0						
Contact: Colleen Hughes Deb McMillan	Colleen Hughes/						
Phone: (250) 790-2617	(250) 790-2617						
Email: chughes@mountpolley.com dmcmillan@minnow.ca	chughes@mountpolley.com						

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	96h RBT	48 h Daphnia magna	7 Day Ceriodaphnia dubia	7 day fathead Minnow	72h aigal growth								
1 HAD-1	13/08/2014	11:27	water	20L	3		X	X	X	X	X								
2																			
3																			
4																			
5																			
6							14 535	14 536	14 537	14 538	14 539								
7																			
8																			
9																			
10																			

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)		RELIQUISHED BY (COURIER)	
Client: Mount Polley Mining Corporation		Total # Containers:	3	Signature: <i>[Signature]</i>		Signature:	
P.O. No.:		Good Condition?	Y	Print: Katie McMahan		Print:	
Shipped Via: Greyhound		Matches Schedule?	Y	Company: MPMC		Company:	
				Time/Date: 13/08/2014 17:00		Time/Date:	
SPECIAL INSTRUCTIONS/COMMENTS: Cost Code 6400067 506190				RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)	
				Signature:		Signature: <i>[Signature]</i>	
				Print:		Print: Jacob Frank	
				Company:		Company: Nautilus ENVU	
				Time/Date:		Time/Date: August 14/14 @ 0900	

PART 7

Toxicity testing on a sample identified as HAD-1: Sample collected August 20, 2014 (Report date August 26, 2014)



Mount Polley Mining Corporation
ATTN: Colleen Hughes
Box 12
Likely, BC
V0L 1N0

Report Date: August 26, 2014
Work Order: 14559 - 560

Data Report

Species: Rainbow trout (*Oncorhynchus mykiss*)
Protocol: EPS 1/RM/13 (Second Ed. with 2007 amendments)

Species: *Daphnia magna*
Protocol: EPS 1/RM/14 (Second Ed. 2000)

Table 1. Results for the 96-h rainbow trout acute toxicity test.

Sample ID	Collection Date and Time	96-h LC50 (%v/v)
HAD-1	August 20, 2014 @ N/A	>100

Table 2. Results for the 48-h *Daphnia magna* acute toxicity test.

Sample ID	Collection Date and Time	48-h LC50 (%v/v)
HAD-1	August 20, 2014 @ N/A	>100

Tests met performance criteria and there were no deviations from the test methods. The results relate only to the sample tested.

Yvonne Lam, B.Sc.
Laboratory Biologist

Reviewed By:
Julianna Kalocai, M.Sc., R.P.Bio
QA Officer

Rainbow Trout Summary Sheet

Client:

Mount Polley Mining

Start Date/Time: August 21/14 @ 1015

Work Order No.:

14559

Test Species: Oncorhynchus mykiss

Sample information:

Sample ID:

HAD-1

Sample Date:

August 20/14 @ N/A

Date Received:

August 21/14 @ 0905

Sample Volume:

3 x 20L

Other:

N/A

Test Validity Criteria:

≥ 90% control survival

WQ Ranges:

T (°C) = 15 ± 1; DO (mg/L) = 7.0 to 10.3; pH = 5.5 to 8.5

Dilution Water:

Type:

Dechlorinated Municipal Tap Water

Hardness (mg/L CaCO₃):

11

Alkalinity (mg/L CaCO₃):

9

Test Organism Information:

Batch No.:

080614

Source:

Miracle Springs

No. Fish/Volume (L):

10/10

Loading Density (g/L):

0.33

Mean Length ± SD (mm):

33 ± 3

Range: 28 - 37

Mean Weight ± SD (g):

0.33 ± 0.08

Range: 0.21 - 0.47

NaNO₂ Reference Toxicant Results:

Reference Toxicant ID:

RTN166

Stock Solution ID:

14NE01

Date Initiated:

August 20/14

96-h LC50 (95% CL):

10.9 (8.1 - 14.7) mg/L NaNO₂

Reference Toxicant Mean and Historical Range:

4.9 (2.0 - 12.0) mg/L NaNO₂

Reference Toxicant CV (%):

56

Test Results:

The 96-h LC50 is >100% (N/A).

Reviewed by:

JGU

Date reviewed:

Aug. 25/14

96-Hour Rainbow Trout Toxicity Test Data Sheet

Client/Project#: Mount Polley Mining
 Sample I.D. HAD-1
 W.O. # 14559
 RBT Batch #: 080614
 Date Collected/Time: August 20/14 @ N/A
 Date Setup/Time: August 21/14 @ 1015
 Sample Setup By: SBF

 D.O. meter: 1/2/3/4
 pH meter: 1/2/3
 Cond. Meter: 1/2/3

Number Fish/Volume: 10/10L
 7-d % Mortality: 1.73
 Total Pre-aeration Time (mins): 30
 Aeration rate adjusted to 6.5 ± 1 mL/min/L? (Y/N): Y

Undiluted Sample WQ			
Parameters	Initial WQ	Adjustment	30 min WQ
Temp °C	14.5	/	14.5
pH	8.1	/	8.3
D.O. (mg/L)	9.6	/	10.1
Cond. (µS/cm)	195	/	202

Concentration	# Survivors							Temperature (°C)					Dissolved Oxygen (mg/L)					pH					Conductivity (µS/cm)		
	(% v/v)	1	2	4	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
control					10	10	10	10	15.0	14.5	14.5	14.5	14.0	9.9	9.9	9.9	9.9	9.9	6.8	7.2	6.9	6.8	7.1	35	43
6.25					10	10	10	10	15.0	14.5	14.5	14.5	14.0	9.8	9.9	9.7	9.9	9.9	7.0	7.2	7.1	7.0	7.3	44	48
12.5					10	10	10	10	15.5	14.5	14.5	14.5	14.0	9.9	9.8	9.6	9.8	10.0	7.2	7.3	7.2	7.1	7.2	60	64
25					10	10	10	10	15.5	14.5	14.5	14.5	14.0	10.0	9.8	9.7	9.9	10.2	7.4	7.4	7.5	7.4	7.3	81	86
50					10	10	10	10	15.0	14.5	14.5	14.5	14.0	10.0	9.8	9.7	9.9	10.2	7.8	7.5	7.6	7.5	7.5	123	129
100					10	10	10	10	14.5	14.5	14.5	14.5	14.0	10.1	9.8	9.6	9.9	10.2	8.3	7.7	7.6	7.6	7.5	202	211
Initials					JAB	m	m	SBF	SBF	JAB	m	m	JBF	SBF	JAB	m	m	SBF	SBF	JAB	m	m	SBF	SBF	SBF

WQ Ranges: T (°C) = 15 ± 1; DO (mg/L) = 7.0 to 10.3; pH = 5.5 to 8.5

Sample Description/Comments: clear, yellow

Fish Description at 96 h All fish OK Number of Stressed Fish at 96 h 0

Other Observations: _____

Reviewed by: JGB

Date Reviewed: Aug. 25/14

Daphnia magna Summary Sheet

Client: Mount Polley
Work Order No.: 14560

Start Date/Time: August 22, 2014 @ 1305
Test Species: Daphnia magna
Set up by: UML

Sample Information:

Sample ID: HAD-1
Sample Date: August 20, 2014
Date Received: August 21, 2014
Sample Volume: 3 x 20L

Test Validity Criteria:
≥ 90% mean control survival (no more than 2 mortalities in any control replicate)
WQ Ranges:
T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.6

Test Organism Information:

Broodstock No.: 08064B
Age of young (Day 0): <24 h
Avg No. young per brood in previous 7 d: 16
Mortality (%) in previous 7 d: 0
Days to first brood: 10

NaCl Reference Toxicant Results:

Reference Toxicant ID: Dm125
Stock Solution ID: 14NaO2
Date Initiated: August 23, 2014
48-h LC50 (95% CL): 3.9 (2.8-5.5) g/L NaCl

Reference Toxicant Mean and Historical Range: 4.0 (3.7-4.3) g/L NaCl
Reference Toxicant CV (%): 4

Test Results: The 48h LC50 is estimated to be >100% (v/v)

Reviewed by: Jon

Date reviewed: Aug. 26/14

Freshwater Acute 48 Hour Toxicity Test Data Sheet

Client: Mount Polley
 Sample ID: HAD-1
 Work Order No.: 14560

Start Date/Time: August 22, 2014 @ 1305
 No. Organisms/volume: 10/200mL
 Test Organism: D.magna
 Set up by: WNV

DO meter: 3/4 pH meter: 3 Conductivity meter: 213

Concentration (% v/v)	Number of Live Organisms Rep	No. Immobilized			Temperature (°C)			Dissolved oxygen (mg/L)			pH			Conductivity (µS/cm)	
		24	48	48	0	24	48	0	24	48	0	24	48	0	48
Control	A	10	10	0	20.0	20.0	20.0	8.6	8.5	8.4	8.0	8.1	7.9	348	360
	B														
	C														
	D														
6.25	A	10	10	0	20.0	20.0	20.0	8.5	8.6	8.5	8.0	8.1	7.9	339	346
	B														
	C														
	D														
12.5	A	10	10	0	20.0	20.0	20.0	8.5	8.6	8.5	8.1	8.1	7.8	330	341
	B														
	C														
	D														
25	A	10	10	0	20.0	20.0	20.0	8.5	8.7	8.5	8.1	8.1	7.8	316	320
	B														
	C														
	D														
50	A	10	10	0	20.0	20.0	20.0	8.4	8.6	8.5	8.3	8.2	7.9	277	289
	B														
	C														
	D														
100	A	10	10	0	20.0	20.0	20.0	8.0	8.6	8.5	8.5	8.2	7.9	207	217
	B														
	C														
	D														
Technician Initials		A	B	C	WNV	M	M	WNV	M	M	WNV	M	M	WNV	M

WQ Ranges: T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

	Hardness*	Alkalinity*
Conc.	(mg/L as CaCO ₃)	
Control (MHW)	100	68
Highest conc.	92	70

	Initial WQ	Adjustment	Adjusted WQ
Temp (°C)	20.0		
DO (mg/L)	8.0		
pH	8.5		
Cond (µS/cm)	207		

Sample Description: light yellow colour, slight particulates
 Comments: Batch#: 080614B 7-d previous # young/brood: 16 Day of 1st Brood: 10 Previous 7-d % Mortality: 0

Reviewed by: Jok Date reviewed: Aug 25/14

Client: Mount Polley

W.O.#: 14560

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
HAD-1	Aug 22/14	50	3.7	3.9	70	50	4.6	92	YML
MHW	↓	50	3.5	3.6	68	50	5.0	100	YML

Notes: _____

Reviewed by: JGU

Date Reviewed: Aug 25/14

COPY # 20

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

Date 20/08/2014 Page 1 of 1

Sample Collection By: Sky Freeman		Report to:		Invoice to:	
Company: Mount Polley Mining Corporation		Mount Polley Mining Corporation		Mount Polley Mining Corporation	
Address: Box 12		Box 12		Box 12	
City/Prov/Postal Code: Likely BC V0L 1N0		Likely BC V0L 1N0		Likely BC V0L 1N0	
Contact: Colleen Hughes Deb McMillan		Colleen Hughes/		Colleen Hughes/	
Phone: (250) 790-2617		(250) 790-2617		(250) 790-2617	
Email: chughes@mountpolley.com dmcmillan@minnow.ca		chughes@mounlpolley.com		chughes@mounlpolley.com	

ANALYSES REQUIRED

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	96h RBT	LC50	NY	48 h Daphnia magna	LC50 NY	7 Day Ceriodaphnia dubia	7 day fathead Minnow	72h algal growth	7d L. Minnow	Receipt Temperature (°C)
1 HAD-1	20/08/2014	12:24	water	20L	3		X	X	X	X	X	X	X	X	X	
2																
3																
4																
5																
6																
7																
8																
9																
10																

WO #
14559
14560
14561
14562
14563
14564

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUINSHED BY (CLIENT)		RELIQUINSHED BY (COURIER)	
Client: Mount Polley Mining Corporation		Total # Containers:	3	Signature:		Signature:	
P.O. No.:		Good Condition?	Y	Sky Freeman		Print:	
Shipped Via: Greyhound		Matches Schedule?	Y	Company: MPMC		Company:	
SPECIAL INSTRUCTIONS/COMMENTS: Cost Code 6400067 506190 ① DATE ON THE CARBOY - NY				Time/Date: 20/08/2014 15:30:00		Time/Date:	
				RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)	
				Signature:		Signature: NY	
				Print:		Print: NAIR YAMAMOTO	
				Company:		Company: NAUTILUS	
		Time/Date:		Time/Date: Aug 21/14 @ 9:05			

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 8

Toxicity testing on a sample identified as HAD-1: Sample collected August 20, 2014 (Report date October 9, 2014, Revised December 4, 2014)



Nautilus Environmental

Toxicity testing on a sample identified as HAD-1

Sample collected August 20, 2014

Final Report

Report date: October 9, 2014, revised December 4, 2014

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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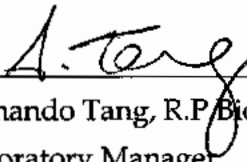
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- APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data
- APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data
- APPENDIX C - *Lemna Minor* Toxicity Test Data
- APPENDIX D - *Pseudokirchneriella subcapitata* Toxicity Test Data
- APPENDIX E - Chain of Custody Form

SIGNATURE PAGE



Krysta Percy, B.Sc.
Laboratory Biologist



Armando Tang, R.P./Bio.
Laboratory Manager

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted toxicity tests for Mount Polley Mining Corporation on a sample identified as HAD-1. The sample was collected on August 20, 2014 and delivered to the laboratory in Burnaby, BC on August 21, 2014. The sample was transported in three 20-L plastic carboys and coolers. The sample was received at a temperature of 10.8°C and was stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing. The following sub-lethal toxicity tests were performed on the sample:

- *Ceriodaphnia dubia* survival and reproduction
- 7-d fathead minnow (*Pimephales promelas*) survival and growth
- 7-d duckweed (*Lemna minor*) growth inhibition
- 72-h algal (*Pseudokirchneriella subcapitata*) growth inhibition

This report describes the results of these toxicity tests. Copies of laboratory data sheets and printouts of statistical analyses for each test are provided in Appendices A to D. The chain-of-custody form is provided in Appendix E. This report was revised from an earlier version to incorporate data for dry weight of fathead minnows, in addition to biomass.

2.0 METHODS

Methods for the toxicity tests are summarized in Tables 1 to 4. Testing was conducted according to procedures described by the Environment Canada protocols (2007a, 2007b, 2007c and 2011). Statistical analyses for all tests were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house culture
Test organism age	<24 h old neonates produced within 12 h
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20 mL test tube
Test volume	15 mL
Test replicates	10 test replicates per treatment
Number of organisms	1 per replicate
Control water	20% Perrier water
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	<i>Pseudokirchneriella subcapitata</i> and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada, (2007a) EPS 1/RM/21
Statistical software	CETIS (2013)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods
Reference toxicant	Sodium chloride

Table 2. Summary of test conditions: fathead minnow (*Pimephales promelas*) survival and growth test.

Test organism	<i>Pimephales promelas</i>
Test organism source	Aquatic BioSystems, Fort Collins, CO
Test organism age	<24 hours
Test type	Static renewal
Test duration	7 days
Test vessel	375-mL glass containers
Test volume	250 mL
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control water	Moderately-hard water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	Twice a day with newly hatched brine shrimp (<i>Artemia nauplii</i>)
Light intensity	100 – 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test protocol	Environment Canada (2011), EPS 1/RM/22
Statistical software	CETIS (2013)
Test endpoint	Survival and biomass
Test acceptability criteria for controls	≥80% survival, ≥250 µg mean dry weight
Reference toxicant	Sodium Chloride

Table 3. Summary of test conditions: *Lemna minor* growth inhibition test.

Test organism	<i>Lemna minor</i>
Test organism source	In-house culture, obtained from Canadian Phycological Culture Centre, and originally isolated from Wainfleet, Stinking Barn, Niagara Peninsula, Ontario, Canada
Test organism age	7 to 10 day old
Test type	Static
Test duration	7 days
Test vessel	250 mL glass containers
Test volume	100 mL
Test replicates	4 test replicates per treatment
No. of organisms	Two 3-frond plants per replicate
Control water	Deionized water with nutrients added
Test solution renewal	None
Test temperature	25 ± 2°C
Feeding	None
Light intensity	4000 to 5600 lux full spectrum light
Photoperiod	24 hours light
Aeration	None
Test protocol	Environment Canada (2007b), EPS 1/RM/37
Statistical software	CETIS (2013)
Test endpoint	Number of fronds and dry weight
Test acceptability criteria for controls	≥ 8-fold increase in number of fronds
Reference toxicant	Potassium chloride

Table 4. Summary of test conditions: *Pseudokirchneriella subcapitata* growth inhibition test.

Test organism	<i>Pseudokirchneriella subcapitata</i> , strain UTCC #37
Test organism source	In-house culture, obtained from Canadian Phycological Culture Center, and originally isolated from Nitelva River, Norway.
Test organism age	3- to 7-day old culture in logarithmic growth phase
Test type	Static
Test duration	72 hours
Test vessel	Microplate
Test volume	220 µL
Test replicates	4 replicates per treatment; 8 replicates for control
Number of organisms	10,000 cells/mL
Control water	Deionized water with supplemented nutrients
Test solution renewal	None
Test temperature	24 ± 2°C
Feeding	None
Light intensity	3600 to 4400 lux
Photoperiod	24 hours light
Aeration	None
Test protocol	Environment Canada (2007c), EPS1/RM/25
Statistical software	CETIS (2013)
Test endpoint	Algal cell growth inhibition
Test acceptability criteria for controls	≥ 16-fold increase in number of algal cells; CV ≤ 20%; no trend when analyzed using Mann-Kendall test
Reference toxicant	Zinc

3.0 RESULTS

There were no adverse effects observed on survival and reproduction of *C. dubia* (Table 5), survival and growth of fathead minnow (Table 6), frond count and dry weight of *L. minor* (Table 7) or cell yield of *P. subcapitata* (Table 8). The LC and IC values were therefore greater than the highest concentration tested for each of these endpoints in all toxicity tests. In addition, a stimulatory effect was observed for *P. subcapitata* cell yield; percent stimulation ranged from 18.9 to 114.9%.

Table 5. Results: *Ceriodaphnia dubia* survival and reproduction test.

Concentration (% v/v)	Survival (%)	Reproduction (mean ± SD)
Control	100	20.5 ± 1.6
1.56	100	20.6 ± 2.8
3.12	100	17.9 ± 3.9
6.25	100	20.0 ± 3.7
12.5	90	18.4 ± 7.3
25	100	20.6 ± 5.0
50	100	21.2 ± 2.6
100	100	21.8 ± 2.2
Test endpoint (% v/v)		
LC50	>100	--
IC25	--	>100
IC50	--	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

Table 6. Results: fathead minnow (*Pimephales promelas*) survival and growth test.

Concentration (% v/v)	Mean ± SD		
	Survival (%)	Biomass (µg)	Dry Weight (µg)
Control	83.3 ± 11.6	502.7 ± 113.2	598.3 ± 61.4
1.56	96.7 ± 5.8	646.3 ± 51.0	668.8 ± 38.3
3.1	93.3 ± 11.6	587.7 ± 82.4	629.1 ± 25.9
6.25	96.7 ± 5.8	672.0 ± 35.1	696.5 ± 47.9
12.5	100.0 ± 0.0	700.3 ± 39.2	700.3 ± 39.2
25	83.3 ± 15.3	604.0 ± 89.3	729.2 ± 57.3
50	80.0 ± 10.0	551.7 ± 42.1	693.5 ± 58.0
100	76.7 ± 20.8	518.3 ± 142.7	675.5 ± 11.9
Test endpoint (% v/v)			
LC50	>100	--	--
IC25	--	>100	>100
IC50	--	>100	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

Table 7. Results: *Lemna minor* growth inhibition test.

Concentration (% v/v)	Frond Growth (No. of Fronds)	Dry Weight (mg)
	(Mean ± SD)	(Mean ± SD)
Control	51.0 ± 5.7	4.7 ± 0.6
1.5	55.2 ± 10.8	5.1 ± 1.0
3.0	53.8 ± 7.9	5.0 ± 0.7
6.1	54.2 ± 6.9	5.0 ± 0.9
12.1	57.2 ± 6.8	5.0 ± 0.5
24.2	57.5 ± 7.7	5.2 ± 1.0
48.5	57.5 ± 1.3	5.6 ± 0.3
97	62.0 ± 6.5	5.8 ± 0.6
Test endpoint		
IC25	>97	>97
IC50	>97	>97

SD = Standard Deviation, IC = Inhibition Concentration.

Table 8. Results: *Pseudokirchneriella subcapitata* growth inhibition test.

Concentration (% v/v)	Cell Density (x 10 ⁴ cells/mL) (Mean ± SD)	Stimulation (%)
Control	40.4 ± 3.9	--
1.5	48.0 ± 5.1	18.9
3.0	50.2 ± 5.7*	24.5
6.0	55.2 ± 5.1*	36.8
11.9	66.0 ± 8.0*	63.5
23.8	72.2 ± 9.5*	79.0
47.6	74.0 ± 7.8*	83.3
95.2	86.8 ± 6.6*	114.9
Test endpoint (% v/v)		
IC25	>95.2	--
IC50	>95.2	--

SD = Standard Deviation, IC = Inhibition Concentration.

*Indicates cell yield that were significantly greater than the control.

4.0 QA/QC

The health history of the test organisms used in the exposures was acceptable and met the requirements of the Environment Canada protocols. The tests met all control acceptability criteria and water quality parameters remained within ranges specified in the protocols throughout the tests. There were no deviations from the test methodologies. Uncertainty associated with these tests is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

Results of the reference toxicant tests conducted during the testing program are summarized in Table 9. Results for these tests fell within the range for organism performance of mean and two standard deviation range, based on historical results obtained by the laboratory with these tests. Thus, the sensitivity of the organisms used in these tests was appropriate.

Table 9. Reference toxicant results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>C. dubia</i>	Survival (LC50): 1.8 g/L NaCl	1.8 (1.2 - 2.7)	22	August 26 , 2014
	Reproduction (IC50): 1.3 g/L NaCl	1.4 (1.0 - 1.9)	19	
<i>P. promelas</i>	Survival (LC50): 5.2 g/L NaCl	4.5 (3.4 - 6.1)	16	August 22, 2014
	Biomass (IC50): 3.9 g/L NaCl	4.1 (3.0 - 5.6)	17	
<i>L. minor</i>	No. Fronds (IC50) 3.8 g/L KCl	4.2 (3.1 - 5.7)	16	September 5, 2014
<i>P. subcapitata</i>	Growth (IC50) 28.9 µg/L Zn	25.1 (14.8 - 42.7)	30	August 14, 2014

SD = Standard Deviation, CV = Coefficient of Variation, IC = Inhibition Concentration, LC = Lethal Concentration.

5.0 REFERENCES

- Environment Canada. 2007a. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. Report EPS 1/RM/21, Second Edition, February 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 74 pp.
- Environment Canada. 2007b. Biological test method: tests for measuring the inhibition of growth using the freshwater macrophyte, *Lemna minor*. Environmental Protection Series, Report EPS 1/RM/37. Second Edition. January 2007. Environment Canada, Method Development and Application Section, Environmental Technology Centre, Ottawa, ON. 112 pp.
- Environment Canada. 2007c. Biological test method: growth inhibition test using the freshwater alga. Environmental Protection Series, Report EPS 1/RM/25. Second Edition, March 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 53 pp.
- Environment Canada. 2011. Biological test method: test of larval growth and survival using fathead minnows. Environmental Protection Series, Report EPS 1/RM/22. February 2011,. Environment Canada, Environmental Protection, Conservation and Protection, Ottawa, ON. 73 pp.
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APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: AT Mount Polley
 Work Order No.: 14561

Start Date/Time: Aug 22/14 @ 1030h
 Set up by: EMM

Sample Information:

Sample ID: HA0-1
 Sample Date: Aug 20/14
 Date Received: Aug 21/14
 Sample Volume: 3x20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 081514B
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 20
 Mortality (%) in previous 7 d: 0
 Individual female # used ≥ 8 young on test day: 21, 22, 23, 24, 25, 26, 27, 28, 29, 30

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd117
 Stock Solution ID: 14Na02
 Date Initiated: Aug 20/14

7-d LC50 (95% CL): 1.8 (1.5-2.2) g/L NaCl
 7-d IC50 (95% CL): 1.3 (1.1-1.5) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.9 (1.2-2.7) g/L NaCl CV (%): 22
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-1.9) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		7100
IC50 % (v/v) (95% CL)		7100

Reviewed by: JGh

Date reviewed: Sep. 23/14

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Polley
 Sample ID: HAD-1
 Work Order #: 14561

Start Date & Time: Aug 22/14 @ 1030h
 Stop Date & Time: Aug 29/14 @ 1530h
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		Final	6	7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
control														
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.0	7.3	8.0	7.5	8.0	7.4	8.1	7.2	8.2	7.2	8.0	8.1	7.1	7.1
pH	8.0	7.8	8.2	7.9	8.2	7.8	8.1	7.6	8.2	7.9	8.1	7.7	7.7	7.7
Cond. (µS/cm)	213	214		213		214		218		215		215		215
Initials	EMM					EMM		EMM		EMM		EMM		EMM

Concentration	Days													
	0	1		2		3		4		5		Final	6	7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
(CVI) 1.56%														
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.5	25.0	24.5	25.0
DO (mg/L)	8.2	7.5	8.2	7.5	8.0	7.3	8.1	7.3	8.2	7.1	8.1	7.0	7.0	7.0
pH	8.1	7.8	8.2	7.9	8.1	8.0	8.1	7.9	8.1	7.6	8.1	7.7	7.7	7.7
Cond. (µS/cm)	211	213		214		213		216		214		215		215
Initials	EMM					EMM		EMM		EMM		EMM		EMM

Concentration	Days													
	0	1		2		3		4		5		Final	6	7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
(CVI) 12.5%														
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.5	25.0	24.5	25.0	24.5	25.0
DO (mg/L)	8.2	7.4	8.1	7.5	8.1	7.3	8.1	7.2	8.0	7.1	8.1	7.0	7.0	7.0
pH	8.0	7.9	8.2	7.9	8.1	7.9	8.1	7.9	8.1	7.8	8.1	7.8	7.8	7.8
Cond. (µS/cm)	211	213		213		210		211		210		208		208
Initials	EMM					EMM		EMM		EMM		EMM		EMM

Concentration	Days													
	0	1		2		3		4		5		Final	6	7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
(CVI) 100%														
Temperature (°C)	24.5	25.0	24.0	25.0	24.0	25.0	24.0	25.0	25.0	24.5	25.0	24.5	25.0	25.0
DO (mg/L)	8.1	7.5	8.1	7.4	8.0	7.3	7.8	7.0	7.7	7.2	7.7	6.9	6.9	6.9
pH	8.3	7.9	8.3	8.0	8.2	7.8	8.1	7.9	8.1	7.8	8.2	7.8	7.8	7.8
Cond. (µS/cm)	206	207		207		204		204		209		209		209
Initials	EMM					EMM		EMM		EMM		EMM		EMM

	Control	100% (CVI)
Hardness*	100	92
Alkalinity*	80	70

* mg/L as CaCO₃

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5

Sample Description: clear, slightly yellow

Comments: Broodboard Used: 081514B (#s 21,22,23,24,25,26,27,28,29,30)

Analysts: AWD, EMM

Reviewed by: JGU

Date reviewed: sep 23/14

Chronic Freshwater Toxicity Test
C. dubia Reproduction Data

Client: Mt. Polley
Sample ID: HAD-1
Work Order: 14569

Start Date & Time: Aug 22/14 @ 1030h
Stop Date & Time: Aug 28/14 @ 1530h
Set up by: EMM

90 (VIV)

Days	Concentration: <u>control</u>											Concentration: <u>1.5L</u>											Concentration: <u>3.12</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	3	✓	4	4	3	3	3	3	3	4	EMM	3	3	5	3	3	4	3	3	3	3	EMM	4	3	3	3	2	4	✓	3	3	✓	EMM
5	8	7	8	8	7	6	7	7	8	8	EMM	8	9	7	7	9	7	8	6	7	EMM	5	8	7	7	6	7	5	9	6	5	EMM	
6	8	11	11	10	9	11	11	12	7	8	EMM	9	10	10	11	8	12	10	11	11	13	EMM	8	10	9	10	11	6	9	9	13	9	EMM
7																																	
8																																	
Total	19	21	23	22	19	20	21	22	18	20	EMM	20	22	15	21	18	25	20	22	20	23	EMM	17	21	19	20	19	17	9	21	22	14	EMM

Days	Concentration: <u>6.25</u>											Concentration: <u>12.5</u>											Concentration: <u>25</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	3	4	3	5	4	3	2	4	3	3	EMM	4	4	3	3	2	3	X	4	3	3	EMM	4	4	5	3	4	3	1	4	4	4	EMM
5	7	9	8	✓	7	7	6	8	8	7	EMM	6	9	6	7	5	8		7	7	EMM	8	9	9	8	10	7	7	✓	7	8	EMM	
6	10	11	10	9	11	8	6	10	14	10	EMM	11	13	11	12	11	10		9	12	11	EMM	13	9	12	11	12	10	10	9	11	✓	EMM
7																																	
8																																	
Total	20	24	21	14	22	18	14	22	25	20	EMM	21	26	20	22	18	21	X	13	22	24	EMM	25	27	26	22	26	20	18	13	22	12	EMM

Days	Concentration: <u>50</u>											Concentration: <u>100</u>											Concentration:										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓											
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓											
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
4	3	4	4	3	4	4	2	4	4	4	EMM	5	4	5	4	4	3	5	4	2	4	EMM											
5	6	7	8	7	7	8	6	8	✓	7	EMM	7	8	6	8	9	7	6	6	7	7	EMM											
6	12	11	10	11	11	12	10	13	12	10	EMM	11	11	14	9	12	8	10	11	12	9	EMM											
7																																	
8																																	
Total	21	22	22	21	22	24	18	25	16	21	EMM	23	23	25	21	25	18	21	21	21	20	EMM											

Notes: X = mortality.

Sample Description: ① ^{cup} clear, slightly yellow

Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JOU

Date reviewed: Sept. 23/14

CETIS Analytical Report

Report Date: 04 Sep-14 19:05 (p 1 of 2)
 Test Code: 14561 | 17-4571-8281

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 11-6926-9833	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 04 Sep-14 19:04	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 06-1535-6274	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 22 Aug-14 10:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 28 Aug-14 15:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 5h	Source: In-House Culture	Age: <24h
Sample ID: 10-4743-5522	Code: 3E6E9902	Client: Mount Polley
Sample Date: 20 Aug-14	Material: Water Sample	Project:
Receive Date: 21 Aug-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 56h (10.8 °C)	Station: HAD-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1629272	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	0	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 04 Sep-14 19:05 (p 2 of 2)
 Test Code: 14561 | 17-4571-8281

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

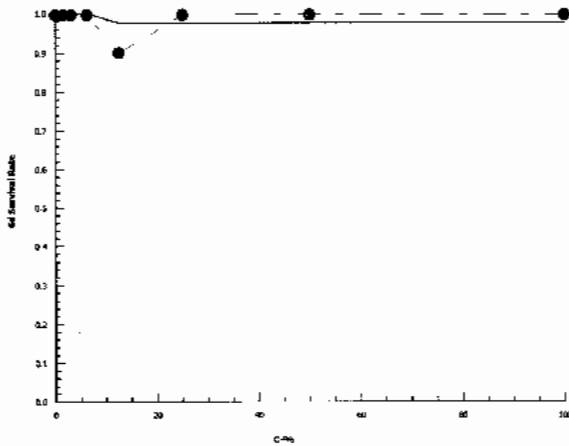
Analysis ID: 11-6926-9833 Endpoint: 6d Survival Rate
 Analyzed: 04 Sep-14 19:04 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 04 Sep-14 19:05 (p 1 of 2)
 Test Code: 14561 | 17-4571-8281

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 10-4192-9911	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 04 Sep-14 19:05	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 06-1535-6274	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 22 Aug-14 10:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 28 Aug-14 15:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 5h	Source: In-House Culture	Age: <24h
Sample ID: 10-4743-5522	Code: 3E6E9902	Client: Mount Polley
Sample Date: 20 Aug-14	Material: Water Sample	Project:
Receive Date: 21 Aug-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 58h (10.8 °C)	Station: HAD-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1823228	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	20.5	18	23	0.5	1.581	7.71%	0.0%
1.56		10	20.6	15	25	0.8718	2.757	13.38%	-0.49%
3.12		10	17.9	9	22	1.242	3.929	21.95%	12.68%
6.25		10	20	14	25	1.183	3.742	18.71%	2.44%
12.5		10	18.4	0	26	2.296	7.26	39.46%	10.24%
25		10	20.6	12	26	1.572	4.971	24.13%	-0.49%
50		10	21.2	16	25	0.8273	2.616	12.34%	-3.42%
100		10	21.8	18	25	0.696	2.201	10.1%	-6.34%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	19	21	23	22	19	20	21	22	18	20
1.56		20	22	15	21	18	25	20	22	20	23
3.12		17	21	19	20	19	17	9	21	22	14
6.25		20	24	21	14	22	18	14	22	25	20
12.5		21	26	20	22	18	21	0	13	22	21
25		25	22	26	22	26	20	18	13	22	12
50		21	22	22	21	22	24	18	25	16	21
100		23	23	25	21	25	18	21	21	21	20

CETIS Analytical Report

Report Date: 04 Sep-14 19:05 (p 2 of 2)

Test Code: 14561 | 17-4571-8281

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 10-4192-9911

Endpoint: Reproduction

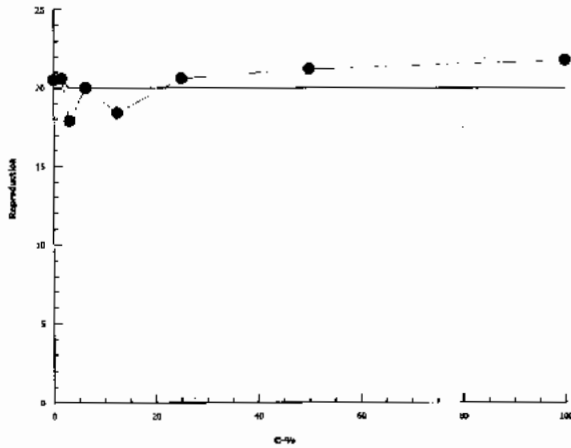
CETIS Version: CETISv1.8.7

Analyzed: 04 Sep-14 19:05

Analysis: Linear Interpolation (ICPIN)

Official Results: Yes

Graphics



APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

Fathead Minnow Test Summary Sheet
(7-d *Pimephales promelas* Survival and Growth Test)

Client: Mount Polley
Work Order No.: 14562

Start Date/Time: Aug 22/14 @ 1500h
Test Species: P. promelas

Sample Information:

Sample ID: HAD-1
Sample Date: Aug 20/14
Date Received: Aug 21/14
Sample Volume: 3x20L

Dilution Water (initial water quality):

Type: Moderately Hard
Temperature (°C): 24.0
pH: 8.0
Dissolved Oxygen (mg/L): 8.1
Hardness (mg/L CaCO₃): 92
Alkalinity (mg/L CaCO₃): 58

Test Validity Criteria:

The test is invalid if:

- 1) for the control solutions, the combined and cumulative incidence of any mortalities, or fish showing loss of equilibrium or other signs of atypical swimming behavior, is >20%
- 2) the average dry weight of the surviving control fish does not attain 250 ug when the fish are dried and weighed.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4; pH = 6.5 to 8.5

Test Organism Information:

Batch No.: 082214
Source: Aquatic Biosystems, CO
Age: 24hr

NaCl Reference Toxicant Results:

Reference Toxicant ID: pp90
Stock Solution ID: n/a
Date Initiated: Aug 24/14
7-d EC50 (95% CL): 5.2 (4.4-6.2)
7-d IC50 (95% CL): 3.9 (3.3-4.6)

Survival:

Reference Toxicant Mean and Historical Range: 4.5 (3.4-6.1) CV (%): 16

Biomass:

Reference Toxicant Mean and Historical Range: 4.1 (3.0-5.6) CV (%): 17

Test Results:

	Survival	Biomass
LC25 % (v/v) (95% CL)	>100	
LC50 % (v/v) (95% CL)	>100	
IC25 % (v/v) (95% CL)		>100
IC50 % (v/v) (95% CL)		>100

Reviewed by: JGh

Date reviewed: Sep. 23/14

**7-d Chronic Freshwater Toxicity Test
Initial and Final Water Quality Measurements**

Client: Mount Pooley
 Sample ID: HAD-1 (purple)
 Work Order #: 14562

Start Date & Time: Aug 22/14 @ 1500h
 Stop Date & Time: Aug 29/14 @ 1400h
 Test Species: Pimephales promelas

%. (V/V) Concentration (CONTROL)	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final	
Temperature (°C)	24.0	25.0	25.5	25.0	25.5	24.0	24.0	25.0	26.0	24.0	25.0	24.0	25.0	24.0	
DO (mg/L)	8.1	6.0	7.9	6.2	8.0	5.6	7.8	6.5	7.7	4.3	7.5	5.9	8.0	6.4	
pH	8.0	7.9	7.9	7.8	8.0	7.5	7.8	7.7	8.1	7.5	8.2	7.7	8.2	7.8	
Cond. (µS/cm)	326		330		371		345		364		347		316	346	
Initials	KJL		M		M		KJL		JW/KJL		JW/KJL		JW/KJL	KJL	

Concentration 1.56	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final	
Temperature (°C)	24.0	25.0	25.5	25.0	25.5	24.0	24.0	25.0	24.0	24.0	24.0	24.0	24.0	24.0	
DO (mg/L)	7.8	5.8	7.9	6.1	7.8	5.5	7.5	6.3	7.8	4.5	8.1	5.8	8.2	6.6	
pH	6.0	7.7	7.9	7.7	8.0	7.6	8.0	7.6	8.1	7.5	8.1	7.7	8.0	7.7	
Cond. (µS/cm)	325		329		370		348		349		349		320	342	
Initials	KJL		M		M		KJL		JW/KJL		JW/KJL		JW/KJL	KJL	

Concentration 12.5	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final	
Temperature (°C)	24.0	25.0	25.5	25.0	25.5	24.0	24.0	25.0	24.5	24.0	24.0	24.0	24.0	24.0	
DO (mg/L)	7.8	5.7	7.8	6.2	7.7	5.0	7.6	6.4	7.8	4.5	7.9	5.7	7.9	5.9	
pH	8.1	7.9	8.2	7.8	8.1	7.5	8.0	7.7	8.2	7.5	8.2	7.6	8.1	7.7	
Cond. (µS/cm)	311		317		316		330		331		331		306	328	
Initials	KJL		M		M		KJL		JW/KJL		JW/KJL		JW/KJL	KJL	

Concentration 100	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final	
Temperature (°C)	24.0	25.0	25.5	25.0	25.5	24.0	24.0	25.0	24.5	24.0	24.0	24.0	24.0	24.0	
DO (mg/L)	7.7	5.6	7.8	6.2	7.7	5.0	7.6	5.9	7.9	4.4	7.9	6.0	8.0	5.8	
pH	8.4	8.1	8.4	7.9	8.4	7.5	8.2	7.6	8.4	7.5	8.4	7.8	8.4	7.7	
Cond. (µS/cm)	207		209		207		207		208		207		208	222	
Initials	KJL		M		M		KJL		JW/KJL		JW/KJL		JW/KJL	KJL	

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6.5 to 8.5

DO meter: 3 pH meter: 3 Conductivity meter: 3

	Control	100% (V/V)		
Hardness*	92	92		
Alkalinity*	58	70		

* mg/L as CaCO₃

Analysts: KJL, JW, AMW

Reviewed by: JLW

Date reviewed: sep. 23/14

Sample Description: clear, slightly yellow

Comments: _____

7-d Fathead Minnow Toxicity Test Daily Survival

Client: Mount Polley
 Sample ID: HAD-1
 Work Order #: 14562

Start Date & Time: Aug 22/14 @ 1500h
 Stop Date & Time: Aug 29/14 @ 1400h
 Test Species: Pimephales promelas

Concentration % (V/V)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	10	10	10	9	9	8	7	
	B			10	10	10	9	9	
	C			10	10	9	9	9	
1-56	A			10	10	10	10	9	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
3-1	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
6-25	A			10	10	10	10	9	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
12-5	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
25	A			8	8	8	8	7	
	B			10	10	10	10	10	
	C	9	9	9	9	9	9	8	
50	A	10	10	10	10	10	10	10	
	B			8	7	7	7	7	
	C			10	10	8	8	8	
100	A			10	10	10	10	8	
	B			10	10	8	8	7	
	C			10	10	8	8	8	
	A								
	B								
	C								
	A								
	B								
	C								
Tech Initials		AM	M	KSL	JW	JW	JW	KL	

Comments: _____

Reviewed by: JGU

Date reviewed: Sep. 23/14

Fathead Minnow Toxicity Test Data Sheet

Dry Weight Data

Client: Mount Polley

Start Date & Time: Aug 22/14 @ 1500h

Sample ID: HAD-1

Termination Date & Time: Aug 29/14 @ 1400h

Work Order No.: 14562

Concentration % (V/V)	orange Rep D	Pan No.	No. alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control	A	1	7	KJL	1026.97	1030.33	7	KJL
	B	2	9		1061.38	1066.76	9	
	C	3	9		1063.30	1069.234	9	
1-56	A	4	9	KJL	1030.20	1036.27 ¹⁰¹	9	KJL
	B	5	10		1053.96	1060.60	10	
	C	6	10		1039.19	1041.47	10	
3-1	A	7	10	KJL	1012.96	1019.14	10	KJL
	B	8	8		1048.11	1053.08	8	
	C	9	10		1035.94	1042.01	10	
6-25	A	10	9	KJL	1047.77	1051.39	9	KJL
	B	11	10		1029.70	1036.12 ¹⁰³	10	
	C	12	10		1065.12	1072.23	10	
12-5	A	13	10	KJL	1014.22	1021.59	10	KJL
	B	14	10		1057.26	1063.86 ¹⁰⁵	10	
	C	15	10		1044.22	1051.27	10	
25	A	16	7	KJL	1018.89	1024.45	7	KJL
	B	17	10		1029.13	1032.20	10	
	C	18	8		1011.92	1017.41	8	
50	A	19	9	KJL	1051.84	1057.84	9	KJL
	B	20	7		1033.39	1038.78 ¹⁰⁷	7	
	C	21	8		1055.05	1060.28	8	
100	A	22	10	KJL	1054.09	1060.85	10	KJL
	B	23	7		1044.56	1049.37	7	
	C	24	6		1008.03	1012.01	6	

Comments: 10% Reweigh: 5-1060.62 13-1021.49

Reviewed by: JOL

Date Reviewed: Sep. 29/14

CETIS Analytical Report

Report Date: 03 Sep-14 19:02 (p 1 of 2)
 Test Code: 14562 | 08-3832-9922

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 07-7876-2778	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 03 Sep-14 19:01	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 01-4093-5155	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 22 Aug-14 15:00	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 29 Aug-14 14:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 10-4743-5522	Code: 3E6E9902	Client: Mount Polley
Sample Date: 20 Aug-14	Material: Water Sample	Project:
Receive Date: 21 Aug-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 63h (10.8 °C)	Station: HAD-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1208668	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.8333	0.8 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	17.02	12.52	90.19	5.875	1.109	7.989
EC10	23.05	12.12	N/A	4.338	NA	8.251
EC15	51.06	N/A	N/A	1.959	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

C-%	Control Type	Count	Mean	Min	Max	Calculated Variate(A/B)					
						Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	3	0.8333	0.7	0.9	0.06667	0.1155	13.86%	0.0%	25	30
1.56		3	0.9667	0.9	1	0.03333	0.05773	5.97%	-16.0%	29	30
3.1		3	0.9333	0.8	1	0.06667	0.1155	12.37%	-12.0%	28	30
6.25		3	0.9667	0.9	1	0.03333	0.05773	5.97%	-16.0%	29	30
12.5		3	1	1	1	0	0	0.0%	-20.0%	30	30
25		3	0.8333	0.7	1	0.08819	0.1528	18.33%	0.0%	25	30
50		3	0.8	0.7	0.9	0.05774	0.1	12.5%	4.0%	24	30
100		3	0.7667	0.6	1	0.1202	0.2082	27.15%	8.0%	23	30

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.7	0.9	0.9
1.56		0.9	1	1
3.1		1	0.8	1
6.25		0.9	1	1
12.5		1	1	1
25		0.7	1	0.8
50		0.9	0.7	0.8
100		1	0.7	0.6

CETIS Analytical Report

Report Date: 03 Sep-14 19:02 (p 2 of 2)
Test Code: 14562 | 08-3832-9922

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 07-7876-2778
Analyzed: 03 Sep-14 19:01

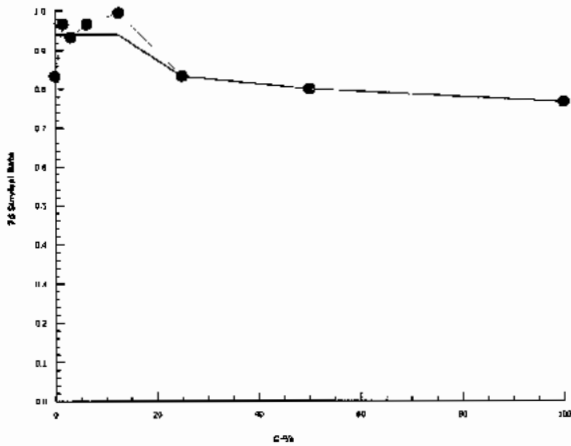
Endpoint: 7d Survival Rate
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	7/10	9/10	9/10
1.56		9/10	10/10	10/10
3.1		10/10	8/10	10/10
6.25		9/10	10/10	10/10
12.5		10/10	10/10	10/10
25		7/10	10/10	8/10
50		9/10	7/10	8/10
100		10/10	7/10	6/10

Graphics



CETIS Analytical Report

Report Date: 03 Sep-14 19:02 (p 1 of 2)
 Test Code: 14562 | 08-3832-9922

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 20-1406-2768	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 03 Sep-14 19:01	Analysis: Nonlinear Regression	Official Results: Yes
Batch ID: 01-4093-5155	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 22 Aug-14 15:00	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 29 Aug-14 14:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 10-4743-5522	Code: 3E6E9902	Client: Mount Polley
Sample Date: 20 Aug-14	Material: Water Sample	Project:
Receive Date: 21 Aug-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 63h (10.8 °C)	Station: HAD-1	

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Log-Logistic EV [Y=A/(1+(X/D)^C)]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
17	46.11	-85.03	-82.69	0.0502	Yes	2.296	2.852	0.0940	Non-Significant Lack of Fit

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	45.17	N/A	107	2.214	0.9349	NA
IC10	69.32	N/A	126.8	1.443	0.7887	NA
IC15	90.36	13.75	147.6	1.107	0.6777	7.272
IC20	110.3	N/A	205.5	0.9065	0.4657	NA
IC25	130.1	N/A	316.5	0.7687	0.316	NA
IC40	193.5	N/A	N/A	0.5167	NA	NA
IC50	244.1	N/A	N/A	0.4096	NA	NA

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.5027	0.25 - NL	Yes	Passes Acceptability Criteria

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	0.6179	0.02661	0.5657	0.67	23.22	<0.0001	Significant Parameter
C	1.745	2.357	-2.874	6.365	0.7405	0.4672	Non-Significant Parameter
D	244.1	317.7	-378.6	866.9	0.7684	0.4508	Non-Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	0.028970	0.028970	1	3.215	0.0874	Non-Significant
Lack of Fit	0.079061	0.015812	5	2.296	0.0940	Non-Significant
Pure Error	0.110176	0.006886	16			
Residual	0.189236	0.009011	21			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	6.253	14.07	0.5105	Equal Variances
	Mod Levene Equality of Variance	0.8331	3.5	0.5887	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9731	0.9169	0.7438	Normal Distribution
	Anderson-Darling A2 Normality	0.2338	2.492	0.8248	Normal Distribution

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 20-1406-2768 Endpoint: Mean Dry Biomass-mg
 Analyzed: 03 Sep-14 19:01 Analysis: Nonlinear Regression

CETIS Version: CETISv1.8.7
 Official Results: Yes

Mean Dry Biomass-mg Summary

Calculated Variate

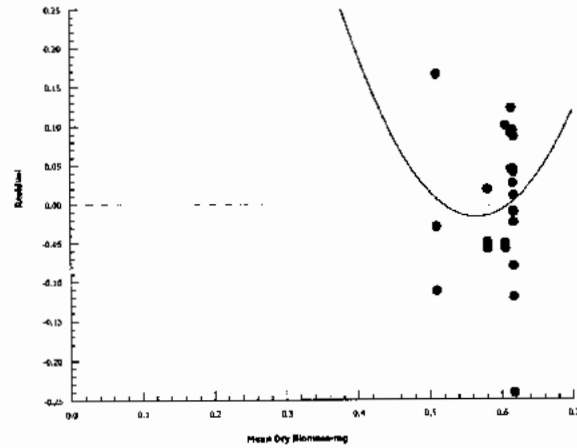
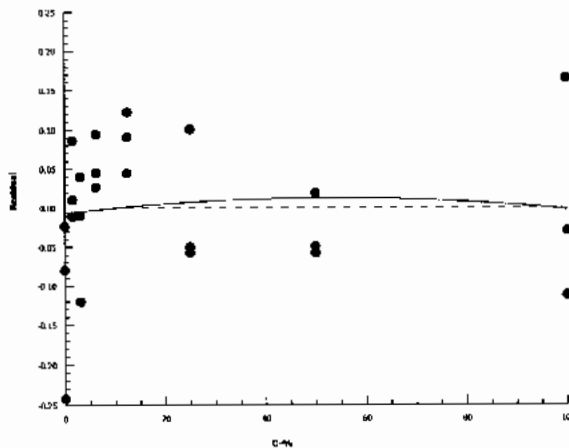
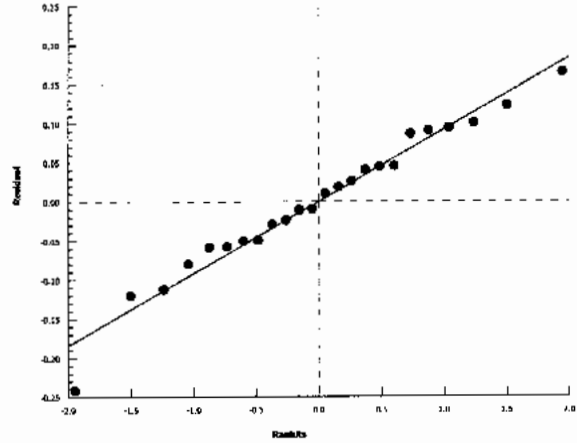
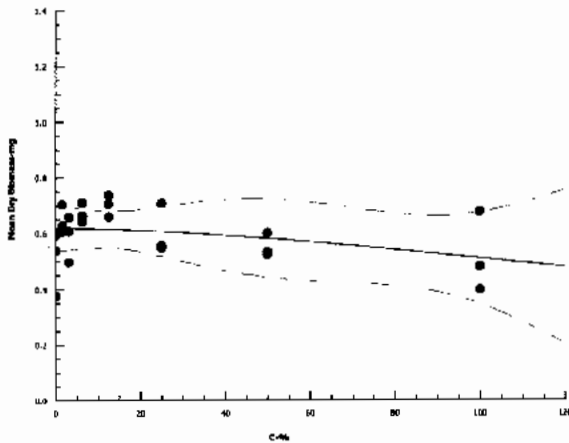
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.5027	0.376	0.594	0.06536	0.1132	22.52%	0.0%
1.56		3	0.6463	0.607	0.704	0.02946	0.05102	7.9%	-28.58%
3.1		3	0.5877	0.497	0.658	0.04758	0.08241	14.02%	-16.91%
6.25		3	0.672	0.643	0.711	0.02025	0.03508	5.22%	-33.69%
12.5		3	0.7003	0.659	0.737	0.02264	0.03921	5.6%	-39.32%
25		3	0.604	0.549	0.707	0.05154	0.08927	14.78%	-20.16%
50		3	0.5517	0.523	0.6	0.02431	0.0421	7.63%	-9.75%
100		3	0.5183	0.398	0.676	0.0824	0.1427	27.53%	-3.12%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.376	0.538	0.594
1.56		0.607	0.704	0.628
3.1		0.658	0.497	0.608
6.25		0.662	0.643	0.711
12.5		0.737	0.659	0.705
25		0.556	0.707	0.549
50		0.6	0.532	0.523
100		0.676	0.481	0.398

Graphics

3P Log-Logistic EV [Y=A/(1+(X/D)^C)]



CETIS Analytical Report

Report Date: 23 Sep-14 17:56 (p 1 of 2)
 Test Code: 14562 | 08-3832-9922

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 11-8443-4641	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 23 Sep-14 17:56	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 01-4093-5155	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 22 Aug-14 15:00	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 29 Aug-14 14:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 10-4743-5522	Code: 3E6E9902	Client:
Sample Date: 20 Aug-14	Material: Water Sample	Project:
Receive Date: 21 Aug-14 09:05	Source: ALS	
Sample Age: 63h (10.8 °C)	Station:	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	15.9%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	1.56	-1.899	2.558	0.095	4	0.9994	CDF	Non-Significant Effect
	3.1	-0.8291	2.558	0.095	4	0.9830	CDF	Non-Significant Effect
	6.25	-2.646	2.558	0.095	4	0.9999	CDF	Non-Significant Effect
	12.5	-2.748	2.558	0.095	4	1.0000	CDF	Non-Significant Effect
	25	-3.525	2.558	0.095	4	1.0000	CDF	Non-Significant Effect
	50	-2.584	2.558	0.095	4	0.9999	CDF	Non-Significant Effect
	100	-2.079	2.558	0.095	4	0.9996	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.03719959	0.005314227	7	2.571	0.0558	Non-Significant Effect
Error	0.0330737	0.002067106	16			
Total	0.07027328		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.691	18.48	0.6976	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9574	0.884	0.3892	Normal Distribution

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	3	0.5983	0.4457	0.7509	0.5978	0.5371	0.66	0.03546	10.27%	0.0%
1.56		3	0.6688	0.5737	0.764	0.6745	0.628	0.704	0.02212	5.73%	-11.78%
3.1		3	0.6291	0.5647	0.6934	0.6212	0.608	0.658	0.01495	4.12%	-5.15%
6.25		3	0.6965	0.5774	0.8156	0.711	0.643	0.7356	0.02768	6.88%	-16.42%
12.5		3	0.7003	0.6029	0.7977	0.705	0.659	0.737	0.02264	5.6%	-17.05%
25		3	0.7292	0.5868	0.8716	0.707	0.6862	0.7943	0.0331	7.86%	-21.87%
50		3	0.6935	0.5495	0.8375	0.6667	0.6537	0.76	0.03347	8.36%	-15.91%
100		3	0.6755	0.6459	0.7051	0.676	0.6633	0.6871	0.006876	1.76%	-12.9%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.5371	0.5978	0.66
1.56		0.6745	0.704	0.628
3.1		0.658	0.6212	0.608
6.25		0.7356	0.643	0.711
12.5		0.737	0.659	0.705
25		0.7943	0.707	0.6862
50		0.6667	0.76	0.6537
100		0.676	0.6871	0.6633

QA: *JOB*
 Sep. 23/14

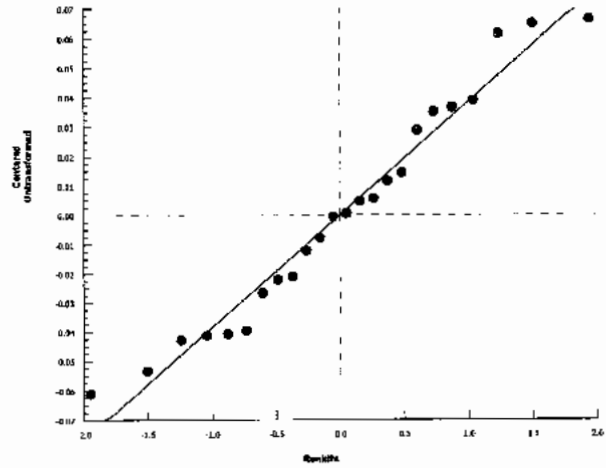
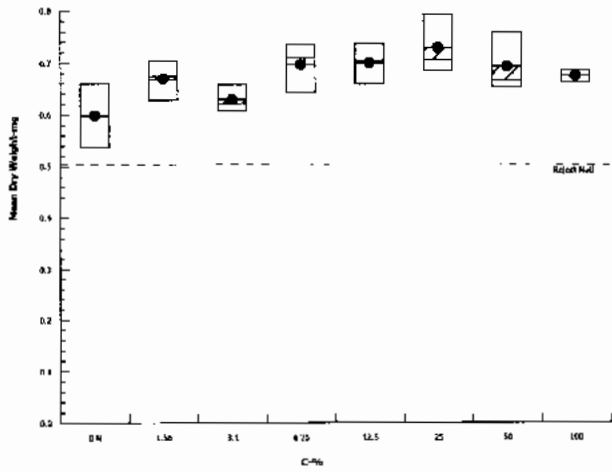
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 11-8443-4641 Endpoint: Mean Dry Weight-mg
Analyzed: 23 Sep-14 17:56 Analysis: Parametric-Control vs Treatments

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 19 Nov-14 12:17 (p 1 of 2)
 Test Code: 14562 | 08-3832-9922

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 00-1851-4201	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 18 Nov-14 16:17	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 01-4093-5155	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 22 Aug-14 15:00	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 29 Aug-14 14:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 10-4743-5522	Code: 3E6E9902	Client:
Sample Date: 20 Aug-14	Material: Water Sample	Project:
Receive Date: 21 Aug-14 09:05	Source: ALS	
Sample Age: 63h (10.8 °C)	Station:	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	188088	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.5983	0.5371	0.66	0.03546	0.06143	10.27%	0.0%
1.56		3	0.6688	0.628	0.704	0.02212	0.03831	5.73%	-11.78%
3.1		3	0.6291	0.608	0.658	0.01495	0.0259	4.12%	-5.15%
6.25		3	0.6965	0.643	0.7356	0.02768	0.04794	6.88%	-16.42%
12.5		3	0.7003	0.659	0.737	0.02264	0.03921	5.6%	-17.05%
25		3	0.7292	0.6862	0.7943	0.0331	0.05733	7.86%	-21.87%
50		3	0.6935	0.6537	0.76	0.03347	0.05797	8.36%	-15.91%
100		3	0.6755	0.6633	0.6871	0.006876	0.01191	1.76%	-12.9%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.5371	0.5978	0.66
1.56		0.6745	0.704	0.628
3.1		0.658	0.6212	0.608
6.25		0.7356	0.643	0.711
12.5		0.737	0.659	0.705
25		0.7943	0.707	0.6862
50		0.6667	0.76	0.6537
100		0.676	0.6871	0.6633

CETIS Analytical Report

Report Date: 19 Nov-14 12:17 (p 2 of 2)
Test Code: 14562 | 08-3832-9922

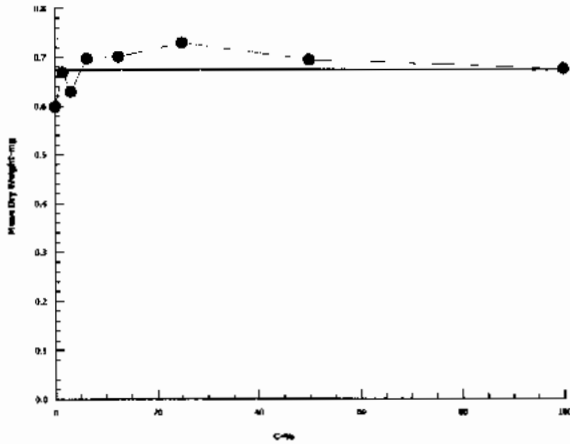
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 00-1851-4201 Endpoint: Mean Dry Weight-mg
Analyzed: 18 Nov-14 16:17 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



APPENDIX C - *Lemna Minor* Toxicity Test Data

Lemna minor Summary Sheet

Client: Mount Polley
Work Order No.: 14564

Start Date: AUG 22 / 14
Set up by: KLP

Sample Information:

Sample ID: HAD - 1
Sample Date: AUG 20 / 14
Date Received: AUG 21 / 14
Sample Volume: 3 x 20L

Test Organism Information:

Culture Date: 08/31/14
Age of culture (Day 0): 9 days
>8X growth in APHA?: Y (24 fronds)

KCI Reference Toxicant Results:

Reference Toxicant ID: LM 108
Date Initiated: Sept 5/14

7-d No. of Fronds IC50 (95% CL): 3.8 (3.4 - 4.2)

7-d No. Fronds IC50 Reference Toxicant Mean (2 SD Range): 4.2 (3.1 - 5.7) CV (%): 16

	Number of Fronds	Dry Weight
Test Results: IC25 %(v/v) (95% CL)	> 97	> 97
IC50 %(v/v) (95% CL)	> 97	> 97

Reviewed by: JOB

Date reviewed: SEP 23 / 14

Plant Growth Inhibition Toxicity Test Water Quality Measurements

Client: Mount Asley Setup by: KLP
 Sample ID: HAD-1 Test Date: August 22/14
 Work Order No.: 14564 Test Species: Lemna minor
 Culture Source: CPCC # 490
 Test Culture Age: 98 days > 8X Growth? (Y/N): Yes (24 fronds)
 Light Intensity Range: 4000-4200 lux Date Measured: August 21/14

Day	0	1	2	3	4	5	6	7
Shelf Temp (°C)	25.5	25.5	25.5	25.5	26.0	25.9	26.0	25.9
Initials	KLP	~	~	EMM	JW	JW	EMM	JW

Sample Characteristics: Initial Water Quality Adjusted Water Quality
 Temperature (°C) 23.0 Aeration?: 20 min 23.5
 DO (mg/L) 7.8 Nutrients added?: yes 7.8
 pH 7.6 → 8.1
 Conductivity (µS) 204 993

Concentration % (v/v)	Temperature (°C)		pH		Conductivity (µS) 0 h
	Day 0	Day 7	Day 0	Day 7	
Control	23.5	25.5	8.3	8.4	893
1.5	24.0	25.5	8.2	8.3	895
3.0	24.0	25.5	8.2	8.4	896
6.1	24.0	25.0	8.2	8.7	900
12.1	24.0	25.5	8.2	8.6	906
24.3	24.0	26.0	8.2	8.9	920
48.5	23.5	26.0	8.2	9.0	947
97	23.5	26.0	8.1	9.1	993
Initials	KLP	KLP	KLP	KLP	KLP

Thermometer: Calibrated Thermometer Cond. Meter: 2 pH meter: 4

Sample Description: clear, slightly yellow

Comments: _____

Reviewed: JW Date Reviewed: Sept. 23/14

Lemna minor Toxicity Test Data Sheet - 7-d Frond Counts

Client: Mount Polley
 Sample ID: HAD-1
 Work Order #: 14564

Start Date: August 22/14
 Termination Date: August 29/14
 Test set up by: KLP

Concentration % (v/v)	Rep	No. of fronds		Chlorosis	Necrosis	Yellow	Abnormal size	Gibbosity	Single fronds	Root destruction	Loss of buoyancy	Comments	Initials
		Day 0	Day 7										
Control	A	6	60										KLP
	B	6	62										
	C	6	49										
	D	6	57										
15	A	6	50										
	B	6	75										
	C	6	56										
	D	6	64										
3.0	A	6	65										
	B	6	62										
	C	6	48										
	D	6	61										
6.1	A	6	64										
	B	6	62										
	C	6	50										
	D	6	65										
12.1	A	6	57										
	B	6	58										
	C	6	71										
	D	6	67										
24.3	A	6	63										
	B	6	53										
	C	6	71										
	D	6	67										

Comments: _____

Reviewed by: JGL

Date Reviewed: sep. 23/14

Lemna minor Toxicity Test Data Sheet - 7-d Frond Counts

Client: Mount Polley
 Sample ID: HAD-1
 Work Order #: 14504

Start Date: August 22/14
 Termination Date: August 29/14
 Test set up by: KLP

Concentration % (v/v)	Rep	No. of fronds		Chlorosis	Necrosis	Yellow	Abnormal size	Gibbosity	Single fronds	Root destruction	Loss of buoyancy	Comments	Initials
		Day 0	Day 7										
48.5	A	6	62										KLP
	B	6	63										
	C	6	64										
	D	6	65										
97	A	6	71										KLP
	B	6	75										
	C	6	60										
	D	6	66										
	A												
	B												
	C												
	D												
	A												
	B												
	C												
	D												
	A												
	B												
	C												
	D												

Comments: _____

Reviewed by: JGH

Date Reviewed: Sept. 23/14

7-d Lemna minor Weight Data Sheet

Client: Mount Polley
 Sample ID: HAD-1
 Work Order #: 14564

Start Date: August 22/14
 Termination Date: August 29/14

Concentration % (v/v)	Rep	MP Pan No. BLUE	Pan weight (mg)	Pan + plant (mg)	Initials
Control	A	1	1051.87	1056.96	JW/BTL
	B	2	1054.00	1059.27	
	C	3	1026.12	1030.05	
	D	4	987.35	990.91	
1.5	A	5	1020.19	1024.33	
	B	6	992.59	998.94	
	C	7	983.72	988.35	
	D	8	1018.76	1023.94	
3.0	A	9	1011.17	1016.55	
	B	10	1023.38	1028.95	
	C	11	994.74	998.65	
	D	12	1010.69	1015.61	
6.1	A	13	1016.92	1022.86	
	B	14	1053.38	1058.44	
	C	15	996.74	1000.50	
	D	16	1011.94	1017.22	
12.1	A	17	1014.93	1018.88	
	B	18	1014.52	1019.55	
	C	19	995.58	1001.20	
	D	20	1008.09	1013.26	
24.3	A	21	1040.80	1045.32	
	B	22	1003.58	1007.71	
	C	23	1031.47	1037.80	
	D	24	1027.36	1033.14	
48.5	A	25	1033.82	1039.03	
	B	26	1044.11	1049.87	
	C	27	1014.34	1020.21	
	D	28	1017.61	1023.01	

Comments: 10% Rereigh : # 3 : 1030.05 # 24 : 1033.00
10 : 1028.84 # 32 : 1031.10

Reviewed by: JW Date Reviewed: Sep. 23/14

7-d Lemna minor Weight Data Sheet

Client: Mount Polley
 Sample ID: HAD-1
 Work Order #: 14564

Start Date: August 22/14
 Termination Date: August 29/14

Concentration % (v/v)	Rep	MP Pan No. Blue	Pan weight (mg)	Pan + plant (mg)	Initials
97	A	29	1025.44	1031.40	JW/BTC
	B	30	1033.00	1039.41	↓
	C	31	1033.13	1038.566 BTC	
	D	32	1026.16	1031.27	
	A				
	B				
	C				
	D				
	A				
	B				
	C				
	D				
	A				
	B				
	C				
	D				
	A				
	B				
	C				
	D				

Comments: _____

Reviewed by: JOU Date Reviewed: Sept. 23/14

CETIS Analytical Report

Report Date: 04 Sep-14 09:55 (p 1 of 2)
 Test Code: 14564 | 04-6408-6728

Lemna Growth Inhibition Test			Nautilus Environmental		
Analysis ID: 14-8807-7623	Endpoint: Frond Count	CETIS Version: CETISv1.8.7	Analyst: Jeslin Wijaya	Official Results: Yes	
Analyzed: 04 Sep-14 9:54	Analysis: Linear Interpolation (ICPIN)		Diluent: Modified APHA		
Batch ID: 12-5072-6223	Test Type: Lemna Growth		Brine:	Age: 9d	
Start Date: 22 Aug-14	Protocol: EC/EPS 1/RM/37				
Ending Date: 29 Aug-14	Species: Lemna minor				
Duration: 7d 0h	Source: CPCC#490				
Sample ID: 10-4743-5522	Code: 3E6E9902	Client: Mount Polley			
Sample Date: 20 Aug-14	Material: Water Sample	Project:			
Receive Date: 21 Aug-14 09:05	Source: Mount Polley (MT POLLEY)				
Sample Age: 48h (10.8 °C)	Station: HAD-1				

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	897208	200	Yes	Two-Point Interpolation

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>97	N/A	N/A	<1.031	NA	NA
IC10	>97	N/A	N/A	<1.031	NA	NA
IC15	>97	N/A	N/A	<1.031	NA	NA
IC20	>97	N/A	N/A	<1.031	NA	NA
IC25	>97	N/A	N/A	<1.031	NA	NA
IC40	>97	N/A	N/A	<1.031	NA	NA
IC50	>97	N/A	N/A	<1.031	NA	NA

Frond Count Summary			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	51	43	56	2.858	5.715	11.21%	0.0%
1.5		4	55.25	44	69	5.406	10.81	19.57%	-8.33%
3		4	53.75	42	59	3.966	7.932	14.76%	-5.39%
6.1		4	54.25	44	59	3.473	6.946	12.8%	-6.37%
12.1		4	57.25	51	65	3.425	6.85	11.96%	-12.25%
24.2		4	57.5	47	65	3.862	7.724	13.43%	-12.75%
48.5		4	57.5	56	59	0.6455	1.291	2.25%	-12.75%
97		4	62	54	69	3.24	6.481	10.45%	-21.57%

Frond Count Detail					
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	54	56	43	51
1.5		44	69	50	58
3		59	56	42	58
6.1		58	56	44	59
12.1		51	52	65	61
24.2		57	47	65	61
48.5		56	57	58	59
97		65	69	54	60

CETIS Analytical Report

Report Date: 04 Sep-14 09:55 (p 2 of 2)
Test Code: 14564 | 04-6408-6728

Lemna Growth Inhibition Test

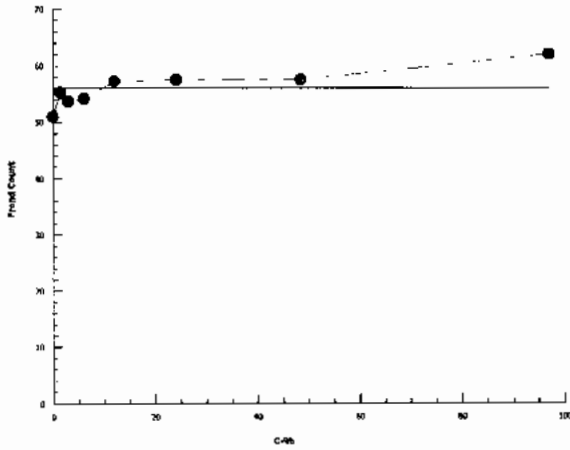
Nautilus Environmental

Analysis ID: 14-8807-7623
Analyzed: 04 Sep-14 9:54

Endpoint: Frond Count
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 23 Sep-14 15:18 (p 1 of 2)
 Test Code: 14564 | 04-6408-6728

Lemna Growth Inhibition Test

Nautilus Environmental

Analysis ID: 12-1413-3522	Endpoint: Frond Count	CETIS Version: CETISv1.8.7
Analyzed: 23 Sep-14 15:17	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 12-5072-6223	Test Type: Lemna Growth	Analyst: Jeslin Wijaya
Start Date: 22 Aug-14	Protocol: EC/EPS 1/RM/37	Diluent: Modified APHA
Ending Date: 29 Aug-14	Species: Lemna minor	Brine:
Duration: 7d 0h	Source: CPCC#490	Age: 9d
Sample ID: 10-4743-5522	Code: 3E6E9902	Client: Mount Polley
Sample Date: 20 Aug-14	Material: Water Sample	Project:
Receive Date: 21 Aug-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 48h (10.8 °C)	Station: HAD-1	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C < T	NA	NA	24.7%	97	>97	NA	1.031

Dunnett Multiple Comparison Test

Control	vs C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	1.5	0.8385	2.482	12.58	6	0.5564	CDF	Non-Significant Effect
	3	0.5426	2.482	12.58	6	0.6896	CDF	Non-Significant Effect
	6.1	0.6412	2.482	12.58	6	0.6467	CDF	Non-Significant Effect
	12.1	1.233	2.482	12.58	6	0.3754	CDF	Non-Significant Effect
	24.2	1.282	2.482	12.58	6	0.3542	CDF	Non-Significant Effect
	48.5	1.282	2.482	12.58	6	0.3542	CDF	Non-Significant Effect
	97	2.17	2.482	12.58	6	0.0910	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			0.7391	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	302.875	43.26786	7	0.8422	0.5639	Non-Significant Effect
Error	1233	51.375	24			
Total	1535.875		31			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	8.164	18.48	0.3183	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9492	0.9081	0.1365	Normal Distribution

Frond Count Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	51	41.91	60.09	52.5	43	56	2.858	11.21%	0.0%
1.5		4	55.25	38.04	72.46	54	44	69	5.406	19.57%	-8.33%
3		4	53.75	41.13	66.37	57	42	59	3.966	14.76%	-5.39%
6.1		4	54.25	43.2	65.3	57	44	59	3.473	12.8%	-6.37%
12.1		4	57.25	46.35	68.15	56.5	51	65	3.425	11.96%	-12.25%
24.2		4	57.5	45.21	69.79	59	47	65	3.862	13.43%	-12.75%
48.5		4	57.5	55.45	59.55	57.5	56	59	0.6455	2.25%	-12.75%
97		4	62	51.69	72.31	62.5	54	69	3.24	10.45%	-21.57%

CETIS Analytical Report

Report Date: 23 Sep-14 15:18 (p 2 of 2)
 Test Code: 14564 | 04-6408-6728

Lemna Growth Inhibition Test

Nautilus Environmental

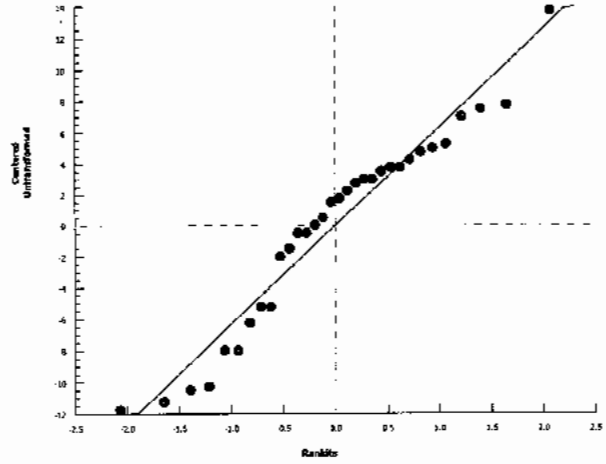
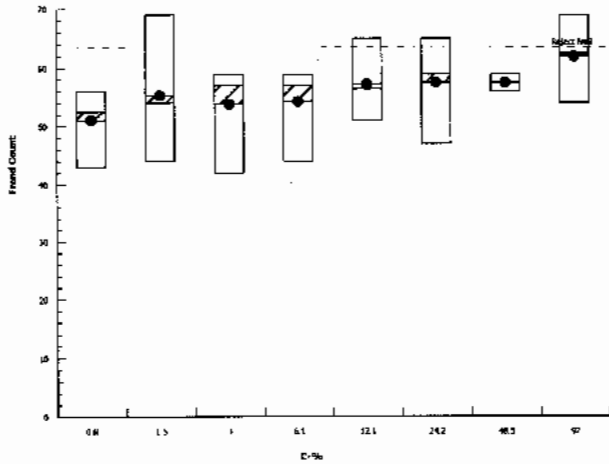
Analysis ID: 12-1413-3522 Endpoint: Frond Count
 Analyzed: 23 Sep-14 15:17 Analysis: Parametric-Control vs Treatments

CETIS Version: CETISv1.8.7
 Official Results: Yes

Frond Count Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	54	56	43	51
1.5		44	69	50	58
3		59	56	42	58
6.1		58	56	44	59
12.1		51	52	65	61
24.2		57	47	65	61
48.5		56	57	58	59
97		65	69	54	60

Graphics



CETIS Analytical Report

Report Date: 04 Sep-14 09:55 (p 1 of 2)
 Test Code: 14564 | 04-6408-6728

Lemna Growth Inhibition Test			Nautilus Environmental		
Analysis ID: 02-7811-4343	Endpoint: Total Dry Weight-mg	CETIS Version: CETISv1.8.7	Analyst: Jeslin Wijaya		
Analyzed: 04 Sep-14 9:55	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes	Diluent: Modified APHA		
Batch ID: 12-5072-6223	Test Type: Lemna Growth	Client: Mount Polley	Brine:		
Start Date: 22 Aug-14	Protocol: EC/EPS 1/RM/37	Project:	Age: 9d		
Ending Date: 29 Aug-14	Species: Lemna minor				
Duration: 7d 0h	Source: CPCC#490				
Sample ID: 10-4743-5522	Code: 3E6E9902				
Sample Date: 20 Aug-14	Material: Water Sample				
Receive Date: 21 Aug-14 09:05	Source: Mount Polley (MT POLLEY)				
Sample Age: 48h (10.8 °C)	Station: HAD-1				

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1642026	200	Yes	Two-Point Interpolation

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>97	N/A	N/A	<1.031	NA	NA
IC10	>97	N/A	N/A	<1.031	NA	NA
IC15	>97	N/A	N/A	<1.031	NA	NA
IC20	>97	N/A	N/A	<1.031	NA	NA
IC25	>97	N/A	N/A	<1.031	NA	NA
IC40	>97	N/A	N/A	<1.031	NA	NA
IC50	>97	N/A	N/A	<1.031	NA	NA

Total Dry Weight-mg Summary			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	4.713	3.93	5.27	0.3012	0.6024	12.78%	0.0%
1.5		4	5.075	4.14	6.35	0.4751	0.9502	18.72%	-7.69%
3		4	4.955	3.91	5.57	0.3709	0.7418	14.97%	-5.15%
6.1		4	5.01	3.76	5.94	0.4567	0.9134	18.23%	-6.31%
12.1		4	5.042	4.35	5.62	0.2629	0.5258	10.43%	-7.0%
24.2		4	5.19	4.13	6.33	0.5181	1.036	19.96%	-10.13%
48.5		4	5.56	5.21	5.87	0.1539	0.3078	5.54%	-17.98%
97		4	5.753	5.11	6.41	0.2795	0.5591	9.72%	-22.07%

Total Dry Weight-mg Detail					
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	5.09	5.27	3.93	4.56
1.5		4.14	6.35	4.63	5.18
3		5.38	5.57	3.91	4.96
6.1		5.94	5.06	3.76	5.28
12.1		4.35	5.03	5.62	5.17
24.2		4.52	4.13	6.33	5.78
48.5		5.21	5.76	5.87	5.4
97		5.96	6.41	5.53	5.11

CETIS Analytical Report

Report Date: 04 Sep-14 09:55 (p 2 of 2)
Test Code: 14564 | 04-6408-6728

Lemna Growth Inhibition Test

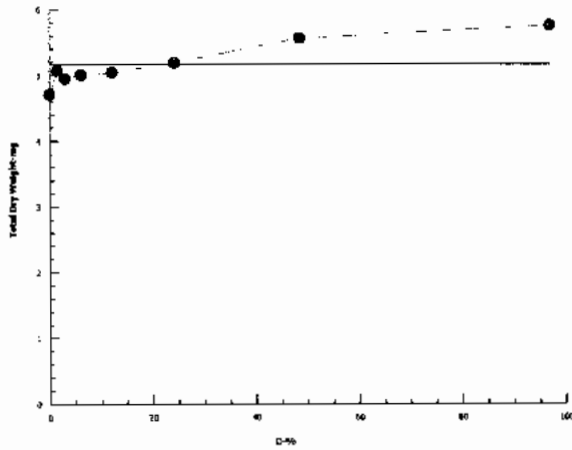
Nautilus Environmental

Analysis ID: 02-7811-4343
Analyzed: 04 Sep-14 9:55

Endpoint: Total Dry Weight-mg
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 23 Sep-14 15:18 (p 1 of 2)
 Test Code: 14564 | 04-6408-6728

Lemna Growth Inhibition Test

Nautilus Environmental

Analysis ID: 03-8837-9866	Endpoint: Total Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 23 Sep-14 15:17	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 12-5072-6223	Test Type: Lemna Growth	Analyst: Jeslin Wijaya
Start Date: 22 Aug-14	Protocol: EC/EPS 1/RM/37	Diluent: Modified APHA
Ending Date: 29 Aug-14	Species: Lemna minor	Brine:
Duration: 7d 0h	Source: CPCC#490	Age: 9d
Sample ID: 10-4743-5522	Code: 3E6E9902	Client: Mount Polley
Sample Date: 20 Aug-14	Material: Water Sample	Project:
Receive Date: 21 Aug-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 48h (10.8 °C)	Station: HAD-1	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C < T	NA	NA	27.6%	97	>97	NA	1.031

Dunnett Multiple Comparison Test

Control	vs C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	1.5	0.6906	2.482	1.303	6	0.6246	CDF	Non-Significant Effect
	3	0.462	2.482	1.303	6	0.7230	CDF	Non-Significant Effect
	6.1	0.5668	2.482	1.303	6	0.6793	CDF	Non-Significant Effect
	12.1	0.6287	2.482	1.303	6	0.6523	CDF	Non-Significant Effect
	24.2	0.9097	2.482	1.303	6	0.5231	CDF	Non-Significant Effect
	48.5	1.615	2.482	1.303	6	0.2279	CDF	Non-Significant Effect
	97	1.982	2.482	1.303	6	0.1273	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			0.7391	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.191214	0.4558876	7	0.8274	0.5747	Non-Significant Effect
Error	13.22316	0.5509651	24			
Total	16.41438		31			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.96	18.48	0.6649	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9774	0.9081	0.7225	Normal Distribution

Total Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	4.713	3.754	5.671	4.825	3.93	5.27	0.3012	12.78%	0.0%
1.5		4	5.075	3.563	6.587	4.905	4.14	6.35	0.4751	18.72%	-7.69%
3		4	4.955	3.775	6.135	5.17	3.91	5.57	0.3709	14.97%	-5.15%
6.1		4	5.01	3.557	6.463	5.17	3.76	5.94	0.4567	18.23%	-6.31%
12.1		4	5.042	4.206	5.879	5.1	4.35	5.62	0.2629	10.43%	-7.0%
24.2		4	5.19	3.541	6.839	5.15	4.13	6.33	0.5181	19.96%	-10.13%
48.5		4	5.56	5.07	6.05	5.58	5.21	5.87	0.1539	5.54%	-17.98%
97		4	5.753	4.863	6.642	5.745	5.11	6.41	0.2795	9.72%	-22.07%

CETIS Analytical Report

Report Date: 23 Sep-14 15:18 (p 2 of 2)
 Test Code: 14564 | 04-6408-6728

Lemna Growth Inhibition Test

Nautilus Environmental

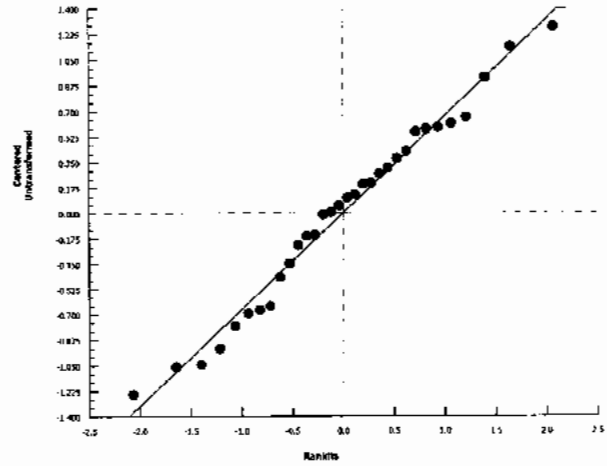
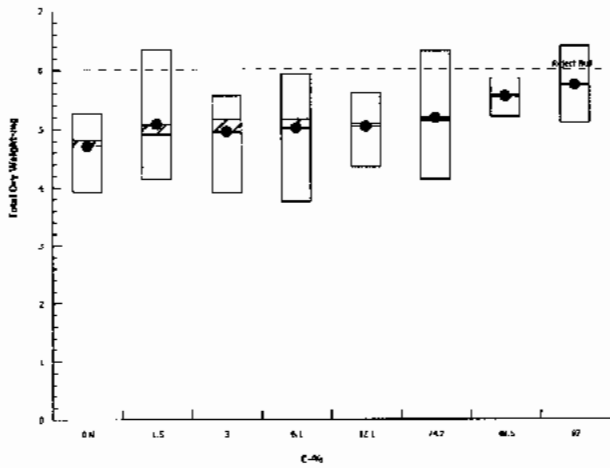
Analysis ID: 03-8837-9866 Endpoint: Total Dry Weight-mg
 Analyzed: 23 Sep-14 15:17 Analysis: Parametric-Control vs Treatments

CETIS Version: CETISv1.8.7
 Official Results: Yes

Total Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	5.09	5.27	3.93	4.56
1.5		4.14	6.35	4.63	5.18
3		5.38	5.57	3.91	4.96
6.1		5.94	5.06	3.76	5.28
12.1		4.35	5.03	5.62	5.17
24.2		4.52	4.13	6.33	5.78
48.5		5.21	5.76	5.87	5.4
97		5.96	6.41	5.53	5.11

Graphics



APPENDIX D - *Pseudokirchneriella subcapitata* Toxicity Test Data

Pseudokirchneriella subcapitata Summary Sheet

Client: Mount Polley
Work Order No.: 14563

Start Date: Aug 22, 2014
Set up by: EMM

Sample Information:

Sample ID: HAD-1
Sample Date: Aug 20, 2014
Date Received: Aug 21, 2014
Sample Volume: 3 x 20L

Test Organism Information:

Culture Date: Aug 15, 2014
Age of culture (Day 0): 7d

Zinc Reference Toxicant Results:

Reference Toxicant ID: SC117
Stock Solution ID: 14Zn01
Date Initiated: Aug 14, 2014

72-h IC50 (95% CL): 28.9 (21.2 - 33.7) µg/L Zn

72-h IC50 Reference Toxicant Mean and Range: 25.1 (14.8 - 42.7) µg/L Zn CV (%): 30

Test Results:	Algal Growth
IC25 %(v/v) (95% CL)	<u>795.2</u>
IC50 %(v/v) (95% CL)	<u>795.2</u>

Reviewed by: JGlu

Date reviewed: Sept. 23/14

72-h Algal Growth Inhibition Toxicity Test Water Quality Measurements

Client: Mr. Polley Setup by: EMM
 Sample ID: HAD-1 Test Date/Time: Aug 22/14 @ 1600
 Work Order No.: 14563 Test Species: Pseudokirchneriella subcapitata

Culture Date: aug 15/14 Age of Culture: 7d Culture Health: Good
 Culture Count: 15892508 Average: 548.5 Culture Cell Density (c1): 548.5 x 10⁴ cells/ml

$$v1 = \frac{220,000 \text{ cells/ml} \times 100 \text{ ml}}{(c1) 548.5 \times 10^4 \text{ cells/ml}} = 4 \text{ mL}$$

Time Zero Counts: 124 219 Average: 21.5

No. of Cells/mL: 21.5 x 10⁴ Initial Density: # cells/mL ÷ 220 µL x 10 µL = 9772 cells/mL
emm 9773 cells/mL

Concentration %(v/v)	Water Quality Measurements					Microplates rotated 2X per day?			
	pH	Temp (°C)				0 h	24 h	48 h	72 h
		0 h	0 h	24 h	48 h				
Control	6.9	24.0	25.5	25.5	25.5	✓	/	/	✓
1.5	7.0	24.0				✓	/	/	✓
3.0	7.0	24.0				✓	/	/	✓
6.0	7.1	24.0				✓	/	/	✓
11.9	7.1	24.5				✓	/	/	✓
23.8	7.4	25.0				✓	/	/	✓
47.6	7.6	25.0				✓	/	/	✓
95.2	7.6	25.0	✓	✓	✓	✓	/	/	✓
Initials	EMM	EMM	~	~	EMM	EMM	~	~	EMM

Initial control pH: Well 1: 7.0 Well 2: 7.0

Final control pH: Well 1: 7.0 Well 2: 7.0

Light intensity (lux): 3800 Date measured: aug 22/14 @ 1600

Sample Description: clear, slightly yellow

Comments: _____

Reviewed: JGU Date reviewed: sep 23/14

Pseudokirchneriella subcapitata Toxicity Test Data Sheet
72-h Algal Cell Counts

Client: Mount Polley Start Date/Time: Aug 22/14 @ 1600
 Work Order #: 14563 Termination Date: Aug 29/14 @ 1600
 Sample ID: HAD-1 Test set up by: EMM
 % (v/v)

Concentration	Rep	Count 1	Count 2	Count 3	Count 4	Comments	Initials
Control	A	42					EMM
	B	38					
	C	46					
	D	39					
	E	46					
	F	38					
	G	37					
	H	45					
1.5	A	54					
	B	42					
	C	49					
	D	51					
3.0	A	51					
	B	44					
	C	52					
	D	58					
6.0	A	57					
	B	58					
	C	61					
	D	49					
11.9	A	56					
	B	68					
	C	69					
	D	75					
23.8	A	76					
	B	63					
	C	69					
	D	88	82				
47.6	A	73					
	B	79					
	C	65					
	D	83					
95.2	A	95					
	B	85					
	C	80					
	D	91					

Comments: _____

Reviewed by: JGh Date Reviewed: Sep-23/14

CETIS Analytical Report

Report Date: 04 Sep-14 08:09 (p 1 of 2)
 Test Code: 14563 | 00-0295-9479

EC Alga Growth Inhibition Test			Nautilus Environmental		
Analysis ID: 07-5960-1688	Endpoint: Cell Yield	CETIS Version: CETISv1.8.7	Analyst: Emma Marus		
Analyzed: 04 Sep-14 8:08	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes	Diluent: Deionized Water + nutrients		
Batch ID: 06-8047-3108	Test Type: Cell Growth	Age: 7d	Brine:		
Start Date: 22 Aug-14 16:00	Protocol: EC/EPS 1/RM/25	Source: In-House Culture	Project:		
Ending Date: 25 Aug-14 16:00	Species: Pseudokirchneriella subcapitata	Client: Mount Polley			
Duration: 72h					
Sample ID: 10-4743-5522	Code: 3E6E9902	Material: Water Sample			
Sample Date: 20 Aug-14	Source: Mount Polley (MT POLLEY)	Station: HAD-1			
Receive Date: 21 Aug-14 09:05					
Sample Age: 64h (10.8 °C)					

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	2098738	200	Yes	Two-Point Interpolation

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>95.2	N/A	N/A	<1.05	NA	NA
IC10	>95.2	N/A	N/A	<1.05	NA	NA
IC15	>95.2	N/A	N/A	<1.05	NA	NA
IC20	>95.2	N/A	N/A	<1.05	NA	NA
IC25	>95.2	N/A	N/A	<1.05	NA	NA
IC40	>95.2	N/A	N/A	<1.05	NA	NA
IC50	>95.2	N/A	N/A	<1.05	NA	NA

Cell Yield Summary			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	8	40.38	36	45	1.362	3.852	9.54%	0.0%
1.5		4	48	41	53	2.55	5.099	10.62%	-18.89%
3		4	50.25	43	57	2.869	5.737	11.42%	-24.46%
6		4	55.25	48	60	2.562	5.123	9.27%	-36.84%
11.9		4	66	55	74	3.979	7.958	12.06%	-63.47%
23.8		4	72.25	62	84	4.732	9.465	13.1%	-78.95%
47.6		4	74	64	82	3.916	7.832	10.58%	-83.28%
95.2		4	86.75	79	94	3.301	6.602	7.61%	-114.9%

Cell Yield Detail									
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	41	37	45	38	45	37	36	44
1.5		53	41	48	50				
3		50	43	51	57				
6		56	57	60	48				
11.9		55	67	68	74				
23.8		75	62	68	84				
47.6		72	78	64	82				
95.2		94	84	79	90				

CETIS Analytical Report

Report Date: 04 Sep-14 08:09 (p 2 of 2)
Test Code: 14563 | 00-0295-9479

EC Alga Growth Inhibition Test

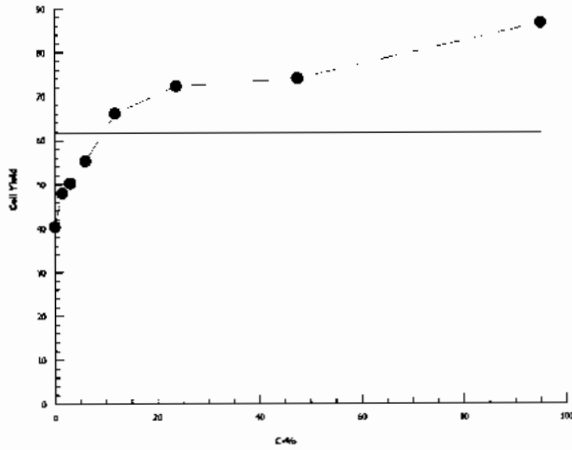
Nautilus Environmental

Analysis ID: 07-5960-1688
Analyzed: 04 Sep-14 8:08

Endpoint: Cell Yield
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 04 Sep-14 08:09 (p 1 of 2)
 Test Code: 14563 | 00-0295-9479

EC Alga Growth Inhibition Test

Nautilus Environmental

Analysis ID: 18-6456-6122	Endpoint: Cell Yield	CETIS Version: CETISv1.8.7
Analyzed: 04 Sep-14 8:08	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 06-8047-3108	Test Type: Cell Growth	Analyst: Emma Marus
Start Date: 22 Aug-14 16:00	Protocol: EC/EPS 1/RM/25	Diluent: Deionized Water + nutrients
Ending Date: 25 Aug-14 16:00	Species: Pseudokirchneriella subcapitata	Brine:
Duration: 72h	Source: In-House Culture	Age: 7d
Sample ID: 10-4743-5522	Code: 3E6E9902	Client: Mount Polley
Sample Date: 20 Aug-14	Material: Water Sample	Project:
Receive Date: 21 Aug-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 64h (10.8 °C)	Station: HAD-1	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C < T	NA	NA	24.4%	1.5	3	2.121	66.67

Dunnett Multiple Comparison Test

Control	vs C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	1.5	1.958	2.526	9.84	10	0.1516	CDF	Non-Significant Effect
	3*	2.535	2.526	9.84	10	0.0491	CDF	Significant Effect
	6*	3.819	2.526	9.84	10	0.0022	CDF	Significant Effect
	11.9*	6.579	2.526	9.84	10	<0.0001	CDF	Significant Effect
	23.8*	8.183	2.526	9.84	10	<0.0001	CDF	Significant Effect
	47.6*	8.632	2.526	9.84	10	<0.0001	CDF	Significant Effect
	95.2*	11.91	2.526	9.84	10	<0.0001	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			0.5540	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	8497.875	1213.982	7	30	<0.0001	Significant Effect
Error	1132.875	40.45982	28			
Total	9630.75		35			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.537	18.48	0.7162	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9747	0.9166	0.5654	Normal Distribution

Cell Yield Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	8	40.38	37.15	43.6	39.5	36	45	1.362	9.54%	0.0%
1.5		4	48	39.89	56.11	49	41	53	2.55	10.62%	-18.89%
3		4	50.25	41.12	59.38	50.5	43	57	2.869	11.42%	-24.46%
6		4	55.25	47.1	63.4	56.5	48	60	2.562	9.27%	-36.84%
11.9		4	66	53.34	78.66	67.5	55	74	3.979	12.06%	-63.47%
23.8		4	72.25	57.19	87.31	71.5	62	84	4.732	13.1%	-78.95%
47.6		4	74	61.54	86.46	75	64	82	3.916	10.58%	-83.28%
95.2		4	86.75	76.25	97.25	87	79	94	3.301	7.61%	-114.9%

CETIS Analytical Report

Report Date: 04 Sep-14 08:09 (p 2 of 2)
 Test Code: 14563 | 00-0295-9479

EC Alga Growth Inhibition Test

Nautilus Environmental

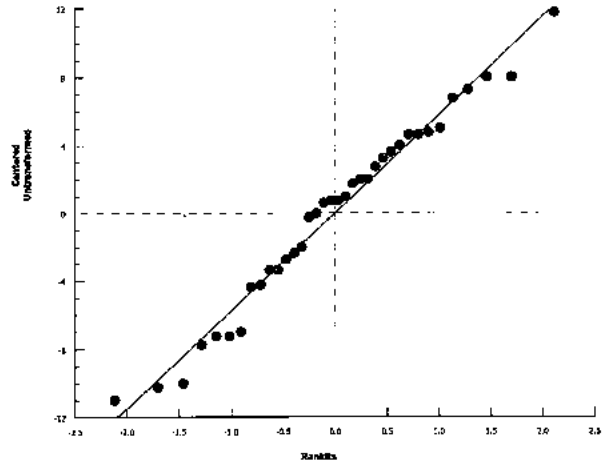
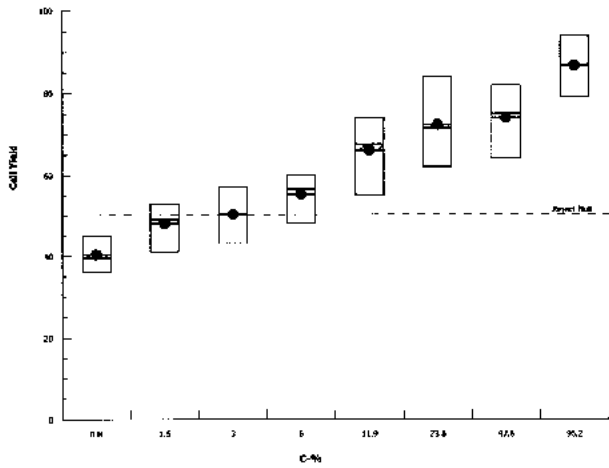
Analysis ID: 18-6456-6122 Endpoint: Cell Yield
 Analyzed: 04 Sep-14 8:08 Analysis: Parametric-Control vs Treatments

CETIS Version: CETISv1.8.7
 Official Results: Yes

Cell Yield Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	41	37	45	38	45	37	36	44
1.5		53	41	48	50				
3		50	43	51	57				
6		56	57	60	48				
11.9		55	67	68	74				
23.8		75	62	68	84				
47.6		72	78	64	82				
95.2		94	84	79	90				

Graphics



APPENDIX E - Chain of Custody Form

Nautilus Environmental

Chain of Custody (electronic)

WO #

Date 20/08/2014 Page 1 of 1

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

Sample Collection By: Sky Freeman		Report to:		Invoice to:	
Company	Mount Polley Mining Corporation	Mount Polley Mining Corporation		Mount Polley Mining Corporation	
Address	Box 12	Box 12		Box 12	
City/Prov/Postal Code	Likely BC V0L 1N0	Likely BC V0L 1N0		Likely BC V0L 1N0	
Contact	Colleen Hughes Deb McMillan	Colleen Hughes/		Colleen Hughes/	
Phone	(250) 790-2617	(250) 790-2617		(250) 790-2617	
Email	chughes@mountpolley.com dmcmillan@minnow.ca	chughes@mountpolley.com		chughes@mountpolley.com	

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	ANALYSES REQUIRED							Receipt Temperature (°C)					
							96h RBT	LC50 NY	48 h Daphnia magna	LC50 NY	7 Day Ceriodaphnia dubia	7 day fathead Minnow	72h algal growth		7d L. Minnow				
1 HAD-1	20/08/2014	12:24	water	20L	3		X	X	X	X	X	X							
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)		RELIQUISHED BY (COURIER)	
Client: Mount Polley Mining Corporation		Total # Containers:	3	Signature:		Signature:	
P.O. No.:		Good Condition?	Y	Sky Freeman		Print:	
Shipped Via: Greyhound		Matches Schedule?	Y	Company: MPMC		Company:	
SPECIAL INSTRUCTIONS/COMMENTS: Cost Code 6400067 506190 ① DATE ON THE CARBOY - NY				Time/Date: 20/08/2014 15:30:00		Time/Date:	
				RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)	
				Signature:		Signature: NY	
				Print:		Print: NAIR YAMAMOTO	
				Company:		Company: NAUTILUS	
		Time/Date:		Time/Date: Aug 21/14 @ 9:05			

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

208 140 151

PART 9

Toxicity testing on a sample identified as QUL66-40m: Sample collected August 21, 2014 (Report date October 9, 2014; Revised December 4, 2014)



Nautilus Environmental

Toxicity testing on a sample identified as QUL66-40m

Sample collected August 21, 2014

Final Report

Report date: October 9, 2014, revised December 4, 2014

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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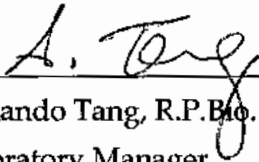
LIST OF APPENDICES

- APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data
- APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data
- APPENDIX C - *Lemna Minor* Toxicity Test Data
- APPENDIX D - *Pseudokirchneriella subcapitata* Toxicity Test Data
- APPENDIX E - Chain of Custody Form

SIGNATURE PAGE



Krysta Pearcy, B.Sc.
Laboratory Biologist



Armando Tang, R.P.Bio.
Laboratory Manager

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted toxicity tests for Mount Polley Mining Corporation on a sample identified as QUL66-40m. The sample was collected on August 21, 2014 and delivered to the laboratory in Burnaby, BC on August 22, 2014. The sample was transported in three 20-L plastic carboys and coolers. The sample was received at a temperature of 4.9°C and was stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing. The following sub-lethal toxicity tests were performed on the sample:

- *Ceriodaphnia dubia* survival and reproduction
- 7-d fathead minnow (*Pimephales promelas*) survival and growth
- 7-d duckweed (*Lemna minor*) growth inhibition
- 72-h algal (*Pseudokirchneriella subcapitata*) growth inhibition

This report describes the results of these toxicity tests. Copies of laboratory data sheets and printouts of statistical analyses for each test are provided in Appendices A to D. The chain-of-custody form is provided in Appendix E. This report was revised from an earlier version to incorporate data for dry weight of fathead minnows, in addition to biomass.

2.0 METHODS

Methods for the toxicity tests are summarized in Tables 1 to 4. Testing was conducted according to procedures described by the Environment Canada protocols (2007a, 2007b, 2007c and 2011). Statistical analyses for all tests were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house culture
Test organism age	<24 h old neonates produced within 12 h
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20 mL test tube
Test volume	15 mL
Test replicates	10 test replicates per treatment
Number of organisms	1 per replicate
Control water	20% Perrier water
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	<i>Pseudokirchneriella subcapitata</i> and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada, (2007a) EPS 1/RM/21
Statistical software	CETIS (2013)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods
Reference toxicant	Sodium chloride

Table 2. Summary of test conditions: fathead minnow (*Pimephales promelas*) survival and growth test.

Test organism	<i>Pimephales promelas</i>
Test organism source	Aquatic BioSystems, Fort Collins, CO
Test organism age	<24 hours
Test type	Static renewal
Test duration	7 days
Test vessel	375-mL glass containers
Test volume	250 mL
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control water	Moderately-hard water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	Twice a day with newly hatched brine shrimp (<i>Artemia nauplii</i>)
Light intensity	100 – 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test protocol	Environment Canada (2011), EPS 1/RM/22
Statistical software	CETIS (2013)
Test endpoint	Survival and biomass
Test acceptability criteria for controls	≥80% survival, ≥250 µg mean dry weight
Reference toxicant	Sodium Chloride

Table 3. Summary of test conditions: *Lemna minor* growth inhibition test.

Test organism	<i>Lemna minor</i>
Test organism source	In-house culture, obtained from Canadian Phycological Culture Centre, and originally isolated from Wainfleet, Stinking Barn, Niagara Peninsula, Ontario, Canada
Test organism age	7-to 10-day old
Test type	Static
Test duration	7 days
Test vessel	250 mL glass containers
Test volume	100 mL
Test replicates	4 test replicates per treatment
No. of organisms	Two 3-frond plants per replicate
Control water	Deionized water with nutrients added
Test solution renewal	None
Test temperature	25 ± 2°C
Feeding	None
Light intensity	4000 to 5600 lux full spectrum light
Photoperiod	24 hours light
Aeration	None
Test protocol	Environment Canada (2007b), EPS 1/RM/37
Statistical software	CETIS (2013)
Test endpoint	Number of fronds and dry weight
Test acceptability criteria for controls	≥ 8-fold increase in number of fronds
Reference toxicant	Potassium chloride

Table 4. Summary of test conditions: *Pseudokirchneriella subcapitata* growth inhibition test.

Test organism	<i>Pseudokirchneriella subcapitata</i> , strain UTCC #37
Test organism source	In-house culture, obtained from Canadian Phycological Culture Center, and originally isolated from Nitelva River, Norway.
Test organism age	3- to 7-day old culture in logarithmic growth phase
Test type	Static
Test duration	72 hours
Test vessel	Microplate
Test volume	220 µL
Test replicates	4 replicates per treatment; 8 replicates for control
Number of organisms	10,000 cells/mL
Control water	Deionized water with supplemented nutrients
Test solution renewal	None
Test temperature	24 ± 2°C
Feeding	None
Light intensity	3600 to 4400 lux
Photoperiod	24 hours light
Aeration	None
Test protocol	Environment Canada (2007c), EPS1/RM/25
Statistical software	CETIS (2013)
Test endpoint	Algal cell growth inhibition
Test acceptability criteria for controls	≥ 16-fold increase in number of algal cells; CV ≤ 20%; no trend when analyzed using Mann-Kendall test
Reference toxicant	Zinc

3.0 RESULTS

Adverse effects were observed only on *C. dubia* reproduction (Table 5). The IC25 and IC50 values were 3.9 and 9.8%, respectively. There were no adverse effects observed on survival of *C. dubia*, survival and growth of fathead minnow (Table 6), frond count and dry weight of *L. minor* (Table 7) or cell yield of *P. subcapitata* (Table 8). The LC and IC values were therefore greater than the highest concentration tested for each of these endpoints in these toxicity tests. In addition, a stimulatory effect was observed for *P. subcapitata* cell yield; percent stimulation ranged from 6.4 to 175.4%.

Table 5. Results: *Ceriodaphnia dubia* survival and reproduction test.

Concentration (% v/v)	Survival (%)	Reproduction (mean ± SD)
Control	90	16.7 ± 7.5
1.56	100	18.7 ± 4.3
3.12	100	14.2 ± 5.7
6.25	100	11.1 ± 1.2
12.5	100	7.6 ± 2.8
25	100	6.8 ± 2.3
50	100	4.4 ± 2.1
100	100	3.5 ± 2.4
Test endpoint (% v/v)		
LC50	>100	--
IC25 (95% CL)	--	3.9 (2.4 - 6.3)
IC50 (95% CL)	--	9.8 (7.0 - 20.1)

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits.

Table 6. Results: fathead minnow (*Pimephales promelas*) survival and growth test.

Concentration (% v/v)	Mean ± SD		
	Survival (%)	Biomass (µg)	Dry Weight (µg)
Control	100.0 ± 0.0*	629.5 ± 29.0*	629.5 ± 29.0*
1.56	100.0 ± 0.0	600.3 ± 78.6	600.3 ± 78.6
3.1	96.7 ± 5.8	598.7 ± 56.3	622.4 ± 89.2
6.25	100.0 ± 0.0	693.0 ± 24.5	693.0 ± 24.5
12.5	100.0 ± 0.0	665.7 ± 29.6	665.7 ± 29.6
25	100.0 ± 0.0	665.0 ± 28.6	665.0 ± 28.6
50	100.0 ± 0.0	628.7 ± 36.7	628.7 ± 36.7
100	86.7 ± 23.1	600.3 ± 139.4	698.3 ± 37.5
Test endpoint (% v/v)			
LC50	>100	--	--
IC25	--	>100	>100
IC50	--	>100	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

*One replicate excluded from mean survival and biomass calculation. See QA/QC section for further details.

Table 7. Results: *Lemna minor* growth inhibition test.

Concentration (% v/v)	Frond Growth (No. of Fronds)	Dry Weight (mg)
	(Mean ± SD)	(Mean ± SD)
Control	57.2 ± 9.0	5.2 ± 0.9
1.5	52.2 ± 13.4	4.7 ± 1.0
3.0	59.0 ± 11.1	5.5 ± 0.9
6.1	44.8 ± 2.5	4.6 ± 0.3
12.1	50.2 ± 4.5	4.9 ± 0.3
24.2	47.5 ± 8.1	4.8 ± 0.6
48.5	51.0 ± 8.3	5.3 ± 0.8
97	49.0 ± 7.2	5.4 ± 0.5
Test endpoint		
IC25	>97	>97
IC50	>97	>97

SD = Standard Deviation, IC = Inhibition Concentration.

Table 8. Results: *Pseudokirchneriella subcapitata* growth inhibition test.

Concentration (% v/v)	Cell Density (x 10 ⁴ cells/mL) (Mean ± SD)	Stimulation (%)
Control	42.8 ± 5.3	--
1.5	45.5 ± 2.6	6.4
3.0	50.2 ± 2.2	17.5
6.0	55.8 ± 7.9*	30.4
11.9	71.5 ± 3.7*	67.2
23.8	94.5 ± 6.0*	121.1
47.6	117.8 ± 10.7*	175.4
95.2	97.5 ± 11.9*	128.1
Test endpoint (% v/v)		
IC25	>95.2	--
IC50	>95.2	--

SD = Standard Deviation, IC = Inhibition Concentration.

*Indicates cell yield that were significantly greater than the control.

4.0 QA/QC

The health history of the test organisms used in the exposures was acceptable and met the requirements of the Environment Canada protocols. The tests met all control acceptability criteria and water quality parameters remained within ranges specified in the protocols throughout the tests. There were no deviations from the test methodologies. Uncertainty associated with these tests is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

In the fathead minnow test two of the three control replicates had 100% survival while the third replicate had 0% survival. The concurrent reference toxicant test conducted had a mean control survival of 96.7%, indicating that the organisms used were healthy. Thus the low survival in the one control replicate was an anomalous result, given that five of the six control replicates tested with this batch of organisms had 90 to 100% survival. A statistical analysis was conducted that identified the one control replicate with low survival as being a statistically significant outlier. Therefore, the control survival and biomass, and the statistical endpoints of the sample were calculated based on two replicates and the data presented in the report are considered valid.

Results of the reference toxicant tests conducted during the testing program are summarized in Table 9. Results for these tests fell within the range for organism performance of mean and two standard deviation range, based on historical results obtained by the laboratory with these tests. Thus, the sensitivity of the organisms used in these tests was appropriate.

Table 9. Reference toxicant results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>C. dubia</i>	Survival (LC50): 1.8 g/L NaCl	1.8 (1.2 - 2.7)	22	August 26 , 2014
	Reproduction (IC50): 1.3 g/L NaCl	1.4 (1.0 - 1.9)	19	
<i>P. promelas</i>	Survival (LC50): 5.2 g/L NaCl	4.5 (3.4 - 6.1)	16	August 22, 2014
	Biomass (IC50): 3.9 g/L NaCl	4.1 (3.0 - 5.6)	17	
<i>L. minor</i>	No. Fronds (IC50) 3.8 g/L KCl	4.2 (3.1 - 5.7)	16	September 5, 2014
<i>P. subcapitata</i>	Growth (IC50) 28.9 µg/L Zn	25.1 (14.8 - 42.7)	30	August 14, 2014

SD = Standard Deviation, CV = Coefficient of Variation, IC = Inhibition Concentration, LC = Lethal Concentration.

5.0 REFERENCES

- Environment Canada. 2007a. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. Report EPS 1/RM/21, Second Edition, February 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 74 pp.
- Environment Canada. 2007b. Biological test method: tests for measuring the inhibition of growth using the freshwater macrophyte, *Lemna minor*. Environmental Protection Series, Report EPS 1/RM/37. Second Edition. January 2007. Environment Canada, Method Development and Application Section, Environmental Technology Centre, Ottawa, ON. 112 pp.
- Environment Canada. 2007c. Biological test method: growth inhibition test using the freshwater alga. Environmental Protection Series, Report EPS 1/RM/25. Second Edition, March 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 53 pp.
- Environment Canada. 2011. Biological test method: test of larval growth and survival using fathead minnows. Environmental Protection Series, Report EPS 1/RM/22. February 2011,. Environment Canada, Environmental Protection, Conservation and Protection, Ottawa, ON. 73 pp.
- Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.4.29 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: Mount Polley
 Work Order No.: 14569

Start Date/Time: Aug 22/14 @ 1100h
 Set up by: EMM

Sample Information:

Sample ID: QUL66-40m
 Sample Date: Aug 21/14
 Date Received: Aug 22/14
 Sample Volume: 3x20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is >80 %
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of >15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 081514A
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 19
 Mortality (%) in previous 7 d: 0
 Individual female # used ≥8 young on test day: 1, 2, 8, 11, 12, 13, 14, 16, 18

NaCl Reference Toxicant Results:

Reference Toxicant ID: CD117
 Stock Solution ID: 14N402
 Date Initiated: Aug 20/14

7-d LC50 (95% CL): 1.8 (1.5-2.2) g/L NaCl
 7-d IC50 (95% CL): 1.3 (1.1-1.5) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.8 (1.2-2.7) g/L NaCl CV (%): 22
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-1.9) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		3.9 (2.4-6.3)
IC50 % (v/v) (95% CL)		9.8 (7.0-20.1)

Reviewed by: JOM

Date reviewed: Sep-18/14

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Polley
 Sample ID: QUL66-40m
 Work Order #: 14569

Start Date & Time: Aug 22/14 @ 1100
 Stop Date & Time: Aug 28/14 @ 1600
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		Final	6	7
control	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.0	7.3	8.0	7.5	8.0	7.2	8.1	7.2	8.2	7.3	8.0	7.3		
pH	8.0	7.8	8.2	7.8	8.2	7.8	8.1	7.7	8.2	7.6	8.1	7.6		
Cond. (µS/cm)	213		214		213		214		218		215		220	
Initials	EMM		AP		M		EMM		EMM		EMM		EMM	

Concentration	Days													
	0	1		2		3		4		5		Final	6	7
1.56%	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.2	7.4	8.1	7.5	8.1	7.1	8.2	7.2	8.2	7.1	8.2	7.2		
pH	8.1	7.9	8.1	7.7	8.1	7.8	8.1	7.8	8.1	7.8	8.1	7.7		
Cond. (µS/cm)	211		217		215		214		216		214		221	
Initials	EMM		M		M		EMM		EMM		EMM		EMM	

Concentration	Days													
	0	1		2		3		4		5		Final	6	7
12.5%	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.5	25.0	25.0	25.0	25.0	25.0
DO (mg/L)	8.2	7.4	8.2	7.5	8.1	7.0	8.1	7.1	8.0	7.0	8.1	7.3		
pH	8.1	7.9	8.1	8.0	8.1	7.8	8.1	7.8	8.0	7.8	7.9	7.7		
Cond. (µS/cm)	209		206		205		204		208		210		214	
Initials	EMM		M		M		EMM		EMM		EMM		EMM	

Concentration	Days													
	0	1		2		3		4		5		Final	6	7
100%	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
DO (mg/L)	8.1	7.5	8.2	7.5	8.1	7.1	8.1	7.2	8.0	7.1	8.0	7.3		
pH	7.9	8.0	8.1	8.0	8.0	7.6	7.8	7.8	7.7	7.4	7.8	7.3		
Cond. (µS/cm)	154		158		157		155		149		159		170	
Initials	EMM		M		M		EMM		EMM		EMM		EMM	

	Control	100% CVU
Hardness*	100	68
Alkalinity*	80	58

Analysts: AWB, EMM
 Reviewed by: JOU
 Date reviewed: Sept. 18/14

* mg/L as CaCO3

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5

Sample Description: slight turbid, greenish ppt present

Comments: Broodboard Used: 081514A (t# 1, 2, 8, 11, 12, 13, 14, 16, 18)

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt. Polley
 Sample ID: 0466-140m
 Work Order: 14569

Start Date & Time: Aug 22/14 @ 1100h
 Stop Date & Time: Aug 28/14 @ 1600h
 Set up by: EMM

90 CVU)

Days	Concentration: <u>control</u>											Concentration: <u>1.56</u>											Concentration: <u>3.12</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	5	3	3	3	4	4	3	3	4	X	EMM	3	3	4	4	4	4	3	2	4	4	EMM	3	3	4	3	3	4	2	3	3	4	EMM
5	9	9	8	7	6	6	7	✓	6	1	EMM	7	6	10	7	8	8	✓	6	7	5	EMM	8	✓	7	7	6	✓	6	✓	✓	✓	EMM
6	12	10	✓	9	10	10	11	8	7		EMM	9	12	9	10	11	9	7	6	9	6	EMM	13	7	10	9	8	7	✓	5	10	7	EMM
7																																	
8																																	
Total	26	22	11	19	20	20	21	11	17	X	EMM	19	21	23	21	23	21	10	14	20	15	EMM	29	10	21	19	17	11	8	8	13	11	EMM

Days	Concentration: <u>6.25</u>											Concentration: <u>12.5</u>											Concentration: <u>25</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	4	4	✓	3	✓	4	3	4	4	3	EMM	4	✓	✓	✓	3	3	3	✓	4	2	EMM	3	✓	✓	3	✓	4	✓	✓	2	✓	EMM
5	✓	✓	4	✓	4	✓	✓	✓	✓	✓	EMM	4	4	3	3	✓	✓	✓	3	✓	6	EMM	4	3	✓	2	✓	3	3	✓	4	✓	EMM
6	9	8	8	6	7	8	7	6	7	8	EMM	5	4	9	✓	6	5	9	✓	5	6	EMM	6	4	✓	3	4	5	5	✓	5	5	EMM
7																																	
8																																	
Total	13	12	12	9	11	12	10	10	11	11	EMM	9	8	7	3	9	8	12	3	9	8	EMM	9	8	3	6	6	9	8	3	7	9	EMM

Days	Concentration: <u>50</u>											Concentration: <u>100</u>											Concentration:										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓											
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓											
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
4	3	✓	✓	✓	✓	✓	✓	✓	✓	2	EMM	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
5	✓	3	✓	4	✓	4	2	3	2	✓	EMM	✓	3	✓	3	2	3	✓	2	✓	2	EMM											
6	4	✓	3	✓	✓	✓	3	4	3	4	EMM	3	2	✓	3	✓	✓	2	✓	2	6	EMM											
7																																	
8																																	
Total	7	3	3	4	0	4	5	7	5	6	EMM	5	5	0	6	2	3	2	2	2	8	EMM											

Notes: X = mortality.

Sample Description: ① turbid, greyish, not present
 Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JOU

Date reviewed: sep. 18/14

CETIS Analytical Report

Report Date: 04 Sep-14 18:43 (p 1 of 2)
 Test Code: 14569 | 07-2046-1293

Ceriodaphnia 7-d Survival and Reproduction Test			Nautilus Environmental
Analysis ID: 18-9954-5709	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7	
Analyzed: 04 Sep-14 18:42	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes	
Batch ID: 20-8229-9450	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy	
Start Date: 22 Aug-14 11:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water	
Ending Date: 28 Aug-14 16:00	Species: Ceriodaphnia dubia	Brine:	
Duration: 6d 5h	Source: In-House Culture	Age: <24h	
Sample ID: 19-7561-5105	Code: 75C17E81	Client: Mount Polley	
Sample Date: 21 Aug-14 11:13	Material: Water Sample	Project:	
Receive Date: 22 Aug-14 08:20	Source: Mount Polley (MT POLLEY)		
Sample Age: 24h (4.9 °C)	Station: QUL66-40m		

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1942685	200	Yes	Two-Point Interpolation

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	0.9	0	1	0.1	0.3162	35.14%	0.0%	9	10
1.56		10	1	1	1	0	0	0.0%	-11.11%	10	10
3.12		10	1	1	1	0	0	0.0%	-11.11%	10	10
6.25		10	1	1	1	0	0	0.0%	-11.11%	10	10
12.5		10	1	1	1	0	0	0.0%	-11.11%	10	10
25		10	1	1	1	0	0	0.0%	-11.11%	10	10
50		10	1	1	1	0	0	0.0%	-11.11%	10	10
100		10	1	1	1	0	0	0.0%	-11.11%	10	10

6d Survival Rate Detail											
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	0
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 04 Sep-14 18:43 (p 2 of 2)
 Test Code: 14569 | 07-2046-1293

Ceriodaphnia 7-d Survival and Reproduction Test

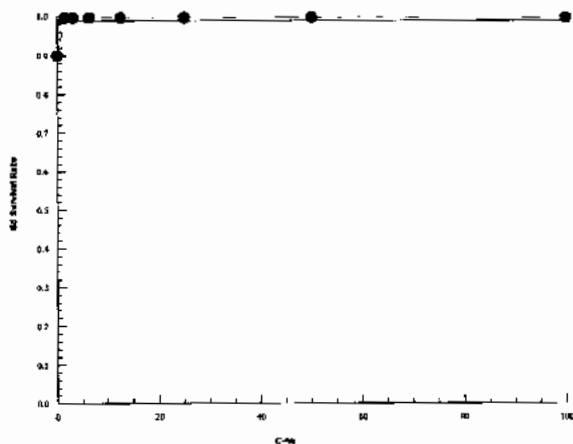
Nautilus Environmental

Analysis ID: 18-9954-5709 Endpoint: 6d Survival Rate CETIS Version: CETISv1.8.7
 Analyzed: 04 Sep-14 18:42 Analysis: Linear Interpolation (ICPIN) Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 04 Sep-14 18:43 (p 1 of 2)
 Test Code: 14569 | 07-2046-1293

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 09-7675-3483	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 04 Sep-14 18:42	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 20-8229-9450	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 22 Aug-14 11:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 28 Aug-14 16:00	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 5h	Source: In-House Culture	Age: <24h
Sample ID: 19-7561-5105	Code: 75C17E81	Client: Mount Polley
Sample Date: 21 Aug-14 11:13	Material: Water Sample	Project:
Receive Date: 22 Aug-14 08:20	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h (4.9 °C)	Station: QUL66-40m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	347239	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	1.887	0.465	3.523	52.99	28.39	215
IC10	2.256	1.146	4.066	44.32	24.59	87.24
IC15	2.673	1.764	4.66	37.41	21.46	56.68
IC20	3.15	2.107	5.335	31.74	18.74	47.46
IC25	3.877	2.437	6.263	25.79	15.97	41.03
IC40	6.895	4.582	9.789	14.5	10.22	21.82
IC50	9.812	6.994	20.06	10.19	4.985	14.3

Reproduction Summary

C-%	Control Type	Count	Mean	Min	Max	Calculated Variate			
						Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	16.7	0	26	2.367	7.484	44.81%	0.0%
1.56		10	18.7	10	23	1.359	4.296	22.97%	-11.96%
3.12		10	14.2	8	24	1.794	5.673	39.95%	14.97%
6.25		10	11.1	9	13	0.3786	1.197	10.79%	33.53%
12.5		10	7.6	3	12	0.8718	2.757	36.27%	54.49%
25		10	6.8	3	9	0.7272	2.3	33.82%	59.28%
50		10	4.4	0	7	0.67	2.119	48.15%	73.65%
100		10	3.5	0	8	0.7638	2.415	69.01%	79.04%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	26	22	11	19	20	20	21	11	17	0
1.56		19	21	23	21	23	21	10	14	20	15
3.12		24	10	21	19	17	11	8	8	13	11
6.25		13	12	12	9	11	12	10	10	11	11
12.5		9	8	7	3	9	8	12	3	9	8
25		9	8	3	6	6	9	8	3	7	9
50		7	3	3	4	0	4	5	7	5	6
100		5	5	0	6	2	3	2	2	2	8

QA: JGK
 Jan. 18/14

CETIS Analytical Report

Report Date: 04 Sep-14 18:43 (p 2 of 2)
Test Code: 14569 | 07-2046-1293

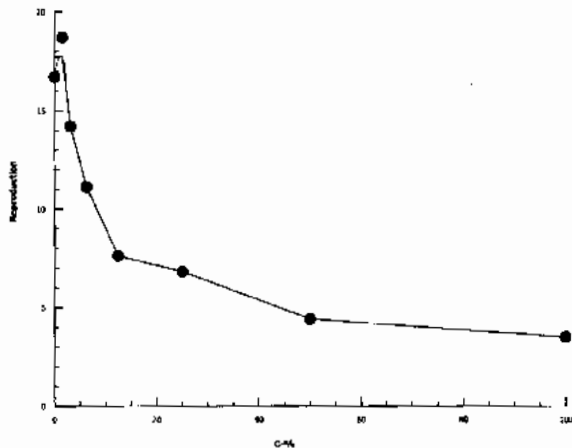
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 09-7675-3483 Endpoint: Reproduction
Analyzed: 04 Sep-14 18:42 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

Fathead Minnow Test Summary Sheet

(7-d *Pimephales promelas* Survival and Growth Test)

Client: Mant Polley
 Work Order No.: 14520

Start Date/Time: Aug 22/14 @ 1500h
 Test Species: P. promelas

Sample Information:

Sample ID: QUL66-40M
 Sample Date: Aug 21/14
 Date Received: Aug 22/14
 Sample Volume: 3820L

Dilution Water (initial water quality):

Type: 24.0^{NSC} Moderately hard
 Temperature (°C): 24.0
 pH: 8.0
 Dissolved Oxygen (mg/L): 8.1
 Hardness (mg/L CaCO₃): 92
 Alkalinity (mg/L CaCO₃): 58

Test Validity Criteria:

The test is invalid if:

- 1) for the control solutions, the combined and cumulative incidence of any mortalities, or fish showing loss of equilibrium or other signs of atypical swimming behavior, is >20%
- 2) the average dry weight of the surviving control fish does not attain 250 ug when the fish are dried and weighed.

WQ Ranges:
 T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4; pH = 6.5 to 8.5

Test Organism Information:

Batch No.: 082214
 Source: Aquatic Biosystems, CO
 Age: 224hr

NaCl Reference Toxicant Results:

Reference Toxicant ID: PP90
 Stock Solution ID: n/a
 Date Initiated: Aug 22/14
 7-d EC50 (95% CL): 5.2 (4.4-6.2)
 7-d IC50 (95% CL): 3.4 (3.3-4.6)

Survival:
 Reference Toxicant Mean and Historical Range: 4.5 (3.4-6.1) CV (%): 16

Biomass:
 Reference Toxicant Mean and Historical Range: 4.1 (3.0-5.6) CV (%): 17

Test Results:

	Survival	Biomass
LC25 % (v/v) (95% CL)	>100	
LC50 % (v/v) (95% CL)	>100	
IC25 % (v/v) (95% CL)		7100
IC50 % (v/v) (95% CL)		>100

Reviewed by: JM

Date reviewed: Sept. 19/14

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Bailey
 Sample ID: QLL66-40m (keel)
 Work Order #: 14570

Start Date & Time: Aug 22/14 @ 1500h
 Stop Date & Time: Aug 29/14 @ 1400h
 Test Species: Pimephales promelas

Concentration (Control)	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	25.6	25.0	25.5	26.0	26.0	25.0	24.0	24.0	25.0	24.0	25.0	24.0
DO (mg/L)	8.1	6.0	7.0	6.1	8.0	5.5	7.8	6.2	7.2	4.1	7.5	5.6	8.0	6.1
pH	8.0	7.7	7.0	7.9	8.0	7.7	7.9	7.8	8.1	7.6	8.2	7.7	8.2	7.8
Cond. (µS/cm)	326		330		331		346		364		347		316	344
Initials	KJL		m		m		KJL		JW/KJL		JW/KJL		JW/KJL	KJL

Concentration 1-56	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	25.5	25.0	25.5	25.8	24.0	25.0	24.5	24.0	24.0	24.0	24.0	24.0
DO (mg/L)	7.8	5.1	7.8	6.0	7.9	5.9	8.0	6.0	8.0	4.1	7.8	5.6	7.6	6.4
pH	8.0	7.8	8.0	7.7	8.0	7.7	7.5	7.7	8.0	7.5	8.0	7.6	7.8	7.8
Cond. (µS/cm)	325		322		329		345		348		345		314	341
Initials	KJL		m		m		KJL		JW/KJL		JW/KJL		JW/KJL	KJL

Concentration 12-5	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	25.5	25.0	25.5	26.0	24.0	25.0	24.5	24.0	24.0	24.0	24.5	24.0
DO (mg/L)	8.0	5.7	7.1	6.1	7.9	5.1	7.7	5.7	7.9	4.1	7.7	5.8	7.9	6.3
pH	8.1	7.9	8.0	7.8	8.0	7.6	8.0	7.7	8.1	7.5	8.2	7.7	8.0	7.7
Cond. (µS/cm)	308		314		312		325		327		325		301	329
Initials	KJL		m		m		KJL		JW/KJL		JW/KJL		JW/KJL	KJL

Concentration 100	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	25.0	25.0	25.0	26.0	24.0	25.0	24.0	24.0	24.0	24.0	24.0	24.0
DO (mg/L)	8.2	5.8	7.7	5.9	7.6	5.2	8.0	5.7	8.1	4.5	8.1	5.9	8.0	6.1
pH	8.0	7.9	7.7	7.8	8.0	7.6	7.8	7.8	8.1	7.5	8.1	7.7	8.0	7.7
Cond. (µS/cm)	156		161		159		156		158		156		156	172
Initials	KJL		m		m		KJL		JW/KJL		JW/KJL		JW/KJL	KJL

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6.5 to 8.5

DO meter: 3 pH meter: 3 Conductivity meter: 3

	Control	100% (WV)	
Hardness*	42	68	/
Alkalinity*	58	58	

* mg/L as CaCO3

Analysts: KJL, JW, AWD

Reviewed by: JGL

Date reviewed: Sept. 18/14

Sample Description: turbid, greyish, precipitate present

Comments: _____

7-d Fathead Minnow Toxicity Test Daily Survival

Client: Mount Pooley
 Sample ID: Quib66-40M (Red)
 Work Order #: 14570

Start Date & Time: Aug 22/14 @ 1500h
 Stop Date & Time: Aug 29/14 @ 1400h
 Test Species: Pimephales promelas

Concentration <i>1/2 (V10)</i>	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	10	10	10	10	10	10	10	
	B			10	9	8	4	00	
	C			10	10	10	10	10	
1-56	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
3.1	A			10	10	10	10	9	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
6.25	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
12.5	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
25	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
50	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
100	A			10	10	9	7	6	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
	A								
	B								
	C								
	A								
	B								
	C								
Tech Initials		AP	~	KSV	JW	JW	JW	KJL	

Comments: DT: 24.0 COND: 337 pH=7.5 DO=6.1

Control failure JGU

Reviewed by: JGU

Date reviewed: Sep. 18/14

Fathead Minnow Toxicity Test Data Sheet

Dry Weight Data

Client: Movat Polley

Start Date & Time: Aug 22/14 @ 1500h

Sample ID: 0266-40m

Termination Date & Time: Aug 29/14 @ 1400h

Work Order No.: 14570

Concentration % (v/v)	Purple Rep E	Pan No.	No. alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control	A	1	10	KJL	1032.26	1038.76	10	KJL
	B	2	0		1063.58	-	10	
	C	3	10		1022.02	1028.11	10	
1-56	A	4	10		1061.87	1067.15	10	
	B	5	10		1019.94	1025.83	10	
	C	6	10		1042.00	1048.84	10	
3.1	A	7	9		1036.93	1043.35	9	
	B	8	10		1061.01	1067.20	10	
	C	9	10		1031.87	1037.22	10	
6.25	A	10	10		1044.65	1051.82	10	
	B	11	10		1032.73	1039.41	10	
	C	12	10		1033.19	1039.13 1040.13	10	
12.5	A	13	10		1061.70	1068.04	10	
	B	14	10		1055.01	1061.36	10	
	C	15	10		1044.62	1051.30	10	
25	A	16	10		1047.51	1054.31	10	
	B	17	10		1053.32	1060.15	10	
	C	18	10		1038.76	1045.08	10	
50	A	19	10		1068.78	1074.65	10	
	B	20	10		1043.58	1050.14	10	
	C	21	10		1031.73	1038.16	10	
100	A	22	6		1052.79	1057.20	6	
	B	23	10		1051.06	1057.66	10	
	C	24	10	✓	1056.13	1063.13	10	↓

Comments: 10 % Reweigh : 5-1025.87 15-1051.33

Reviewed by: JGU

Date Reviewed: Sept. 18/14

CETIS Analytical Report

Report Date: 10 Oct-14 14:28 (p 1 of 2)
 Test Code: 14570 | 16-7912-3381

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 09-7548-3479	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 10 Oct-14 14:28	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 07-0790-8729	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 22 Aug-14 15:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 29 Aug-14 14:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 19-7561-5105	Code: 75C17E81	Client: Mount Polley
Sample Date: 21 Aug-14 11:13	Material: Water Sample	Project:
Receive Date: 22 Aug-14 08:20	Source: Mount Polley (MT POLLEY)	
Sample Age: 28h (4.9 °C)	Station: QUL66-40m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1700051	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	63.43	43.6	N/A	1.577	NA	2.294
EC10	83.38	32.14	N/A	1.199	NA	3.112
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	2	1	1	1	0	0	0.0%	0.0%	20	20
1.56		3	1	1	1	0	0	0.0%	0.0%	30	30
3.1		3	0.9667	0.9	1	0.03333	0.05773	5.97%	3.33%	29	30
6.25		3	1	1	1	0	0	0.0%	0.0%	30	30
12.5		3	1	1	1	0	0	0.0%	0.0%	30	30
25		3	1	1	1	0	0	0.0%	0.0%	30	30
50		3	1	1	1	0	0	0.0%	0.0%	30	30
100		3	0.8667	0.6	1	0.1333	0.2309	26.65%	13.33%	26	30

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	1	1	
1.56		1	1	1
3.1		0.9	1	1
6.25		1	1	1
12.5		1	1	1
25		1	1	1
50		1	1	1
100		0.6	1	1

JGL
 Oct. 16/14

CETIS Analytical Report

Report Date: 10 Oct-14 14:28 (p 2 of 2)
Test Code: 14570 | 16-7912-3381

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

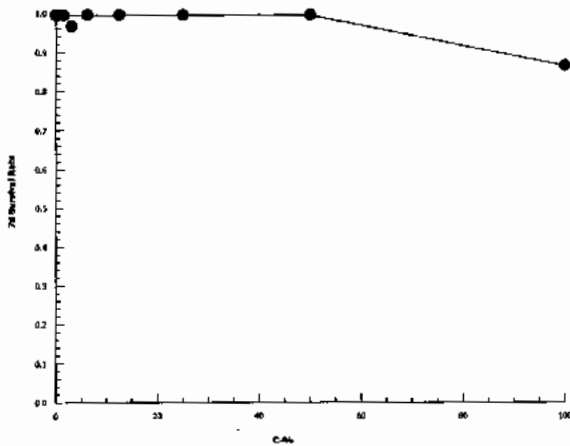
Analysis ID: 09-7548-3479 Endpoint: 7d Survival Rate
Analyzed: 10 Oct-14 14:28 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	10/10	10/10	
1.56		10/10	10/10	10/10
3.1		9/10	10/10	10/10
6.25		10/10	10/10	10/10
12.5		10/10	10/10	10/10
25		10/10	10/10	10/10
50		10/10	10/10	10/10
100		6/10	10/10	10/10

Graphics



CETIS Analytical Report

Report Date: 10 Oct-14 14:28 (p 1 of 2)
 Test Code: 14570 | 16-7912-3381

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 12-8647-0997	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 10 Oct-14 14:28	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 07-0790-8729	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 22 Aug-14 15:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 29 Aug-14 14:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 19-7561-5105	Code: 75C17E81	Client: Mount Polley
Sample Date: 21 Aug-14 11:13	Material: Water Sample	Project:
Receive Date: 22 Aug-14 08:20	Source: Mount Polley (MT POLLEY)	
Sample Age: 28h (4.9 °C)	Station: QUL66-40m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	960986	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	79.14	N/A	N/A	1.264	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	2	0.6295	0.609	0.65	0.0205	0.02899	4.61%	0.0%
1.56		3	0.6003	0.528	0.684	0.04539	0.07861	13.09%	4.63%
3.1		3	0.5987	0.535	0.642	0.03252	0.05632	9.41%	4.9%
6.25		3	0.693	0.668	0.717	0.01415	0.02451	3.54%	-10.09%
12.5		3	0.6657	0.635	0.694	0.01707	0.02957	4.44%	-5.75%
25		3	0.665	0.632	0.683	0.01653	0.02863	4.31%	-5.64%
50		3	0.6287	0.587	0.656	0.02117	0.03667	5.83%	0.13%
100		3	0.6003	0.441	0.7	0.0805	0.1394	23.23%	4.63%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.65	0.609	
1.56		0.528	0.589	0.684
3.1		0.642	0.619	0.535
6.25		0.717	0.668	0.694
12.5		0.694	0.635	0.668
25		0.68	0.683	0.632
50		0.587	0.656	0.643
100		0.441	0.66	0.7

QA: JGL
 Oct 10/14

CETIS Analytical Report

Report Date: 10 Oct-14 14:28 (p 2 of 2)
Test Code: 14570 | 16-7912-3381

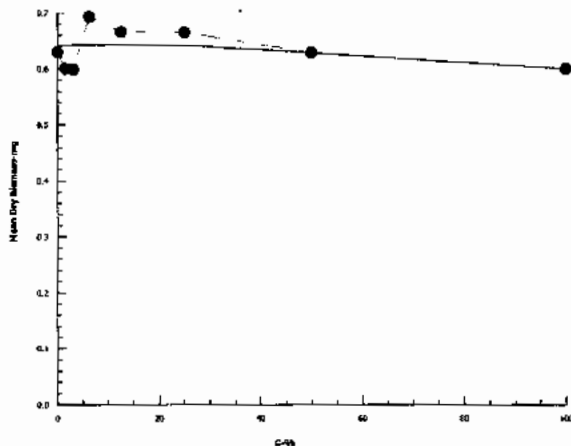
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 12-6647-0997 Endpoint: Mean Dry Biomass-mg
Analyzed: 10 Oct-14 14:28 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 10 Oct-14 14:36 (p 1 of 2)
 Test Code: 14570 | 16-7912-3381

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 19-2389-5206	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 10 Oct-14 14:36	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 07-0790-8729	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 22 Aug-14 15:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 29 Aug-14 14:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 19-7561-5105	Code: 75C17E81	Client: Mount Polley
Sample Date: 21 Aug-14 11:13	Material: Water Sample	Project:
Receive Date: 22 Aug-14 08:20	Source: Mount Polley (MT POLLEY)	
Sample Age: 28h (4.9 °C)	Station: QUL66-40m	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	18.6%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	1.56	0.6249	2.512	0.117	3	0.6063	CDF	Non-Significant Effect
	3.1	0.1512	2.512	0.117	3	0.7912	CDF	Non-Significant Effect
	6.25	-1.361	2.512	0.117	3	0.9929	CDF	Non-Significant Effect
	12.5	-0.775	2.512	0.117	3	0.9677	CDF	Non-Significant Effect
	25	-0.7607	2.512	0.117	3	0.9666	CDF	Non-Significant Effect
	50	0.01774	2.512	0.117	3	0.8323	CDF	Non-Significant Effect
	100	-1.475	2.512	0.117	3	0.9948	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0258137	0.003687672	7	1.411	0.2716	Non-Significant Effect
Error	0.0392128	0.002614187	15			
Total	0.06502651		22			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	5.95	18.48	0.5456	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9682	0.88	0.6458	Normal Distribution

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	2	0.6295	0.369	0.89	0.6295	0.609	0.65	0.0205	4.61%	0.0%
1.56		3	0.6003	0.405	0.7956	0.589	0.528	0.684	0.04539	13.09%	4.63%
3.1		3	0.6224	0.4008	0.8441	0.619	0.535	0.7133	0.05151	14.33%	1.12%
6.25		3	0.693	0.6321	0.7539	0.694	0.668	0.717	0.01415	3.54%	-10.09%
12.5		3	0.6657	0.5922	0.7391	0.668	0.635	0.694	0.01707	4.44%	-5.75%
25		3	0.665	0.5939	0.7361	0.68	0.632	0.683	0.01653	4.31%	-5.64%
50		3	0.6287	0.5376	0.7198	0.643	0.587	0.656	0.02117	5.83%	0.13%
100		3	0.6983	0.6051	0.7915	0.7	0.66	0.735	0.02166	5.37%	-10.93%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.65	0.609	
1.56		0.528	0.589	0.684
3.1		0.7133	0.619	0.535
6.25		0.717	0.668	0.694
12.5		0.694	0.635	0.668
25		0.66	0.683	0.632
50		0.587	0.656	0.643
100		0.735	0.66	0.7

08/10/14

CETIS Analytical Report

Report Date: 10 Oct-14 14:36 (p 2 of 2)

Test Code: 14570 | 16-7912-3381

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 19-2389-5206

Endpoint: Mean Dry Weight-mg

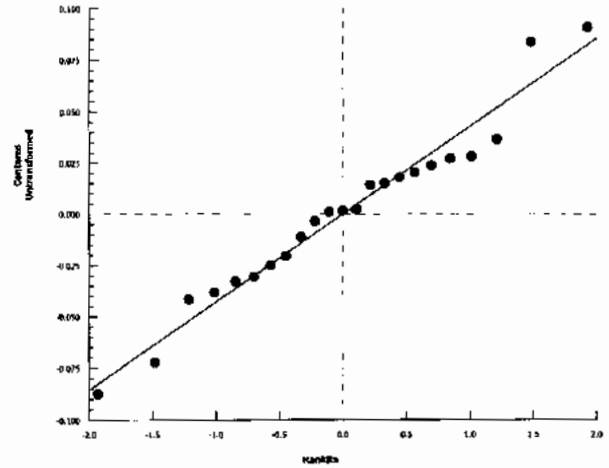
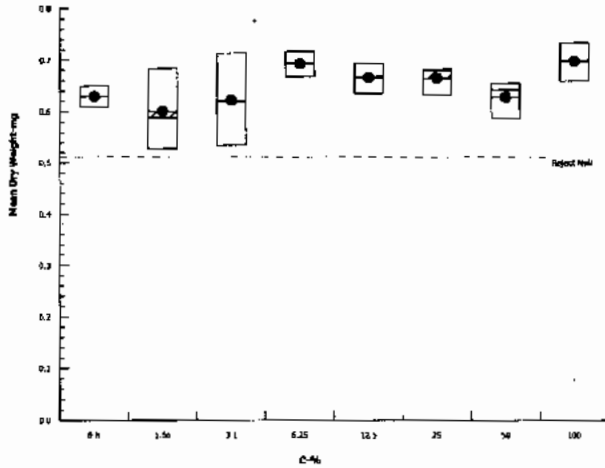
CETIS Version: CETISv1.8.7

Analyzed: 10 Oct-14 14:36

Analysis: Parametric-Control vs Treatments

Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 19 Nov-14 12:14 (p 1 of 2)
 Test Code: 14570 | 16-7912-3381

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 19-2557-3773	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 18 Nov-14 16:09	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 07-0790-8729	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 22 Aug-14 15:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 29 Aug-14 14:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 19-7561-5105	Code: 75C17E81	Client: Mount Polley
Sample Date: 21 Aug-14 11:13	Material: Water Sample	Project:
Receive Date: 22 Aug-14 08:20	Source: Mount Polley (MT POLLEY)	
Sample Age: 28h (4.9 °C)	Station: QUL66-40m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	162692	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	2	0.6295	0.609	0.65	0.0205	0.02899	4.61%	0.0%
1.56		3	0.6003	0.528	0.684	0.04539	0.07861	13.09%	4.63%
3.1		3	0.6224	0.535	0.7133	0.05151	0.08921	14.33%	1.12%
6.25		3	0.693	0.668	0.717	0.01415	0.02451	3.54%	-10.09%
12.5		3	0.6657	0.635	0.694	0.01707	0.02957	4.44%	-5.75%
25		3	0.665	0.632	0.683	0.01653	0.02863	4.31%	-5.64%
50		3	0.6287	0.587	0.656	0.02117	0.03667	5.83%	0.13%
100		3	0.6983	0.66	0.735	0.02166	0.03752	5.37%	-10.93%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.65	0.609	
1.56		0.528	0.589	0.684
3.1		0.7133	0.619	0.535
6.25		0.717	0.668	0.694
12.5		0.694	0.635	0.668
25		0.68	0.683	0.632
50		0.587	0.656	0.643
100		0.735	0.66	0.7

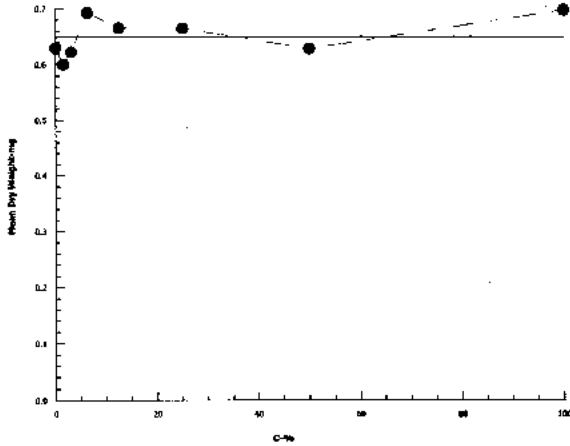
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 19-2557-3773 Endpoint: Mean Dry Weight-mg
Analyzed: 18 Nov-14 16:09 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



APPENDIX C - *Lemna Minor* Toxicity Test Data

Lemna minor Summary Sheet

Client: Mount Polley
Work Order No.: 14572

Start Date: AUG 22 / 14
Set up by: KLP

Sample Information:

Sample ID: QUL - 66 - 40m
Sample Date: AUG 21 / 14
Date Received: AUG 22 / 14
Sample Volume: 3 x 20L

Test Organism Information:

Culture Date: 081314
Age of culture (Day 0): 9 days
>8X growth in APHA?: Y (24 fronds)

KCI Reference Toxicant Results:

Reference Toxicant ID: Lm 108
Date Initiated: SEPT 5 / 14

7-d No. of Fronds IC50 (95% CL): 3.8 (3.4 - 4.2)

7-d No. Fronds IC50 Reference Toxicant Mean (2 SD Range): 4.2 (3.1 - 5.7) CV (%): 16

	Number of Fronds	Dry Weight
Test Results: IC25 %(v/v) (95% CL)	> 97	> 97
IC50 %(v/v) (95% CL)	> 97	> 97

Reviewed by: Jon

Date reviewed: Sept. 19 / 14

Plant Growth Inhibition Toxicity Test Water Quality Measurements

Client: Mount Palley Setup by: KLP
 Sample ID: QUU06-40m Test Date: August 22/14
 Work Order No.: 14572 Test Species: Lemna minor
 Culture Source: CROC # 490
 Test Culture Age: 98 days > 8X Growth? (Y/N): Yes (24 fronds)
 Light Intensity Range: 4000-4200 lux Date Measured: August 21/14

Day	0	1	2	3	4	5	6	7
Shelf Temp (°C)	25.5	25.5	25.5	25.5	26.0	25.5	26.0	25.5
Initials	KLP	~	~	EMM	JW	JW	EMM	JW

Sample Characteristics: Initial Water Quality Adjusted Water Quality

Temperature (°C)	<u>23.0</u>	Aeration?: <u>20 min</u>	<u>23.5</u>
DO (mg/L)	<u>8.5</u>	Nutrients added?: <u>Yes</u>	<u>7.8</u>
pH	<u>7.1</u>		<u>8.0</u>
Conductivity (µS)	<u>154</u>		<u>952</u>

Concentration % (v/v)	Temperature (°C)		pH		Conductivity (µS) 0 h
	Day 0	Day 7	Day 0	Day 7	
Control	24.0	24.0	8.2	8.1	887
1.5	24.0	24.0	8.2	8.2	894 894
3.0	24.0	24.5	8.2	8.2	895
6.1	24.0	24.5	8.2	8.1	896
12.1	24.0	24.5	8.2	8.5	902
24.3	24.0	24.5	8.1	8.3	909
48.5	23.5	24.5	8.1	8.4	925
97	23.5	24.5	8.0	8.6	952
Initials	KLP	KLP	KLP	KLP	KLP

Thermometer: Calibrated Thermometer Cond. Meter: 2 pH meter: 4

Sample Description: Turbid, greyish, ppt present

Comments: _____

Reviewed: JGh Date Reviewed: sep. 17/14

Lemna minor Toxicity Test Data Sheet - 7-d Frond Counts

Client: Mount Polley
 Sample ID: HWL 00166-40m
 Work Order #: 14572

Start Date: August 22/14
 Termination Date: August 29/14
 Test set up by: KCP

Concentration (%v/v)	Rep	No. of fronds		Chlorosis	Necrosis	Yellow	Abnormal size	Gibbosity	Single fronds	Root destruction	Loss of buoyancy	Comments	Initials
		Day 0	Day 7										
Control	A	6	51										KCP
	B	6	70										
	C	6	70										
	D	6	62										
1.5	A	6	77										
	B	6	52										
	C	6	58										
	D	6	46										
3.0	A	6	66										
	B	6	73										
	C	6	72										
	D	6	49										
6.1	A	6	48										
	B	6	50										
	C	6	51										
	D	6	54										
12.1	A	6	36										
	B	6	62										
	C	6	51										
	D	6	56										
24.3	A	6	58										
	B	6	50										
	C	6	44										
	D	6	62										✓

Comments: _____

Reviewed by: JGw

Date Reviewed: sep. 17/14

Lemna minor Toxicity Test Data Sheet - 7-d Frond Counts

Client: Mount Polley
 Sample ID: Q0046-40m
 Work Order #: 14572

Start Date: August 22/14
 Termination Date: August 29/14
 Test set up by: KLP

Concentration % (v/v)	Rep	No. of fronds		Chlorosis	Necrosis	Yellow	Abnormal size	Gibbosity	Single fronds	Root destruction	Loss of buoyancy	Comments	Initials
		Day 0	Day 7										
48.5	A	6	56										KLP
	B	6	52										
	C	6	51										
	D	6	69										
97	A	6	49										↓
	B	6	63										
	C	6	53										
	D	6	55										
	A												
	B												
	C												
	D												
	A												
	B												
	C												
	D												
	A												
	B												
	C												
	D												

Comments: _____

Reviewed by: JG

Date Reviewed: Sep. 17/14

7-d Lemna minor Weight Data Sheet

Client: Mount Polley
 Sample ID: Q0266-40m
 Work Order #: 14572

Start Date: August 22/14
 Termination Date: August 29/14

Concentration (mg/L)	Rep	MP Pan No. BLOCK	Pan weight (mg)	Pan + plant (mg)	Initials
Control	A	1	1052.63	1056.54	JW
	B	2	1031.68	1037.40	
	C	3	1004.91	1010.74	
	D	4	1014.63	1019.87	
1.5	A	5	1023.41	1029.26	
	B	6	1032.96	1037.09	
	C	7	1025.77	1030.79	
	D	8	988.55	992.27	
3.0	A	9	1021.87	1027.17	
	B	10	1008.17	1014.30	
	C	11	1003.20	1009.55 1009.55	
	D	12	999.43	1003.81	
6.1	A	13	999.36	1003.78	
	B	14	1007.99	1012.41	
	C	15	999.25	1003.85	
	D	16	1001.34	1006.32	
12.1	A	17	1015.77	1020.48	
	B	18	1022.41	1027.70	
	C	19	1035.18	1039.70	
	D	20	1041.17	1046.15	
24.3	A	21	1021.61	1026.70	
	B	22	1027.00	1031.77	
	C	23	1032.99	1036.98	
	D	24	1020.07	1025.49	
48.5	A	25	1019.02	1024.10	
	B	26	1026.91	1031.59	
	C	27	1017.45	1022.34	
	D	28	1002.02	1008.45	

Comments: ^{JW} 10% Rereigh: #3 1010.38 : ~~#3~~ # 23 : 1036.82
 #12 1003.73 # 29 : 1016.219

Reviewed by: JGh Date Reviewed: Sept. 17/14

7-d Lemna minor Weight Data Sheet

Client: Mount Polley
 Sample ID: 00166-40m
 Work Order #: 14572

Start Date: August 22/14
 Termination Date: August 29/14

Concentration <i>90 (10)</i>	Rep	MP Pan No. BLOCK	Pan weight (mg)	Pan + plant (mg)	Initials
97	A	29	1011.48	1016.36	JW
	B	30	1041.72	1047.55	
	C	21	1002.21	1007.36	
	D	32	1029.83	1031.58	↓
	A				
	B				
	C				
	D				
	A				
	B				
	C				
	D				
	A				
	B				
	C				
	D				
	A				
	B				
	C				
	D				

Comments: _____

Reviewed by: JGh

Date Reviewed: Sept. 17/14

CETIS Analytical Report

Report Date: 04 Sep-14 10:04 (p 1 of 2)
 Test Code: 14572 | 02-8384-6856

Lemna Growth Inhibition Test

Nautilus Environmental

Analysis ID: 00-0911-3327	Endpoint: Frond Count	CETIS Version: CETISv1.8.7
Analyzed: 04 Sep-14 10:00	Analysis: Nonlinear Regression	Official Results: Yes
Batch ID: 12-5072-6223	Test Type: Lemna Growth	Analyst: Jeslin Wijaya
Start Date: 22 Aug-14	Protocol: EC/EPS 1/RM/37	Diluent: Modified APHA
Ending Date: 29 Aug-14	Species: Lemna minor	Brine:
Duration: 7d 0h	Source: CPCC#490	Age: 9d
Sample ID: 19-7561-5105	Code: 75C17E81	Client: Mount Polley
Sample Date: 21 Aug-14 11:13	Material: Water Sample	Project:
Receive Date: 22 Aug-14 08:20	Source: Mount Polley (MT POLLEY)	
Sample Age: 13h (4.9 °C)	Station: QUL66-40m	

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Cumulative Log-Normal EV [Y=A*(1-Phi(log(X/D)/C))]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
10	-81.19	169.3	172.7	0.0287	Yes	1.086	2.64	0.3946	Non-Significant Lack of Fit

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.1001	N/A	142.3	998.7	0.7026	NA
IC10	4.302	0.005471	143.6	23.24	0.6965	18280
IC15	54.39	0.2549	1656	1.839	0.06037	392.3
IC20	498.6	N/A	250800	0.2448	0.0003988	NA
IC25	2304	N/A	41930000	0.0434	0.0000023	NA
IC40	480200	N/A	N/A	0.0005551	NA	NA
IC50	2480000	N/A	N/A	0.000400	NA	NA

} > 97% (V/V) DIN

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	57.41	4.375	48.84	65.99	13.12	<0.0001	Significant Parameter
C	10.35	12.96	-15.04	35.74	0.7989	0.4311	Non-Significant Parameter
D	2480000	34820000	-6.6E+07	70720000	0.07124	0.9437	Non-Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	221.5162	221.5162	1	2.887	0.1004	Non-Significant
Lack of Fit	410.1612	82.03223	5	1.086	0.3946	Non-Significant
Pure Error	1738	75.56522	23			
Residual	2148.161	76.72004	28			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	7.619	14.07	0.3674	Equal Variances
	Mod Levene Equality of Variance	0.7215	2.464	0.6553	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9533	0.9321	0.1926	Normal Distribution
	Anderson-Darling A2 Normality	0.5156	2.492	0.1948	Normal Distribution

CETIS Analytical Report

Report Date: 04 Sep-14 10:04 (p 2 of 2)
 Test Code: 14572 | 02-8384-6856

Lemna Growth Inhibition Test

Nautilus Environmental

Analysis ID: 00-0911-3327
 Analyzed: 04 Sep-14 10:00

Endpoint: Frond Count
 Analysis: Nonlinear Regression

CETIS Version: CETISv1.8.7
 Official Results: Yes

Frond Count Summary

Calculated Variate

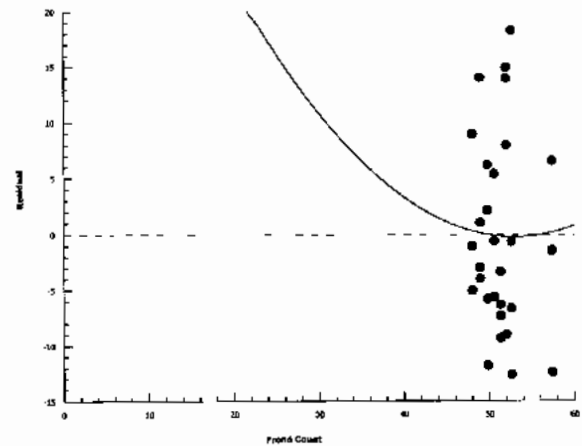
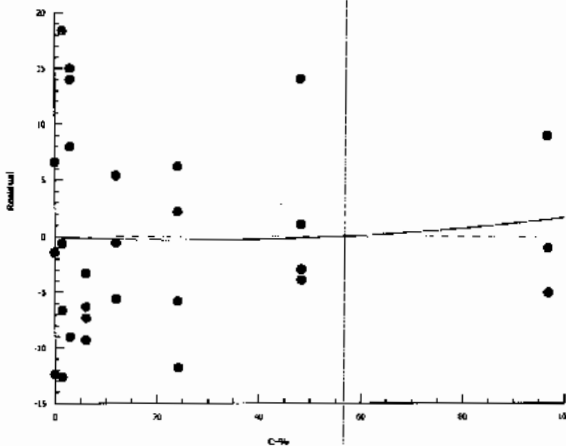
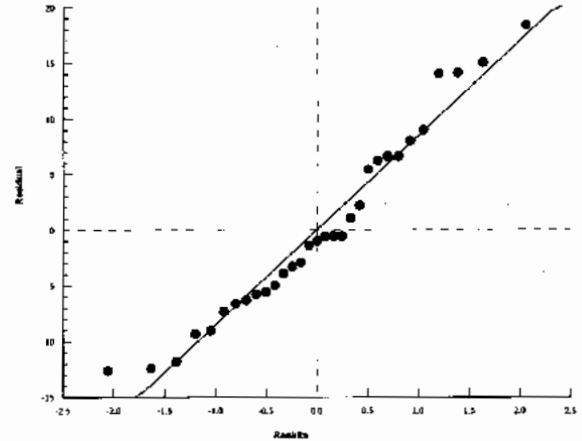
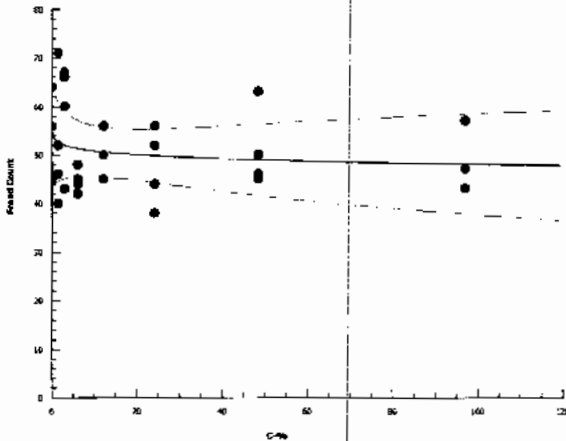
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	57.25	45	64	4.498	8.995	15.71%	0.0%
1.5		4	52.25	40	71	6.713	13.43	25.7%	8.73%
3		4	59	43	67	5.553	11.11	18.82%	-3.06%
6.1		4	44.75	42	48	1.25	2.5	5.59%	21.83%
12.1		4	50.25	45	56	2.25	4.5	8.96%	12.23%
24.2		4	47.5	38	56	4.031	8.062	16.97%	17.03%
48.5		4	51	45	63	4.143	8.287	16.25%	10.92%
97		3	49	43	57	4.163	7.211	14.72%	14.41%

Frond Count Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	45	64	64	56
1.5		71	46	52	40
3		60	67	66	43
6.1		42	44	45	48
12.1		50	56	45	50
24.2		52	44	38	56
48.5		50	46	45	63
97		43	57	47	

Graphics

3P Cumulative Log-Normal EV [Y=A*(1-Phi(log(X/D)/C))]



6/12/14

CETIS Analytical Report

Report Date: 18 Sep-14 17:53 (p 1 of 2)
 Test Code: 14572 | 02-8384-6856

Lemna Growth Inhibition Test

Nautilus Environmental

Analysis ID: 12-9287-6411	Endpoint: Total Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 18 Sep-14 17:53	Analysis: Nonlinear Regression	Official Results: Yes
Batch ID: 12-5072-6223	Test Type: Lemna Growth	Analyst: Jeslin Wijaya
Start Date: 22 Aug-14	Protocol: EC/EPS 1/RM/37	Diluent: Modified APHA
Ending Date: 29 Aug-14	Species: Lemna minor	Brine:
Duration: 7d 0h	Source: CPCC#490	Age: 9d
Sample ID: 19-7561-5105	Code: 75C17E81	Client: Mount Polley
Sample Date: 21 Aug-14 11:13	Material: Water Sample	Project:
Receive Date: 22 Aug-14 08:20	Source: Mount Polley (MT POLLEY)	
Sample Age: 13h (4.9 °C)	Station: QUL66-40m	

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
2P Exponential EV [Y=A*exp(log(0.5)*X/D)]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
4	-4.307	13.03	15.55		Yes	1.299	2.508	0.2953	Non-Significant Lack of Fit

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	3094000	N/A	N/A	0.0000323	NA	NA
IC10	6355000	N/A	N/A	0.0000157	NA	NA
IC15	9803000	N/A	N/A	0.0000102	NA	NA
IC20	13460000	N/A	N/A	0.0000074	NA	NA
IC25	17350000	N/A	N/A	0.0000057	NA	NA
IC40	30810000	N/A	N/A	0.0000032	NA	NA
IC50	41810000	N/A	N/A	0.0000023	NA	NA

} >97% (v/v)

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	4.936	0.1595	4.623	5.248	30.95	<0.0001	Significant Parameter
D	41810000	2.06E+12	-4.0E+12	4.03E+12	2.03E-05	1.0000	Non-Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	0	0	1	0	1.0000	Non-Significant
Lack of Fit	3.777676	0.629613	6	1.299	0.2953	Non-Significant
Pure Error	11.63088	0.48462	24			
Residual	15.40856	0.513619	30			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	7.006	14.07	0.4283	Equal Variances
	Mod Levene Equality of Variance	0.9279	2.423	0.5031	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.981	0.9338	0.8277	Normal Distribution
	Anderson-Darling A2 Normality	0.216	2.492	0.8815	Normal Distribution

Total Dry Weight-mg Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	5.175	3.91	5.83	0.4407	0.8814	17.03%	0.0%
1.5		4	4.68	3.72	5.85	0.4751	0.9502	20.3%	9.57%
3		4	5.54	4.38	6.35	0.4479	0.8958	16.17%	-7.05%
6.1		4	4.605	4.42	4.98	0.132	0.264	5.73%	11.01%
12.1		4	4.875	4.52	5.29	0.1675	0.3349	6.87%	5.8%
24.2		4	4.817	3.99	5.42	0.3061	0.6122	12.71%	6.91%
48.5		4	5.27	4.68	6.43	0.3952	0.7904	15.0%	-1.84%
97		4	5.403	4.88	5.83	0.231	0.462	8.55%	-4.4%

CETIS Analytical Report

Report Date: 18 Sep-14 17:53 (p 2 of 2)
 Test Code: 14572 | 02-8384-6856

Lemna Growth Inhibition Test

Nautilus Environmental

Analysis ID: 12-9287-6411
 Analyzed: 18 Sep-14 17:53

Endpoint: Total Dry Weight-mg
 Analysis: Nonlinear Regression

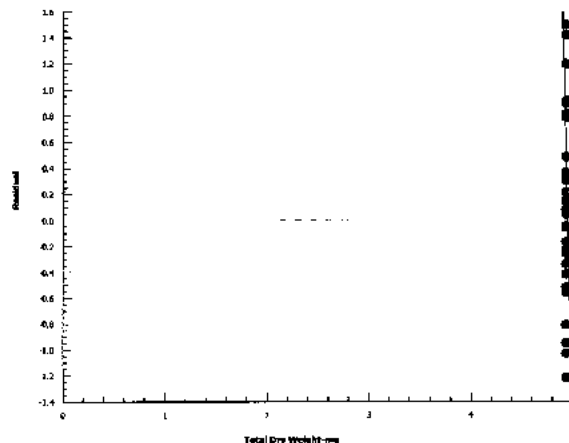
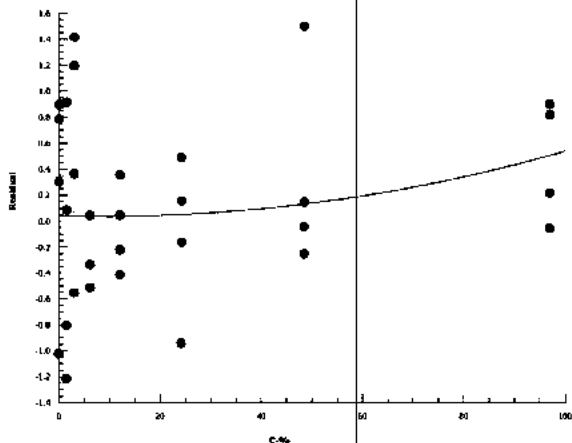
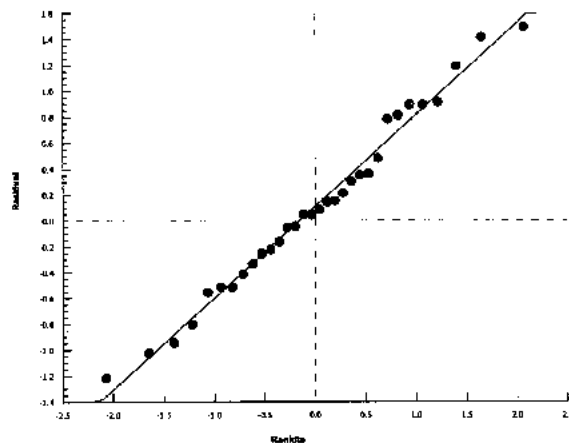
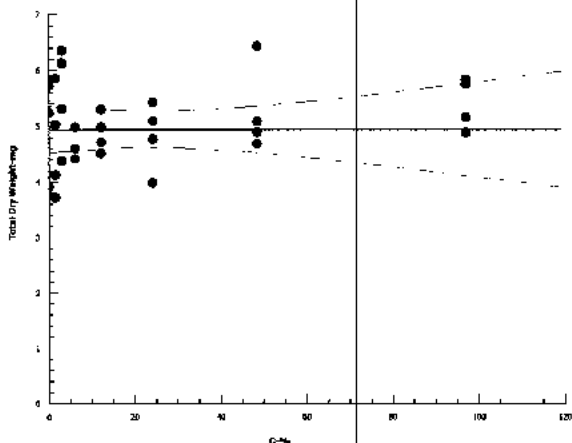
CETIS Version: CETISv1.8.7
 Official Results: Yes

Total Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	3.91	5.72	5.83	5.24
1.5		5.85	4.13	5.02	3.72
3		5.3	6.13	6.35	4.38
6.1		4.42	4.42	4.6	4.98
12.1		4.71	5.29	4.52	4.98
24.2		5.09	4.77	3.99	5.42
48.5		5.08	4.68	4.89	6.43
97		4.88	5.83	5.15	5.75

Graphics

2P Exponential EV [Y=A*exp(log(0.5)*X/D)]



APPENDIX D - *Pseudokirchneriella subcapitata* Toxicity Test Data

Pseudokirchneriella subcapitata Summary Sheet

Client: Mount Polley
Work Order No.: 14571

Start Date: Aug 22, 2014
Set up by: ERM

Sample Information:

Sample ID: QUL66-40m
Sample Date: Aug 21, 2014
Date Received: Aug 22, 2014
Sample Volume: 3x 20L

Test Organism Information:

Culture Date: Aug 15/14
Age of culture (Day 0): 7d

Zinc Reference Toxicant Results:

Reference Toxicant ID: Sc117
Stock Solution ID: 14Zn01
Date Initiated: Aug 14, 2014

72-h IC50 (95% CL): 28.9 (21.2 - 33.7) µg/L Zn

72-h IC50 Reference Toxicant Mean and Range: 25.1 (14.8 - 42.7) µg/L Zn CV (%): 30

Test Results:

	Algal Growth
IC25 % (v/v) (95% CL)	795.2
IC50 % (v/v) (95% CL)	795.2

Reviewed by: JGU

Date reviewed: sep. 18/14

72-h Algal Growth Inhibition Toxicity Test Water Quality Measurements

Client: Mt. Polley Setup by: EMM
 Sample ID: QUL66-40m Test Date/Time: Aug 22/14 @ 1600
 Work Order No.: 14571 Test Species: Pseudokirchneriella subcapitata

Culture Date: Aug 15/14 Age of Culture: 7d Culture Health: Good
 Culture Count: 1589 2508 Average: 5485 Culture Cell Density (c1): 548.5×10^4 cells/mL

$$v1 = \frac{220,000 \text{ cells/mL} \times 100 \text{ mL}}{(c1) 548.5 \times 10^4 \text{ cells/mL}} = 4 \text{ mL}$$

Time Zero Counts: 124 219 Average: 21.5

No. of Cells/mL: 21.5×10^4 Initial Density: # cells/mL + 220 μ L x 10 μ L = 9772 cells/mL

Concentration %(v/v)	Water Quality Measurements					Microplates rotated 2X per day?			
	pH	Temp (°C)				0 h	24 h	48 h	72 h
		0 h	0 h	24 h	48 h				
Control	6.9	24.0	25.5	25.5	25.5	✓	✓	✓	✓
1.5	7.0	24.0	↓	↓	↓	✓	✓	✓	✓
3.0	7.0	24.6	↓	↓	↓	✓	✓	✓	✓
6.0	7.1	24.5	↓	↓	↓	✓	✓	✓	✓
11.9	7.6	24.6	↓	↓	↓	✓	✓	✓	✓
23.8	7.7	25.0	↓	↓	↓	✓	✓	✓	✓
47.6	7.7	25.0	↓	↓	↓	✓	✓	✓	✓
95.2	7.8	25.0	↓	↓	↓	✓	✓	✓	✓
Initials	EMM	EMM	A	~	EMM	EMM	A	~	EMM

Initial control pH: Well 1: 6.7 Well 2: 6.9

Final control pH: Well 1: 7.0 Well 2: 7.0

Light intensity (lux): 3900 Date measured: Aug 22/14 @ 1600h

Sample Description: turbid, greyish ppt present

Comments: _____

Reviewed: JGh Date reviewed: sep. 18/14

Pseudokirchneriella subcapitata Toxicity Test Data Sheet
72-h Algal Cell Counts

Client: Mount Polley Start Date/Time: Aug 22/14 @ 1600
 Work Order #: 14571 Termination Date: Aug 29/14 @ 1600
 Sample ID: Quilley 40m Test set up by: Ann 25m
 % (v/v)

Concentration	Rep	Count 1	Count 2	Count 3	Count 4	Comments	Initials
Control	A	44					Ann
	B	37					
	C	52					
	D	38					
	E	50					
	F	42					
	G	42					
	H	45					
1.5	A	49					
	B	43					
	C	46					
	D	48					
3.0	A	53					
	B	52					
	C	52					
	D	48					
6.0	A	61					
	B	65					
	C	54					
	D	47					
11.9	A	76					
	B	68					
	C	71					
	D	75					
23.8	A	88					
	B	94					
	C	98					
	D	102					
47.6	A	121					
	B	105					
	C	118					
	D	131					
95.2	A	109					
	B	92					
	C	88					
	D	103					

Comments: _____
 Reviewed by: JGU Date Reviewed: Sept. 18/14

***Pseudokirchneriella subcapitata* Algal Counts**

Client: Mt. Polley
 WO#: 14571
 Sample ID: QUL66-40m

Start Date/Time: 22-Aug-14 1600
 Termination Date: 25-Aug-14 1600

Initial Cell Density: 9773 cell/mL
 215000
 0.22
 0.01
 9772.727

Concentration % v/v	Rep	Count 1 (x 10 ⁴)	Count 2 (x 10 ⁴)	Count 3 (x 10 ⁴)	Count 4 (x 10 ⁴)	Mean (x 10 ⁴)	Cell Yield (x 10 ⁴) cell/mL		
Control	A	44				44	43.0	mean	42.8
	B	37				37	36.0	SD	5.257647
	C	52				52	51.0	CV	12.29206
	D	38				38	37.0		
	E	50				50	49.0		
	F	42				42	41.0		
	G	42				42	41.0		
	H	45				45	44.0		
1.5	A	49				49	48.0		
	B	43				43	42.0		
	C	46				46	45.0		
	D	48				48	47.0		
3	A	53				53	52.0		
	B	52				52	51.0		
	C	52				52	51.0		
	D	48				48	47.0		
6	A	61				61	60.0		
	B	65				65	64.0		
	C	54				54	53.0		
	D	47				47	46.0		
11.9	A	76				76	75.0		
	B	68				68	67.0		
	C	71				71	70.0		
	D	75				75	74.0		
23.8	A	88				88	87.0		
	B	94				94	93.0		
	C	98				98	97.0		
	D	102				102	101.0		
47.6	A	121				121	120.0		
	B	105				105	104.0		
	C	118				118	117.0		
	D	131				131	130.0		
95.2	A	109				109	108.0		
	B	92				92	91.0		
	C	85				85	84.0		
	D	108				108	107.0		

JGU
 Sep. 18/14

CETIS Analytical Report

Report Date: 04 Sep-14 08:19 (p 1 of 2)
 Test Code: 14571 | 02-8905-6444

EC Alga Growth Inhibition Test		Nautilus Environmental	
Analysis ID: 17-9308-3064	Endpoint: Cell Yield	CETIS Version: CETISv1.8.7	
Analyzed: 04 Sep-14 8:11	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes	
Batch ID: 04-2428-4258	Test Type: Cell Growth	Analyst: Emma Marus	
Start Date: 22 Aug-14 16:00	Protocol: EC/EPS 1/RM/25	Diluent: Deionized Water + nutrients	
Ending Date: 25 Aug-14 16:00	Species: Pseudokirchneriella subcapitata	Brine:	
Duration: 72h	Source: In-House Culture	Age: 7d	
Sample ID: 19-7561-5105	Code: 75C17E81	Client: Mount Polley	
Sample Date: 21 Aug-14 11:13	Material: Water Sample	Project:	
Receive Date: 22 Aug-14 08:20	Source: Mount Polley (MT POLLEY)		
Sample Age: 29h (4.9 °C)	Station: QUL66-40m		

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	862673	200	Yes	Two-Point Interpolation

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>95.2	N/A	N/A	<1.05	NA	NA
IC10	>95.2	N/A	N/A	<1.05	NA	NA
IC15	>95.2	N/A	N/A	<1.05	NA	NA
IC20	>95.2	N/A	N/A	<1.05	NA	NA
IC25	>95.2	N/A	N/A	<1.05	NA	NA
IC40	>95.2	N/A	N/A	<1.05	NA	NA
IC50	>95.2	N/A	N/A	<1.05	NA	NA

Cell Yield Summary			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	8	42.75	36	51	1.859	5.258	12.3%	0.0%
1.5		4	45.5	42	48	1.323	2.646	5.82%	-6.43%
3		4	50.25	47	52	1.109	2.217	4.41%	-17.54%
6		4	55.75	46	64	3.966	7.932	14.23%	-30.41%
11.9		4	71.5	67	75	1.848	3.697	5.17%	-67.25%
23.8		4	94.5	87	101	2.986	5.972	6.32%	-121.1%
47.6		4	117.8	104	130	5.36	10.72	9.1%	-175.4%
95.2		4	97.5	84	108	5.951	11.9	12.21%	-128.1%

Cell Yield Detail									
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	43	36	51	37	49	41	41	44
1.5		48	42	45	47				
3		52	51	51	47				
6		60	64	53	46				
11.9		75	67	70	74				
23.8		87	93	97	101				
47.6		120	104	117	130				
95.2		108	91	84	107				

QA: *Jou*
 Dec. 18/14

CETIS Analytical Report

Report Date: 04 Sep-14 08:19 (p 2 of 2)
Test Code: 14571 | 02-8905-6444

EC Alga Growth Inhibition Test

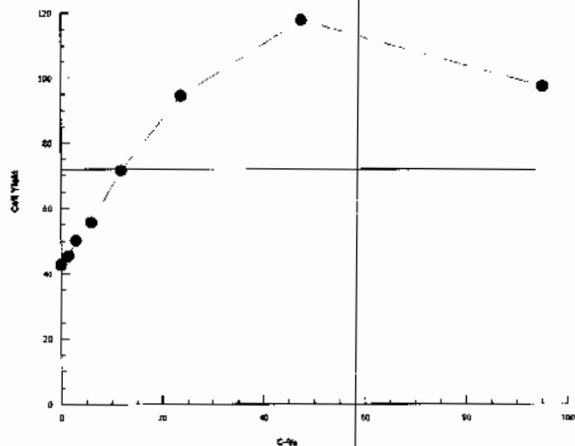
Nautilus Environmental

Analysis ID: 17-9308-3064
Analyzed: 04 Sep-14 8:11

Endpoint: Cell Yield
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 04 Sep-14 08:19 (p 1 of 2)
 Test Code: 14571 | 02-8905-6444

EC Alga Growth Inhibition Test			Nautilus Environmental		
Analysis ID: 08-6159-8676	Endpoint: Cell Yield	CETIS Version: CETISv1.8.7			
Analyzed: 04 Sep-14 8:12	Analysis: Parametric-Control vs Treatments	Official Results: Yes			
Batch ID: 04-2428-4258	Test Type: Cell Growth	Analyst: Emma Marus			
Start Date: 22 Aug-14 16:00	Protocol: EC/EPS 1/RM/25	Diluent: Deionized Water + nutrients			
Ending Date: 25 Aug-14 16:00	Species: Pseudokirchneriella subcapitata	Brine:			
Duration: 72h	Source: In-House Culture	Age: 7d			
Sample ID: 19-7561-5105	Code: 75C17E81	Client: Mount Polley			
Sample Date: 21 Aug-14 11:13	Material: Water Sample	Project:			
Receive Date: 22 Aug-14 08:20	Source: Mount Polley (MT POLLEY)				
Sample Age: 29h (4.9 °C)	Station: QUL66-40m				

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C < T	NA	NA	25.0%	3	6	4.243	33.33

Dunnett Multiple Comparison Test		Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Control	vs C-%							
Negative Control	1.5	0.6502	2.526	10.68	10	0.7204	CDF	Non-Significant Effect
	3	1.773	2.526	10.68	10	0.2067	CDF	Non-Significant Effect
	6*	3.074	2.526	10.68	10	0.0144	CDF	Significant Effect
	11.9*	6.797	2.526	10.68	10	<0.0001	CDF	Significant Effect
	23.8*	12.24	2.526	10.68	10	<0.0001	CDF	Significant Effect
	47.6*	17.73	2.526	10.68	10	<0.0001	CDF	Significant Effect
	95.2*	12.94	2.526	10.68	10	<0.0001	CDF	Significant Effect

Auxiliary Tests		Test Stat	Critical	P-Value	Decision(α:5%)
Attribute	Test				
Control Trend	Mann-Kendall Trend			0.9049	Non-significant Trend in Controls

ANOVA Table		Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Source	Sum Squares					
Between	25207.89	3601.127	7	75.49	<0.0001	Significant Effect
Error	1335.75	47.70536	28			
Total	26543.64		35			

Distributional Tests		Test Stat	Critical	P-Value	Decision(α:1%)
Attribute	Test				
Variances	Bartlett Equality of Variance	12.8	18.48	0.0772	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9813	0.9166	0.7886	Normal Distribution

Cell Yield Summary		Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect	
C-%	Control Type	Count									
0	Negative Control	8	42.75	38.35	47.15	42	36	51	1.859	12.3%	0.0%
1.5		4	45.5	41.29	49.71	46	42	48	1.323	5.82%	-6.43%
3		4	50.25	46.72	53.78	51	47	52	1.109	4.41%	-17.54%
6		4	55.75	43.13	68.37	56.5	46	64	3.966	14.23%	-30.41%
11.9		4	71.5	65.62	77.38	72	67	75	1.848	5.17%	-67.25%
23.8		4	94.5	85	104	95	87	101	2.986	6.32%	-121.1%
47.6		4	117.8	100.7	134.8	118.5	104	130	5.36	9.1%	-175.4%
95.2		4	97.5	78.56	116.4	99	84	108	5.951	12.21%	-128.1%

CETIS Analytical Report

Report Date: 04 Sep-14 08:19 (p 2 of 2)
 Test Code: 14571 | 02-8905-6444

EC Alga Growth Inhibition Test

Nautilus Environmental

Analysis ID: 08-6159-8676
 Analyzed: 04 Sep-14 8:12

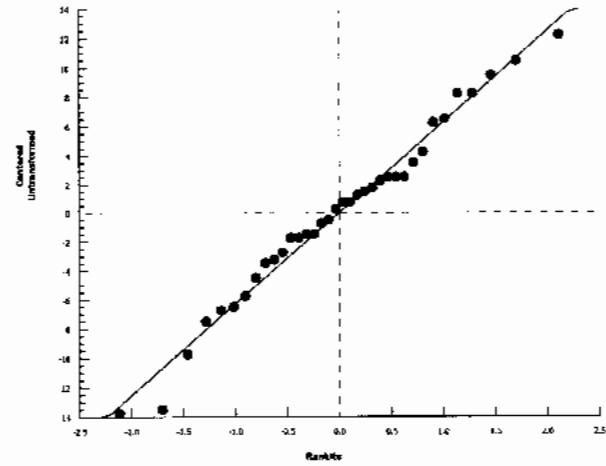
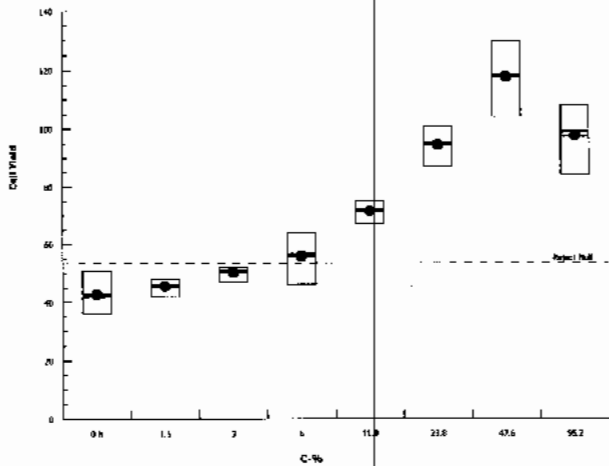
Endpoint: Cell Yield
 Analysis: Parametric-Control vs Treatments

CETIS Version: CETISv1.8.7
 Official Results: Yes

Cell Yield Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	43	36	51	37	49	41	41	44
1.5		48	42	45	47				
3		52	51	51	47				
6		60	64	53	46				
11.9		75	67	70	74				
23.8		87	93	97	101				
47.6		120	104	117	130				
95.2		108	91	84	107				

Graphics



APPENDIX E - Chain of Custody Form

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

Date Aug 21/14 Page 1 of 1

Sample Collection By: Sky Freeman <u>Katharina Batchelar</u>			ANALYSES REQUIRED																
Report to:			Invoice to:			96h RBT	48 h Daphnia magna	7 Day Ceriodaphnia dubia	7 day fathead Minnow	72h algal growth	Lemna								Receipt Temperature (°C)
Company: Mount Polley Mining Corporation			Mount Polley Mining Corporation																
Address: Box 12			Box 12																
City/Prov/Postal Code: Likely BC V0L 1N0			Likely BC V0L 1N0																
Contact: Colleen Hughes Deb McMillan			Colleen Hughes/																
Phone: (250) 790-2617			(250) 790-2617																
Email: chughes@mountpolley.com dmcmillan@minnow.ca			chughes@mountpolley.com																

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	96h RBT	48 h Daphnia magna	7 Day Ceriodaphnia dubia	7 day fathead Minnow	72h algal growth	Lemna									
1 QUL66-40m	Aug 21/14	11:13	water	20L	3	MMER Full Suite	X	X	X	X	X	X								9.9°C	
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)				RELIQUISHED BY (COURIER)			
Client: Mount Polley Mining Corporation		Total # Containers:	<u>3x20L</u>	Signature: <u>Katharina Batchelar</u>				Signature: _____			
P.O. No.:		Good Condition?	<u>yes</u>					Print: _____			
Shipped Via: Greyhound		Matches Schedule?	<u>yes</u>	Company: <u>Minnow Environmental</u>				Company: _____			
				Time/Date: <u>Aug 21/14 14:26</u>				Time/Date: _____			
SPECIAL INSTRUCTIONS/COMMENTS: Cost Code 6400067 506190				RECEIVED BY (COURIER)				RECEIVED BY (LABORATORY)			
				Signature: _____				Signature: <u>[Signature]</u>			
				Print: _____				Print: <u>EMMA MAKUS</u>			
				Company: _____				Company: <u>Nautilus Environmental</u>			
				Time/Date: _____				Time/Date: <u>Aug 22/14 @ 0820h</u>			

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 10

Toxicity testing on a sample identified as QUL66-40m: Sample collected August 21, 2014 (Report date August 26, 2014)



Mount Polley Mining Corporation
ATTN: Colleen Hughes
Box 12
Likely, BC
VOL 1N0

Report Date: August 26, 2014
Work Order: 14567 - 568

Data Report

Species: Rainbow trout (*Oncorhynchus mykiss*)
Protocol: EPS 1/RM/13 (Second Ed. with 2007 amendments)

Species: *Daphnia magna*
Protocol: EPS 1/RM/14 (Second Ed. 2000)

Table 1. Results for the 96-h rainbow trout acute toxicity test.

Sample ID	Collection Date and Time	96-h LC50 (%v/v)
QUL66-40m	August 21, 2014 @ 1113h	>100

Table 2. Results for the 48-h *Daphnia magna* acute toxicity test.

Sample ID	Collection Date and Time	48-h LC50 (%v/v)
QUL66-40m	August 21, 2014 @ 1113h	>100

Tests met performance criteria and there were no deviations from the test methods. The results relate only to the sample tested.

Yvonne Lam, B.Sc.
Laboratory Biologist

Reviewed By:
Julianna Kalocai, M.Sc., R.P.Bio
QA Officer

Rainbow Trout Summary Sheet

Client: Mount Polley Mining

Start Date/Time: August 22/14 @ 1345

Work Order No.: 14567

Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: QUL66-40m
Sample Date: August 21/14 @ 1113
Date Received: August 22/14 @ 0820
Sample Volume: 3 x 20L
Other: N/A

Test Validity Criteria:

≥ 90% control survival

WQ Ranges:

T (°C) = 15 ± 1; DO (mg/L) = 7.0 to 10.3; pH = 5.5 to 8.5

Dilution Water:

Type: Dechlorinated Municipal Tap Water
Hardness (mg/L CaCO₃): 11
Alkalinity (mg/L CaCO₃): 9

Test Organism Information:

Batch No.: 080614
Source: Miracle Springs
No. Fish/Volume (L): 10/10
Loading Density (g/L): 0.33
Mean Length ± SD (mm): 34 ± 3
Mean Weight ± SD (g): 0.33 ± 0.05

Range: 30 - 38

Range: 0.26 - 0.43

NaNO₂ Reference Toxicant Results:

Reference Toxicant ID: RTNE66
Stock Solution ID: 14NE01
Date Initiated: August 20/14
96-h LC50 (95% CL): 10.9 (8.1 - 14.7) mg/L NaNO₂

Reference Toxicant Mean and Historical Range: 4.9 (2.0 - 12.0) mg/L NaNO₂

Reference Toxicant CV (%): 56

Test Results: The 96-h LC50 is > 100% (N/A).

Reviewed by: JGU

Date reviewed: Aug. 26/14

96-Hour Rainbow Trout Toxicity Test Data Sheet

Client/Project#: Mount Polley
 Sample I.D. QUL-66-40m
 W.O. # 14567
 RBT Batch #: 080614
 Date Collected/Time: Aug 21/14 @ 11:36h
 Date Setup/Time: Aug 22/14 @ 13:45h
 Sample Setup By: JAB

 D.O. meter: DO-1/23/14
 pH meter: pH-1
 Cond. Meter: C-1/2

Number Fish/Volume: 10/10L
 7-d % Mortality: 1.8
 Total Pre-aeration Time (mins): 30
 Aeration rate adjusted to 6.5 ± 1 mL/min/L? (Y/N): Y

Undiluted Sample WQ			
Parameters	Initial WQ	Adjustment	30 min WQ
Temp °C	14.0		14.0
pH	7.8		7.8
D.O. (mg/L)	9.5		9.9
Cond. (µS/cm)	153		153

Concentration (% v/v)	# Survivors							Temperature (°C)					Dissolved Oxygen (mg/L)					pH					Conductivity (µS/cm)	
	1	2	4	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
Control				10	10	10	10	14.5	14.5	14.5	14.5	16.0	9.9	9.8	9.9	9.8	9.9	7.1	7.1	7.1	7.0	7.0	34	39
6.25				10	10	10	10	14.5	14.5	14.5	14.5	15.5	9.9	9.8	9.8	9.9	10.0	7.2	7.2	7.1	7.3	7.2	46	51
12.5				10	10	10	10	14.5	14.5	14.5	14.5	15.5	9.9	9.7	9.9	9.9	10.0	7.3	7.3	7.2	7.2	7.2	53	55
25				10	10	10	10	14.5	14.5	14.5	14.5	14.5	9.9	9.8	9.9	10.0	9.9	7.3	7.5	7.6	7.2	7.1	67	71
50				10	10	10	10	14.0	14.5	14.5	14.5	14.5	9.9	9.9	9.9	9.9	9.8	7.5	7.6	7.5	7.3	7.3	97	101
100				10	10	10	10	14.0	14.5	14.5	14.5	14.0	9.9	9.8	9.9	10.0	9.9	7.8	7.1	7.5	7.6	7.6	153	161
Initials						JBF	JBF	JAB			JBF	JBF	JAB			JBF	JBF	JAB			JBF	JBF	JAB	JBF

WQ Ranges: T (°C) = 15 ± 1; DO (mg/L) = 7.0 to 10.3; pH = 5.5 to 8.5

Sample Description/Comments: cloudy, grey

Fish Description at 96 h All fish OK Number of Stressed Fish at 96 h 0

Other Observations: _____

Reviewed by: JGU

Date Reviewed: Aug 26/14

Daphnia magna Summary Sheet

Client: Mount Polley
Work Order No.: 17568

Start Date/Time: August 22, 2014 @ 1300
Test Species: Daphnia magna
Set up by: VML

Sample Information:

Sample ID: QUL66-40m
Sample Date: August 21, 2014
Date Received: August 22, 2014
Sample Volume: 3 x 20L

Test Validity Criteria:

≥ 90% mean control survival (no more than 2 mortalities in any control replicate)

WQ Ranges:

T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 8 to 8.5

Test Organism Information:

Broodstock No.: 080614A
Age of young (Day 0): <24 h
Avg No. young per brood in previous 7 d: 15
Mortality (%) in previous 7 d: 0
Days to first brood: 10

NaCl Reference Toxicant Results:

Reference Toxicant ID: Dm125
Stock Solution ID: 14NaO2
Date Initiated: August 23, 2014
48-h LC50 (95% CL): 3.9 (2.8-5.5) g/L NaCl
Reference Toxicant Mean and Historical Range: 4.0 (3.7-4.3) g/L NaCl
Reference Toxicant CV (%): 4

Test Results: The ^{me} 48-h LC50 is estimated to be >100% CVN)

Reviewed by: JOU

Date reviewed: Aug. 26/14

Freshwater Acute 48 Hour Toxicity Test Data Sheet

Client: Mount Polley
 Sample ID: QVL66-40m
 Work Order No.: 14568

Start Date/Time: August 22, 2014 @ 1300
 No. Organisms/volume: 10/200mL
 Test Organism: D. magna
 Set up by: UML

DO meter: 3/4 pH meter: 3 Conductivity meter: 2/3

Concentration (% v/v)	Number of Live Organisms Rep	Number of Live Organisms		No. Immobilized	Temperature (°C)			Dissolved oxygen (mg/L)			pH			Conductivity (µS/cm)		
		24	48		0	24	48	0	24	48	0	24	48	0	48	
Control	A	10	10	0	20.0	20.0	20.0	8.6	8.7	8.6	8.0	7.9	8.0	348	358	
	B															
	C															
	D															
6.25	A	10	10	0	20.0	20.0	20.0	8.6	8.6	8.5	8.0	8.0	8.0	338	347	
	B															
	C															
	D															
12.5	A	10	10	0	20.0	20.0	20.0	8.5	8.6	8.5	8.0	8.1	7.9	322	334	
	B															
	C															
	D															
25	A	10	10	0	20.0	20.0	20.0	8.6	8.6	8.5	8.0	8.1	7.9	298	310	
	B															
	C															
	D															
50	A	10	10	0	20.0	20.0	20.0	8.7	8.5	8.6	8.0	8.1	7.8	250	261	
	B															
	C															
	D															
100	A	10	10	0	20.0	20.0	20.0	8.9	8.5	8.4	8.0	8.1	7.9	154	163	
	B															
	C															
	D															
Technician Initials		U	M	L	U	M	L	U	M	L	U	M	L	U	M	L

WQ Ranges: T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

	Hardness*	Alkalinity*
Conc.	*(mg/L as CaCO ₃)	
Control (MHW)	100	68
Highest conc.	68	58

	Initial WQ	Adjustment	Adjusted WQ
Temp (°C)	20.0		
DO (mg/L)	8.9		
pH	8.0		
Cond (µS/cm)	154		

Sample Description: greenish-yellow colour, opaque
 Comments: Batch#: 080614A 7-d previous # young/brood: UML 15 Day of 1st Brood: 10 Previous 7-d % Mortality: 0
 Reviewed by: JGL Date reviewed: Aug. 26/14

COPY

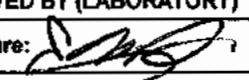
British Columbia: 8864 Commerce Court, Burnaby, BC, V5A 4N7

Date Aug 21/14 Page 1 of 1

Sample Collection By: Sky Freeman Katharina Batchelar			ANALYSES REQUIRED											
Report to:	Invoice to:		96h RBT	48 h Daphnia magna	7 Day Ceriodaphnia dubia	7 day fathead Minnow	72h aigal growth	Lemna						
Company	Mount Polley Mining Corporation	Mount Polley Mining Corporation												
Address	Box 12	Box 12												
City/Prov/Postal Code	Likely BC V0L 1N0	Likely BC V0L 1N0												
Contact	Colleen Hughes Deb McMillan	Colleen Hughes/												
Phone	(250) 790-2617	(250) 790-2617												
Email	chughes@mountpolley.com dmcmillan@minnow.ca	chughes@mountpolley.com												

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	96h RBT	48 h Daphnia magna	7 Day Ceriodaphnia dubia	7 day fathead Minnow	72h aigal growth	Lemna						
QUL66-40m	Aug 21/14	11:13	water	20L	3	MMER Full Suite	X	X	X	X	X	X						

14567
 14568
 14569
 14570
 14571
 14572

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)		RELIQUISHED BY (COURIER)	
Client: Mount Polley Mining Corporation		Total # Containers:	3x20L	Signature: Katharina Batchelar		Signature:	
P.O. No.:		Good Condition?	yes			Print:	
Shipped Via: Greyhound		Matches Schedule?	yes	Company: Minnow Environmental		Company:	
SPECIAL INSTRUCTIONS/COMMENTS: Cost Code 6400067 506190				Time/Date: Aug 21/14 14:26		Time/Date:	
				RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)	
				Signature:		Signature: 	
				Print:		Print: EMMA MARKUS	
				Company:		Company: NAUTILUS ENVIRONMENTAL	
				Time/Date:		Time/Date: Aug 22/14 @ 0820h	

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 11

Toxicity testing on a sample identified as QUR-1: Sample collected August 22, 2014 (Report date August 29, 2014)



Mount Polley Mining Corporation
ATTN: Colleen Hughes
Box 12
Likely, BC
VOL 1N0

Report Date: August 29, 2014
Work Order: 14575 - 576

Data Report

Species: Rainbow trout (*Oncorhynchus mykiss*)
Protocol: EPS 1/RM/13 (Second Ed. with 2007 amendments)

Species: *Daphnia magna*
Protocol: EPS 1/RM/14 (Second Ed. 2000)

Table 1. Results for the 96-h rainbow trout acute toxicity test.

Sample ID	Collection Date and Time	96-h LC50 (%v/v)
QUR-1	August 22, 2014 @ N/A	>100

Table 2. Results for the 48-h *Daphnia magna* acute toxicity test.

Sample ID	Collection Date and Time	48-h LC50 (%v/v)
QUR-1	August 22, 2014 @ N/A	>100

Tests met performance criteria and there were no deviations from the test methods. The results relate only to the sample tested.

Yvonne Lam, B.Sc.
Laboratory Biologist

Reviewed By:
Julianna Kalocai, M.Sc., R.P.Bio
QA Officer

Rainbow Trout Summary Sheet

Client: Mount Polley Mining Start Date/Time: August 25/14 @ 1000
Work Order No.: 14575 Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: QUR-1
Sample Date: August 22/14 @ N/A
Date Received: August 23/14 @ 1335
Sample Volume: 3 x 20L
Other: N/A

Test Validity Criteria:

≥ 90% control survival

WQ Ranges:

T (°C) = 15 ± 1; DO (mg/L) = 7.0 to 10.3; pH = 5.5 to 8.5

Dilution Water:

Type: Dechlorinated Municipal Tap Water
Hardness (mg/L CaCO₃): 11
Alkalinity (mg/L CaCO₃): 9

Test Organism Information:

Batch No.: 0806/4
Source: Miracle Springs
No. Fish/Volume (L): 10/10
Loading Density (g/L): 0.37
Mean Length ± SD (mm): 35 ± 3 Range: 30 - 39
Mean Weight ± SD (g): 0.37 ± 0.11 Range: 0.23 - 0.52

NaNO₂ Reference Toxicant Results:

Reference Toxicant ID: RTNt66
Stock Solution ID: 14NE01
Date Initiated: August 20/14
96-h LC50 (95% CL): 10.9 (8.1 - 14.7) mg/L NaNO₂

Reference Toxicant Mean and Historical Range: 4.9 (2.0 - 12.0) mg/L NaNO₂
Reference Toxicant CV (%): 56

Test Results: The 96-h LC50 is >100% (N/N).

Reviewed by: JGU Date reviewed: Aug. 29/14

96-Hour Rainbow Trout Toxicity Test Data Sheet

Client/Project#: Mount Polley Mining
 Sample I.D.: QUR-1
 W.O. #: 14575
 RBT Batch #: 080614
 Date Collected/Time: August 22/14 @ N/A
 Date Setup/Time: August 25/14 @ 1000
 Sample Setup By: JBF

Number Fish/Volume: 10/10L
 7-d % Mortality: 0.73
 Total Pre-aeration Time (mins): 30
 Aeration rate adjusted to 6.5 ± 1 mL/min/L? (Y/N): Y

D.O. meter: 1/2/3/4
 pH meter: 1/2/3
 Cond. Meter: 1/2/3

Undiluted Sample WQ			
Parameters	Initial WQ	Adjustment	30 min WQ
Temp °C	16.0	/	14.5
pH	JBF 7.7 7.5		7.5
D.O. (mg/L)	9.7		9.9
Cond. (µS/cm)	100		103

Concentration (% v/v)	# Survivors								Temperature (°C)					Dissolved Oxygen (mg/L)					pH					Conductivity (µS/cm)	
	1	2	4	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96	
Control				10	10	10	10	14.5	14.0	14.5	14.5	14.0	9.9	10.0	9.9	9.8	10.3	7.1	7.0	7.0	7.1	7.2	33	41	
6.25				10	10	10	10	14.5	14.0	14.5	14.5	14.0	9.8	9.9	10.0	9.9	10.3	7.1	7.0	7.0	7.1	7.3	37	44	
12.5				10	10	10	10	14.5	14.0	14.5	14.5	14.0	9.9	9.8	10.1	9.9	10.2	7.1	7.1	7.1	7.2	7.3	42	47	
25				10	10	10	10	14.5	14.0	14.5	14.5	14.0	10.0	9.9	10.0	9.9	10.2	7.2	7.1	7.2	7.2	7.4	50	56	
50				10	10	10	10	14.5	14.0	14.5	14.5	14.0	9.9	9.9	10.0	10.0	10.2	7.3	7.2	7.3	7.3	7.5	68	74	
100				10	10	10	10	14.5	14.0	14.5	14.5	14.0	9.9	9.9	10.0	9.9	10.2	7.5	7.3	7.4	7.5	7.7	103	110	
Initials				JBF	JBF	JBF	JAB	JBF	JBF	JBF	JBF	JAB	JBF	JBF	JBF	JBF	JAB	JBF	JBF	JBF	JBF	JAB	JBF	JAB	

WQ Ranges: T (°C) = 15 ± 1; DO (mg/L) = 7.0 to 10.3; pH = 5.5 to 8.5

Sample Description/Comments: clear, colorless.

Fish Description at 96 h All fish appear ok Number of Stressed Fish at 96 h 0

Other Observations: _____

Reviewed by: JGh

Date Reviewed: Aug. 29/14

Daphnia magna Summary Sheet

Client: Mount Polley
Work Order No.: 14576

Start Date/Time: August 23, 2014 @1450
Test Species: Daphnia magna
Set up by: AWD

Sample Information:

Sample ID: QUR-1
Sample Date: August 22, 2014
Date Received: August 23, 2014
Sample Volume: 3 x 20L

Test Validity Criteria:

≥ 90% mean control survival (no more than 2 mortalities in any control replicate)

WQ Ranges:

T (°C) = 20 ± 2; DO (mg/L) = 3.5 to 9.4; pH = 6 to 8.5

Test Organism Information:

Broodstock No.: 073014B
Age of young (Day 0): <24 h
Avg No. young per brood in previous 7 d: 16
Mortality (%) in previous 7 d: 0
Days to first brood: 9

NaCl Reference Toxicant Results:

Reference Toxicant ID: Dm125
Stock Solution ID: 14NaO2
Date Initiated: August 23, 2014
48-h LC50 (95% CL): 3.9 (2.8-5.5) g/L NaCl
Reference Toxicant Mean and Historical Range: 4.0 (3.7-4.3) g/L NaCl
Reference Toxicant CV (%): 4

Test Results: The 48-h LC50 is estimated to be >100% (v/v)

Reviewed by: JGle Date reviewed: Aug. 29/14

Freshwater Acute 48 Hour Toxicity Test Data Sheet

Client: Mount Polley
 Sample ID: 0021
 Work Order No.: 14576

Start Date/Time: August 23, 2014 @ 1450
 No. Organisms/volume: 10/200mL
 Test Organism: D.magna
 Set up by: h

DO meter: 3 pH meter: 3 Conductivity meter: 213

Concentration (% v/v)	Number of Live Organisms Rep.	Number of Live Organisms		No. Immobilized	Temperature (°C)			Dissolved oxygen (mg/L)			pH			Conductivity (µS/cm)	
		24	48		48	0	24	48	0	24	48	0	24	48	0
Control	A	10	10	0	20.0	20.0	19.5	8.5	8.6	8.3	8.0	8.0	8.1	350	367
	B														
	C														
	D														
6.25	A	10	10	0	20.0	20.0	19.5	8.5	8.5	8.4	8.0	8.0	8.1	328	347
	B														
	C														
	D														
12.5	A	10	10	0	20.0	20.0	19.5	8.5	8.6	8.5	8.0	7.9	8.1	300	317
	B														
	C														
	D														
25	A	10	10	0	20.0	20.0	19.5	8.6	8.6	8.4	8.0	7.9	8.1	258	279
	B														
	C														
	D														
50	A	10	10	0	20.5	20.0	19.5	8.5	8.5	8.5	7.9	7.8	8.1	198	199
	B														
	C														
	D														
100	A	10	9	0	21.0	20.0	19.5	8.6	8.5	8.5	7.9	7.8	8.0	104	117
	B														
	C														
	D														
Technician Initials		h	h	h	h	h	h	h	h	h	h	h	h	h	h

WQ Ranges: T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

	Hardness*	Alkalinity*
Conc.	*(mg/L as CaCO ₃)	
Control (MHW)	100	68
Highest conc.	40	44

	Initial WQ	Adjustment	Adjusted WQ
Temp (°C)	21.0		
DO (mg/L)	2.6		
pH	7.9		
Cond (µS/cm)	104		

Sample Description: clear - light yellow
 Comments: Batch#: 073014B 7-d previous # young/brood: 16 Day of 1st Brood: 9 Previous 7-d % Mortality: 0
 Reviewed by: JGB Date reviewed: Aug. 29/14

COPY

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

14575
14576
14577
14578
14579
14580

Sample Collection By: Sky Freeman		Report to:		Invoice to:	
Company: Mount Polley Mining Corporation		Address: Box 12		City/Prov/Postal Code: Likely BC V0L 1N0	
Contact: Colleen Hughes		Contact: Deb McMillan		Phone: (250) 790-2617	
Email: chughes@mountpolley.com		Email: dmcmillan@minnow.ca		Email: chughes@mountpolley.com	

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	ANALYSES REQUIRED											
							96h RBT	48 h Daphnia magna	7 Day Ceriodaphnia dubia	7 day fathead Minnow	72h algal growth	Seema						
1 QUR-1	8/22/2014		water	2 POL	3		X	X	X	X	X	X						
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUINSHED BY (CLIENT)		RELIQUINSHED BY (COURIER)	
Client: Mount Polley Mining Corporation		Total # Containers:	3	Signature:		Signature:	
P.O. No.:		Good Condition?	yes	Sky Freeman		Print:	
Shipped Via: Greyhound		Matches Schedule?	yes	Company: MPMC		Company:	
SPECIAL INSTRUCTIONS/COMMENTS:				RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)	
				Signature:		Signature:	
				Print:		Print:	
				Company:		Company:	
				Time/Date: 22/08/2014 15:30:00		Time/Date:	
				Time/Date:		Time/Date: 13:35 Aug 27/14	

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 12

Toxicity testing on a sample identified as QUR-1: Sample collected August 22, 2014 (Report date October 21, 2014; Revised December 4, 2014)



Nautilus Environmental

Toxicity testing on a sample identified as QUR-1

Sample collected August 22, 2014

Final Report

Report date: October 21, 2014, revised December 4, 2014

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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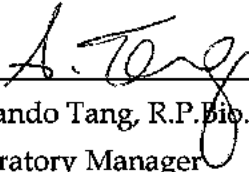
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- APPENDIX E - Chain of Custody Form

SIGNATURE PAGE



Krysta Pearcy, B.Sc.
Laboratory Biologist



Armando Tang, R.P.Bio.
Laboratory Manager

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted toxicity tests for Mount Polley Mining Corporation on a sample identified as QUR-1. The sample was collected on August 22, 2014 and delivered to the laboratory in Burnaby, BC on August 23, 2014. The sample was transported in three 20-L plastic carboys and coolers. The sample was received at a temperature of 7.5°C and was stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing. The following sub-lethal toxicity tests were performed on the sample:

- *Ceriodaphnia dubia* survival and reproduction
- 7-d fathead minnow (*Pimephales promelas*) survival and growth
- 7-d duckweed (*Lemna minor*) growth inhibition
- 72-h algal (*Pseudokirchneriella subcapitata*) growth inhibition

This report describes the results of these toxicity tests. Copies of laboratory data sheets and printouts of statistical analyses for each test are provided in Appendices A to D. The chain-of-custody form is provided in Appendix E. This report was revised from an earlier version to incorporate data for dry weight of fathead minnows, in addition to biomass.

2.0 METHODS

Methods for the toxicity tests are summarized in Tables 1 to 4. Testing was conducted according to procedures described by the Environment Canada protocols (2007a, 2007b, 2007c and 2011). Statistical analyses for all tests were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house culture
Test organism age	<24 h old neonates produced within 12 h
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20 mL test tube
Test volume	15 mL
Test replicates	10 test replicates per treatment
Number of organisms	1 per replicate
Control water	20% Perrier water
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	<i>Pseudokirchneriella subcapitata</i> and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada, (2007a) EPS 1/RM/21
Statistical software	CETIS (2013)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods
Reference toxicant	Sodium chloride

Table 2. Summary of test conditions: fathead minnow (*Pimephales promelas*) survival and growth test.

Test organism	<i>Pimephales promelas</i>
Test organism source	Aquatic BioSystems, Fort Collins, CO
Test organism age	<24 hours
Test type	Static renewal
Test duration	7 days
Test vessel	375-mL glass containers
Test volume	250 mL
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control water	Moderately-hard water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	Twice a day with newly hatched brine shrimp (<i>Artemia nauplii</i>)
Light intensity	100 – 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test protocol	Environment Canada (2011), EPS 1/RM/22
Statistical software	CETIS (2013)
Test endpoint	Survival and biomass
Test acceptability criteria for controls	≥80% survival, ≥250 µg mean dry weight
Reference toxicant	Sodium Chloride

Table 3. Summary of test conditions: *Lemna minor* growth inhibition test.

Test organism	<i>Lemna minor</i>
Test organism source	In-house culture, obtained from Canadian Phycological Culture Centre, and originally isolated from Wainfleet, Stinking Barn, Niagara Peninsula, Ontario, Canada
Test organism age	7- to 10-day old
Test type	Static
Test duration	7 days
Test vessel	250 mL glass containers
Test volume	100 mL
Test replicates	4 test replicates per treatment
No. of organisms	Two 3-frond plants per replicate
Control water	Deionized water with nutrients added
Test solution renewal	None
Test temperature	25 ± 2°C
Feeding	None
Light intensity	4000 to 5600 lux full spectrum light
Photoperiod	24 hours light
Aeration	None
Test protocol	Environment Canada (2007b), EPS 1/RM/37
Statistical software	CETIS (2013)
Test endpoint	Number of fronds and dry weight
Test acceptability criteria for controls	≥ 8-fold increase in number of fronds
Reference toxicant	Potassium chloride

Table 4. Summary of test conditions: *Pseudokirchneriella subcapitata* growth inhibition test.

Test organism	<i>Pseudokirchneriella subcapitata</i> , strain UTCC #37
Test organism source	In-house culture, obtained from Canadian Phycological Culture Center, and originally isolated from Nitelva River, Norway.
Test organism age	3- to 7-day old culture in logarithmic growth phase
Test type	Static
Test duration	72 hours
Test vessel	Microplate
Test volume	220 µL
Test replicates	4 replicates per treatment; 8 replicates for control
Number of organisms	10,000 cells/mL
Control water	Deionized water with supplemented nutrients
Test solution renewal	None
Test temperature	24 ± 2°C
Feeding	None
Light intensity	3600 to 4400 lux
Photoperiod	24 hours light
Aeration	None
Test protocol	Environment Canada (2007c), EPS1/RM/25
Statistical software	CETIS (2013)
Test endpoint	Algal cell growth inhibition
Test acceptability criteria for controls	≥ 16-fold increase in number of algal cells; CV ≤ 20%; no trend when analyzed using Mann-Kendall test
Reference toxicant	Zinc

3.0 RESULTS

Adverse effects were observed on fathead minnow biomass (Table 6); the IC25 for biomass was 75.9%. There were no adverse effects observed on survival and reproduction of *C. dubia* (Table 5), frond count and dry weight of *L. minor* (Table 7) or cell yield of *P. subcapitata* (Table 8). The LC and IC values were therefore greater than the highest concentration tested for each of these endpoints in these toxicity tests. In addition, a stimulatory effect was observed for *P. subcapitata* cell yield; percent stimulation ranged from 38.9 to 320.4%.

Table 5. Results: *Ceriodaphnia dubia* survival and reproduction test.

Concentration (% v/v)	Survival (%)	Reproduction (mean ± SD)
Control	100	20.1 ± 5.2
1.56	100	20.5 ± 4.0
3.12	100	21.4 ± 3.4
6.25	100	22.0 ± 3.5
12.5	100	20.1 ± 4.9
25	100	21.1 ± 4.7
50	100	19.9 ± 5.2
100	100	22.9 ± 5.1
Test endpoint (% v/v)		
LC50	>100	--
IC25	--	>100
IC50	--	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

Table 6. Results: fathead minnow (*Pimephales promelas*) survival and growth test.

Concentration (% v/v)	Mean ± SD		
	Survival (%)	Biomass (µg)	Dry Weight (µg)
Control	80.0 ± 10.0	472.3 ± 36.8	596.6 ± 89.9
1.56	66.7 ± 5.8	376.7 ± 44.6	564.6 ± 36.4
3.1	56.7 ± 28.9	382.3 ± 174.0	685.9 ± 38.6
6.25	63.3 ± 23.1	464.7 ± 121.3	752.2 ± 106.0
12.5	66.7 ± 20.8	406.7 ± 94.8	620.1 ± 53.6
25	70.0 ± 10.0	374.0 ± 94.5	529.5 ± 82.6
50	80.0 ± 17.3	452.7 ± 64.8	573.0 ± 49.6
100	56.7 ± 35.1	317.7 ± 187.9	560.9 ± 115.1
Test endpoint (% v/v)			
LC50	>100	--	--
IC25 (95% CL)	--	75.9 (24.9 - N/A)	>100
IC50	--	>100	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits, N/A = Not Available.

Table 7. Results: *Lemna minor* growth inhibition test.

Concentration (% v/v)	Frond Growth (No. of Fronds)	Dry Weight (mg)
	(Mean ± SD)	(Mean ± SD)
Control	45.5 ± 2.6	4.3 ± 0.1
1.5	45.0 ± 3.4	4.3 ± 0.5
3.0	40.8 ± 3.3	4.0 ± 0.6
6.1	39.2 ± 4.0	4.0 ± 0.3
12.1	39.2 ± 2.8	3.9 ± 0.5
24.2	38.2 ± 2.2	3.9 ± 0.2
48.5	36.2 ± 3.3	4.0 ± 0.3
97	40.2 ± 1.3	4.2 ± 1.0
Test endpoint		
IC25	>97	>97
IC50	>97	>97

SD = Standard Deviation, IC = Inhibition Concentration.

Table 8. Results: *Pseudokirchneriella subcapitata* growth inhibition test.

Concentration (% v/v)	Cell Density (x 10 ⁴ cells/mL) (Mean ± SD)	Stimulation (%)
Control	41.8 ± 3.8	--
1.5	58.0 ± 4.8*	38.9
3.0	72.0 ± 4.1*	72.5
6.0	70.5 ± 4.2*	68.9
11.9	82.0 ± 7.3*	96.4
23.8	119.8 ± 8.7*	186.8
47.6	138.8 ± 10.2*	232.3
95.2	175.5 ± 16.1*	320.4
Test endpoint (% v/v)		
IC25	>95.2	--
IC50	>95.2	--

SD = Standard Deviation, IC = Inhibition Concentration.

*Indicates cell yield that were significantly greater than the control.

4.0 QA/QC

The health history of the test organisms used in the exposures was acceptable and met the requirements of the Environment Canada protocols. The tests met all control acceptability criteria and water quality parameters remained within ranges specified in the protocols throughout the tests. Uncertainty associated with these tests is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

As per the client's request the fathead minnow test was initiated one day after the sample holding time expired due to a lack of available organisms. There were no other deviations from the test methodologies.

Results of the reference toxicant tests conducted during the testing program are summarized in Table 9. Results for these tests fell within the range for organism performance of mean and two standard deviation range, based on historical results obtained by the laboratory with these tests. Thus, the sensitivity of the organisms used in these tests was appropriate.

Table 9. Reference toxicant results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>C. dubia</i>	Survival (LC50): 1.8 g/L NaCl	1.8 (1.2 - 2.7)	22	August 26 , 2014
	Reproduction (IC50): 1.3 g/L NaCl	1.4 (1.0 - 1.9)	19	
<i>P. promelas</i>	Survival (LC50): 4.2 g/L NaCl	4.5 (3.5 - 5.9)	14	August 26, 2014
	Biomass (IC50): 3.3 g/L NaCl	4.1 (3.0 - 5.6)	17	
<i>L. minor</i>	No. Fronds (IC50) 3.8 g/L KCl	4.2 (3.1 - 5.7)	16	September 5, 2014
<i>P. subcapitata</i>	Growth (IC50) 28.9 µg/L Zn	25.1 (14.8 - 42.7)	30	August 14, 2014

SD = Standard Deviation, CV = Coefficient of Variation, IC = Inhibition Concentration, LC = Lethal Concentration.

5.0 REFERENCES

- Environment Canada. 2007a. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. Report EPS 1/RM/21, Second Edition, February 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 74 pp.
- Environment Canada. 2007b. Biological test method: tests for measuring the inhibition of growth using the freshwater macrophyte, *Lemna minor*. Environmental Protection Series, Report EPS 1/RM/37. Second Edition. January 2007. Environment Canada, Method Development and Application Section, Environmental Technology Centre, Ottawa, ON. 112 pp.
- Environment Canada. 2007c. Biological test method: growth inhibition test using the freshwater alga. Environmental Protection Series, Report EPS 1/RM/25. Second Edition, March 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 53 pp.
- Environment Canada. 2011. Biological test method: test of larval growth and survival using fathead minnows. Environmental Protection Series, Report EPS 1/RM/22. February 2011,. Environment Canada, Environmental Protection, Conservation and Protection, Ottawa, ON. 73 pp.
- Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.4.29 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: Mant Polley
 Work Order No.: 14577

Start Date/Time: Aug 23/14 @ 1425h
 Set up by: AWD

Sample Information:

Sample ID: QUR-1
 Sample Date: Aug 22/14
 Date Received: Aug 23/14
 Sample Volume: 3x200 = 3x20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 081514A
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 19
 Mortality (%) in previous 7 d: 0
 Individual female # used ≥ 8 young on test day: 7, 2, 8, 11, 12, 14, 16, 18

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd117
 Stock Solution ID: 14NaO2
 Date Initiated: Aug 26/14

7-d LC50 (95% CL): 1.8 (1.5-2.2) g/L NaCl
 7-d IC50 (95% CL): 1.3 (1.1-1.5) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.8 (1.2-2.7) g/L NaCl CV (%): 22
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-1.9) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		7100
IC50 % (v/v) (95% CL)		7100

Reviewed by: JOU

Date reviewed: sep. 23/14

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Foley
 Sample ID: 002-1
 Work Order #: 14577

Start Date & Time: Aug 23/14 @ 1425h
 Stop Date & Time: Aug 29/14 @ 1730h
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		Final 6		7
Control	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	22.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	8.0	7.8	8.0	7.2	8.1	7.4	8.2	7.3	8.0	7.1	8.0	7.3		
pH	8.0	7.7	8.2	7.8	8.1	8.0	8.2	7.6	8.1	7.7	8.1	7.7		
Cond. (µS/cm)	214	213		214		218		215		215		215		
Initials	~	~		EMM		EMM		EMM		EMM		EMM		

Concentration (VIV)	Days													
	0	1		2		3		4		5		Final 6		7
1.56%	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	8.0	7.5	8.0	7.1	8.1	7.0	8.1	7.4	8.2	7.1	8.1	7.2		
pH	8.0	8.0	8.0	7.9	8.0	7.9	8.0	7.7	8.1	7.7	8.1	7.6		
Cond. (µS/cm)	215	214		214		216		214		215		216		
Initials	~	~		EMM		EMM		EMM		EMM		EMM		

Concentration (VIV)	Days													
	0	1		2		3		4		5		Final 6		7
12.5%	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.5	25.0	24.5	25.0	24.0	25.0		
DO (mg/L)	8.0	7.6	8.0	7.2	8.0	7.1	8.1	7.3	8.1	7.2	8.1	7.2		
pH	8.0	8.0	8.0	7.5	7.6	7.6	7.8	7.6	7.9	7.6	7.9	7.6		
Cond. (µS/cm)	202	203		209		207		206		204		209		
Initials	~	~		EMM		EMM		EMM		EMM		EMM		

Concentration (VIV)	Days													
	0	1		2		3		4		5		Final 6		7
100%	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	25.0	25.0	25.0	25.0	24.0	25.0		
DO (mg/L)	7.5	7.6	8.0	7.1	8.1	7.0	8.0	7.3	8.0	7.1	8.0	7.1		
pH	7.9	8.0	7.8	7.6	7.3	7.5	7.3	7.5	7.7	7.5	7.8	7.6		
Cond. (µS/cm)	105	105		109		101		109		108		104		
Initials	~	~		EMM		EMM		EMM		EMM		EMM		

	Control	100% (VIV)	
Hardness*	100	68	
Alkalinity*	80	44	

Analysts: EMM, AWD
 Reviewed by: JG
 Date reviewed: Aug. 23/14

* mg/L as CaCO₃

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5

Sample Description: CRP @ down

Comments: Broodboard Used: DA514A

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mount Palley
 Sample ID: QWR-1
 Work Order: 14577

Start Date & Time: Aug 27/14 01425h
 Stop Date & Time: 09/29/14 01730h
 Set up by: EMM A800

% (v/v)

Days	Concentration: <u>Control</u>												Concentration: <u>1.56</u>												Concentration: <u>3.12</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	/	/	/	/	/	/	/	/	/	/	↗	/	/	/	/	/	/	/	/	/	/	↗	/	/	/	/	/	/	/	/	/	/	↗			
2	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM			
3	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM			
4	4	4	✓	4	4	4	3	3	4	4	EMM	4	3	3	5	4	6	4	4	4	4	EMM	4	3	3	4	✓	✓	3	5	4	4	EMM			
5	6	6	✓	7	7	6	5	6	8	7	EMM	6	7	✓	6	8	✓	8	6	10	9	EMM	6	10	7	9	4	4	6	9	7	8	EMM			
6	11	13	6	11	11	10	11	12	13	11	EMM	10	14	10	14	10	9	7	10	9	11	EMM	9	10	13	12	13	11	12	11	12	11	EMM			
7																																				
8																																				
Total	21	23	6	22	22	20	19	21	25	22	EMM	20	24	13	25	22	15	19	20	23	24	EMM	19	23	23	25	17	15	21	25	23	23	EMM			

Days	Concentration: <u>6.25</u>												Concentration: <u>12.5</u>												Concentration: <u>25</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	/	/	/	/	/	/	/	/	/	/	↗	/	/	/	/	/	/	/	/	/	/	↗	/	/	/	/	/	/	/	/	/	/	↗			
2	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM			
3	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM			
4	4	4	4	4	2	3	4	4	3	3	EMM	4	3	4	4	4	4	3	3	✓	3	EMM	3	4	3	4	3	✓	4	3	✓	4	EMM			
5	11	8	9	7	5	6	6	7	7	5	EMM	8	7	9	8	8	7	8	✓	3	7	EMM	6	6	7	7	9	4	10	8	5	9	EMM			
6	13	10	14	9	10	11	12	12	13	10	EMM	12	13	10	11	11	9	10	8	8	12	EMM	10	9	14	11	15	10	14	11	9	9	EMM			
7																																				
8																																				
Total	28	22	27	20	17	20	22	23	23	18	EMM	24	23	23	23	23	20	21	11	11	22	EMM	19	19	24	22	27	14	28	22	14	22	EMM			

Days	Concentration: <u>50</u>												Concentration: <u>100</u>												Concentration:											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	/	/	/	/	/	/	/	/	/	/	↗	/	/	/	/	/	/	/	/	/	/	↗														
2	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM														
3	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM														
4	4	3	4	3	4	✓	4	3	5	3	EMM	4	5	3	4	4	4	4	3	✓	4	EMM														
5	8	8	9	7	7	5	8	5	6	8	EMM	9	9	✓	8	8	7	8	10	5	8	EMM														
6	11	10	12	10	11	9	12	✓	9	11	EMM	14	13	10	11	14	11	13	15	10	11	EMM														
7																																				
8																																				
Total	23	21	25	20	22	14	24	8	20	22	EMM	27	27	13	23	26	22	25	28	15	23	EMM														

Notes: X = mortality.

Sample Description: clear

Comments: Total # Young only based on the first 3 broods. Fourth and subsequent broods not included in total count.

Reviewed by: JGH

Date reviewed: Sep. 23/14

CETIS Analytical Report

Report Date: 04 Sep-14 18:54 (p 1 of 2)
 Test Code: 14577 | 19-5527-2840

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 10-9091-6488	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 04 Sep-14 18:53	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 04-0528-1597	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 23 Aug-14 14:25	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 29 Aug-14 17:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 3h	Source: In-House Culture	Age: <24h
Sample ID: 12-3726-8679	Code: 49BF38C7	Client: Mount Polley
Sample Date: 22 Aug-14	Material: Water Sample	Project:
Receive Date: 23 Aug-14 13:35	Source: Mount Polley (MT POLLEY)	
Sample Age: 38h (7.5 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	334057	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 04 Sep-14 18:54 (p 2 of 2)

Test Code: 14577 | 19-5527-2840

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 10-9091-6488
 Analyzed: 04 Sep-14 18:53

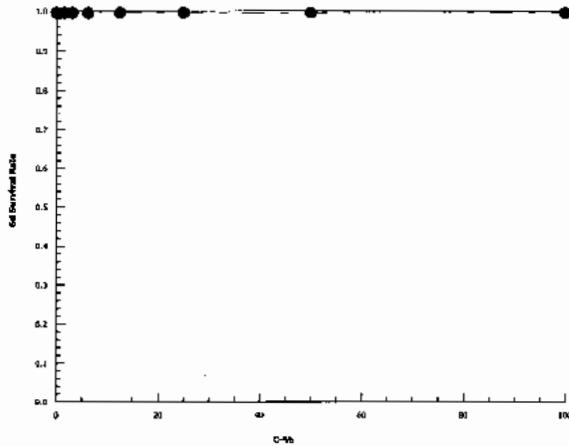
Endpoint: 6d Survival Rate
 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 04 Sep-14 18:54 (p 1 of 2)
 Test Code: 14577 | 19-5527-2840

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 20-9473-6278	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 04 Sep-14 18:53	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 04-0528-1597	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 23 Aug-14 14:25	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 29 Aug-14 17:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 3h	Source: In-House Culture	Age: <24h
Sample ID: 12-3726-8679	Code: 49BF38C7	Client: Mount Polley
Sample Date: 22 Aug-14	Material: Water Sample	Project:
Receive Date: 23 Aug-14 13:35	Source: Mount Polley (MT POLLEY)	
Sample Age: 38h (7.5 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1291386	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	20.1	6	25	1.65	5.216	25.95%	0.0%
1.56		10	20.5	13	25	1.258	3.979	19.41%	-1.99%
3.12		10	21.4	15	25	1.067	3.373	15.76%	-6.47%
6.25		10	22	17	28	1.116	3.528	16.03%	-9.45%
12.5		10	20.1	11	24	1.56	4.932	24.54%	0.0%
25		10	21.1	14	28	1.501	4.748	22.5%	-4.98%
50		10	19.9	8	25	1.629	5.152	25.89%	1.0%
100		10	22.9	13	28	1.616	5.109	22.31%	-13.93%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	21	23	6	22	22	20	19	21	25	22
1.56		20	24	13	25	22	15	19	20	23	24
3.12		19	23	23	25	17	15	21	25	23	23
6.25		28	22	27	20	17	20	22	23	23	18
12.5		24	23	23	23	23	20	21	11	11	22
25		19	19	24	22	27	14	28	22	14	22
50		23	21	25	20	22	14	24	8	20	22
100		27	27	13	23	26	22	25	28	15	23

CETIS Analytical Report

Report Date: 04 Sep-14 18:54 (p 2 of 2)
Test Code: 14577 | 19-5527-2840

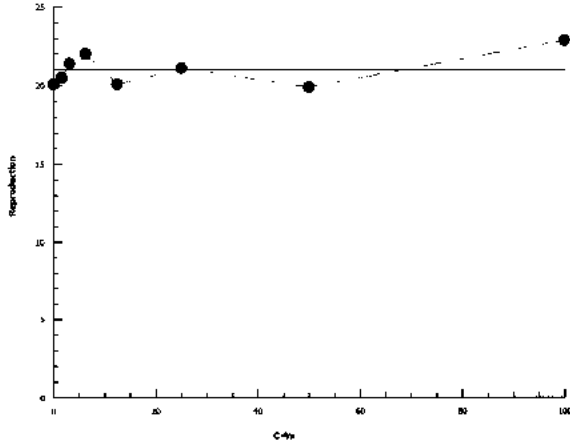
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 20-9473-6278 Endpoint: Reproduction
Analyzed: 04 Sep-14 18:53 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Client: M. Pollerig

W.O.#: 14577

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
<u>QUR-1</u>	<u>Aug 23/14</u>	<u>50</u>	<u>2.3</u>	<u>2.4</u>	<u>44</u>	<u>50</u>	<u>3.4</u>	<u>68</u>	<u>YVL</u>
<u>20% Perrier</u>	<u>Aug 27/14</u>	<u>50</u>	<u>4.2</u>	<u>4.4</u>	<u>80</u>	<u>50</u>	<u>5.0</u>	<u>100</u>	<u>EMM</u>

Notes: _____

Reviewed by: Joh

Date Reviewed: Sep - 23, 2014

APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

Fathead Minnow Test Summary Sheet
(7-d *Pimephales promelas* Survival and Growth Test)

Client: Mount Polley
Work Order No.: 14578

Start Date/Time: Aug 26/14 @ 1215h
Test Species: P. promelas

Sample Information:

Sample ID: OUR-1
Sample Date: Aug 22/14
Date Received: Aug 23/14
Sample Volume: 3020L

Dilution Water (initial water quality):

Type: Moderately hard water
Temperature (°C): 26.0
pH: 8.1
Dissolved Oxygen (mg/L): 7.7
Hardness (mg/L CaCO₃): ~~100~~ 100
Alkalinity (mg/L CaCO₃): 64

Test Validity Criteria:

The test is invalid if:

- 1) for the control solutions, the combined and cumulative incidence of any mortalities, or fish showing loss of equilibrium or other signs of atypical swimming behavior, is >20%
- 2) the average dry weight of the surviving control fish does not attain 250 ug when the fish are dried and weighed.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4; pH = 6.5 to 8.5

Test Organism Information:

Batch No.: 082614
Source: Aquatic Biosystems, CO
Age: 224 hrs

NaCl Reference Toxicant Results:

Reference Toxicant ID: pp91
Stock Solution ID: n/a
Date Initiated: Aug 26/14
7-d EC50 (95% CL): 4.2 (3.7-4.7)
7-d IC50 (95% CL): ~~3.3 (2.9-4.7)~~ 3.3 (2.7-4.8)

Survival:

Reference Toxicant Mean and Historical Range: 4.5 (3.5-5.9) CV (%): 14

Biomass:

Reference Toxicant Mean and Historical Range: 4.1 (3.0-5.6) CV (%): 17

Test Results:

	Survival	Biomass
LC25 % (v/v) (95% CL)	10.4 (n/a-n/a)	
LC50 % (v/v) (95% CL)	<u>7100</u>	
IC25 % (v/v) (95% CL)		68.5 (n/a) <u>75.9 (24.9-102)</u>
IC50 % (v/v) (95% CL)		<u>7100</u>

Reviewed by: JGU

Date reviewed: Oct. 3/14

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: QUR-1 (brown)
 Work Order #: 14578

Start Date & Time: Aug 26/14 @ 12:54
 Stop Date & Time: Sept 2/14 @ 13:45
 Test Species: Pimephales promelas

Concentration Control	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final	
Temperature (°C)	26.0	25.0	25.0	25.0	25.0	24.0	25.0	25.0	25.0	25.0	25.0	25.0	24.0	24.0	24.0
DO (mg/L)	7.7	4.1	7.5	6.3	8.0	6.9	8.0	6.0	7.9	5.9	7.9	6.1	8.1	6.1	
pH	8.1	7.6	8.2	7.8	8.2	7.8	8.1	7.8	8.0	7.7	8.0	7.5	8.1	7.8	
Cond. (µS/cm)	364		347		316		324		320		321		328	347	
Initials	KJL		JW/KJL		JW/KJL		KJL		A		M		KJL	JW	

Concentration 1-56	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final	
Temperature (°C)	24.0	25.0	24.0	25.0	24.5	24.0	24.0	25.0	25.5	25.0	25.5	24.0	24.0	24.0	
DO (mg/L)	8.1	4.5	7.6	6.5	7.8	7.0	7.8	6.2	7.9	6.0	7.9	6.0	8.1	5.8	
pH	8.1	7.6	8.1	7.8	8.1	7.8	7.9	7.8	8.0	7.7	7.9	7.5	8.0	7.7	
Cond. (µS/cm)	342		345		313		320		316		218		326	351	
Initials	KJL		JW/KJL		JW/KJL		KJL		M		M		KJL	JW	

Concentration 12-5	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final	
Temperature (°C)	24.0	25.0	24.0	25.0	24.5	24.0	24.0	25.0	25.5	25.0	25.5	24.0	24.5	24.0	
DO (mg/L)	8.1	4.4	7.6	6.5	7.9	7.1	8.0	6.2	8.0	5.9	7.9	5.9	8.1	5.9	
pH	8.1	7.6	8.1	7.8	8.1	7.8	7.8	7.8	7.9	7.8	7.9	7.6	8.2	7.7	
Cond. (µS/cm)	320		321		291		294		297		291		300	328	
Initials	KJL		JW/KJL		JW/KJL		KJL		M		M		KJL	JW	

Concentration 100	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final	
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	24.0	24.0	25.0	25.5	25.0	25.6	24.0	24.0	24.0	
DO (mg/L)	8.2	4.6	8.2	6.6	8.1	7.1	8.0	6.2	7.9	5.8	7.9	5.9	7.9	5.8	
pH	7.9	7.6	8.0	7.6	8.0	7.7	7.8	7.8	7.9	7.8	8.0	7.6	8.3	7.5	
Cond. (µS/cm)	106		100		104		104		103		104		105	121	
Initials	KJL		JW/KJL		JW/KJL		KJL		M		M		KJL	JW	

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6.5 to 8.5

DO meter: 3 pH meter: 3 Conductivity meter: 3

	Control	100% (v/v)		
Hardness*	100	48		
Alkalinity*	64	44		

* mg/L as CaCO₃

Analysts: KJL, JW, AWD

Reviewed by: JW

Date reviewed: sep. 23/14

Sample Description: clear

Comments: _____

7-d Fathead Minnow Toxicity Test Daily Survival

Client: Mount Pooley
 Sample ID: QUR-1 (broadway)
 Work Order #: 14578

Start Date & Time: Aug 26/14 @ 12:15h
 Stop Date & Time: Sept 2/14 @ 13:45h
 Test Species: Pimephales promelas

Concentration % (V/V)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	10	10	10	9	8	7	7	Dlong test xrl
	B	10	10	10	10	9	9	8	
	C	10	10	10	9	8	8	9	
1-56	A	10	10	10	10	10	7	7	Dlong test xrl
	B	10	10	10	10	9	7	6	
	C	9	9	9	9	7	7	7	
3-1	A	10	10	10	10	9	4	4	
	B	10	10	10	10	9	4	4	
	C	10	10	10	10	10	4	4	
6-25	A	10	10	10	10	9	6	5	
	B	10	10	10	6	6	5	5	
	C	10	10	10	10	10	6	9	
12-5	A	10	10	10	10	8	8	6	
	B	10	10	10	10	8	5	5	
	C	10	10	10	10	10	9	9	
25	A	10	10	9	9	7	7	7	
	B	10	10	10	9	8	8	8	
	C	10	10	10	10	8	8	9	
50	A	10	10	9	9	7	6	6	
	B	10	10	10	10	9	9	9	
	C	10	9	9	9	9	9	9	
100	A	10	10	6	6	3	3	2	
	B	10	10	10	10	10	10	9	
	C	10	10	10	10	9	8	6	
	A								
	B								
	C								
	A								
	B								
	C								
Tech Initials		JW	JW	FJL	M	M	FL	MP	

Comments: _____

Reviewed by: JOU

Date reviewed: sep-23/14

Fathead Minnow Toxicity Test Data Sheet

Dry Weight Data

Client: Mount Polley

Start Date & Time: Aug 26/14 @ 12:54

Sample ID: QUR-1

Termination Date & Time: Sept 2/14 @ 13:56

Work Order No.: 14578

Concentration % (v/v)	Rep	Braun Pan No. F	No. alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control	A	1	7	KLP	1020.893	1025.83	7	KJ ✓
	B	2	8	KLP	1022.42	1026.72	8	
	C	3	9	KLP	1013.04	1018.01	9	
1.56	A	4	7	KLP	1045.88	1049.61	7	
	B	5	6	KLP	1065.36	1068.70	6	
	C	6	7	KLP	1053.60	1057.83	7	
3.1	A	7	9	KLP	1028.25	1034.08	9	
	B	8	4	KLP	1008.52	1011.42	4	
	C	9	4	KLP	971.02	973.76	4	
6.25	A	10	5	KLP	1016.69	1020.29	5	
	B	11	5	KLP	1023.71	1028.06	5	
	C	12	9	KLP	1004.66	1010.64	9	
12.5	A	13	6	KLP	992.93	996.59	6	
	B	14	5	KLP	1014.26	1017.65	5	
	C	15	9	KLP	1017.04	1022.19	9	
25	A	16	7	KLP	1033.92	1038.16	7	
	B	17	8	KLP	1035.75	1040.08	8	
	C	18	6	KLP	1054.09	1056.74	6	
50	A	19	6	KLP	1036.189	1039.97	6	
	B	20	9	KLP	1019.04	1023.90	9	
	C	21	9	KLP	1015.84	1020.78	9	
100	A	22.5	2	KLP	999.99	1001.00	2	
	B	23	9	KLP	1061.44	1065.80	9	
	C	24	6	KLP	1052.02	1056.18	6	

Comments: 10% Rereigh: #7-1034.10 #20-1023.97

Reviewed by: JOK

Date Reviewed: sep. 23/14

CETIS Analytical Report

Report Date: 07 Oct-14 10:47 (p 1 of 2)
 Test Code: 14578 | 17-6101-6303

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 17-4179-4426	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 24 Sep-14 15:49	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 07-8359-0506	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 26 Aug-14 12:15	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 02 Sep-14 14:00	Species: Pimephales promelas	Brine:
Duration: 7d 2h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 12-3726-8679	Code: 49BF38C7	Client: Mount Polley
Sample Date: 22 Aug-14	Material: Water Sample	Project:
Receive Date: 23 Aug-14 13:35	Source: Mount Polley (MT POLLEY)	
Sample Age: 4d 12h (7.5 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1021364	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	0.3421	0.1183	122	292.3	0.8197	845.5
EC10	0.8013	0.2243	N/A	124.8	NA	445.9
EC15	1.418	0.3014	N/A	70.54	NA	331.8
EC20	61.83	N/A	N/A	1.617	NA	NA
EC25	80.4	N/A	N/A	1.244	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	3	0.8	0.7	0.9	0.05774	0.1	12.5%	0.0%	24	30
1.56		3	0.6667	0.6	0.7	0.03333	0.05773	8.66%	16.67%	20	30
3.1		3	0.5667	0.4	0.9	0.1667	0.2887	50.94%	29.17%	17	30
6.25		3	0.6333	0.5	0.9	0.1333	0.2309	36.46%	20.83%	19	30
12.5		3	0.6667	0.5	0.9	0.1202	0.2082	31.22%	16.67%	20	30
25		3	0.7	0.6	0.8	0.05774	0.1	14.29%	12.5%	21	30
50		3	0.8	0.6	0.9	0.1	0.1732	21.65%	0.0%	24	30
100		3	0.5667	0.2	0.9	0.2028	0.3512	61.97%	29.17%	17	30

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.7	0.8	0.9
1.56		0.7	0.6	0.7
3.1		0.9	0.4	0.4
6.25		0.5	0.5	0.9
12.5		0.6	0.5	0.9
25		0.7	0.8	0.6
50		0.6	0.9	0.9
100		0.2	0.9	0.6

CETIS Analytical Report

Report Date: 07 Oct-14 10:47 (p 2 of 2)
 Test Code: 14578 | 17-6101-6303

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

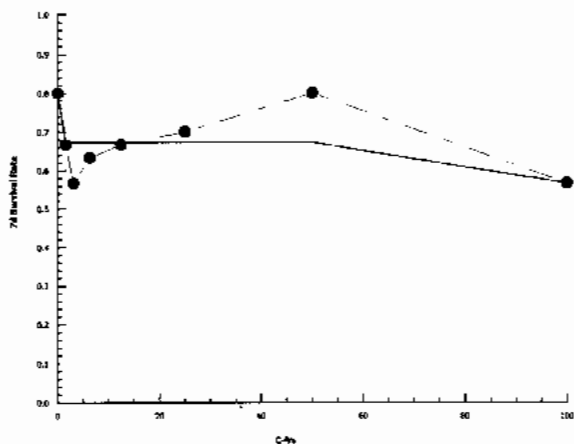
Analysis ID: 17-4179-4426 Endpoint: 7d Survival Rate
 Analyzed: 24 Sep-14 15:49 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	7/10	8/10	9/10
1.56		7/10	6/10	7/10
3.1		9/10	4/10	4/10
6.25		5/10	5/10	9/10
12.5		6/10	5/10	9/10
25		7/10	8/10	6/10
50		6/10	9/10	9/10
100		2/10	9/10	6/10

Graphics



CETIS Analytical Report

Report Date: 07 Oct-14 10:47 (p 1 of 2)
 Test Code: 14578 | 17-6101-6303

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 00-7422-5667	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 24 Sep-14 15:13	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 07-8359-0506	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 26 Aug-14 12:15	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 02 Sep-14 14:00	Species: Pimephales promelas	Brine:
Duration: 7d 2h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 12-3726-8679	Code: 49BF38C7	Client: Mount Polley
Sample Date: 22 Aug-14	Material: Water Sample	Project:
Receive Date: 23 Aug-14 13:35	Source: Mount Polley (MT POLLEY)	
Sample Age: 4d 12h (7.5 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	2042323	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.4238	0.04587	111.7	236	0.895	2180
IC10	1.027	0.01904	N/A	97.36	NA	5253
IC15	53.14	N/A	N/A	1.882	NA	NA
IC20	63.54	N/A	N/A	1.574	NA	NA
IC25	75.93	24.86	N/A	1.317	NA	4.023
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.4723	0.43	0.497	0.02126	0.03683	7.8%	0.0%
1.56		3	0.3767	0.334	0.423	0.02576	0.04461	11.84%	20.25%
3.1		3	0.3823	0.274	0.583	0.1004	0.174	45.5%	19.05%
6.25		3	0.4647	0.361	0.598	0.07001	0.1213	26.1%	1.62%
12.5		3	0.4067	0.339	0.515	0.05472	0.09479	23.31%	13.9%
25		3	0.374	0.265	0.433	0.05456	0.0945	25.27%	20.82%
50		3	0.4527	0.378	0.494	0.0374	0.06479	14.31%	4.16%
100		3	0.3177	0.101	0.436	0.1085	0.1879	59.15%	32.74%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.49	0.43	0.497
1.56		0.373	0.334	0.423
3.1		0.583	0.29	0.274
6.25		0.361	0.435	0.598
12.5		0.366	0.339	0.515
25		0.424	0.433	0.265
50		0.378	0.486	0.494
100		0.101	0.436	0.416

CETIS Analytical Report

Report Date: 07 Oct-14 10:47 (p 2 of 2)

Test Code: 14578 | 17-6101-6303

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 00-7422-5667

Endpoint: Mean Dry Biomass-mg

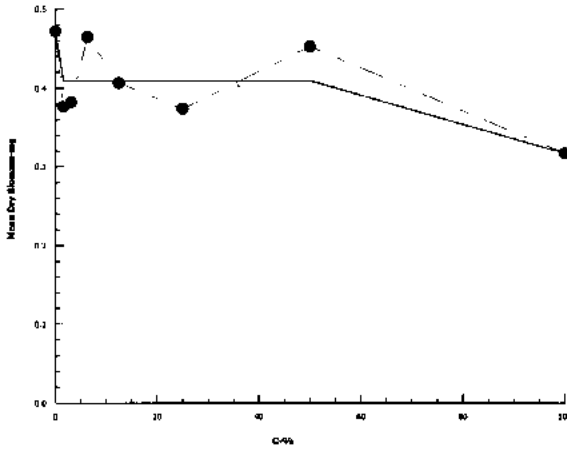
CETIS Version: CETISv1.8.7

Analyzed: 24 Sep-14 15:13

Analysis: Linear Interpolation (ICPIN)

Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 29 Sep-14 14:40 (p 1 of 1)
 Test Code: 14578 | 17-6101-6303

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 11-9422-7288	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 24 Sep-14 15:59	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 07-8359-0506	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 26 Aug-14 12:15	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 02 Sep-14 14:00	Species: Pimephales promelas	Brine:
Duration: 7d 2h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 12-3726-8679	Code: 49BF38C7	Client: Mount Polley
Sample Date: 22 Aug-14	Material: Water Sample	Project:
Receive Date: 23 Aug-14 13:35	Source: Mount Polley (MT POLLEY)	
Sample Age: 4d 12h (7.5 °C)	Station: QUR-1	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	27.0%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	1.56	0.5079	2.558	0.161	4	0.7049	CDF	Non-Significant Effect
	3.1	-1.419	2.558	0.161	4	0.9970	CDF	Non-Significant Effect
	6.25	-2.471	2.558	0.161	4	0.9999	CDF	Non-Significant Effect
	12.5	-0.3734	2.558	0.161	4	0.9447	CDF	Non-Significant Effect
	25	1.065	2.558	0.161	4	0.4539	CDF	Non-Significant Effect
	50	0.375	2.558	0.161	4	0.7575	CDF	Non-Significant Effect
	100	0.5662	2.558	0.161	4	0.6804	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1156961	0.01652801	7	2.781	0.0428	Significant Effect
Error	0.09510618	0.005944137	16			
Total	0.2108023		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.395	18.48	0.7333	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9356	0.884	0.1300	Normal Distribution

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	3	0.5966	0.3733	0.8198	0.5522	0.5375	0.7	0.05189	15.06%	0.0%
1.56		3	0.5646	0.4743	0.6549	0.5567	0.5329	0.6043	0.021	6.44%	5.36%
3.1		3	0.6859	0.59	0.7819	0.685	0.6478	0.725	0.0223	5.63%	-14.98%
6.25		3	0.7522	0.4887	1.016	0.722	0.6644	0.87	0.06123	14.1%	-26.08%
12.5		3	0.6201	0.4869	0.7532	0.61	0.5722	0.678	0.03095	8.65%	-3.94%
25		3	0.5295	0.3242	0.7348	0.5412	0.4417	0.6057	0.04771	15.61%	11.24%
50		3	0.573	0.4498	0.6962	0.5489	0.54	0.63	0.02863	8.66%	3.96%
100		3	0.5609	0.2749	0.8469	0.505	0.4845	0.6933	0.06647	20.52%	5.97%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.7	0.5375	0.5522
1.56		0.5329	0.5567	0.6043
3.1		0.6478	0.725	0.685
6.25		0.722	0.87	0.6644
12.5		0.61	0.678	0.5722
25		0.6057	0.5412	0.4417
50		0.63	0.54	0.5489
100		0.505	0.4845	0.6933

CETIS Analytical Report

Report Date: 19 Nov-14 12:15 (p 1 of 2)
 Test Code: 14578 | 17-6101-6303

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 13-2557-3735	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 18 Nov-14 16:10	Analysis: Nonlinear Regression	Official Results: Yes
Batch ID: 07-8359-0506	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 26 Aug-14 12:15	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 02 Sep-14 14:00	Species: Pimephales promelas	Brine:
Duration: 7d 2h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 12-3726-8679	Code: 49BF38C7	Client: Mount Polley
Sample Date: 22 Aug-14	Material: Water Sample	Project:
Receive Date: 23 Aug-14 13:35	Source: Mount Polley (MT POLLEY)	
Sample Age: 4d 12h (7.5 °C)	Station: QUR-1	

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Log-Logistic EV [Y=A/(1+(X/D)^C)]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
27	46.15	-85.1	-82.77	0.0198	Yes	3.148	2.852	0.0363	Significant Lack of Fit

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	25.04	N/A	101.9	3.994	0.9813	NA
IC10	59.32	N/A	152.7	1.686	0.6547	NA
IC15	101.2	N/A	301.8	0.9884	0.3314	NA
IC20	151.2	N/A	757.7	0.6612	0.132	NA
IC25	210.8	N/A	2299	0.4744	0.04349	NA
IC40	469.1	N/A	N/A	0.2132	NA	NA
IC50	749.1	N/A	N/A	0.1335	NA	NA

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	0.6377	0.03857	0.5621	0.7133	16.53	<0.0001	Significant Parameter
C	0.8664	1.272	-1.627	3.36	0.681	0.5033	Non-Significant Parameter
D	749.1	2311	-3780	5278	0.3242	0.7490	Non-Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	0.022143	0.022143	1	2.465	0.1314	Non-Significant
Lack of Fit	0.093553	0.018711	5	3.148	0.0363	Significant
Pure Error	0.095106	0.005944	16			
Residual	0.188659	0.008984	21			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	4.395	14.07	0.7333	Equal Variances
	Mod Levene Equality of Variance	0.4111	3.5	0.8707	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9622	0.9169	0.4845	Normal Distribution
	Anderson-Darling A2 Normality	0.3716	2.492	0.4263	Normal Distribution

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 13-2557-3735
 Analyzed: 18 Nov-14 16:10

Endpoint: Mean Dry Weight-mg
 Analysis: Nonlinear Regression

CETIS Version: CETISv1.8.7
 Official Results: Yes

Mean Dry Weight-mg Summary

Calculated Variate

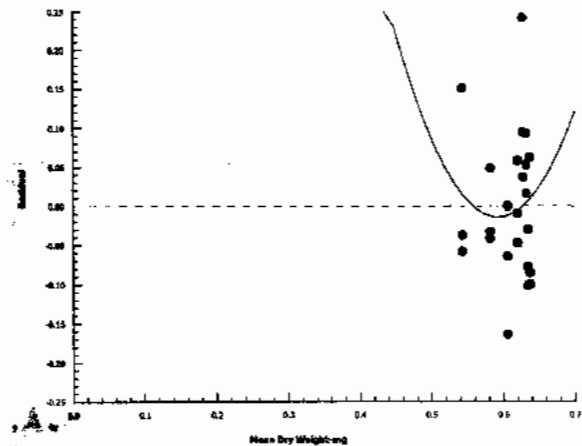
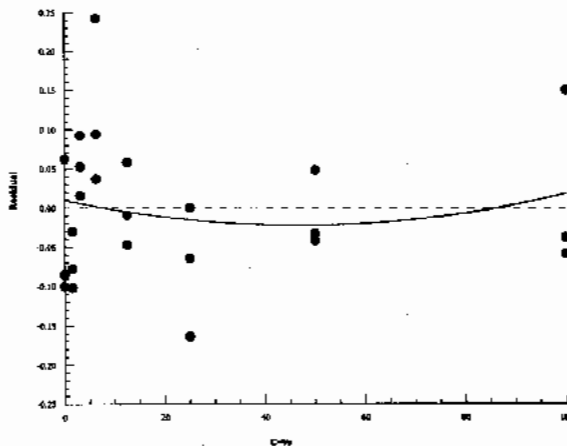
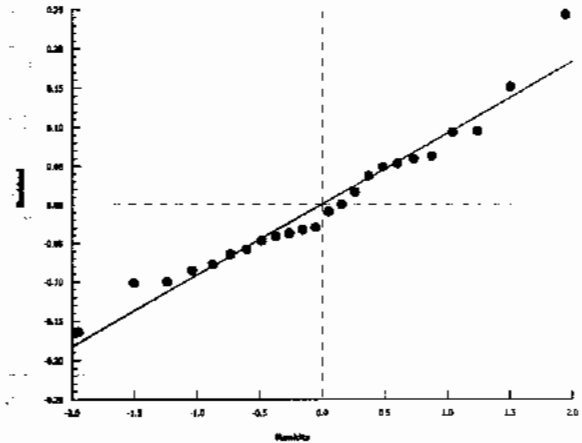
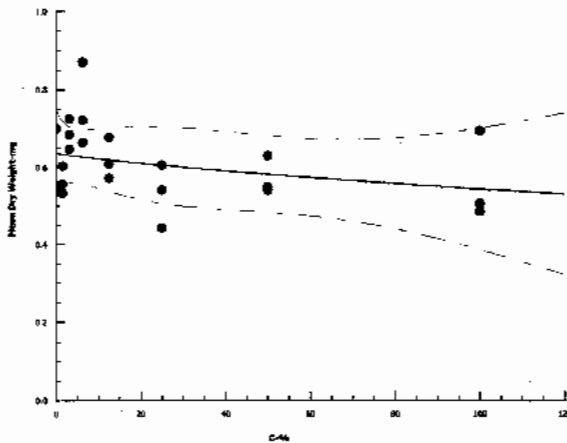
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.5966	0.5375	0.7	0.05189	0.08987	15.06%	0.0%
1.56		3	0.5646	0.5329	0.6043	0.021	0.03837	6.44%	5.36%
3.1		3	0.6859	0.6478	0.725	0.0223	0.03862	5.63%	-14.98%
6.25		3	0.7522	0.6644	0.87	0.06123	0.106	14.1%	-26.08%
12.5		3	0.6201	0.5722	0.678	0.03095	0.0536	8.65%	-3.94%
25		3	0.5295	0.4417	0.6057	0.04771	0.08264	15.61%	11.24%
50		3	0.573	0.54	0.63	0.02863	0.0496	8.66%	3.96%
100		3	0.5609	0.4845	0.6933	0.06647	0.1151	20.52%	5.97%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.7	0.5375	0.5522
1.56		0.5329	0.5567	0.6043
3.1		0.6478	0.725	0.685
6.25		0.722	0.87	0.6644
12.5		0.61	0.678	0.5722
25		0.6057	0.5412	0.4417
50		0.63	0.54	0.5489
100		0.505	0.4845	0.6933

Graphics

3P Log-Logistic EV [Y=A/(1+(X/D)^C)]



Client: MT Palley

W.O.#: 14578

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	Technician
QUR-1	Aug 16/14	50	2.3	2.4	44	50	2.4	48	YML
MHW Control 082214	Aug 22/14	50	3.4	3.4 3.6	64	50	5.0	100	KLP

Notes: _____

Reviewed by: Joh

Date Reviewed: Sep. 23/14

APPENDIX C - *Lemna Minor* Toxicity Test Data

Lemna minor Summary Sheet

Client: Mount Polley
Work Order No.: 14580

Start Date: AUG 23/14
Set up by: AWD

Sample Information:

Sample ID: GUR - 1
Sample Date: AUG 22 /14
Date Received: AUG 23 /14
Sample Volume: 3 X 20L

Test Organism Information:

Culture Date: 081314
Age of culture (Day 0): 10 days
>8X growth in APHA?: Y (24 Fronds)

KCI Reference Toxicant Results:

Reference Toxicant ID: lm 108
Date Initiated: Sept 5/14

7-d No. of Fronds IC50 (95% CL): 3.8 (3.4 - 4.2)

7-d No. Fronds IC50 Reference Toxicant Mean (2 SD Range): 4.2 (3.1 - 5.7) CV (%): 16

	Number of Fronds	Dry Weight
Test Results: IC25 %(v/v) (95% CL)	> 97	> 97
IC50 %(v/v) (95% CL)	> 97	> 97

Reviewed by: JGU

Date reviewed: Sept-23/14

Plant Growth Inhibition Toxicity Test Water Quality Measurements

Client: Mant Polley Setup by: Aug 23/14
 Sample ID: OUR -1 Test Date: Aug 23/14
 Work Order No.: 14580 Test Species: Lemna minor
 Culture Source: OPCC # 490
 Test Culture Age: 10 days > 8X Growth? (Y/N): Yes (24 folds)
 Light Intensity Range: 4000 - 4150 lux Date Measured: August 21/14

Day	0	1	2	3	4	5	6	7
Sheff Temp (°C)	25.85	25.5	25.5	26.0	25.5	26.0	25.5	25.5
Initials	-	-	EMM	JW	JW	EMM	JW	M

Sample Characteristics: Initial Water Quality Adjusted Water Quality

Temperature (°C)	<u>24.0</u>	Aeration?:	<u>20 min</u>	Adjusted Temperature (°C)	<u>24.0</u>
DO (mg/L)	<u>7.9</u>	Nutrients added?:	<u>Yes</u>	Adjusted DO (mg/L)	<u>8.0</u>
pH	<u>7.9</u>			Adjusted pH	<u>7.9</u>
Conductivity (µS)	<u>185</u>			Adjusted Conductivity (µS)	<u>160</u>

Concentration % (v/v)	Temperature (°C)		pH		Conductivity (µS) 0 h
	Day 0	Day 7	Day 0	Day 7	
Control	24.0	25.5	8.3	8.7	189
1.5	↓	↓	8.3	8.9	190
3.0			8.2	9.2	189
6.1			8.2	9.4	190
12.1			8.1	9.5	186
24.3			8.0	9.7	184
48.5			8.0	9.7	180
97			7.9	9.8	160
Initials			-	-	M

Thermometer: Calibrated Thermometer Cond. Meter: 2 pH meter: 4

Sample Description: clear

Comments: _____

Reviewed: Joh Date Reviewed: Sep 23/14

Lemna minor Toxicity Test Data Sheet - 7-d Frond Counts

Client: Mount Polley
 Sample ID: QR - 1
 Work Order #: 14580

Start Date: AUG 23/14
 Termination Date: AUG 30/14
 Test set up by: AWD

Concentration (% v/v)	Rep	No. of fronds		Chlorosis	Necrosis	Yellow	Abnormal size	Gibbosity	Single fronds	Root destruction	Loss of buoyancy	Comments	Initials
		Day 0	Day 7										
Control	A	6	52										AWD
	B	6	50										
	C	6	51										
	D	6	49										
1.5	A	6	50										
	B	6	47										
	C	6	52										
	D	6	53										
3.0	A	6	49										
	B	6	43										
	C	6	50										
	D	6	45										
6.1	A	6	47										
	B	6	43										
	C	6	50										
	D	6	41										
12.1	A	6	48				/						
	B	6	42				/						
	C	6	44				/						
	D	6	47				/						
24.3	A	6	42				/						
	B	6	43				/						
	C	6	43				/						
	D	6	47				/						

Comments: _____

Reviewed by: JGh

Date Reviewed: sep. 23/14

Lemna minor Toxicity Test Data Sheet - 7-d Frond Counts

Client: Mantoloking
 Sample ID: 002-1
 Work Order #: 14580

Start Date: Aug 23/14
 Termination Date: Aug 30/14
 Test set up by: AWD

Concentration % (v/v)	Rep	No. of fronds		Chlorosis	Necrosis	Yellow	Abnormal size	Gibbosity	Single fronds	Root destruction	Loss of buoyancy	Comments	Initials
		Day 0	Day 7										
48.5	A	6	47										AWD
	B	6	40										
	C	6	40										
	D	6	42										
97	A	6	48										AWD
	B	6	46										
	C	6	45										
	D	6	46										
	A												
	B												
	C												
	D												
	A												
	B												
	C												
	D												
	A												
	B												
	C												
	D												

Comments: _____

Reviewed by: JGh

Date Reviewed: Sep. 23/14

7-d Lemna minor Weight Data Sheet

Client: Mount Polley
 Sample ID: QUR - 1
 Work Order #: 14580

Start Date: AUG 23/14
 Termination Date: AUG 30/14

Concentration (%)	Rep	MP Pan No. (PURPLE)	Pan weight (mg)	Pan + plant (mg)	Initials
Control	A	1	1039.42	1043.62	JW/BTK
	B	2	1011.38	1015.68	
	C	3	1005.12	1009.59	
	D	4	1012.98	1017.39	
1.5	A	5	1062.04	1066.53	
	B	6	1060.61	1065.35	
	C	7	1028.12	1031.62	
	D	8	1038.44	1042.88	
3.0	A	9	1001.63	1005.93	
	B	10	999.82	1003.09	
	C	11	1028.44	1033.16	
	D	12	1007.79	1011.62	
6.1	A	13	1030.33	1034.03	
	B	14	1023.33	1027.25	
	C	15	1021.23	1025.58	
	D	16	1017.41	1021.22	
12.1	A	17	1008.57	1012.80	
	B	18	1018.80	1022.23	
	C	19	1013.94	1017.52	
	D	20	1022.10	1026.49	
24.3	A	21	1039.70	1043.90	
	B	22	1032.41	1036.05	
	C	23	1023.56	1027.42	
	D	24	1014.46	1018.36	
48.5	A	25	1050.73	1054.45	
	B	26	1052.76	1056.52	
	C	27	1053.37	1057.70	
	D	28	1035.64	1039.94	✓

Comments: 10 % reweigh : # 2 : 1015.54 # 18 : 1022.15
8 : 1042.95 # 28 : 1039.80

Reviewed by: JGK Date Reviewed: Sept. 23/14

7-d Lemna minor Weight Data Sheet

Client: Mount Polley
 Sample ID: BUR-1
 Work Order #: 14580

Start Date: AUG 23/14
 Termination Date: AUG 30/14

Concentration % (w/v)	Rep	MP Pan No. DATE	Pan weight (mg)	Pan + plant (mg)	Initials
97	A	29	1007.88	1010.61	JW/BTZ
	B	30	1017.49	1022.56	↓
	C	31	1031.75	1036.12	
	D	32	1030.64	1035.15	
A					
	B				
	C				
	D				
	A				
	B				
	C				
	D				
	A				
	B				
	C				
	D				
	A				
	B				
	C				
	D				

Comments: _____

Reviewed by: JGh

Date Reviewed: Sep. 23/14

CETIS Analytical Report

Report Date: 04 Sep-14 10:25 (p 1 of 2)
 Test Code: 14580 | 00-2721-5278

Lemna Growth Inhibition Test

Nautilus Environmental

Analysis ID: 05-3284-5472	Endpoint: Frond Count	CETIS Version: CETISv1.8.7
Analyzed: 04 Sep-14 10:12	Analysis: Nonlinear Regression	Official Results: Yes
Batch ID: 09-7373-0509	Test Type: Lemna Growth	Analyst: Jeslin Wijaya
Start Date: 23 Aug-14	Protocol: EC/EPS 1/RM/37	Diluent: Modified APHA
Ending Date: 30 Aug-14	Species: Lemna minor	Brine:
Duration: 7d 0h	Source: CPCC#490	Age: 10d
Sample ID: 12-3726-8679	Code: 49BF38C7	Client: Mount Polley
Sample Date: 22 Aug-14	Material: Water Sample	Project:
Receive Date: 23 Aug-14 13:35	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h (7.5 °C)	Station: QUR-1	

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Cumulative Log-Normal EV [Y=A*(1- Φ(log(X/D)/C))]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
11	-52.55	112	115.5	0.3254	Yes	2.33	2.621	0.0736	Non-Significant Lack of Fit

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.1325	N/A	3.862	754.5	25.9	NA
IC10	3.413	0.3888	17.77	29.3	5.628	257.2
IC15	30.55	8.471	93.24	3.273	1.073	11.8
IC20	474.4	14.73	1286	0.5794	0.67779	6.788
IC25	777.2	14.19	16290	0.1287	0.006139	7.046
IC40	33570	7.33	23510000	0.002979	0.0000042	13.64
IC50	323400	7.641	1.37E+10	0.0003092	0.0000000	13.09

} > 97% (V/V) JW

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	45.77	1.643	42.55	48.99	27.86	<0.0001	Significant Parameter
C	8.942	4.277	0.5579	17.33	2.09	0.0455	Significant Parameter
D	323400	1390000	-2401000	3048000	0.2327	0.8177	Non-Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	183.6942	183.6942	1	16.96	0.0003	Significant
Lack of Fit	102.6808	20.53616	5	2.33	0.0736	Non-Significant
Pure Error	211.5	8.8125	24			
Residual	314.1808	10.83382	29			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	3.704	14.07	0.8132	Equal Variances
	Mod Levene Equality of Variance	1.024	2.423	0.4404	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9609	0.9338	0.2902	Normal Distribution
	Anderson-Darling A2 Normality	0.5868	2.492	0.1299	Normal Distribution

CETIS Analytical Report

Report Date: 04 Sep-14 10:25 (p 2 of 2)
 Test Code: 14580 | 00-2721-5278

Lemna Growth Inhibition Test

Nautilus Environmental

Analysis ID: 05-3284-5472 Endpoint: Frond Count
 Analyzed: 04 Sep-14 10:12 Analysis: Nonlinear Regression

CETIS Version: CETISv1.8.7
 Official Results: Yes

Frond Count Summary

Calculated Variate

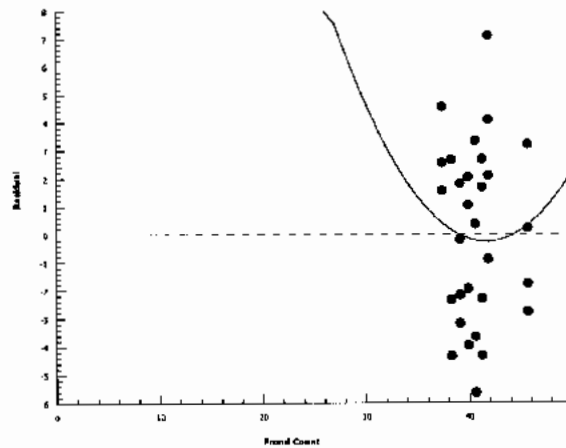
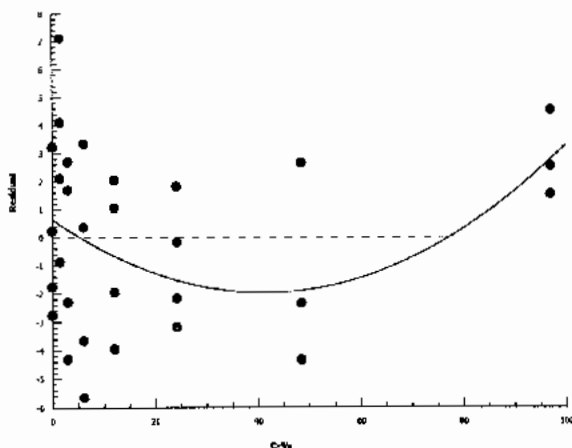
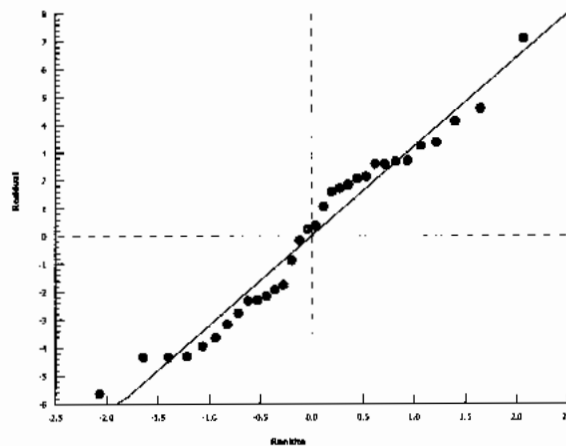
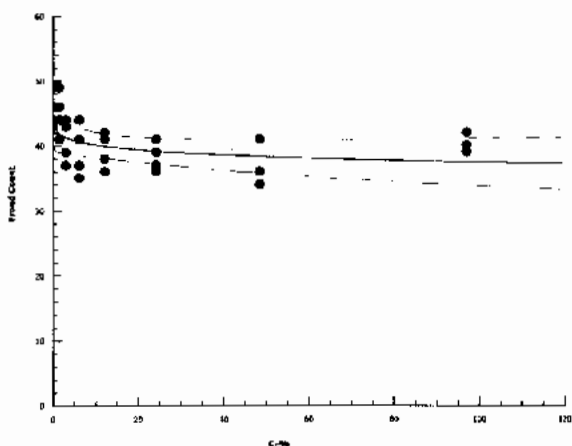
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	45.5	43	49	1.323	2.646	5.82%	0.0%
1.5		4	45	41	49	1.683	3.367	7.48%	1.1%
3		4	40.75	37	44	1.652	3.304	8.11%	10.44%
6.1		4	39.25	35	44	2.016	4.031	10.27%	13.74%
12.1		4	39.25	36	42	1.377	2.754	7.02%	13.74%
24.2		4	38.25	36	41	1.109	2.217	5.8%	15.93%
48.5		4	36.25	34	41	1.652	3.304	9.12%	20.33%
97		4	40.25	39	42	0.6292	1.258	3.13%	11.54%

Frond Count Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	46	44	49	43
1.5		44	41	46	49
3		43	37	44	39
6.1		41	37	44	35
12.1		42	36	38	41
24.2		36	39	37	41
48.5		41	34	34	36
97		42	40	39	40

Graphics

3P Cumulative Log-Normal EV [Y=A*(1- Φ(log(X/D)/C))]



CETIS Analytical Report

Report Date: 04 Sep-14 10:12 (p 1 of 2)
 Test Code: 14580 | 00-2721-5278

Lemna Growth Inhibition Test

Nautilus Environmental

Analysis ID: 07-5770-2809	Endpoint: Total Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 04 Sep-14 10:12	Analysis: Nonlinear Regression	Official Results: Yes
Batch ID: 09-7373-0509	Test Type: Lemna Growth	Analyst: Jeslin Wijaya
Start Date: 23 Aug-14	Protocol: EC/EPS 1/RM/37	Diluent: Modified APHA
Ending Date: 30 Aug-14	Species: Lemna minor	Brine:
Duration: 7d 0h	Source: CPCC#490	Age: 10d
Sample ID: 12-3726-8679	Code: 49BF38C7	Client: Mount Polley
Sample Date: 22 Aug-14	Material: Water Sample	Project:
Receive Date: 23 Aug-14 13:35	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h (7.5 °C)	Station: QUR-1	

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Log-Gompertz EV [Y=A*exp(log(0.5)(X/D)^C)]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
17	7.117	-7.378	-3.837		Yes	0.7424	2.621	0.5994	Non-Significant Lack of Fit

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.004768	N/A	16620	20980	0.006017	NA
IC10	12.15	0.01668	849.7	8.228	0.1177	5996
IC15	1367	N/A	89650000	0.07317	0.0000011	NA
IC20	43240	N/A	1.04E+12	0.002313	0.0000000	NA
IC25	688800	N/A	N/A	0.0001452	NA	NA
IC40	35910000	N/A	N/A	0.0000002	NA	NA
IC50	99890000	N/A	N/A	0.0000000	NA	NA

} > 97% (N/N) JW

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	4.343	0.255	3.843	4.843	17.03	<0.0001	Significant Parameter
C	0.09177	0.1769	-0.2549	0.4384	0.5189	0.6078	Non-Significant Parameter
D	9.99E+09	3.77E+11	-7.3E+11	7.5E+11	0.02647	0.9791	Non-Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	0	0	1	0	1.0000	Non-Significant
Lack of Fit	1.010699	0.20214	5	0.7424	0.5994	Non-Significant
Pure Error	6.534433	0.272268	24			
Residual	7.545133	0.260177	29			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	13.8	14.07	0.0549	Equal Variances
	Mod Levene Equality of Variance	1.059	2.423	0.4186	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9808	0.9338	0.8229	Normal Distribution
	Anderson-Darling A2 Normality	0.354	2.492	0.4670	Normal Distribution

CETIS Analytical Report

Report Date: 04 Sep-14 10:12 (p 2 of 2)
 Test Code: 14580 | 00-2721-5278

Lemna Growth Inhibition Test

Nautilus Environmental

Analysis ID: 07-5770-2809
 Analyzed: 04 Sep-14 10:12

Endpoint: Total Dry Weight-mg
 Analysis: Nonlinear Regression

CETIS Version: CETISv1.8.7
 Official Results: Yes

Total Dry Weight-mg Summary

Calculated Variate

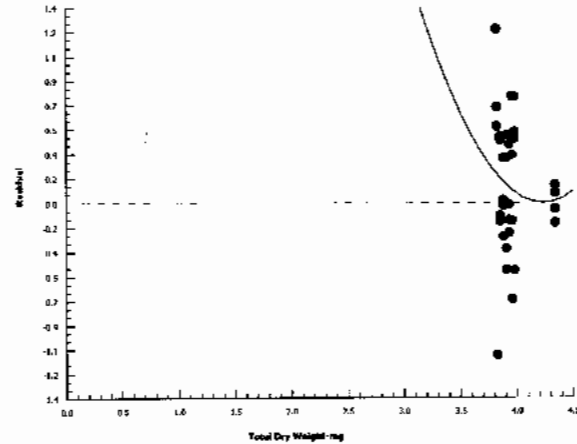
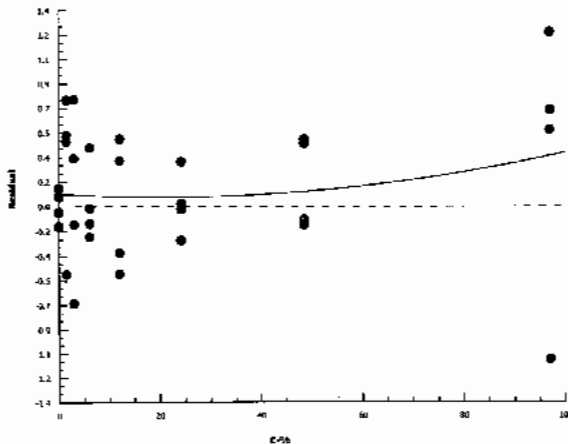
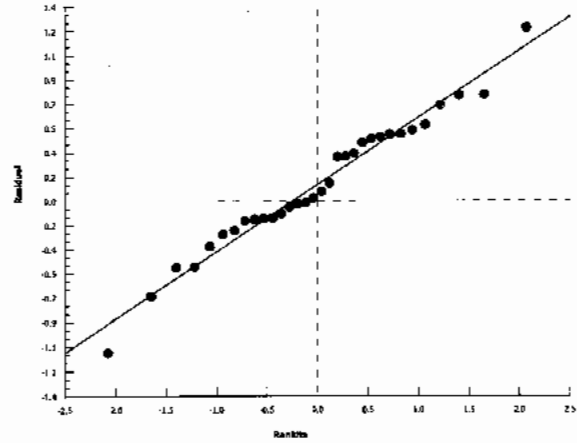
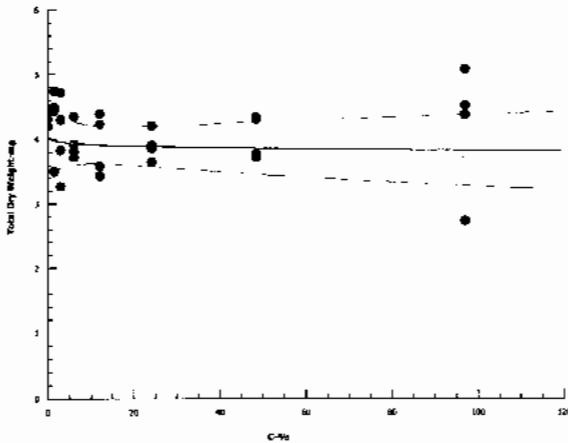
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	4.345	4.2	4.47	0.05981	0.1196	2.75%	0.0%
1.5		4	4.293	3.5	4.74	0.2722	0.5444	12.68%	1.21%
3		4	4.03	3.27	4.72	0.3118	0.6236	15.47%	7.25%
6.1		4	3.95	3.72	4.35	0.1394	0.2789	7.06%	9.09%
12.1		4	3.908	3.43	4.39	0.2367	0.4733	12.11%	10.07%
24.2		4	3.9	3.64	4.2	0.1152	0.2304	5.91%	10.24%
48.5		4	4.027	3.72	4.33	0.1663	0.3326	8.26%	7.31%
97		4	4.17	2.73	5.07	0.5033	1.007	24.14%	4.03%

Total Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	4.2	4.3	4.47	4.41
1.5		4.49	4.74	3.5	4.44
3		4.3	3.27	4.72	3.83
6.1		3.72	3.92	4.35	3.81
12.1		4.23	3.43	3.58	4.39
24.2		4.2	3.64	3.86	3.9
48.5		3.72	3.76	4.33	4.3
97		2.73	5.07	4.37	4.51

Graphics

3P Log-Gompertz EV [Y=A*exp(log(0.5)(X/D)^C)]



APPENDIX D - *Pseudokirchneriella subcapitata* Toxicity Test Data

Pseudokirchneriella subcapitata Summary Sheet

Client: Mount Polley
Work Order No.: 14579

Start Date: Aug 25, 2014
Set up by: EMM

Sample Information:

Sample ID: QUR-1
Sample Date: Aug 22, 2014
Date Received: Aug 23, 2014
Sample Volume: 3x 500 mL

Test Organism Information:

Culture Date: Aug 22, 2014
Age of culture (Day 0): 3 d

Zinc Reference Toxicant Results:

Reference Toxicant ID: Sc117
Stock Solution ID: 14Zn01
Date Initiated: Aug 14, 2014
72-h IC50 (95% CL): 28.9 (21.2 - 33.7) µg/L Zn

72-h IC50 Reference Toxicant Mean and Range: 25.1 (14.8 - 42.7) µg/L Zn CV (%): 30

Test Results:

	Algal Growth
IC25 %(v/v) (95% CL)	<u>795.2</u>
IC50 %(v/v) (95% CL)	<u>795.2</u>

Reviewed by: JOK

Date reviewed: Sep. 23/14

72-h Algal Growth Inhibition Toxicity Test Water Quality Measurements

Client: Mount Palley Setup by: EMM
 Sample ID: QUR-1 Test Date/Time: Aug 25/14 @ 1430
 Work Order No.: 14579 Test Species: Pseudokirchneriella subcapitata

Culture Date: Aug 22/14 Age of Culture: 3d Culture Health: Good
 Culture Count: 1239 2 207 Average: 223 Culture Cell Density (c1): 223 x 10⁴ cells/mL

$$v1 = \frac{220,000 \text{ cells/mL} \times 50 \text{ mL}}{(c1) \quad 223 \times 10^4 \text{ cells/mL}} = 5 \text{ mL}$$

Time Zero Counts: 1 18 2 22 Average: 20

No. of Cells/mL: 20 x 10⁴ Initial Density: # cells/mL ÷ 220 µL x 10 µL = 9091 cell/mL

Concentration %(v/v)	Water Quality Measurements					Microplates rotated 2X per day?			
	pH	Temp (°C)				0 h	24 h	48 h	72 h
		0 h	0 h	24 h	48 h				
Control	6.8	25.0	25.5	25.5	26.0	✓	✓	✓	✓
1.5	6.8	25.0	↓	↓	↓	✓	✓	✓	✓
3.0	7.0	25.0	↓	↓	↓	✓	✓	✓	✓
6.0	7.1	25.0	↓	↓	↓	✓	✓	✓	✓
11.9	7.2	25.0	↓	↓	↓	✓	✓	✓	✓
23.8	7.1	25.0	↓	↓	↓	✓	✓	✓	✓
47.6	7.6	25.5	↓	↓	↓	✓	✓	✓	✓
95.2	7.6	25.5	↓	↓	↓	✓	✓	✓	✓
Initials	EMM	EMM	EMM	EMM	EMM	EMM	EMM	EMM	EMM

Initial control pH: Well 1: 6.8 Well 2: 6.8

Final control pH: Well 1: 7.0 Well 2: 7.0

Light intensity (lux): 4100 Date measured: Aug 25/14

Sample Description: clear

Comments: _____

Reviewed: JOU Date reviewed: Sep. 23/14

Pseudokirchneriella subcapitata Toxicity Test Data Sheet
72-h Algal Cell Counts

Client: Mount Palley Start Date/Time: Aug 28/14 @ 1430 h
 Work Order #: QUR-1 Termination Date: Aug 28/14 @ 1430 h
 Sample ID: 14579 Test set up by: EMM

Concentration	Rep	Count 1	Count 2	Count 3	Count 4	Comments	Initials
Control	A	41					EMM
	B	48					
	C	37					
	D	45					
	E	46					
	F	43					
	G	44					
	H	38					
1.5	A	60					
	B	61					
	C	63					
	D	52					
3.0	A	74					
	B	67					
	C	76					
	D	75					
6.0	A	67					
	B	76					
	C	69					
	D	74					
11.9	A	74					
	B	81					
	C	86					
	D	91					
23.8	A	123					
	B	110					
	C	131					
	D	119					
47.6	A	144					
	B	126					
	C	150					
	D	139					
95.2	A	156					A
	B	104					
	C	183					
	D	173					

Comments: _____

Reviewed by: JGh Date Reviewed: Sep. 23/14

***Pseudokirchneriella subcapitata* Algal Counts**

Client: Mt. Polley Start Date/Time: 25-Aug-14 1430
 WO#: 14579 Termination Date: 28-Aug-14 1430
 Sample ID: QUR-1

Initial Cell Density: 9091 cell/mL 200000

Concentration % v/v	Rep	Count 1 (x 10 ⁴)	Count 2 (x 10 ⁴)	Count 3 (x 10 ⁴)	Count 4 (x 10 ⁴)	Mean (x 10 ⁴)	Cell Yield		9090.909
							(x 10 ⁴)	cell/mL	
Control	A	41				41	40.1	mean	41.8
	B	48				48	47.1	SD	3.84522
	C	37				37	36.1	CV	9.190096
	D	45				45	44.1		
	E	46				46	45.1		
	F	43				43	42.1		
	G	44				44	43.1		
	H	38				38	37.1		
1.5	A	60				60	59.1		
	B	61				61	60.1		
	C	63				63	62.1		
	D	52				52	51.1		
3	A	74				74	73.1		
	B	67				67	66.1		
	C	76				76	75.1		
	D	75				75	74.1		
6	A	67				67	66.1		
	B	76				76	75.1		
	C	69				69	68.1		
	D	74				74	73.1		
11.9	A	74				74	73.1		
	B	81				81	80.1		
	C	86				86	85.1		
	D	91				91	90.1		
23.8	A	123				123	122.1		
	B	110				110	109.1		
	C	131				131	130.1		
	D	119				119	118.1		
47.6	A	144				144	143.1		
	B	126				126	125.1		
	C	150				150	149.1		
	D	139				139	138.1		
95.2	A	156				156	155.1		
	B	194				194	193.1		
	C	183				183	182.1		
	D	173				173	172.1		

JGU
 Sep. 23/14

CETIS Analytical Report

Report Date: 04 Sep-14 08:26 (p 1 of 2)
 Test Code: 14579 | 05-5848-5172

EC Alga Growth Inhibition Test			Nautifus Environmental		
Analysis ID: 04-2065-7413	Endpoint: Cell Yield	CETIS Version: CETISv1.8.7	Analyst: Emma Marus		
Analyzed: 04 Sep-14 8:25	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes	Diluent: Deionized Water + nutrients		
Batch ID: 03-6789-1330	Test Type: Cell Growth	Brine:	Age: 3d		
Start Date: 25 Aug-14 14:30	Protocol: EC/EPS 1/RM/25	Species: Pseudokirchneriella subcapitata	Source: In-House Culture		
Ending Date: 28 Aug-14 14:30	Duration: 72h	Code: 49BF38C7	Client: Mount Polley		
Sample ID: 12-3726-8679	Material: Water Sample	Project:			
Sample Date: 22 Aug-14	Source: Mount Polley (MT POLLEY)				
Receive Date: 23 Aug-14 13:35	Station: QUR-1				
Sample Age: 86h (7.5 °C)					

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1829897	200	Yes	Two-Point Interpolation

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>95.2	N/A	N/A	<1.05	NA	NA
IC10	>95.2	N/A	N/A	<1.05	NA	NA
IC15	>95.2	N/A	N/A	<1.05	NA	NA
IC20	>95.2	N/A	N/A	<1.05	NA	NA
IC25	>95.2	N/A	N/A	<1.05	NA	NA
IC40	>95.2	N/A	N/A	<1.05	NA	NA
IC50	>95.2	N/A	N/A	<1.05	NA	NA

Cell Yield Summary			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	8	41.75	36	47	1.359	3.845	9.21%	0.0%
1.5		4	58	51	62	2.415	4.83	8.33%	-38.92%
3		4	72	66	75	2.041	4.082	5.67%	-72.46%
6		4	70.5	66	75	2.102	4.203	5.96%	-68.86%
11.9		4	82	73	90	3.629	7.257	8.85%	-96.41%
23.8		4	119.8	109	130	4.366	8.732	7.29%	-186.8%
47.6		4	138.8	125	149	5.105	10.21	7.36%	-232.3%
95.2		4	175.5	155	193	8.067	16.13	9.19%	-320.4%

Cell Yield Detail									
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	40	47	36	44	45	42	43	37
1.5		59	60	62	51				
3		73	66	75	74				
6		66	75	68	73				
11.9		73	80	85	90				
23.8		122	109	130	118				
47.6		143	125	149	138				
95.2		155	193	182	172				

CETIS Analytical Report

Report Date: 04 Sep-14 08:26 (p 2 of 2)
Test Code: 14579 | 05-5848-5172

EC Alga Growth Inhibition Test

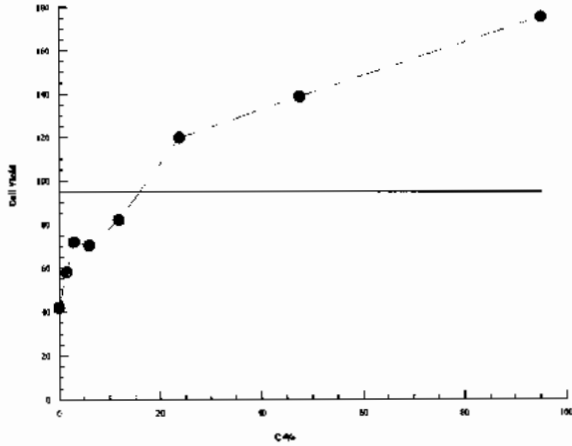
Nautilus Environmental

Analysis ID: 04-2065-7413
Analyzed: 04 Sep-14 8:25

Endpoint: Cell Yield
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 04 Sep-14 08:26 (p 1 of 2)
 Test Code: 14579 | 05-5848-5172

EC Alga Growth Inhibition Test

Nautilus Environmental

Analysis ID: 16-1112-7563	Endpoint: Cell Yield	CETIS Version: CETISv1.8.7
Analyzed: 04 Sep-14 8:26	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 03-6789-1330	Test Type: Cell Growth	Analyst: Emma Marus
Start Date: 25 Aug-14 14:30	Protocol: EC/EPS 1/RM/25	Diluent: Deionized Water + nutrients
Ending Date: 28 Aug-14 14:30	Species: Pseudokirchneriella subcapitata	Brine:
Duration: 72h	Source: In-House Culture	Age: 3d
Sample ID: 12-3726-8679	Code: 49BF38C7	Client: Mount Polley
Sample Date: 22 Aug-14	Material: Water Sample	Project:
Receive Date: 23 Aug-14 13:35	Source: Mount Polley (MT POLLEY)	
Sample Age: 86h (7.5 °C)	Station: QUR-1	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C < T	NA	NA	29.4%	<1.5	1.5	NA	>66.67

Dunnett Multiple Comparison Test

Control	vs C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	1.5*	3.35	2.526	12.25	10	0.0074	CDF	Significant Effect
	3*	6.236	2.526	12.25	10	<0.0001	CDF	Significant Effect
	6*	5.927	2.526	12.25	10	<0.0001	CDF	Significant Effect
	11.9*	8.297	2.526	12.25	10	<0.0001	CDF	Significant Effect
	23.8*	16.08	2.526	12.25	10	<0.0001	CDF	Significant Effect
	47.6*	20	2.526	12.25	10	<0.0001	CDF	Significant Effect
	95.2*	27.57	2.526	12.25	10	<0.0001	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			0.7195	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	68036.55	9719.508	7	154.9	<0.0001	Significant Effect
Error	1757	62.75	28			
Total	69793.55		35			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	13.45	18.48	0.0618	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9662	0.9166	0.3314	Normal Distribution

Cell Yield Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	8	41.75	38.54	44.96	42.5	36	47	1.359	9.21%	0.0%
1.5		4	58	50.31	65.69	59.5	51	62	2.415	8.33%	-38.92%
3		4	72	65.5	78.5	73.5	66	75	2.041	5.67%	-72.46%
6		4	70.5	63.81	77.19	70.5	66	75	2.102	5.96%	-68.86%
11.9		4	82	70.45	93.55	82.5	73	90	3.629	8.85%	-96.41%
23.8		4	119.8	105.9	133.6	120	109	130	4.366	7.29%	-186.8%
47.6		4	138.8	122.5	155	140.5	125	149	5.105	7.36%	-232.3%
95.2		4	175.5	149.8	201.2	177	155	193	8.067	9.19%	-320.4%

CETIS Analytical Report

Report Date: 04 Sep-14 08:26 (p 2 of 2)
 Test Code: 14579 | 05-5848-5172

EC Alga Growth Inhibition Test

Nautilus Environmental

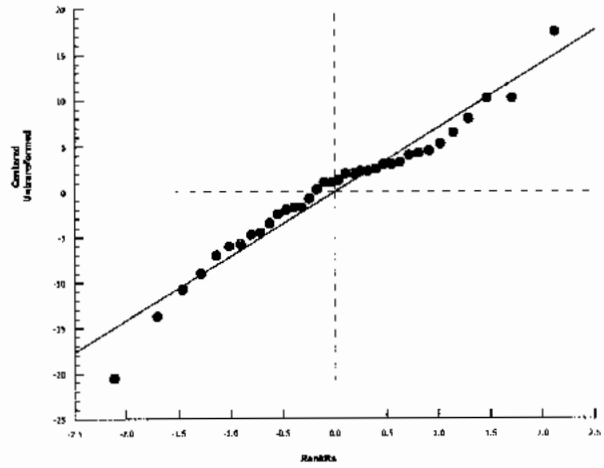
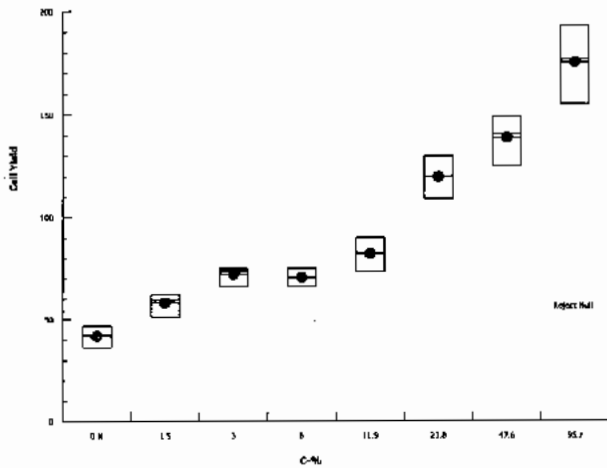
Analysis ID: 16-1112-7563 Endpoint: Cell Yield
 Analyzed: 04 Sep-14 8:26 Analysis: Parametric-Control vs Treatments

CETIS Version: CETISv1.8.7
 Official Results: Yes

Cell Yield Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	40	47	36	44	45	42	43	37
1.5		59	60	62	51				
3		73	66	75	74				
6		66	75	68	73				
11.9		73	80	85	90				
23.8		122	109	130	118				
47.6		143	125	149	138				
95.2		155	193	182	172				

Graphics



APPENDIX E - Chain of Custody Form

Nautilus Environmental

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

①

Chain of Custody (electronic)

4 _____ Page 1 of 1

W0
 14575
 14576
 14577
 14578
 14579
 14580

Sample Collection By: Sky Freeman						ANALYSES REQUIRED										Receipt Temperature (°C)					
Report to:		Invoice to:				96h RBT L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50	48 h Daphnia magna L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50	7 Day Ceriodaphnia dubia L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50	7 day flathead Minnow L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50	72h algal growth L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50	L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50	L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50	L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50	L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50	L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50		L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50 L. 0.50				
Company	Mount Polley Mining Corporation	Mount Polley Mining Corporation																			
Address	Box 12	Box 12																			
City/Prov/Postal Code	Likely BC V0L 1N0	Likely BC V0L 1N0																			
Contact	Colleen Hughes	Deb McMillan																			
Phone	(250) 790-2617	(250) 790-2617																			
Email	chughes@mountpolley.com	dmcmillan@minnow.ca																			
chughes@mountpolley.com		dmcmillan@minnow.ca																			
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	96h RBT	48 h Daphnia magna	7 Day Ceriodaphnia dubia	7 day flathead Minnow	72h algal growth	L. 0.50	L. 0.50	L. 0.50	L. 0.50		L. 0.50	L. 0.50	L. 0.50	L. 0.50	L. 0.50
1	QUR-1	8/22/2014		water	60L	3		X	X	X	X	X	X	X	X	X	X	X	X	X	X
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
PROJECT INFORMATION			SAMPLE RECEIPT			RELIQUISHED BY (CLIENT)			RELIQUISHED BY (COURIER)												
Client: Mount Polley Mining Corporation			Total # Containers: 3			Signature:			Signature:												
P.O. No.:			Good Condition? <i>yes</i>			Sky Freeman			Print:												
Shipped Via: Greyhound			Matches Schedule? <i>yes</i>			Company: MPMC			Company:												
						Time/Date: 22/08/2014 15:30:00			Time/Date:												
SPECIAL INSTRUCTIONS/COMMENTS:						RECEIVED BY (COURIER)			RECEIVED BY (LABORATORY)												
						Signature:			Signature: <i>As</i>												
						Print:			Print: <i>As</i>												
						Company:			Company: <i>①</i>												
						Time/Date:			Time/Date: <i>1335 Aug 27/14</i>												

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 13

Toxicity testing on a sample identified as HAD-1-140827: Sample collected August 27, 2014 (Report date October 21, 2014; Revised December 4, 2014)



Nautilus Environmental

**Toxicity testing on a sample identified as
HAD-1-140827**

Sample collected August 27, 2014

Final Report

Report date: October 21, 2014, revised December 4, 2014

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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LIST OF APPENDICES

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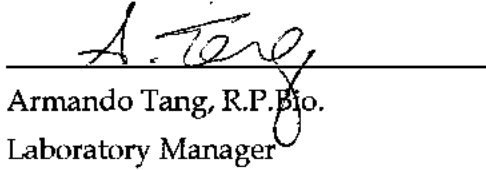
APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

APPENDIX C - Chain of Custody Form

SIGNATURE PAGE

A handwritten signature in cursive script, appearing to read 'K. Pearcy', written over a horizontal line.

Krysta Pearcy, B.Sc.
Laboratory Biologist

A handwritten signature in cursive script, appearing to read 'A. Tang', written over a horizontal line.

Armando Tang, R.P. Bio.
Laboratory Manager

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted toxicity tests for Mount Polley Mining Corporation on a sample identified as HAD-1-140827. The sample was collected on August 27, 2014 and delivered to the laboratory in Burnaby, BC on August 28, 2014. The sample was transported in two 20-L plastic carboys and coolers. The sample was received at a temperature of 14.1°C and was stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing. The following sub-lethal toxicity tests were performed on the sample:

- *Ceriodaphnia dubia* survival and reproduction
- 7-d fathead minnow (*Pimephales promelas*) survival and growth

This report describes the results of these toxicity tests. Copies of laboratory data sheets and printouts of statistical analyses for each test are provided in Appendices A and B. The chain-of-custody form is provided in Appendix C. This report was revised from an earlier version to incorporate data for dry weight of fathead minnows, in addition to biomass.

2.0 METHODS

Methods for the toxicity tests are summarized in Tables 1 and 2. Testing was conducted according to procedures described by the Environment Canada protocols (2007 and 2011). Statistical analyses for all tests were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house culture
Test organism age	<24 h old neonates produced within 12 h
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20 mL test tube
Test volume	15 mL
Test replicates	10 test replicates per treatment
Number of organisms	1 per replicate
Control water	20% Perrier water
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	<i>Pseudokirchneriella subcapitata</i> and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada, (2007) EPS 1/RM/21
Statistical software	CETIS (2013)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods
Reference toxicant	Sodium chloride

Table 2. Summary of test conditions: fathead minnow (*Pimephales promelas*) survival and growth test.

Test organism	<i>Pimephales promelas</i>
Test organism source	Aquatic BioSystems, Fort Collins, CO
Test organism age	<24 hours
Test type	Static renewal
Test duration	7 days
Test vessel	375-mL glass containers
Test volume	250 mL
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control water	Moderately-hard water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	Twice a day with newly hatched brine shrimp (<i>Artemia nauplii</i>)
Light intensity	100 – 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test protocol	Environment Canada (2011), EPS 1/RM/22
Statistical software	CETIS (2013)
Test endpoint	Survival and biomass
Test acceptability criteria for controls	≥80% survival, ≥250 µg mean dry weight
Reference toxicant	Sodium Chloride

3.0 RESULTS

There were no adverse effects observed on survival or reproduction of *C. dubia* (Table 3). The LC50, IC25 and IC50 were >100%. Adverse effects were observed on fathead minnow and biomass (Table 4); the IC25 and IC50 were 71.6 and >100%, respectively.

Table 3. Results: *Ceriodaphnia dubia* survival and reproduction test.

Concentration (% v/v)	Survival (%)	Reproduction (mean ± SD)
Control	90	16.1 ± 7.5
1.56	100	21.1 ± 2.3
3.12	100	22.7 ± 2.1
6.25	90	20.4 ± 7.7
12.5	100	23.7 ± 3.9
25	100	24.0 ± 2.9
50	70	20.3 ± 11.7
100	90	21.6 ± 10.9
Test endpoint (% v/v)		
LC50	>100	--
IC25	--	>100
IC50	--	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

Table 4. Results: fathead minnow (*Pimephales promelas*) survival and growth test.

Concentration (% v/v)	Mean ± SD		
	Survival (%)	Biomass (µg)	Dry Weight (µg)
Control	96.7 ± 5.8	788.3 ± 118.6	813.4 ± 87.0
1.56	86.7 ± 15.3	662.0 ± 29.6	778.2 ± 123.6
3.1	100.0 ± 0.0	792.0 ± 21.0	792.0 ± 21.0
6.25	90.0 ± 10.0	818.0 ± 76.6	910.8 ± 44.5
12.5	83.3 ± 11.6	719.0 ± 66.2	867.7 ± 61.5
25	100.0 ± 0.0	792.0 ± 26.6	792.0 ± 26.6
50	66.7 ± 15.3	571.0 ± 138.4	854.4 ± 19.5
100	60.0 ± 10.0	521.0 ± 55.2	876.6 ± 93.0
Test endpoint (% v/v)			
LC50	>100	--	--
IC25 (95% CL)	--	71.6 (47.0 - 98.8)	>100
IC50	--	>100	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits.

4.0 QA/QC

The health history of the test organisms used in the exposures was acceptable and met the requirements of the Environment Canada protocols. The tests met all control acceptability criteria and water quality parameters remained within ranges specified in the protocols throughout the tests. There were no deviations from the test methodologies. Uncertainty associated with these tests is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

Results of the reference toxicant tests conducted during the testing program are summarized in Table 5. Results for these tests fell within the range for organism performance of mean and two standard deviation range, based on historical results obtained by the laboratory with these tests. Thus, the sensitivity of the organisms used in these tests was appropriate.

Table 5. Reference toxicant results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>C. dubia</i>	Survival (LC50): 1.8 g/L NaCl	1.8 (1.2 - 2.7)	22	August 26 , 2014
	Reproduction (IC50): 1.3 g/L NaCl	1.4 (1.0 - 1.9)	19	
<i>P. promelas</i>	Survival (LC50): 4.1 g/L NaCl	4.5 (3.4 - 5.9)	14	August 28, 2014
	Biomass (IC50): 3.4 g/L NaCl	4.0 (2.9 - 5.5)	17	

SD = Standard Deviation, CV = Coefficient of Variation, IC = Inhibition Concentration, LC = Lethal Concentration.

5.0 REFERENCES

Environment Canada. 2007. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. Report EPS 1/RM/21, Second Edition, February 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 74 pp.

Environment Canada. 2011. Biological test method: test of larval growth and survival using fathead minnows. Environmental Protection Series, Report EPS 1/RM/22. February 2011,. Environment Canada, Environmental Protection, Conservation and Protection, Ottawa, ON. 73 pp.

Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.4.29 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: Mount Polley
 Work Order No.: 14597

Start Date/Time: Aug 28/14 @ 1320h
 Set up by: EMM

Sample Information:

Sample ID: HAO-1-140827
 Sample Date: Aug 27/14
 Date Received: Aug 28/14
 Sample Volume: 2 x 20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 081514A
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 34
 Mortality (%) in previous 7 d: 5
 Individual female # used ≥ 8 young on test day: 11, 12, 13, 17, 19, 20

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd117
 Stock Solution ID: 14Na02
 Date Initiated: Aug 26/14

7-d LC50 (95% CL): 1.8 (1.5-2.2) g/L NaCL
 7-d IC50 (95% CL): 1.3 (1.1-1.5) g/L NaCL

7-d LC50 Reference Toxicant Mean and Historical Range: 1.8 (1.2-2.7) g/L NaCL CV (%): 23
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-1.9) g/L NaCL CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		7100
IC50 % (v/v) (95% CL)		7100

Reviewed by: JGh

Date reviewed: Oct 9/14

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: MT Polley
 Sample ID: HAD-1-140827
 Work Order #: 14597

Start Date & Time: Aug 28/14 @ 1320h
 Stop Date & Time: Sept 4/14 @ 1210h
 Test Species: Ceriodaphnia dubia

Concentration <i>Control</i>	Days															
	0		1		2		3		4		5		6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.0	7.6	7.9	7.3	7.9	7.4	7.8	7.4	8.0	7.4	8.0	7.1	8.0	7.1	8.0	7.2
pH	8.1	7.9	8.0	7.7	8.1	8.0	8.1	7.8	8.0	7.7	8.0	7.7	8.1	7.9	8.1	7.9
Cond. (µS/cm)	215	218		218		214		213		213		215		217		217
Initials	EMM	EMM		YML		JW		EMM		EMM		EMM		EMM		EMM

Concentration <i>(VIV)</i> 1.5%	Days															
	0		1		2		3		4		5		6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.5	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.1	7.6	8.0	7.3	7.9	7.5	7.7	7.4	8.0	7.4	8.1	6.9	8.1	7.1	8.1	7.1
pH	7.9	7.9	7.9	7.7	8.1	8.1	8.1	7.8	8.1	7.7	8.1	7.7	8.1	7.7	8.1	7.7
Cond. (µS/cm)	215	218		218		214		216		213		214		218		218
Initials	EMM	EMM		YML		JW		EMM		EMM		EMM		EMM		EMM

Concentration <i>(VIV)</i> 12.5%	Days															
	0		1		2		3		4		5		6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.5	25.0	24.0	25.0	24.0	25.0	24.5	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.0	7.4	7.9	7.4	8.1	7.5	7.7	7.4	8.0	7.4	8.1	7.0	7.9	7.1	8.1	7.1
pH	8.0	7.9	8.0	7.8	8.1	8.1	8.3	7.9	8.2	7.8	8.2	7.7	8.1	7.8	8.1	7.8
Cond. (µS/cm)	213	215		217		213		214		212		213		216		216
Initials	EMM	EMM		YML		JW		EMM		EMM		EMM		EMM		EMM

Concentration <i>(VIV)</i> 100%	Days															
	0		1		2		3		4		5		6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.5	25.0	24.0	25.0	24.0	25.0	24.5	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.1	7.6	7.6	7.5	8.0	7.4	8.2	7.5	8.1	7.6	7.9	7.0	7.8	7.1	8.1	7.1
pH	8.2	7.9	8.3	7.9	8.4	8.0	8.5	7.9	8.3	7.7	8.4	7.7	8.3	7.7	8.3	7.7
Cond. (µS/cm)	203	213		208		210		210		210		212		215		215
Initials	EMM	EMM		YML		JW		EMM		EMM		EMM		EMM		EMM

	Control	100% (VIV)
Hardness*	100	102
Alkalinity*	2880	72

* mg/L as CaCO₃

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5

Sample Description: wp clear

Analysts: AWD, EMM, JW

Reviewed by: JOB

Date reviewed: Oct. 8/14

Comments: Broodboard Used: 081514A (t# 11, 12, 13, 17, 19, 20)

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mount Polley
 Sample ID: HAD-1 (Aug. 27 sampled)
 Work Order: 14597

Start Date & Time: Aug 28/14 @ 13:0h
 Stop Date & Time: Sept 4/14 @ 12:0h
 Set up by: Emm

%(v/v)

Days	Concentration: <u>Control</u>											Concentration: <u>1.56</u>											Concentration: <u>3.12</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW
4	3	4	7	3	3	4	3	✓	3	3	we	4	3	3	3	3	2	4	2	3	4	we	4	3	3	3	✓	4	3	3	2	7	we
5	8	6	✓	✓	7	6	6	6	6	✓	we	7	9	6	8	8	10	9	7	6	9	we	9	7	9	8	8	9	8	8	10	10	we
6	✓	✓	✓	✓	9	✓	✓	✓	9	3	we	12	✓	✓	✓	✓	✓	✓	✓	✓	✓	we	✓	✓	✓	✓	✓	12	✓	✓	✓	✓	we
7	10	8	✓	13	11	7	10	✓	10	✓	Emm	✓	11	8	11	10	12	9	9	10	9	Emm	14	11	11	10	✓	12	10	12	11	9	Emm
8																																	
Total	21	19	5	25	21	17	19	15	19	6	Emm	23	23	17	22	21	24	22	18	19	22	Emm	27	21	23	21	20	25	21	23	23	23	Emm

Days	Concentration: <u>6.25</u>											Concentration: <u>12.5</u>											Concentration: <u>25</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW
4	3	4	✓	4	✓	3	3	3	✓	4	we	4	2	3	4	4	3	✓	3	3	4	we	3	4	4	4	3	4	4	3	4	4	we
5	7	10	7	7	7	9	8	7	✓	10	we	10	8	6	10	8	9	5	10	✓	8	we	11	7	✓	9	✓	✓	✓	8	8	10	we
6	✓	✓	12	✓	✓	✓	✓	✓	✓	✓	we	✓	✓	✓	✓	✓	✓	10	✓	10	✓	we	✓	✓	4	✓	10	10	10	✓	✓	✓	we
7	11	12	✓	11	15	13	9	11	✓	14	Emm	14	14	11	13	10	15	✓	11	13	12	Emm	10	10	9	12	13	12	11	14	13	12	Emm
8																																	
Total	21	27	19	22	22	25	20	21	0	28	Emm	28	24	20	27	22	27	15	24	26	24	Emm	24	21	17	25	26	26	25	25	25	26	Emm

Days	Concentration: <u>50</u>											Concentration: <u>100</u>											Concentration:											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm												
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW												
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW												
4	3	4	✓	4	x	2	3	3	2	✓	we	5	4	3	4	4	3	3	✓	3	✓	we												
5	9	10	11	10	✓	11	✓	12	10	✓	we	10	10	✓	12	x	11	10	✓	13	✓	we												
6	✓	x	✓	✓	✓	12	✓	✓	✓	✓	we	✓	✓	8	✓	✓	✓	10	✓	✓	✓	we												
7	12	✓	11	15	✓	15	14	16	14	✓	Emm	12	13	14	14	✓	15	11	9	15	✓	Emm												
8																																		
Total	24	14	x	22	29	0	28	29	31	26	0	Emm	27	27	25	30	4	29	24	19	31	0	Emm											

Notes: X = mortality.

Sample Description: clear

Comments: Total # Young only based on the first 3 broods. Fourth and subsequent broods not included in total count.

Reviewed by: JG

Date reviewed: Oct. 8/14

CETIS Analytical Report

Report Date: 12 Sep-14 10:35 (p 1 of 2)
 Test Code: 14597 | 03-6751-4154

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 11-1169-7051	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 12 Sep-14 10:34	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 08-8621-5373	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 28 Aug-14 13:20	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 04 Sep-14 12:10	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 23h	Source: In-House Culture	Age: <24h
Sample ID: 18-8247-0192	Code: 70343730	Client: Mount Polley
Sample Date: 27 Aug-14 14:00	Material: Water Sample	Project:
Receive Date: 28 Aug-14 10:10	Source: Mount Polley (MT POLLEY)	
Sample Age: 23h (14.1 °C)	Station: HAD-1-140827	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	924217	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	30.61	4.465	N/A	3.267	NA	22.39
EC10	37.43	27.14	N/A	2.672	NA	3.684
EC15	45.72	31.22	N/A	2.187	NA	3.203
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	0.9	0	1	0.1	0.3162	35.14%	0.0%	9	10
1.56		10	1	1	1	0	0	0.0%	-11.11%	10	10
3.12		10	1	1	1	0	0	0.0%	-11.11%	10	10
6.25		10	0.9	0	1	0.1	0.3162	35.14%	0.0%	9	10
12.5		10	1	1	1	0	0	0.0%	-11.11%	10	10
25		10	1	1	1	0	0	0.0%	-11.11%	10	10
50		10	0.7	0	1	0.1528	0.483	69.01%	22.22%	7	10
100		10	0.9	0	1	0.1	0.3162	35.14%	0.0%	9	10

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	0	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	0	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	0	1	1	0	1	1	1	1	0
100		1	1	1	1	0	1	1	1	1	1

CETIS Analytical Report

Report Date: 12 Sep-14 10:35 (p 2 of 2)
 Test Code: 14597 | 03-6751-4154

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

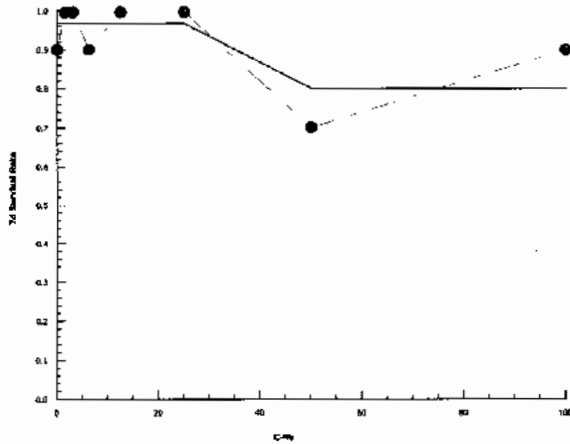
Analysis ID: 11-1169-7051 Endpoint: 7d Survival Rate
 Analyzed: 12 Sep-14 10:34 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	0/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	0/1
100		1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 12 Sep-14 10:35 (p 1 of 2)
 Test Code: 14597 | 03-6751-4154

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 17-0935-0185	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 12 Sep-14 10:35	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 08-8621-5373	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Percy
Start Date: 28 Aug-14 13:20	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 04 Sep-14 12:10	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 23h	Source: In-House Culture	Age: <24h
Sample ID: 18-8247-0192	Code: 70343730	Client: Mount Polley
Sample Date: 27 Aug-14 14:00	Material: Water Sample	Project:
Receive Date: 28 Aug-14 10:10	Source: Mount Polley (MT POLLEY)	
Sample Age: 23h (14.1 °C)	Station: HAD-1-140827	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	2077939	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	16.1	0	25	2.383	7.534	46.8%	0.0%
1.56		10	21.1	17	24	0.7371	2.331	11.05%	-31.06%
3.12		10	22.7	20	27	0.6675	2.111	9.3%	-40.99%
6.25		10	20.4	0	28	2.437	7.706	37.77%	-26.71%
12.5		10	23.7	15	28	1.239	3.917	16.53%	-47.2%
25		10	24	17	26	0.9068	2.867	11.95%	-49.07%
50		10	20.3	0	31	3.709	11.73	57.78%	-26.09%
100		10	21.6	0	31	3.452	10.92	50.54%	-34.16%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	21	18	0	25	21	17	19	15	19	6
1.56		23	23	17	22	21	24	22	18	19	22
3.12		27	21	23	21	20	25	21	23	23	23
6.25		21	26	19	22	22	25	20	21	0	28
12.5		28	24	20	27	22	27	15	24	26	24
25		24	21	17	25	26	26	25	25	25	26
50		24	14	22	29	0	28	29	31	26	0
100		27	27	25	30	4	29	24	19	31	0

CETIS Analytical Report

Report Date: 12 Sep-14 10:35 (p 2 of 2)
Test Code: 14597 | 03-6751-4154

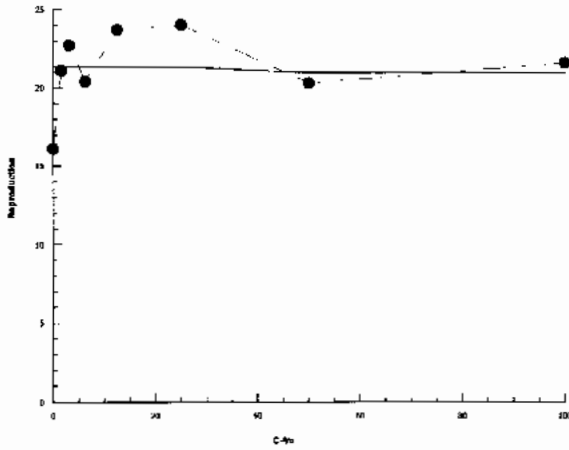
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 17-0935-0185 Endpoint: Reproduction
Analyzed: 12 Sep-14 10:35 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 09 Oct-14 16:13 (p 1 of 2)
 Test Code: 14597 | 03-6751-4154

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 04-2320-6627	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 09 Oct-14 16:13	Analysis: Nonparametric-Control vs Treatments	Official Results: Yes
Batch ID: 08-8621-5373	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 28 Aug-14 13:20	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 04 Sep-14 12:10	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 23h	Source: In-House Culture	Age: <24h
Sample ID: 18-8247-0192	Code: 70343730	Client: Mount Polley
Sample Date: 27 Aug-14 14:00	Material: Water Sample	Project:
Receive Date: 28 Aug-14 10:10	Source: Mount Polley (MT POLLEY)	
Sample Age: 23h (14.1 °C)	Station: HAD-1-140827	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C < T	NA	NA	47.2%	1.56	3.12	2.206	64.1

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		1.56	79	74	4	18	0.1137	Asymp	Non-Significant Effect
		3.12*	68.5	74	2	18	0.0167	Asymp	Significant Effect
		6.25	78	74	4	18	0.0975	Asymp	Non-Significant Effect
		12.5*	69.5	74	1	18	0.0206	Asymp	Significant Effect
		25*	66.5	74	3	18	0.0107	Asymp	Significant Effect
		50	84	74	1	18	0.2231	Asymp	Non-Significant Effect
		100	79	74	3	18	0.1137	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	439.5875	62.79821	7	1.236	0.2945	Non-Significant Effect
Error	3656.9	50.79028	72			
Total	4096.487		79			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	48.12	18.48	<0.0001	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8276	0.9579	<0.0001	Non-normal Distribution

Reproduction Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	10	16.1	10.71	21.49	18.5	0	25	2.383	46.8%	0.0%
1.56		10	21.1	19.43	22.77	22	17	24	0.7371	11.05%	-31.06%
3.12		10	22.7	21.19	24.21	23	20	27	0.6675	9.3%	-40.99%
6.25		10	20.4	14.89	25.91	21.5	0	28	2.437	37.77%	-26.71%
12.5		10	23.7	20.9	26.5	24	15	28	1.239	16.53%	-47.2%
25		10	24	21.95	26.05	25	17	26	0.9068	11.95%	-49.07%
50		10	20.3	11.91	28.69	25	0	31	3.709	57.78%	-26.09%
100		10	21.6	13.79	29.41	26	0	31	3.452	50.54%	-34.16%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	21	18	0	25	21	17	19	15	19	6
1.56		23	23	17	22	21	24	22	18	19	22
3.12		27	21	23	21	20	25	21	23	23	23
6.25		21	26	19	22	22	25	20	21	0	28
12.5		28	24	20	27	22	27	15	24	26	24
25		24	21	17	25	26	26	25	25	25	26
50		24	14	22	29	0	28	29	31	26	0
100		27	27	25	30	4	29	24	19	31	0

Ceriodaphnia 7-d Survival and Reproduction Test

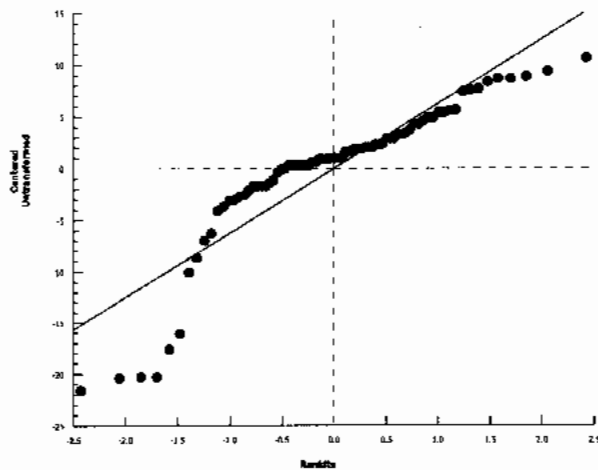
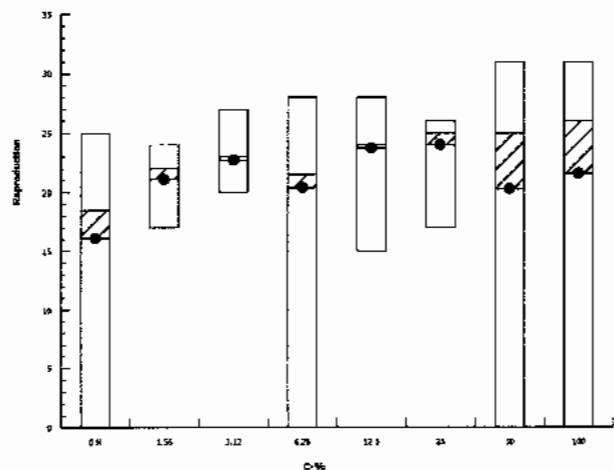
Nautilus Environmental

Analysis ID: 04-2320-6627
 Analyzed: 09 Oct-14 16:13

Endpoint: Reproduction
 Analysis: Nonparametric-Control vs Treatments

CETIS Version: CETISv1.8.7
 Official Results: Yes

Graphics



Client: McInt Polley

W.O.#: 14597

Hardness and Alkalinity Datasheet

Alkalinity						Hardness			
Sample ID	Sample Date	Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	Technician
HAD-1-140827	aug 28/14	50	3.8	4.1	70	50	5.1	102	EMM
20% Reher	aug 28/14	50	4.2	4.4	80	50	5.0	100	EMM

Notes: _____

Reviewed by: JGh

Date Reviewed: Oct. 8/14

APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

Fathead Minnow Test Summary Sheet
(7-d *Pimephales promelas* Survival and Growth Test)

Client: Mount Polley
Work Order No.: 14598

Start Date/Time: Aug 28/14 @ 1330h
Test Species: *P. promelas*

Sample Information:

Sample ID: HAD-1-140827
Sample Date: Aug 29/14
Date Received: Aug 28/14
Sample Volume: 2x vol

Dilution Water (initial water quality):

Type: Moderately Hard Water
Temperature (°C): 25.0
pH: 8.2
Dissolved Oxygen (mg/L): 8.0
Hardness (mg/L CaCO₃): 100
Alkalinity (mg/L CaCO₃): 60

Test Validity Criteria:

The test is invalid if:

- 1) for the control solutions, the combined and cumulative incidence of any mortalities, or fish showing loss of equilibrium or other signs of atypical swimming behavior, is >20%
- 2) the average dry weight of the surviving control fish does not attain 250 ug when the fish are dried and weighed.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4; pH = 6.5 to 8.5

Test Organism Information:

Batch No.: 082814
Source: Aquatic Biosystems, CO
Age: 224 hrs

NaCl Reference Toxicant Results:

Reference Toxicant ID: PP92
Stock Solution ID: n/a
Date Initiated: Aug 28/14
7-d EC50 (95% CL): 4.9 (3.5 - 6.8) g/L NaCl
7-d IC50 (95% CL): 3.7 (3.1 - 3.8) g/L NaCl

Survival:

Reference Toxicant Mean and Historical Range: 4.5 (3.4 - 5.9) g/L NaCl CV (%): 14

Biomass:

Reference Toxicant Mean and Historical Range: 4.0 (2.9 - 5.5) g/L NaCl CV (%): 17

Test Results:

	Survival	Biomass
LC25 % (v/v) (95% CL)	42.4 (24.6 - 92.0)	
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		71.6 (47.0 - 98.8)
IC50 % (v/v) (95% CL)		7100

Reviewed by: JBL

Date reviewed: Oct-9/14

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: NRD-1 (blue)
 Work Order #: 14598

Start Date & Time: Aug 28/14 @ 1330h
 Stop Date & Time: Sept 4/14 @ 1230h
 Test Species: Pimephales promelas

%. (v/v) Concentration Control	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	25.0	24.0	25.0	24.0	25.5	24.0	25.5	24.0	25.0	24.0	25.0	24.5	25.0	25.0	25.0
DO (mg/L)	8.0	7.2	8.0	6.3	7.9	6.0	7.9	6.3	8.1	6.4	7.6	6.1	8.0	5.9	5.9
pH	8.2	8.1	8.1	7.2	8.0	7.9	8.0	7.6	8.1	7.8	8.2	7.5	8.3	7.5	7.5
Cond. (µS/cm)	316	324		320		324		326		339		333		350	
Initials	KJL	KJL						KJL		KJL		KJL		KJL	

Concentration 1.96	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	24.5	24.0	24.0	24.0	25.5	24.0	25.5	24.0	24.0	24.0	25.0	24.5	25.0	25.0	25.0
DO (mg/L)	8.2	7.1	8.0	6.2	8.0	6.1	8.0	6.5	7.5	6.0	7.6	6.0	7.9	5.9	5.9
pH	8.1	8.1	7.9	8.0	7.9	8.0	8.0	7.5	8.0	7.8	8.3	7.5	8.4	7.5	7.5
Cond. (µS/cm)	310	321		322		324		326		328		331		350	
Initials	KJL	KJL						KJL		KJL		KJL		KJL	

Concentration 12.5	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	24.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	25.0	24.5	24.5	25.0	25.0
DO (mg/L)	7.8	7.1	8.2	6.3	8.0	6.0	8.1	6.3	7.6	6.1	7.6	5.9	7.9	5.9	5.9
pH	8.3	8.0	8.1	8.0	7.9	8.0	8.1	7.6	8.1	7.8	8.3	7.5	8.3	7.4	7.4
Cond. (µS/cm)	310	307		308		306		312		315		317		336	
Initials	KJL	KJL						KJL		KJL		KJL		KJL	

Concentration 100	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	24.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	24.0	24.5	25.0	25.0	25.0
DO (mg/L)	8.1	7.4	8.0	6.3	8.1	5.9	8.1	6.1	7.7	5.6	7.9	6.0	8.0	6.0	6.0
pH	8.7	8.4	8.5	8.4	8.6	8.3	8.3	7.7	8.4	7.8	8.6	7.5	8.5	7.5	7.5
Cond. (µS/cm)	213	214		215		216		215		214		216		235	
Initials	KJL	KJL						KJL		KJL		KJL		KJL	

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6.5 to 8.5

DO meter: 3 pH meter: 3 Conductivity meter: 3

	Control	100%		
Hardness*	100	102		
Alkalinity*	60	72		

* mg/L as CaCO₃

Analysts: KJL, JW, AWJ

Reviewed by: JGL

Date reviewed: Oct-9/14

Sample Description: clear

Comments: _____

7-d Fathead Minnow Toxicity Test Daily Survival

Client: Mount Polley
 Sample ID: HAD-1 (blue)
 Work Order #: 14598

Start Date & Time: Aug 28/14 @ 1330h
 Stop Date & Time: Sept 4/14 @ 1230h
 Test Species: Pimephales promelas

Concentration % (v/v)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	9	9	9	9	9	
1.56	A	10	10	10	10	10	10	10	
	B	10	10	10	9	9	9	9	6 long missing 1st L
	C	10	10	7	7	7	7	7	
3.1	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
6.25	A	9	9	8	8	8	8	8	
	B	10	10	9	9	9	9	9	
	C	10	10	10	10	10	10	10	
12.5	A	10	10	10	10	9	9	9	
	B	10	10	10	10	9	7	7	
	C	10	10	10	10	10	9	9	
25	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
50	A	9	9	8	8	8	8	8	
	B	10	10	10	10	10	8	7	
	C	10	10	9	9	9	5	5	
100	A	8	8	8	8	6	6	6	
	B	10	10	8	8	6	5	5	
	C	8	8	8	8	8	8	7	
	A								
	B								
	C								
	A								
	B								
	C								
Tech Initials		KSL	R	R	RJ	WV	KSL	KSL	

Comments: _____

Reviewed by: JGL

Date reviewed: Oct-9/14

Fathead Minnow Toxicity Test Data Sheet

Dry Weight Data

Client: Mount Polley

Start Date & Time: Aug 28/14 @ 1330h

Sample ID: HAD-1-140827

Termination Date & Time: Sept 4/14 @ 1230h

Work Order No.: 14598

Concentration % (v/v)	Rep	ALS Pan No. Blue	No. alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control	A	16	10	KJU	1060.17	1067.92	10	NY
	B	17	10		1036.83	1045.96	10	
	C	18	9		1052.35	1059.12	9	
1.56	A	19	10		1060.17	1066.76	10	
	B	20	9		1043.63	1050.56	9	
	C	21	7		1051.58	1057.92	7	
3.1	A	22	10		991.14	998.97	10	
	B	23	10		1029.85	1038.01	10	
	C	24	10		1034.51	1042.28	10	
6.25	A	25	8		1029.02	1036.68	8	
	B	26	9		1030.77	1038.59	9	
	C	27	10		1071.23	1080.29	10	
12.5	A	28	9		1045.68	1053.50	9	
	B	29	7		1042.73	1049.23	7	
	C	30	9		1046.20	1053.45	9	
25	A	31	10		1061.29	1069.18	10	
	B	32	10		1024.26	1032.46	10	
	C	33	10		1027.30	1034.97	10	
50	A	34	8		1026.61	1033.46	8	
	B	35	7		1073.80	1079.91	7	
	C	36	5		1026.81	1030.98	5	
100	A	37	8		1049.78	1055.43	6	
	B	38	5		1050.50	1055.09	5	
	C	39	7		1056.79	1062.18	7	

Comments: 10% Reweigh: #22 - 999.05
#30 - 1053.44

Reviewed by: J. Kelle

Date Reviewed: Oct-9/14

CETIS Analytical Report

Report Date: 01 Oct-14 09:00 (p 1 of 2)
 Test Code: 14598 | 18-0628-4591

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 02-5531-1506	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 09 Sep-14 9:23	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 17-2077-1179	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 28 Aug-14 13:30	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 04 Sep-14 12:30	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 18-9247-0192	Code: 70343730	Client: Mount Polley
Sample Date: 27 Aug-14 14:00	Material: Water Sample	Project:
Receive Date: 28 Aug-14 10:10	Source: Mount Polley (MT POLLEY)	
Sample Age: 23h (14.1 °C)	Station: HAD-1-140827	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	840055	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	5.024	N/A	52.49	19.9	1.905	NA
EC10	28.12	N/A	38.46	3.556	2.6	NA
EC15	32.27	20.3	55.81	3.099	1.792	4.926
EC20	37.01	22.28	74.51	2.702	1.342	4.488
EC25	42.43	24.55	92	2.357	1.087	4.074
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	3	0.9667	0.9	1	0.03333	0.05773	5.97%	0.0%	29	30
1.56		3	0.8667	0.7	1	0.08819	0.1528	17.63%	10.34%	26	30
3.1		3	1	1	1	0	0	0.0%	-3.45%	30	30
6.25		3	0.9	0.8	1	0.05774	0.1	11.11%	6.9%	27	30
12.5		3	0.8333	0.7	0.9	0.06667	0.1155	13.86%	13.79%	25	30
25		3	1	1	1	0	0	0.0%	-3.45%	30	30
50		3	0.6667	0.5	0.8	0.08819	0.1528	22.91%	31.03%	20	30
100		3	0.6	0.5	0.7	0.05773	0.1	16.67%	37.93%	18	30

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	1	1	0.9
1.56		1	0.9	0.7
3.1		1	1	1
6.25		0.8	0.9	1
12.5		0.9	0.7	0.9
25		1	1	1
50		0.8	0.7	0.5
100		0.6	0.5	0.7

CETIS Analytical Report

Report Date: 01 Oct-14 09:00 (p 2 of 2)
Test Code: 14598 | 18-0628-4591

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 02-5531-1506 Endpoint: 7d Survival Rate
Analyzed: 09 Sep-14 9:23 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	10/10	10/10	9/10
1.56		10/10	9/10	7/10
3.1		10/10	10/10	10/10
6.25		8/10	9/10	10/10
12.5		9/10	7/10	9/10
25		10/10	10/10	10/10
50		8/10	7/10	5/10
100		6/10	5/10	7/10

CETIS Analytical Report

Report Date: 09 Oct-14 12:58 (p 1 of 2)
 Test Code: 14598 | 18-0628-4591

Fathead Minnow 7-d Larval Survival and Growth Test				Nautilus Environmental	
Analysis ID: 17-6022-9263	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7			
Analyzed: 09 Sep-14 9:23	Analysis: Nonlinear Regression	Official Results: Yes			
Batch ID: 17-2077-1179	Test Type: Growth-Survival (7d)	Analyst: Karen Lee			
Start Date: 28 Aug-14 13:30	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water			
Ending Date: 04 Sep-14 12:30	Species: Pimephales promelas	Brine:			
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h			
Sample ID: 18-8247-0192	Code: 70343730	Client: Mount Polley			
Sample Date: 27 Aug-14 14:00	Material: Water Sample	Project:			
Receive Date: 28 Aug-14 10:10	Source: Mount Polley (MT POLLEY)				
Sample Age: 23h (14.1 °C)	Station: HAD-1-140827				

Non-Linear Regression Options				
Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Log-Logistic EV [Y=A/(1+(X/D)^C)]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary									
Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
27	46.75	-86.29	-83.96	0.4584	Yes	2.716	2.852	0.0582	Non-Significant Lack of Fit

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	19.69	N/A	39.45	5.079	2.535	NA
IC10	33.21	3.164	57.58	3.011	1.737	31.61
IC15	45.9	19.65	71.66	2.179	1.395	5.09
IC20	58.57	34.16	84.34	1.707	1.186	2.927
IC25	71.62	47	98.83	1.396	1.012	2.128
IC40	116.3	66.89	187	0.8597	0.5348	1.495
IC50	154.5	72.62	328.6	0.6474	0.3043	1.377

Regression Parameters							
Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	0.7679	0.02875	0.7116	0.8243	26.71	<0.0001	Significant Parameter
C	1.429	0.6862	0.08447	2.774	2.083	0.0497	Significant Parameter
D	154.5	52.04	52.46	256.5	2.968	0.0073	Significant Parameter

ANOVA Table						
Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	0.183513	0.183513	1	21.47	0.0001	Significant
Lack of Fit	0.082409	0.016482	5	2.716	0.0582	Non-Significant
Pure Error	0.097097	0.006069	16			
Residual	0.179507	0.008548	21			

Residual Analysis						
Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)	
Variances	Bartlett Equality of Variance	9.699	14.07	0.2063	Equal Variances	
	Mod Levene Equality of Variance	1.804	3.5	0.2130	Equal Variances	
Distribution	Shapiro-Wilk W Normality	0.9642	0.9169	0.5276	Normal Distribution	
	Anderson-Darling A2 Normality	0.3843	2.492	0.3990	Normal Distribution	

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 17-6022-9263 Endpoint: Mean Dry Biomass-mg
 Analyzed: 09 Sep-14 9:23 Analysis: Nonlinear Regression

CETIS Version: CETISv1.8.7
 Official Results: Yes

Mean Dry Biomass-mg Summary

Calculated Variate

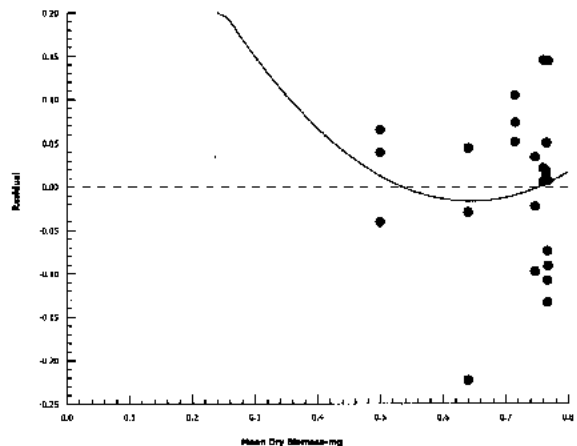
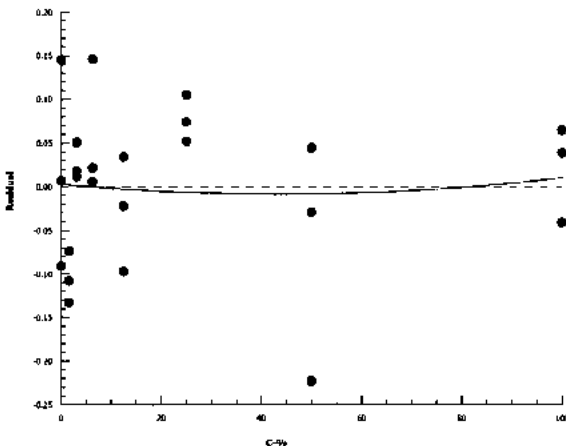
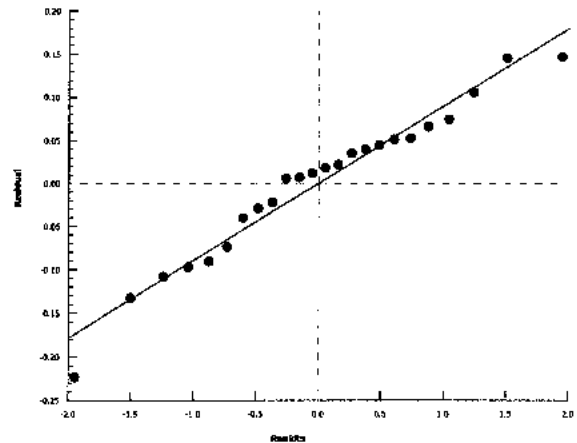
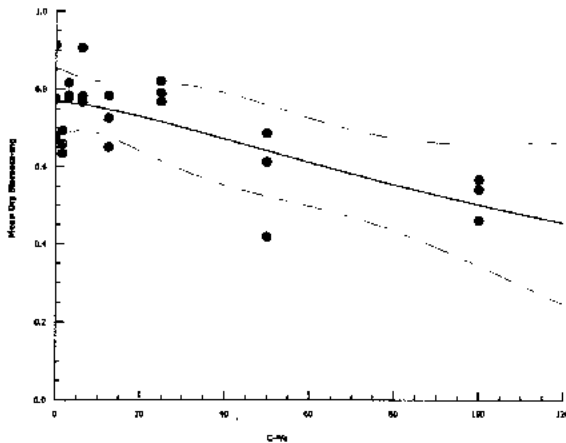
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.7883	0.677	0.913	0.06845	0.1186	15.04%	0.0%
1.56		3	0.662	0.634	0.693	0.0171	0.02961	4.47%	16.03%
3.1		3	0.792	0.777	0.816	0.01213	0.021	2.65%	-0.47%
6.25		3	0.818	0.766	0.906	0.04424	0.07663	9.37%	-3.76%
12.5		3	0.719	0.65	0.782	0.03822	0.0662	9.21%	8.8%
25		3	0.792	0.767	0.82	0.01537	0.02663	3.36%	-0.46%
50		3	0.571	0.417	0.685	0.07991	0.1384	24.24%	27.57%
100		3	0.521	0.459	0.565	0.0319	0.05525	10.6%	33.91%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.775	0.913	0.677
1.56		0.659	0.693	0.634
3.1		0.783	0.816	0.777
6.25		0.766	0.782	0.906
12.5		0.782	0.65	0.725
25		0.789	0.82	0.767
50		0.685	0.611	0.417
100		0.565	0.459	0.539

Graphics

3P Log-Logistic EV [Y=A/(1+(X/D)^C)]



CETIS Analytical Report

Report Date: 09 Oct-14 12:57 (p 1 of 2)

Test Code: 14598 | 18-0628-4591

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 06-3291-9043	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 09 Oct-14 12:57	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 17-2077-1179	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 28 Aug-14 13:30	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 04 Sep-14 12:30	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 18-8247-0192	Code: 70343730	Client: Mount Polley
Sample Date: 27 Aug-14 14:00	Material: Water Sample	Project:
Receive Date: 28 Aug-14 10:10	Source: Mount Polley (MT POLLEY)	
Sample Age: 23h (14.1 °C)	Station: HAD-1-140827	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	17.9%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		1.56	0.6185	2.558	0.145	4	0.6578	CDF	Non-Significant Effect
		3.1	0.3765	2.558	0.145	4	0.7569	CDF	Non-Significant Effect
		6.25	-1.713	2.558	0.145	4	0.9988	CDF	Non-Significant Effect
		12.5	-0.9544	2.558	0.145	4	0.9881	CDF	Non-Significant Effect
		25	0.3766	2.558	0.145	4	0.7569	CDF	Non-Significant Effect
		50	-0.7203	2.558	0.145	4	0.9772	CDF	Non-Significant Effect
		100	-1.111	2.558	0.145	4	0.9925	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04889107	0.006984438	7	1.44	0.2569	Non-Significant Effect
Error	0.07757872	0.00484867	16			
Total	0.1264698		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	9.829	18.48	0.1985	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9828	0.884	0.9407	Normal Distribution

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	3	0.8134	0.5973	1.03	0.775	0.7522	0.913	0.05023	10.7%	0.0%
1.56		3	0.7782	0.4713	1.085	0.77	0.659	0.9057	0.07134	15.88%	4.32%
3.1		3	0.792	0.7398	0.8442	0.783	0.777	0.816	0.01213	2.65%	2.63%
6.25		3	0.9108	0.8002	1.021	0.906	0.8689	0.9575	0.02569	4.89%	-11.97%
12.5		3	0.8677	0.7149	1.02	0.8689	0.8056	0.9286	0.03552	7.09%	-6.67%
25		3	0.792	0.7258	0.8581	0.789	0.767	0.82	0.01537	3.36%	2.63%
50		3	0.8544	0.8059	0.9028	0.8562	0.834	0.8729	0.01126	2.28%	-5.04%
100		3	0.8766	0.6454	1.108	0.918	0.77	0.9417	0.05371	10.61%	-7.76%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.775	0.913	0.7522
1.56		0.659	0.77	0.9057
3.1		0.783	0.816	0.777
6.25		0.9575	0.8689	0.906
12.5		0.8689	0.9286	0.8056
25		0.789	0.82	0.767
50		0.8562	0.8729	0.834
100		0.9417	0.918	0.77

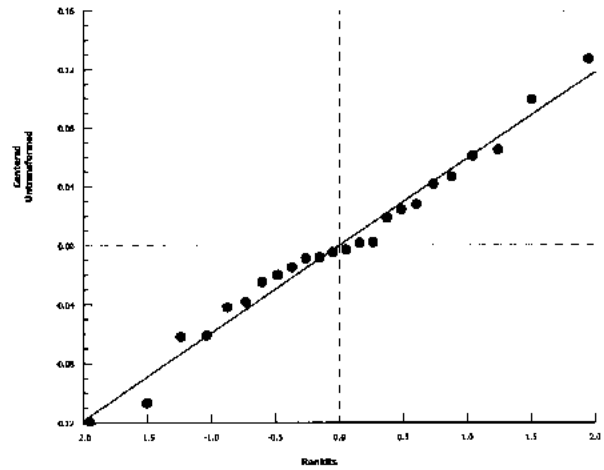
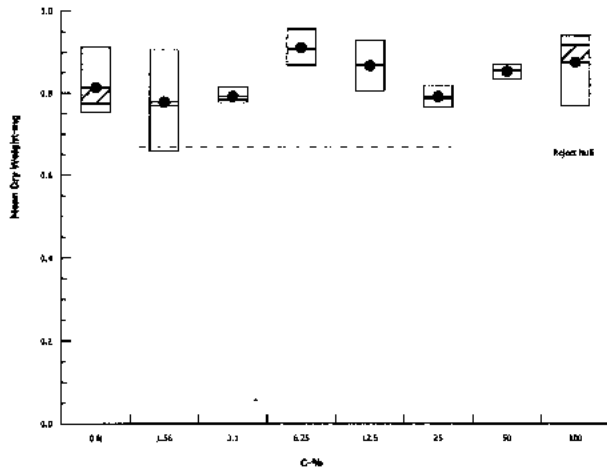
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 06-3291-9043 Endpoint: Mean Dry Weight-mg
Analyzed: 09 Oct-14 12:57 Analysis: Parametric-Control vs Treatments

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 19 Nov-14 12:15 (p 1 of 2)
 Test Code: 14598 | 18-0628-4591

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 09-6819-4210	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 18 Nov-14 16:11	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 17-2077-1179	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 28 Aug-14 13:30	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 04 Sep-14 12:30	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 18-8247-0192	Code: 70343730	Client: Mount Polley
Sample Date: 27 Aug-14 14:00	Material: Water Sample	Project:
Receive Date: 28 Aug-14 10:10	Source: Mount Polley (MT POLLEY)	
Sample Age: 23h (14.1 °C)	Station: HAD-1-140827	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	833567	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	96% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.8134	0.7522	0.913	0.05023	0.087	10.7%	0.0%
1.56		3	0.7782	0.659	0.9057	0.07134	0.1236	15.88%	4.32%
3.1		3	0.792	0.777	0.816	0.01213	0.021	2.65%	2.63%
6.25		3	0.9108	0.8689	0.9575	0.02569	0.0445	4.89%	-11.97%
12.5		3	0.8677	0.8056	0.9286	0.03552	0.06152	7.09%	-6.67%
25		3	0.792	0.767	0.82	0.01537	0.02663	3.36%	2.63%
50		3	0.8544	0.834	0.8729	0.01126	0.0195	2.28%	-5.04%
100		3	0.8766	0.77	0.9417	0.05371	0.09303	10.61%	-7.76%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.775	0.913	0.7522
1.56		0.659	0.77	0.9057
3.1		0.783	0.816	0.777
6.25		0.9575	0.8689	0.906
12.5		0.8689	0.9286	0.8056
25		0.789	0.82	0.767
50		0.8562	0.8729	0.834
100		0.9417	0.918	0.77

CETIS Analytical Report

Report Date: 19 Nov-14 12:15 (p 2 of 2)
Test Code: 14598 | 18-0628-4591

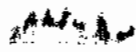
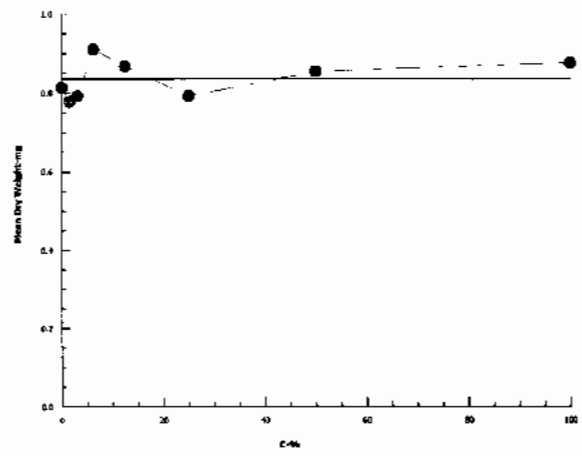
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 09-6819-4210 Endpoint: Mean Dry Weight-mg
Analyzed: 18 Nov-14 16:11 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Client: Mount Polley

W.O.#: 14598

Hardness and Alkalinity Datasheet

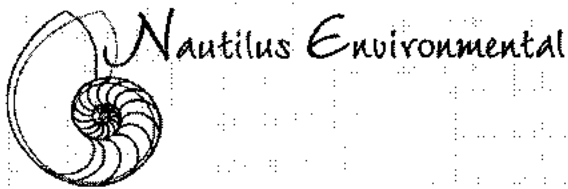
Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
EHM MHW 082714	Aug 28/14	50	3.2	3.4	60	50	5.0	100	JP
HAD-1 100	Aug 28/14	50	4.238	4.4	80	50	5.1	102	EMM
HAD-1	Aug 28/14	50	3.8	4.0	72	50	5.1	102	EMM

Notes: _____

Reviewed by: JGU

Date Reviewed: Oct - 9/14

APPENDIX C - Chain of Custody Form



Chain of Custody

British Columbia
 8664 Commerce Court
 Burnaby, British Columbia, Canada V5A 4N3
 Phone 604.420.8773

P0328

Date 27/09/14 Page 1 of 1

Sample Collection By:		Report to:		Invoice To: <i>Same as report</i>		ANALYSES REQUIRED						Receipt Temperature (°C)
Company	<i>Mount Polley Mining Corp.</i>	Company		Company								
Address	<i>PO Box 12,</i>	Address		Address								
City/State/Zip	<i>Likely, BC, V0L 1A0</i>	City/State/Zip		City/State/Zip								
Contact	<i>Colleen Hughes</i>	Contact		Contact								
Phone	<i>250-790-2215</i>	Phone		Phone								
Email		Email		Email								

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS												
1	<i>HAD-1-140827</i>	<i>Aug 27/14</i>	<i>14:00</i>	<i>Water</i>	<i>20L Carboys</i>	<i>2</i>												
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY (CLIENT)		RELINQUISHED BY (COURIER)					
Client:	<i>MPMC</i>	Total No. of Containers	<i>2</i>	(Signature)	<i>[Signature]</i>	(Time)	<i>15:16</i>	(Signature)		(Time)	
PO No.:		Received Good Condition?	<i>Y</i>	(Printed Name)	<i>SKY Forrester</i>	(Date)	<i>Aug 27/14</i>	(Printed Name)		(Date)	
Shipped Via:	<i>Greyhound</i>	Matches Test Schedule?	<i>Y</i>	(Company)	<i>Mount Polley Mining Corp.</i>	(Company)		(Company)		(Date)	
				RECEIVED BY (COURIER)				RECEIVED BY (LABORATORY)			
				(Signature)		(Time)		(Signature)	<i>NY</i>	(Time)	<i>@ 10:10</i>
				(Printed Name)		(Date)		(Printed Name)	<i>NAIR YAMAMOTO</i>	(Date)	<i>Aug 28/14</i>
				(Company)		(Company)		(Company)	<i>NAUTILUS</i>	(Date)	

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

PART 14

**Toxicity testing on a sample identified as QUL-66-40m-140828: Sample collected
August 28, 2014 (Report date September 3, 2014)**



Mount Polley Mining Corporation
ATTN: Colleen Hughes
Box 12
Likely, BC
V0L 1N0

Report Date: September 3, 2014
Work Order: 14600 - 601

Data Report

Species: Rainbow trout (*Oncorhynchus mykiss*)
Protocol: EPS 1/RM/13 (Second Ed. with 2007 amendments)

Species: *Daphnia magna*
Protocol: EPS 1/RM/14 (Second Ed. 2000)

Table 1. Results for the 96-h rainbow trout acute toxicity test.

Sample ID	Collection Date and Time	96-h LC50 (%v/v)
QUL-66-40m-140828	August 28, 2014 @ 1005	>100

Table 2. Results for the 48-h *Daphnia magna* acute toxicity test.

Sample ID	Collection Date and Time	48-h LC50 (%v/v)
QUL-66-40m-140828	August 28, 2014 @ 1005	>100

Tests met performance criteria and there were no deviations from the test methods. The results relate only to the sample tested.

Jacob Frank, B.Sc.
Laboratory Biologist

Reviewed By:
Julianna Kalocai, M.Sc., R.P.Bio
QA Officer

Rainbow Trout Summary Sheet

Client: Mount Polley Mining Corporation

Start Date/Time: August 29/14 @ 1300

Work Order No.: 14600

Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: CUL-66-40m-140828
Sample Date: August 28/14 @ 1005
Date Received: August 29/14 @ 0950
Sample Volume: 3 x 20L
Other: N/A

Test Validity Criteria:

≥ 90% control survival

WQ Ranges:

T (°C) = 15 ± 1; DO (mg/L) = 7.0 to 10.3; pH = 5.5 to 8.5

Dilution Water:

Type: Dechlorinated Municipal Tap Water
Hardness (mg/L CaCO₃): 11
Alkalinity (mg/L CaCO₃): 9

Test Organism Information:

Batch No.: 080614
Source: Miracle Springs
No. Fish/Volume (L): 10/10
Loading Density (g/L): 0.33
Mean Length ± SD (mm): 34 ± 2 Range: 30 - 38
Mean Weight ± SD (g): 0.33 ± 0.07 Range: 0.21 - 0.43

NaNO₂ Reference Toxicant Results:

Reference Toxicant ID: RTN166
Stock Solution ID: 14NE01
Date Initiated: August 20/14
96-h LC50 (95% CL): 10.9 (8.1 - 14.7) mg/L NaNO₂

Reference Toxicant Mean and Historical Range: 4.9 (2.0 - 12.0) mg/L NaNO₂
Reference Toxicant CV (%): 56

Test Results: The 96-h LC50 is >100% (N/A).

Reviewed by: JGH

Date reviewed: Sept. 2/14

96-Hour Rainbow Trout Toxicity Test Data Sheet

Client/Project#: Mount Valley Mining
 Sample I.D.: QUL-66-40m-140828
 W.O. #: 14600
 RBT Batch #: 080614
 Date Collected/Time: August 28/14 @ 11:45^{PM} 1005h
 Date Setup/Time: August 29/14 @ 1300h
 Sample Setup By: JBF JBF JAB

Number Fish/Volume: 10/10
 7-d % Mortality: 0.63
 Total Pre-aeration Time (mins): 30
 Aeration rate adjusted to 6.5 ± 1 mL/min/L? (Y/N): Y

D.O. meter: 1/2/3/4
 pH meter: 1
 Cond. Meter: 1/2/3

Undiluted Sample WQ			
Parameters	Initial WQ	Adjustment	30 min WQ
Temp °C	14.0	/	14.0
pH	7.6		7.8
D.O. (mg/L)	9.8		10.0
Cond. (µS/cm)	118		119

Concentration (% v/v)	# Survivors							Temperature (°C)					Dissolved Oxygen (mg/L)					pH					Conductivity (µS/cm)	
	1	2	4	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
Control				10	10	10	10	14.5	14.6	14.5	14.5	14.5	10.0	9.8	9.9	9.7	10.0	7.0	6.9	6.9	7.1	6.9	36	41
6.25				10	10	10	10	14.5	14.5	14.5	14.5	14.5	9.9	9.9	9.8	9.7	10.1	7.2	7.1	7.0	7.1	6.9	42	45
12.5				10	10	10	10	14.5	14.6	14.5	14.5	14.5	9.9	9.9	9.9	9.7	10.0	7.2	7.3	7.2	7.1	7.0	46	49
25				10	10	10	10	14.5	14.5	14.5	14.5	14.0	10.0	9.8	9.8	9.7	10.0	7.4	7.5	7.4	7.3	7.2	55	59
50				10	10	10	10	14.5	14.5	14.5	14.5	14.0	10.0	9.9	9.8	9.7	10.1	7.6	7.6	7.5	7.5	7.3	77	80
100				10	10	10	10	14.0	14.5	14.5	14.5	14.0	10.0	9.9	9.9	9.7	10.1	7.8	7.9	7.9	7.6	7.6	119	126
Initials				JAB	JBF	JAB	JBF	JAB	JBF	JAB	JBF	JAB	JBF	JAB	JBF	JAB	JBF	JAB	JBF	JAB	JBF	JAB	JBF	

WQ Ranges: T (°C) = 15 ± 1; DO (mg/L) = 7.0 to 10.3; pH = 5.5 to 8.5

Sample Description/Comments: grey, cloudy

Fish Description at 96 h All Fish ok Number of Stressed Fish at 96 h 0

Other Observations: _____

Reviewed by: JOB Date Reviewed: Sept. 2/14

Daphnia magna Summary Sheet

Client: Mount Polley
Work Order No.: 14601

Start Date/Time: August 29, 2014 @ 1200
Test Species: Daphnia magna
Set up by: YML

Sample Information:

Sample ID: QVL66-40m-140828
Sample Date: August 28, 2014
Date Received: August 29, 2014
Sample Volume: 3 x 20L

Test Validity Criteria:

≥ 90% mean control survival (no more than 2 mortalities in any control replicate)

WQ Ranges:

T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

Test Organism Information:

Broodstock No.: 081314A
Age of young (Day 0): <24 h
Avg No. young per brood in previous 7 d: 17
Mortality (%) in previous 7 d: 0
Days to first brood: 10

NaCl Reference Toxicant Results:

Reference Toxicant ID: Dm125
Stock Solution ID: 14NaO2
Date Initiated: August 23, 2014
48-h LC50 (95% CL): 3.9 (2.8-5.5) g/L NaCl
Reference Toxicant Mean and Historical Range: 4.0 (3.7-4.3) g/L NaCl
Reference Toxicant CV (%): 4

Test Results: The 48-h LC50 is estimated to be >100% (v/v).

Reviewed by: JGh Date reviewed: sep-2/14

Freshwater Acute 48 Hour Toxicity Test Data Sheet

Client: Mount Polley
 Sample ID: QUL06-40m-140820
 Work Order No.: 14601

Start Date/Time: August 29, 2014 @ 1200
 No. Organisms/volume: 10/200mL
 Test Organism: D. magna
 Set up by: UML

DO meter: 3 pH meter: 3 Conductivity meter: 3

Concentration (% v/v)	Number of Live Organisms Rep	Number of Live Organisms		No. Immobilized	Temperature (°C)			Dissolved oxygen (mg/L)			pH			Conductivity (µS/cm)	
		24	48		48	0	24	48	0	24	48	0	24	48	0
Control	A	10	10	0	19.5	20.0	20.0	8.8	8.7	8.4	8.0	8.0	8.0	350	362
	B														
	C														
	D														
6.25	A	10	10	0	19.5	20.0	20.0	8.8	8.7	8.5	7.9	8.0	8.0	374	344
	B														
	C														
	D														
12.5	A	10	10	0	19.5	20.0	20.0	8.9	8.8	8.4	7.9	8.0	7.9	320	331
	B														
	C														
	D														
25	A	10	10	0	19.5	20.0	20.0	9.0	8.7	8.4	7.9	7.9	7.9	292	300
	B														
	C														
	D														
50	A	10	10	0	19.5	20.0	20.0	9.1	8.7	8.4	7.8	7.7	7.8	122	242
	B														
	C														
	D														
100	A	10	10	0	19.5	20.0	20.0	9.1	8.7	8.4	7.7	7.8	7.8	122	130
	B														
	C														
	D														
Technician Initials					UML			UML			UML			UML	

WQ Ranges: T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

	Hardness*	Alkalinity*
Conc.	*(mg/L as CaCO ₃)	
Control (MHW)	100	72
Highest conc.	100	50

	Initial WQ	Adjustment	Adjusted WQ
Temp (°C)	19.5		
DO (mg/L)	9.1		
pH	7.7		
Cond (µS/cm)	122		

Sample Description: light grey color
 Comments: Batch#: 081314A 7-d previous # young/brood: 17 Day of 1st Brood: 10 Previous 7-d % Mortality: 0
 Reviewed by: Joh Date reviewed: Sept. 2/14

Client: Mant Polley

W.O.#: 14601

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
Q0L66-40m-14028	Aug 29/14	50	2.7	2.9	50	50	3.0	60	YML
MHW	↓	50	3.7	3.8	72	50	5.0	100	YML

Notes: _____

Reviewed by: JGB

Date Reviewed: Sept 2/14

COPY

w0 # 14600 14601 14602 14603 14604 14605 Chain of Custody (electronic) P0333 Page 1 of 1

British Columbia: 8064 Commerce Court, Burnaby, BC, V5A 4N7

Sample Collection By: McLean Donohoe	Report to:	Invoice to:
Company: Mount Polley Mining Corporation	Mount Polley Mining Corporation	Mount Polley Mining Corporation
Address: Box 12	Box 12	Box 12
City/Prov/Postal Code: Likely BC V0L 1N0	Likely BC V0L 1N0	Likely BC V0L 1N0
Contact: Colleen Hughes Deb McMillan	Colleen Hughes/	Colleen Hughes/
Phone: (250) 790-2617	(250) 790-2617	(250) 790-2617
Email: chughes@mountpolley.com drcmillan@minnow.ca	chughes@mountpolley.com	chughes@mountpolley.com

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	ANALYSES REQUIRED										
							96h RBT	LC50	48 h Daphnia magna	LC50	7 Day Ceriodaphnia dubia	7 day flathead Minnow	72h algal growth	Lemna Growth			
1 QUL-66-40m-140828	8/28/2014	10:05	water	60L 20L NY	3		X	X	X	X	X	X					
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)		RELIQUISHED BY (COURIER)	
Client: Mount Polley Mining Corporation	Total # Containers: 3	Signature:	Colleen Hughes	Signature:		Signature:	
P.O. No.:	Good Condition? Y	Company: MPMC	Time/Date: 28/08/2014 16:30:00	Company:		Print:	
Shipped Via: Greyhound	Matches Schedule? Y	Time/Date: 28/08/2014 16:30:00		Time/Date:		Company:	NAUTILUS
SPECIAL INSTRUCTIONS/COMMENTS:				RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)	
				Signature:		Signature: NY	
				Print:		Print: NAIR YAMAMOTO	
				Company:		Company: NAUTILUS	
				Time/Date:		Time/Date: Aug 29/14 @ 9:50	

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 15

Toxicity testing on a sample identified as QUL66-40m-140828: Sample collected August 28, 2014 (Report date October 21, 2014; Revised December 4, 2014)



Nautilus Environmental

**Toxicity testing on a sample identified as
QUL66-40m-140828**

Sample collected August 28, 2014

Final Report

Report date: October 21, 2014, revised December 4, 2014

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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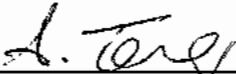
LIST OF APPENDICES

- APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data
- APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data
- APPENDIX C - *Lemna Minor* Toxicity Test Data
- APPENDIX D - *Pseudokirchneriella subcapitata* Toxicity Test Data
- APPENDIX E - Chain of Custody Form

SIGNATURE PAGE



Krysta Pearcy, B.Sc.
Laboratory Biologist



Armando Tang, R.P.Bio.
Laboratory Manager

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted toxicity tests for Mount Polley Mining Corporation on a sample identified as QUL66-40m-140828. The sample was collected on August 28, 2014 and delivered to the laboratory in Burnaby, BC on August 29, 2014. The sample was transported in three 20-L plastic carboys and coolers. The sample was received at a temperature of 7.2°C and was stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing. The following sub-lethal toxicity tests were performed on the sample:

- *Ceriodaphnia dubia* survival and reproduction
- 7-d fathead minnow (*Pimephales promelas*) survival and growth
- 7-d duckweed (*Lemna minor*) growth inhibition
- 72-h algal (*Pseudokirchneriella subcapitata*) growth inhibition

This report describes the results of these toxicity tests. Copies of laboratory data sheets and printouts of statistical analyses for each test are provided in Appendices A to D. The chain-of-custody form is provided in Appendix E. This report was revised from an earlier version to incorporate data for dry weight of fathead minnows, in addition to biomass.

2.0 METHODS

Methods for the toxicity tests are summarized in Tables 1 to 4. Testing was conducted according to procedures described by the Environment Canada protocols (2007a, 2007b, 2007c and 2011). Statistical analyses for all tests were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house culture
Test organism age	<24 h old neonates produced within 12 h
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20 mL test tube
Test volume	15 mL
Test replicates	10 test replicates per treatment
Number of organisms	1 per replicate
Control water	20% Perrier water
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	<i>Pseudokirchneriella subcapitata</i> and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada, (2007a) EPS 1/RM/21
Statistical software	CETIS (2013)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods
Reference toxicant	Sodium chloride

Table 2. Summary of test conditions: fathead minnow (*Pimephales promelas*) survival and growth test.

Test organism	<i>Pimephales promelas</i>
Test organism source	Aquatic BioSystems, Fort Collins, CO
Test organism age	<24 hours
Test type	Static renewal
Test duration	7 days
Test vessel	375-mL glass containers
Test volume	250 mL
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control water	Moderately-hard water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	Twice a day with newly hatched brine shrimp (<i>Artemia nauplii</i>)
Light intensity	100 – 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test protocol	Environment Canada (2011), EPS 1/RM/22
Statistical software	CETIS (2013)
Test endpoint	Survival and biomass
Test acceptability criteria for controls	≥80% survival, ≥250 µg mean dry weight
Reference toxicant	Sodium Chloride

Table 3. Summary of test conditions: *Lemna minor* growth inhibition test.

Test organism	<i>Lemna minor</i>
Test organism source	In-house culture, obtained from Canadian Phycological Culture Centre, and originally isolated from Wainfleet, Stinking Barn, Niagara Peninsula, Ontario, Canada
Test organism age	7-to 10-day old
Test type	Static
Test duration	7 days
Test vessel	250 mL glass containers
Test volume	100 mL
Test replicates	4 test replicates per treatment
No. of organisms	Two 3-frond plants per replicate
Control water	Deionized water with nutrients added
Test solution renewal	None
Test temperature	25 ± 2°C
Feeding	None
Light intensity	4000 to 5600 lux full spectrum light
Photoperiod	24 hours light
Aeration	None
Test protocol	Environment Canada (2007b), EPS 1/RM/37
Statistical software	CETIS (2013)
Test endpoint	Number of fronds and dry weight
Test acceptability criteria for controls	≥ 8-fold increase in number of fronds
Reference toxicant	Potassium chloride

Table 4. Summary of test conditions: *Pseudokirchneriella subcapitata* growth inhibition test.

Test organism	<i>Pseudokirchneriella subcapitata</i> , strain UTCC #37
Test organism source	In-house culture, obtained from Canadian Phycological Culture Center, and originally isolated from Nitelva River, Norway.
Test organism age	3- to 7-day old culture in logarithmic growth phase
Test type	Static
Test duration	72 hours
Test vessel	Microplate
Test volume	220 µL
Test replicates	4 replicates per treatment; 8 replicates for control
Number of organisms	10,000 cells/mL
Control water	Deionized water with supplemented nutrients
Test solution renewal	None
Test temperature	24 ± 2°C
Feeding	None
Light intensity	3600 to 4400 lux
Photoperiod	24 hours light
Aeration	None
Test protocol	Environment Canada (2007c), EPS1/RM/25
Statistical software	CETIS (2013)
Test endpoint	Algal cell growth inhibition
Test acceptability criteria for controls	≥ 16-fold increase in number of algal cells; CV ≤ 20%; no trend when analyzed using Mann-Kendall test
Reference toxicant	Zinc

3.0 RESULTS

Adverse effects were observed only on *C. dubia* reproduction (Table 5). The IC25 and IC50 values were 3.0 and 5.3%, respectively. There were no adverse effects observed on survival of *C. dubia*, survival and growth of fathead minnow (Table 6), frond count and dry weight of *L. minor* (Table 7) or cell yield of *P. subcapitata* (Table 8). The LC and IC values were therefore greater than the highest concentration tested for each of these endpoints in these toxicity tests. In addition, a stimulatory effect was observed for *P. subcapitata* cell yield; percent stimulation ranged from 9.6 to 198.7%.

Table 5. Results: *Ceriodaphnia dubia* survival and reproduction test.

Concentration (% v/v)	Survival (%)	Reproduction (mean ± SD)
Control	100	18.8 ± 4.0
1.56	100	16.2 ± 3.6
3.12	100	13.9 ± 3.5
6.25	90	8.0 ± 4.4
12.5	90	6.8 ± 3.7
25	80	3.4 ± 2.9
50	90	1.6 ± 1.4
100	100	2.1 ± 1.0
Test endpoint (% v/v)		
LC50	>100	--
IC25 (95% CL)	--	3.0 (1.4 - 4.0)
IC50 (95% CL)	--	5.3 (4.3 - 9.0)

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits.

Table 6. Results: fathead minnow (*Pimephales promelas*) survival and growth test.

Concentration (% v/v)	Mean ± SD		
	Survival (%)	Biomass (µg)	Dry Weight (µg)
Control	100.0 ± 0.0	839.0 ± 37.4	839.0 ± 37.4
1.56	93.3 ± 5.8	769.3 ± 46.9	824.8 ± 36.8
3.1	100.0 ± 0.0	796.3 ± 49.8	796.3 ± 49.8
6.25	100.0 ± 0.0	855.3 ± 26.3	855.3 ± 26.3
12.5	96.7 ± 5.8	801.3 ± 14.5	830.7 ± 44.4
25	100.0 ± 0.0	775.0 ± 26.9	775.0 ± 26.9
50	96.7 ± 5.8	823.7 ± 37.6	855.6 ± 90.8
100	100.0 ± 0.0	732.7 ± 24.5	732.7 ± 24.5
Test endpoint (% v/v)			
LC50	>100	--	--
IC25	--	>100	>100
IC50	--	>100	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

Table 7. Results: *Lemna minor* growth inhibition test.

Concentration (% v/v)	Frond Growth (No. of Fronds)	Dry Weight (mg)
	(Mean ± SD)	(Mean ± SD)
Control	51.5 ± 1.3	4.3 ± 0.3
1.5	54.8 ± 6.6	4.7 ± 1.1
3.0	51.5 ± 3.7	4.1 ± 0.7
6.1	53.0 ± 7.9	4.5 ± 1.1
12.1	55.2 ± 6.8	4.7 ± 0.6
24.2	49.5 ± 4.9	4.0 ± 0.4
48.5	58.0 ± 6.1	5.0 ± 0.8
97	51.8 ± 11.5	4.4 ± 1.1
Test endpoint		
IC25	>97	>97
IC50	>97	>97

SD = Standard Deviation, IC = Inhibition Concentration.

Table 8. Results: *Pseudokirchneriella subcapitata* growth inhibition test.

Concentration (% v/v)	Cell Density (x 10 ⁴ cells/mL) (Mean ± SD)	Stimulation (%)
Control	39.0 ± 4.0	--
1.5	42.8 ± 4.8	9.6
3.0	54.8 ± 5.1*	40.4
6.0	74.8 ± 6.2*	91.7
11.9	74.0 ± 7.0*	89.7
23.8	116.5 ± 7.5*	198.7
47.6	97.8 ± 13.7*	150.6
95.2	56.2 ± 7.6*	44.2
Test endpoint (% v/v)		
IC25	>95.2	--
IC50	>95.2	--

SD = Standard Deviation, IC = Inhibition Concentration.

*Indicates cell yield that were significantly greater than the control.

4.0 QA/QC

The health history of the test organisms used in the exposures was acceptable and met the requirements of the Environment Canada protocols. The tests met all control acceptability criteria and water quality parameters remained within ranges specified in the protocols throughout the tests. Uncertainty associated with these tests is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

The *L. minor* test was initiated using fronds from a culture dish that had visible contamination. The client was notified and requested to proceed with testing. All test acceptability criteria were satisfied, indicating that the fronds used in the test were healthy and the data presented in this report are valid. There were no other deviations from the test methodologies.

Results of the reference toxicant tests conducted during the testing program are summarized in Table 9. Results for these tests fell within the range for organism performance of mean and two standard deviation range, based on historical results obtained by the laboratory with these tests. Thus, the sensitivity of the organisms used in these tests was appropriate.

Table 9. Reference toxicant results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>C. dubia</i>	Survival (LC50): 1.8 g/L NaCl	1.8 (1.2 - 2.7)	22	August 26 , 2014
	Reproduction (IC50): 1.3 g/L NaCl	1.4 (1.0 - 1.9)	19	
<i>P. promelas</i>	Survival (LC50): 4.2 g/L NaCl	4.5 (3.4 - 5.9)	14	August 29, 2014
	Biomass (IC50): 3.2 g/L NaCl	4.0 (2.9 - 5.5)	18	
<i>L. minor</i>	No. Fronds (IC50) 3.8 g/L KCl	4.2 (3.1 - 5.7)	16	September 5, 2014
<i>P. subcapitata</i>	Growth (IC50) 29.2 µg/L Zn	25.2 (14.8 - 42.8)	30	September 5, 2014

SD = Standard Deviation, CV = Coefficient of Variation, IC = Inhibition Concentration, LC = Lethal Concentration.

5.0 REFERENCES

- Environment Canada. 2007a. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. Report EPS 1/RM/21, Second Edition, February 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 74 pp.
- Environment Canada. 2007b. Biological test method: tests for measuring the inhibition of growth using the freshwater macrophyte, *Lemna minor*. Environmental Protection Series, Report EPS 1/RM/37. Second Edition. January 2007. Environment Canada, Method Development and Application Section, Environmental Technology Centre, Ottawa, ON. 112 pp.
- Environment Canada. 2007c. Biological test method: growth inhibition test using the freshwater alga. Environmental Protection Series, Report EPS 1/RM/25. Second Edition, March 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 53 pp.
- Environment Canada. 2011. Biological test method: test of larval growth and survival using fathead minnows. Environmental Protection Series, Report EPS 1/RM/22. February 2011,. Environment Canada, Environmental Protection, Conservation and Protection, Ottawa, ON. 73 pp.
- Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.4.29 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: Mount Pottery
 Work Order No.: 14602

Start Date/Time: Aug 29/14 @ 1100h
 Set up by: EMM

Sample Information:

Sample ID: QUL-6640m-140828
 Sample Date: Aug 28/14
 Date Received: Aug 29/14
 Sample Volume: 3x20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 082114
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 20
 Mortality (%) in previous 7 d: 0
 Individual female # used ≥ 8 young on test day: 21, 23, 25, 26, 28, 29, 30

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd117
 Stock Solution ID: 14Na02
 Date Initiated: Aug 26/14

7-d LC50 (95% CL): 1.8 (1.5 - 2.2) g/L NaCl
 7-d IC50 (95% CL): 1.3 (1.1 - 1.5) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.8 (1.2 - 2.7) g/L NaCl CV (%): 22
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0 - 1.9) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		3.0 (1.56 - 4.0)
IC50 % (v/v) (95% CL)		5.3 (4.3 - 9.0)

Reviewed by: Jbu

Date reviewed: Oct 9/14

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: QU 66-40M-140828
 Work Order #: 14602

Start Date & Time: Aug 29/14 02:11:00h
 Stop Date & Time: Sept 4/14 02:14:30h
 Test Species: Ceriodaphnia dubia

Concentration <i>CONTROL</i>	Days													
	0 init.	1		2		3		4		5		6 <i>Final</i>		7 <i>Final</i>
	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	24.5	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	8.1	7.3	7.9	7.4	7.8	7.3	8.0	7.9	8.0	7.2	8.0	7.3		
pH	8.0	7.6	8.1	8.0	8.1	7.6	8.0	8.0	8.0	7.6	8.1	7.6		
Cond. (µS/cm)	218	218		214		213		213		215		216		
Initials	EMM	YML		JW		EMM		EMM		EMM		EMM		

Concentration <i>(11V)</i> 1.56% <th colspan="14">Days</th>	Days													
	0 init.	1		2		3		4		5		6 <i>Final</i>		7 <i>Final</i>
	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	25.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	8.0	7.2	8.0	7.4	7.6	7.5	8.1	7.9	8.0	7.3	8.2	7.1		
pH	7.9	7.8	7.9	8.0	8.3	7.8	8.2	8.0	8.1	7.7	8.1	7.6		
Cond. (µS/cm)	222	217		213		216		214		215		219		
Initials	EMM	YML		JW		EMM		EMM		EMM		EMM		

Concentration <i>(11V)</i> 12.5% <th colspan="14">Days</th>	Days													
	0 init.	1		2		3		4		5		6 <i>Final</i>		7 <i>Final</i>
	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	24.5	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	8.0	7.2	8.0	7.4	7.6	7.5	8.1	7.3	8.0	7.3	8.2	7.1		
pH	7.8	7.5	8.0	8.0	8.3	7.9	8.2	8.0	8.2	7.8	8.1	7.7		
Cond. (µS/cm)	206	206		202		209		209		205		209		
Initials	EMM	YML		JW		EMM		EMM		EMM		EMM		

Concentration <i>(11V)</i> 100% <th colspan="14">Days</th>	Days													
	0 init.	1		2		3		4		5		6 <i>Final</i>		7 <i>Final</i>
	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	24.5	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	8.1	7.3	8.1	7.6	8.2	7.5	8.2	7.3	8.0	7.2	8.1	7.2		
pH	7.2	7.3	7.0	7.9	7.8	7.7	7.7	7.8	7.7	7.7	7.7	7.7		
Cond. (µS/cm)	121	119		121		120		121		116		119		
Initials	EMM	YML		JW		EMM		EMM		EMM		EMM		

	Control	100% (11V)	
Hardness*	100	98	
Alkalinity*	1880	48	

* mg/L as CaCO3

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5

Sample Description: water starts slightly turbid, color, slightly yellow

Comments: Broodboard Used: 082114

Analysts: EMM, AWB, YML
 Reviewed by: JW
 Date reviewed: Oct. 9/14

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: mt. palley
 Sample ID: 01466-140M-140828
 Work Order: 14602

Start Date & Time: Aug 29/14 @ 1100h
 Stop Date & Time: Sept 4/14 @ 1430h
 Set up by: Emm

%(v/v)

Days	Concentration: <u>Control</u>												Concentration: <u>1.56</u>												Concentration: <u>3.12</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm		
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW		
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm		
4	3	4	4	4	3	4	4	2	3	3	Emm	4	4	3	4	4	2	2	2	3	3	Emm	3	4	4	3	3	3	3	3	3	3	Emm			
5	6	6	7	7	5	5	8	6	7	9	Emm	5	9	5	6	7	8	4	6	7	9	Emm	5	7	7	4	4	8	5	7	5	6	Emm			
6	✓	9	8	10	10	11	11	8	10	11	Emm	8	✓	8	8	9	10	10	10	13	✓	Emm	9	✓	10	8	8	✓	8	9	9	7	Emm			
7																																				
8																																				
Total	9	19	19	21	18	20	23	16	20	23	Emm	13	13	13	17	20	22	14	18	20	12	Emm	14	10	21	12	12	11	13	19	14	13	Emm			

Days	Concentration: <u>6.25</u>												Concentration: <u>12.5</u>												Concentration: <u>25</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm			
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW			
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	X	✓	✓	✓	X	✓	✓	✓	✓	✓	Emm			
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm			
5	4	5	4	4	4	5	✓	4	3	✓	Emm	4	5	4	4	5	3	4	3	4	✓	Emm	✓	3	3	2	✓	2	4	2	3	✓	Emm			
6	7	6	6	5	7	6	✓	6	4	✓	Emm	5	8	4	X	✓	4	6	5	✓	✓	Emm	3	✓	7	3	✓	✓	✓	✓	2	✓	Emm			
7																																				
8																																				
Total	11	11	10	9	11	11	0	10	7	X	Emm	9	13	8	4	X	5	7	10	8	4	Emm	X	3	3	10	5	6	2	4	2	5	Emm			

Days	Concentration: <u>50</u>												Concentration: <u>100</u>												Concentration:											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm														
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW														
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm														
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm														
5	✓	✓	✓	2	1	✓	2	3	✓	2	Emm	✓	2	4	2	2	3	2	2	2	2	Emm														
6	✓	✓	✓	✓	✓	2	2	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm														
7																																				
8																																				
Total	0	0	2	2	1	2	4	3	X	2	Emm	0	2	4	2	2	3	2	2	2	2	Emm														

Notes: X = mortality.
 Sample Description: slightly turbid, slightly yellow

Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: Joh

Date reviewed: Oct 9/14

CETIS Analytical Report

Report Date: 12 Sep-14 10:24 (p 1 of 2)
 Test Code: 14602 | 16-5245-5322

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 21-2379-4125	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 12 Sep-14 10:23	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 01-0864-3862	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 29 Aug-14 11:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 04 Sep-14 14:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 3h	Source: In-House Culture	Age: <24h
Sample ID: 18-3439-2202	Code: 6D569A8A	Client: Mount Polley
Sample Date: 28 Aug-14 10:05	Material: Effluent	Project:
Receive Date: 29 Aug-14 09:50	Source: Mount Polley (MT POLLEY)	
Sample Age: 25h (7.2 °C)	Station: QUL-66-40m-140828	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1495908	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	4.465	3.916	N/A	22.39	NA	25.54
EC10	100	4.865	N/A	1	NA	20.55
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
12.5		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
25		10	0.8	0	1	0.1333	0.4216	52.7%	20.0%	8	10
50		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	0
12.5		1	1	1	0	1	1	1	1	1	1
25		0	1	1	1	1	0	1	1	1	1
50		1	1	1	1	1	1	1	1	0	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 12 Sep-14 10:24 (p 2 of 2)
 Test Code: 14602 | 16-5245-5322

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

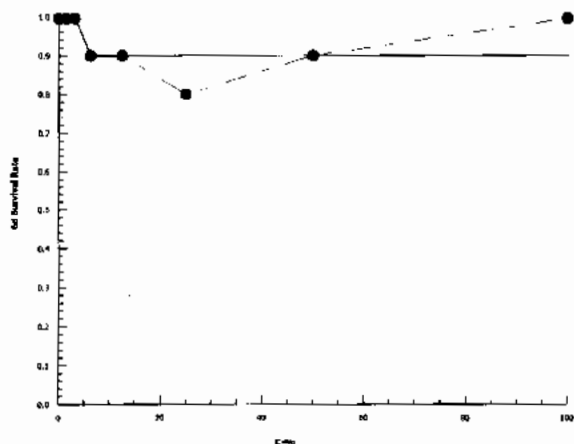
Analysis ID: 21-2379-4125 Endpoint: 6d Survival Rate
 Analyzed: 12 Sep-14 10:23 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1
12.5		1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1
25		0/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 12 Sep-14 10:25 (p 1 of 2)
 Test Code: 14602 | 16-5245-5322

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 05-2109-3510	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 12 Sep-14 10:24	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 01-0864-3862	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 29 Aug-14 11:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 04 Sep-14 14:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 3h	Source: In-House Culture	Age: <24h
Sample ID: 18-3439-2202	Code: 6D569A8A	Client: Mount Polley
Sample Date: 28 Aug-14 10:05	Material: Effluent	Project:
Receive Date: 29 Aug-14 09:50	Source: Mount Polley (MT POLLEY)	
Sample Age: 25h (7.2 °C)	Station: QUL-66-40m-140828	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1516179	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.4047	0.1886	1.933	247.1	51.72	530.2
IC10	0.9733	0.4128	2.484	102.7	40.26	242.3
IC15	1.679	0.6792	3.299	59.55	30.31	147.2
IC20	2.254	0.996	3.643	44.36	27.45	100.4
IC25	2.953	1.372	4.019	33.86	24.88	72.86
IC40	4.295	3.328	5.72	23.28	17.48	30.05
IC50	5.34	4.325	9.012	18.73	11.1	23.12

Reproduction Summary

C-%	Control Type	Count	Mean	Min	Max	Calculated Variate				%Effect
						Std Err	Std Dev	CV%		
0	Negative Control	10	18.8	9	23	1.281	4.05	21.54%	0.0%	
1.56		10	16.2	12	22	1.153	3.645	22.5%	13.83%	
3.12		10	13.9	10	21	1.1	3.479	25.03%	26.06%	
6.25		10	8	0	11	1.39	4.397	54.96%	57.45%	
12.5		10	6.8	0	13	1.162	3.676	54.06%	63.83%	
25		10	3.4	0	10	0.9214	2.914	85.69%	81.91%	
50		10	1.6	0	4	0.4269	1.35	84.37%	91.49%	
100		10	2.1	0	4	0.3145	0.9944	47.35%	88.83%	

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	9	19	19	21	18	20	23	16	20	23
1.56		13	13	13	17	20	22	14	18	20	12
3.12		14	10	21	12	12	11	13	19	14	13
6.25		11	11	10	9	11	11	0	10	7	0
12.5		9	13	8	4	5	7	10	8	4	0
25		0	3	3	10	5	0	2	4	2	5
50		0	0	2	2	1	2	4	3	0	2
100		0	2	4	2	2	3	2	2	2	2

QA: *Joh*
Oct-9/14

CETIS Analytical Report

Report Date: 12 Sep-14 10:25 (p 2 of 2)
Test Code: 14602 | 16-5245-5322

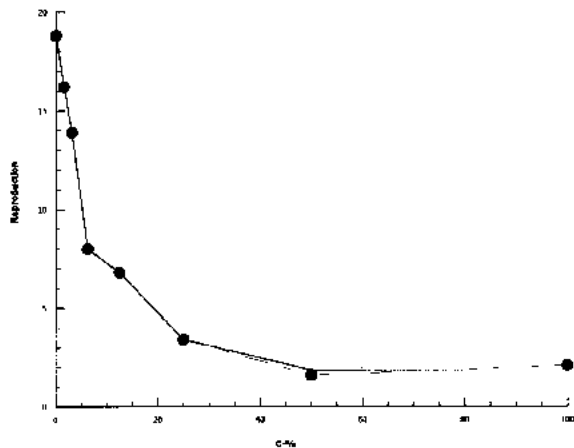
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 05-2109-3510 Endpoint: Reproduction
Analyzed: 12 Sep-14 10:24 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Client: Mount Polley

W.O.#: 14602

Hardness and Alkalinity Datasheet

Sample ID	Alkalinity					Hardness			Technician
	Sample Date	Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
@L166-40m	aug 28/14	50	2.6	2.8	48	50	2.4	48	EMM
20% Perrier	aug 28/14	50	4.2	4.4	80	50	5.0	100	EMM

Notes: _____

Reviewed by: JGU

Date Reviewed: Oct-9/14

APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

Fathead Minnow Test Summary Sheet

(7-d *Pimephales promelas* Survival and Growth Test)

Client: Mount Pooley
 Work Order No.: 14603

Start Date/Time: Aug 29/14 @ 1250h
 Test Species: P. promelas

Sample Information:

Sample ID: 011-66-40m-140625
 Sample Date: Aug 28/14
 Date Received: Aug 29/14
 Sample Volume: 3 x 20L

Dilution Water (initial water quality):

Type: Moderately hard water
 Temperature (°C): 25.0
 pH: 8.1
 Dissolved Oxygen (mg/L): 8.0
 Hardness (mg/L CaCO₃): 100
 Alkalinity (mg/L CaCO₃): 60

Test Validity Criteria:

The test is invalid if:

- 1) for the control solutions, the combined and cumulative incidence of any mortalities, or fish showing loss of equilibrium or other signs of atypical swimming behavior, is >20%
- 2) the average dry weight of the surviving control fish does not attain 250 ug when the fish are dried and weighed.

WQ Ranges:
 T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4; pH = 6.5 to 8.5

Test Organism Information:

Batch No.: 082914
 Source: Aquatic Biosystems
 Age: 27d 224hr

NaCl Reference Toxicant Results:

Reference Toxicant ID: PP93
 Stock Solution ID: nlq
 Date Initiated: Aug 29/14
 7-d EC50 (95% CL): 4.2 (3.5-5.0)
 7-d IC50 (95% CL): 3.2 (2.7-3.9)

Survival:
 Reference Toxicant Mean and Historical Range: 4.5 (3.4-5.9) CV (%): 14

Biomass:
 Reference Toxicant Mean and Historical Range: 4.0 (2.9-5.5) CV (%): 18

Test Results:

	Survival	Biomass
LC25 % (v/v) (95% CL)	>100	
LC50 % (v/v) (95% CL)	>100	
IC25 % (v/v) (95% CL)		>100
IC50 % (v/v) (95% CL)		>100

Reviewed by: JGu

Date reviewed: Oct. 9/14

**7-d Chronic Freshwater Toxicity Test
Initial and Final Water Quality Measurements**

Client: Mount Polley
 Sample ID: COJL 66- (purple)
 Work Order #: 40M-140828
14603

Start Date & Time: Aug 29/14 @ 1250h
 Stop Date & Time: Sept 5/14 @ 1230h
 Test Species: Pimephales promelas

Concentration <u>Control</u>	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	25.0	25.0	25.5	25.0	25.5	25.5	24.0	24.0	24.5	25.0	25.0	24.5	25.0	24.0	24.0
DO (mg/L)	8.0	6.2	7.9	6.1	7.9	6.0	8.1	5.5	7.6	5.8	8.0	5.3	8.2	3.5	3.5
pH	8.1	7.8	8.0	7.6	8.0	7.2	8.1	7.7	8.2	7.5	8.3	7.5	8.3	8.1	8.1
Cond. (µS/cm)	324		320		221		328		309		335		339		362
Initials	KJL		AD		AD		KJL		JW		KJL		KJL		BTL

Concentration <u>1.56</u>	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	24.0	25.0	25.5	25.0	25.5	25.5	24.5	24.0	24.5	25.0	24.0	24.5	25.0	24.0	24.0
DO (mg/L)	8.1	6.2	7.9	6.0	7.9	6.0	7.6	6.1	7.8	5.7	7.6	5.4	8.1	3.3	3.3
pH	8.1	7.8	8.0	7.6	8.0	7.5	8.2	7.7	8.3	7.5	8.4	7.5	8.4	8.1	8.1
Cond. (µS/cm)	319		315		310		327		308		308		330		355
Initials	KJL		AD		AD		KJL		JW		KJL		KJL		BTL

Concentration <u>12.5</u>	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	24.0	25.0	25.5	25.0	25.5	25.0	24.5	24.0	24.5	25.0	24.0	24.5	25.0	24.0	24.0
DO (mg/L)	8.1	6.2	7.9	6.0	8.0	5.9	7.5	6.4	7.9	5.8	7.6	5.5	7.8	3.6	3.6
pH	8.1	7.9	7.9	7.7	8.0	7.5	8.2	7.8	8.2	7.5	8.5	7.5	8.2	8.0	8.0
Cond. (µS/cm)	296		295		297		302		302		305		310		332
Initials	KJL		AD		AD		KJL		JW		KJL		KJL		BTL

Concentration <u>100</u>	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	24.0	25.0	25.5	25.0	25.5	25.0	24.0	24.0	24.0	25.0	24.0	24.5	24.5	24.0	24.0
DO (mg/L)	8.3	6.3	8.0	5.9	8.2	5.9	8.1	5.2	8.1	5.9	8.3	5.8	8.4	5.3	5.3
pH	7.8	7.9	7.9	7.8	8.0	7.6	7.9	7.7	7.9	7.4	8.0	7.5	7.9	8.0	8.0
Cond. (µS/cm)	122		120		122		121		119		121		121		129
Initials	KJL		AD		AD		KJL		JW		KJL		KJL		BTL

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6.5 to 8.5

DO meter: 3 pH meter: 3 Conductivity meter: 3

	Control	100% (V/V)		
Hardness*	100	48		
Alkalinity*	610	48		

* mg/L as CaCO₃

Analysts: KJL, AD, JW
 Reviewed by: JG
 Date reviewed: Oct. 9/14

Sample Description: _____
 Comments: _____

7-d Fathead Minnow Toxicity Test Daily Survival

Client: Mount Polley
 Sample ID: RUB 66-40m-1 (purple)
 Work Order #: 14603 140828

Start Date & Time: Aug 29/14 @ 12:56h
 Stop Date & Time: Sept 5/14 @ 12:01h
 Test Species: Pimephales promelas

Concentration % (v/v)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	10	10	10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
1.56	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			9	9	9	9	9	
3.1	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
6.25	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
12.5	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
25	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
50	A			10	10	10	10	10	
	B			9	9	9	9	9	
	C			10	10	10	10	10	
100	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
	A								
	B								
	C								
	A								
	B								
	C								
Tech Initials		m	m	RJL	RJL	RJL	RJL	RJL	JW

Comments: _____

Reviewed by: JGU

Date reviewed: Oct. 9/14

Fathead Minnow Toxicity Test Data Sheet

Dry Weight Data

Client:

Mount Polley

Start Date & Time:

Aug 29/14 @ 12:50h

Sample ID:

OWL 66-40⁰ (purple)

Termination Date & Time:

Sept 5/14 @ 12:20h

Work Order No.:

-140828
14603

Concentration % (v/v)	Rep	50 Pan No. purple	No. alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control	A	1	10	JW	1020.95	1028.94	10	NV
	B	2	10		1024.62	1033.07	10	
	C	3	10		1039.44	1048.17	10	
1.56	A	4	10		996.7.03	1005.13	10	
	B	5	9		1038.57	1046.37	9	
	C	6	9		1032.30	1039.48	9	
3.1	A	7	10		984.82	993.31	10	
	B	8	10		1008.42	1016.32	10	
	C	9	10		1064.18	1071.68	10	
6.25	A	10	10		1022.72	1031.41	10	
	B	11	10		1009.45	1018.17	10	
	C	12	10		1009.89	1018.14	10	
12.5	A	13	10		1024.03	1032.21	10	
	B	14	9		1016.945	1024.87	9	
	C	15	10		1041.56	1049.50	10	
25	A	16	10		1040.24	1048.68	10	
	B	17	10		1025.56	1033.45	10	
	C	18	10		1037.304	1033.04 / 1040.96	10	
50	A	19	10		1041.21	1049.41	10	
	B	20	9		1044.26	1052.89	9	
	C	21	10		1048.5.18	1053.06	10	
100	A	22	10		1025.71	1032.79	10	
	B	23	10		1028.7.00	1034.33	10	
	C	24	10		1023.32	1030.89	10	

Comments:

Re-weighed pans 6-1039.59 15-1049.52

Reviewed by:

JGL

Date Reviewed:

Oct-9/14

CETIS Analytical Report

Report Date: 01 Oct-14 08:58 (p 1 of 2)
 Test Code: 14603 | 13-8653-9066

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 19-8888-7622	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 09 Sep-14 15:20	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 05-3264-1062	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 29 Aug-14	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 05 Sep-14 12:30	Species: Pimephales promelas	Brine:
Duration: 7d 13h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 08-3884-0155	Code: 31FFAF5B	Client: Mount Polley
Sample Date: 28 Aug-14 10:05	Material: Effluent	Project:
Receive Date: 29 Aug-14 09:50	Source: Mount Polley (MT POLLEY)	
Sample Age: 14h (7.2 °C)	Station: QUL-66-40m-140828	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	390074	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	3	1	1	1	0	0	0.0%	0.0%	30	30
1.56		3	0.9333	0.9	1	0.03333	0.05773	6.19%	6.67%	28	30
3.1		3	1	1	1	0	0	0.0%	0.0%	30	30
6.25		3	1	1	1	0	0	0.0%	0.0%	30	30
12.5		3	0.9667	0.9	1	0.03333	0.05773	5.97%	3.33%	29	30
25		3	1	1	1	0	0	0.0%	0.0%	30	30
50		3	0.9667	0.9	1	0.03333	0.05773	5.97%	3.33%	29	30
100		3	1	1	1	0	0	0.0%	0.0%	30	30

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	1	1	1
1.56		1	0.9	0.9
3.1		1	1	1
6.25		1	1	1
12.5		1	0.9	1
25		1	1	1
50		1	0.9	1
100		1	1	1

QA: *Joh*
 Oct-9/14

CETIS Analytical Report

Report Date: 01 Oct-14 08:58 (p 2 of 2)
Test Code: 14603 | 13-8653-9066

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

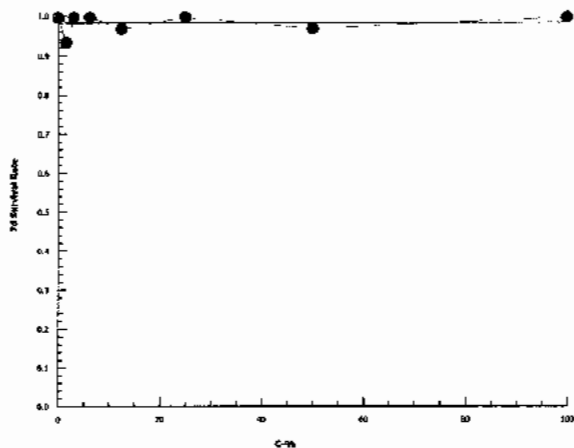
Analysis ID: 19-8888-7622 Endpoint: 7d Survival Rate
Analyzed: 09 Sep-14 15:20 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	10/10	10/10	10/10
1.56		10/10	9/10	9/10
3.1		10/10	10/10	10/10
6.25		10/10	10/10	10/10
12.5		10/10	9/10	10/10
25		10/10	10/10	10/10
50		10/10	9/10	10/10
100		10/10	10/10	10/10

Graphics



CETIS Analytical Report

Report Date: 01 Oct-14 08:58 (p 1 of 2)
 Test Code: 14603 | 13-8653-9066

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 17-8036-7326	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 09 Sep-14 15:20	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 05-3264-1062	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 29 Aug-14	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 05 Sep-14 12:30	Species: Pimephales promelas	Brine:
Duration: 7d 13h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 08-3884-0155	Code: 31FFAF5B	Client: Mount Polley
Sample Date: 28 Aug-14 10:05	Material: Effluent	Project:
Receive Date: 29 Aug-14 09:50	Source: Mount Polley (MT POLLEY)	
Sample Age: 14h (7.2 °C)	Station: QUL-66-40m-140828	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	864637	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	51.21	N/A	96.81	1.953	1.033	NA
IC10	79.25	27.65	N/A	1.262	NA	3.616
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.839	0.799	0.873	0.02158	0.03737	4.45%	0.0%
1.56		3	0.7693	0.718	0.81	0.02709	0.04692	6.1%	8.3%
3.1		3	0.7963	0.75	0.849	0.02875	0.0498	6.25%	5.09%
6.25		3	0.8553	0.825	0.872	0.01519	0.02631	3.08%	-1.95%
12.5		3	0.8013	0.792	0.818	0.008353	0.01447	1.81%	4.49%
25		3	0.775	0.744	0.792	0.01552	0.02688	3.47%	7.63%
50		3	0.8237	0.788	0.863	0.02173	0.03763	4.57%	1.83%
100		3	0.7327	0.708	0.757	0.01414	0.0245	3.34%	12.67%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.799	0.845	0.873
1.56		0.81	0.78	0.718
3.1		0.849	0.79	0.75
6.25		0.869	0.872	0.825
12.5		0.818	0.792	0.794
25		0.744	0.789	0.792
50		0.82	0.863	0.788
100		0.708	0.733	0.757

CETIS Analytical Report

Report Date: 01 Oct-14 08:58 (p 2 of 2)
Test Code: 14603 | 13-8653-9066

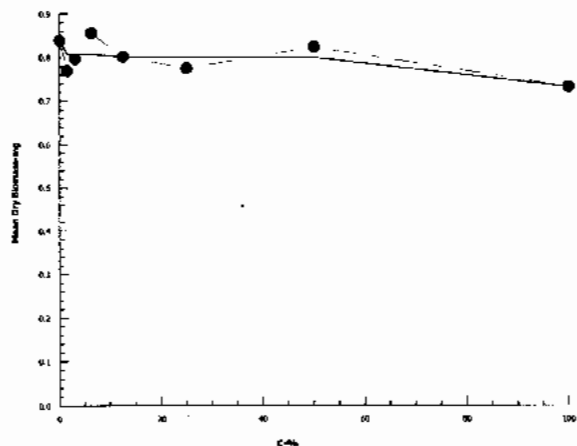
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 17-8036-7326 Endpoint: Mean Dry Biomass-mg
Analyzed: 09 Sep-14 15:20 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 19 Nov-14 12:15 (p 1 of 2)
 Test Code: 14603 | 13-8653-9066

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 13-6296-1450	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 18 Nov-14 16:11	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 05-3264-1062	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 29 Aug-14	Protocol: EC/EPS 1/RW/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 05 Sep-14 12:30	Species: Pimephales promelas	Brine:
Duration: 7d 13h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 08-3884-0155	Code: 31FFAF5B	Client: Mount Polley
Sample Date: 28 Aug-14 10:05	Material: Effluent	Project:
Receive Date: 29 Aug-14 09:50	Source: Mount Polley (MT POLLEY)	
Sample Age: 14h (7.2 °C)	Station: QUL-66-40m-140828	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1390436	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	58.31	N/A	80.33	1.715	1.245	NA
IC10	82.9	36.04	N/A	1.206	NA	2.774
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.839	0.799	0.873	0.02158	0.03737	4.45%	0.0%
1.56		3	0.8248	0.7978	0.8667	0.02122	0.03676	4.46%	1.69%
3.1		3	0.7963	0.75	0.849	0.02875	0.0498	6.25%	5.09%
6.25		3	0.8553	0.825	0.872	0.01519	0.02631	3.08%	-1.95%
12.5		3	0.8307	0.794	0.88	0.02562	0.04438	5.34%	0.99%
25		3	0.775	0.744	0.792	0.01552	0.02688	3.47%	7.63%
50		3	0.8556	0.788	0.9589	0.05245	0.09084	10.62%	-1.98%
100		3	0.7327	0.708	0.757	0.01414	0.0245	3.34%	12.67%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.799	0.845	0.873
1.56		0.81	0.8667	0.7978
3.1		0.849	0.79	0.75
6.25		0.869	0.872	0.825
12.5		0.818	0.88	0.794
25		0.744	0.789	0.792
50		0.82	0.9589	0.788
100		0.708	0.733	0.757

CETIS Analytical Report

Report Date: 19 Nov-14 12:15 (p 2 of 2)
Test Code: 14603 | 13-8653-9066

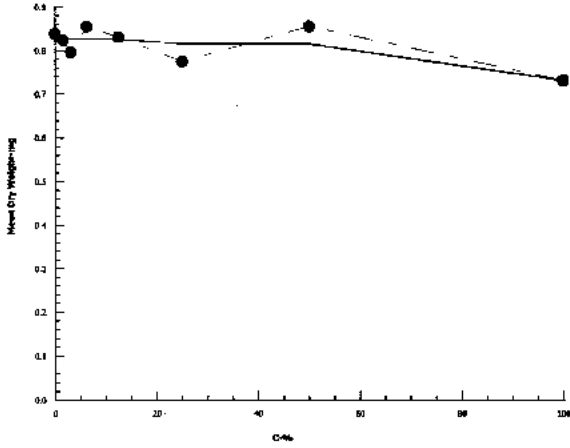
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 13-6296-1450 Endpoint: Mean Dry Weight-mg
Analyzed: 18 Nov-14 16:11 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



APPENDIX C - *Lemna Minor* Toxicity Test Data

Lemna minor Summary Sheet

Client: Mount Polley
Work Order No.: 14605

Start Date: AUGUST 29 / 14
Set up by: KLP

Sample Information:

Sample ID: GUL-66-40M-140828
Sample Date: AUG 28 / 14
Date Received: AUG 29 / 14
Sample Volume: 3 x 20L

Test Organism Information:

Culture Date: 082014
Age of culture (Day 0): 9 days
>8X growth in APHA?: Y (31 fronds)

KCI Reference Toxicant Results:

Reference Toxicant ID: Lm 108
Date Initiated: Sept 5/14

7-d No. of Fronds IC50 (95% CL): 3.8 (3.4 - 4.2)

7-d No. Fronds IC50 Reference Toxicant Mean (2 SD Range): 4.2 (3.1-5.7) CV (%): 16

	Number of Fronds	Dry Weight
Test Results: IC25 %(v/v) (95% CL)	> 97	> 97
IC50 %(v/v) (95% CL)	> 97	> 97

Reviewed by: JGh

Date reviewed: Oct. 10/14

Plant Growth Inhibition Toxicity Test Water Quality Measurements

Client: Mount Polley Setup by: KLP
 Sample ID: QUL-66-40m-140828 Test Date: AUG 29/14
 Work Order No.: 14605 Test Species: Lemna minor
 Culture Source: CPC # 490
 Test Culture Age: 9 days > 8X Growth? (Y/N): Y (31 Fronds)
 Light Intensity Range: 4000-4200 lux Date Measured: AUG 27/14

Day	0	1	2	3	4	5	6	7
Shelf Temp (°C)	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.0
Initials	KLP	A	n	EMM	EMM	JW	JW	JW

Sample Characteristics: Initial Water Quality Adjusted Water Quality

Temperature (°C)	<u>26.0</u>	Aeration?:	<u>20 min</u>	Temperature (°C)	<u>24.5</u>
DO (mg/L)	<u>8.8</u>	Nutrients added?:	<u>Y</u>	DO (mg/L)	<u>7.5</u>
pH	<u>7.7</u>			pH	<u>7.5 → 8.0</u>
Conductivity (µS)	<u>123</u>			Conductivity (µS)	<u>910</u>

Concentration % (v/v)	Temperature (°C)		pH		Conductivity (µS) 0 h
	Day 0	Day 7	Day 0	Day 7	
Control	23.0	25.0	8.2	8.3	832
1.5	23.0	24.0	8.1	8.5	833
3.0	23.0	24.0	8.1	8.8	835
6.1	23.0	24.0	8.1	8.8	835
12.1	23.0	24.0	8.1	8.8	840
24.2	23.0	24.0	8.1	9.0	845
48.5	23.0 ^{KLP} 24.0	24.0	8.1	8.9	870
97	23.0 ^{KLP} 24.5	24.0	8.0	9.3	910
Initials	KLP	JW	KLP	JW	KLP

Thermometer: Calibrated Thermometer Cond. Meter: 2 pH meter: 4
 Sample Description: slightly turbid, slightly yellow
 Comments: slight culture 082014 used for testing. Dishes contained a white jelly-like sphere of contamination. Client wishes to proceed with testing.
 Reviewed: Joh Date Reviewed: Oct. 10/14

Lemna minor Toxicity Test Data Sheet - 7-d Frond Counts

Client: Mount Poiley
 Sample ID: SUL - 66-40m-140828
 Work Order #: 14605

Start Date: Aug 29/14
 Termination Date: Sept 5/14
 Test set up by: KUP

Concentration %o (v/v)	Rep	No. of fronds		Chlorosis	Necrosis	Yellow	Abnormal size	Gibbosity	Single fronds	Root destruction	Loss of buoyancy	Comments	Initials
		Day 0	Day 7										
control	A	6	58										JW
	B	6	59										
	C	6	57										
	D	6	56										
1.5	A	6	61										
	B	6	53										
	C	6	60										
	D	6	69										
3.0	A	6	55										
	B	6	54										
	C	6	59										
	D	6	62										
6.1	A	6	60										
	B	6	50										
	C	6	57										
	D	6	69										
12.1	A	6	63										
	B	6	55										
	C	6	70										
	D	6	57										
24.2	A	6	56										
	B	6	56										
	C	6	61										
	D	6	49										

Comments: _____

Reviewed by: Joh

Date Reviewed: Oct. 10/14

Lemna minor Toxicity Test Data Sheet - 7-d Frond Counts

Client: MOUNT POLLEY
 Sample ID: QUL - 66-40m-140828
 Work Order #: 14605

Start Date: Aug 29/14
 Termination Date: Sept 5/14
 Test set up by: REP

Concentration % (V/V)	Rep	No. of fronds		Chlorosis	Necrosis	Yellow	Abnormal size	Gibbosity	Single fronds	Root destruction	Loss of buoyancy	Comments	Initials
		Day 0	Day 7										
48.5	A	6	55										JW
	B	6	68										
	C	6	67										
	D	6	66										
97	A	6	51										
	B	6	68										
	C	6	67										
	D	6	45										
	A												
	B												
	C												
	D												
	A												
	B												
	C												
	D												
	A												
	B												
	C												
	D												

Comments: _____

Reviewed by: JGh

Date Reviewed: Oct. 10/14

7-d Lemna minor Weight Data Sheet

Client: Mount Polley
 Sample ID: QUL - 66-40m - 140828
 Work Order #: 14605

Start Date: Aug 29/14
 Termination Date: Sept 5/14

Concentration % (V/V)	Rep	MP Pan No. Green	Pan weight (mg)	Pan + plant (mg)	Initials
control	A	1	1028.00	1032.07	BTL /JW
	B	2	1046.64	1051.36	
	C	3	999.71	1004.22	
	D	4	1026.14	1030.19	
1.5	A	5	1015.19	1019.45	
	B	6	1030.43	1033.97	
	C	7	1037.54	1042.47	
	D	8	1046.13	1052.37	
3.0	A	9	1041.90	1045.66	
	B	10	1010.08	1013.46	
	C	11	1060.34	1064.63	
	D	12	1053.03	1058.06	
6.1	A	13	1036.21	1040.76	
	B	14	1037.88	1041.14	
	C	15	1056.14	1060.40	
	D	16	1052.63	1058.54	
12.1	A	17	1041.91	1046.33	
	B	18	1026.13	1030.81	
	C	19	1010.01	1015.56	
	D	20	1049.25	1053.57	
24.2	A	21	1043.71	1047.51	
	B	22	1048.05	1052.13	
	C	23	1019.16	1023.57	
	D	24	1005.10	1008.63	
48.5	A	25	1023.31	1027.30	
	B	26	1019.38	1025.31	
	C	27	1020.60	1025.44	
	D	28	1011.77	1016.92	

Comments: 10% Rereigh: #1 1032.06 #18 1030.70
#7 1042.33 #29 1016.91

Reviewed by: JH Date Reviewed: Oct. 10/14

7-d Lemna minor Weight Data Sheet

Client: MOUNT POLLEY
 Sample ID: 6UL - 66 - 40m - 40000
 Work Order #: 14605

Start Date: Aug 29/14
 Termination Date: sep 5/14

Concentration % (NAV)	Rep	MP Pan No. steel	Pan weight (mg)	Pan + plant (mg)	Initials
97	A	29	1013.17	1017.04	BTL/JW
	B	30	1035.48	1040.44	↓
	C	31	1032.45	1037.96	↓
	D	32	1033.64	1036.79	↓
	A				
	B				
	C				
	D				
	A				
	B				
	C				
	D				
	A				
	B				
	C				
	D				
	A				
	B				
	C				
	D				

Comments: _____

Reviewed by: JGU Date Reviewed: Oct. 10/14

CETIS Analytical Report

Report Date: 09 Sep-14 15:59 (p 1 of 2)
 Test Code: 14605 | 20-5005-4014

Lemna Growth Inhibition Test

Nautilus Environmental

Analysis ID: 06-1420-9792	Endpoint: Frond Count	CETIS Version: CETISv1.8.7
Analyzed: 09 Sep-14 15:58	Analysis: Nonlinear Regression	Official Results: Yes
Batch ID: 10-9807-1042	Test Type: Lemna Growth	Analyst: Jeslin Wijaya
Start Date: 29 Aug-14	Protocol: EC/EPS 1/RM/37	Diluent: Modified APHA
Ending Date: 05 Sep-14	Species: Lemna minor	Brine:
Duration: 7d 0h	Source: CPCC#490	Age: 9d
Sample ID: 08-3884-0155	Code: 31FFAF5B	Client: Mount Polley
Sample Date: 28 Aug-14 10:05	Material: Effluent	Project:
Receive Date: 29 Aug-14 09:50	Source: Mount Polley (MT POLLEY)	
Sample Age: 14h (7.2 °C)	Station: QUL-66-40m-140828	

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
2P Exponential EV [Y=A*exp(log(0.5)*X/D)]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
6	-75.08	154.6	157.1		Yes	0.7608	2.508	0.6076	Non-Significant Lack of Fit

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	1486000	N/A	N/A	0.0000672	NA	NA
IC10	3053000	N/A	N/A	0.0000327	NA	NA
IC15	4710000	N/A	N/A	0.0000212	NA	NA
IC20	6467000	N/A	N/A	0.0000154	NA	NA
IC25	8337000	N/A	N/A	0.0000119	NA	NA
IC40	14800000	N/A	N/A	0.0000067	NA	NA
IC50	20090000	N/A	N/A	0.0000049	NA	NA

} > 97% (V/V) ON

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	53.06	1.456	50.21	55.91	36.44	<0.0001	Significant Parameter
D	20090000	4.04E+11	-7.9E+11	7.91E+11	4.98E-05	1.0000	Non-Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	0	0	1	0	1.0000	Non-Significant
Lack of Fit	205.2692	34.21154	6	0.7608	0.6076	Non-Significant
Pure Error	1079.25	44.96875	24			
Residual	1284.519	42.81731	30			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	10.49	14.07	0.1626	Equal Variances
	Mod Levene Equality of Variance	2.065	2.423	0.0877	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9632	0.9338	0.3352	Normal Distribution
	Anderson-Darling A2 Normality	0.4751	2.492	0.2443	Normal Distribution

Frond Count Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	51.5	50	53	0.6455	1.291	2.51%	0.0%
1.5		4	54.75	47	63	3.276	6.551	11.97%	-6.31%
3		4	51.5	48	56	1.848	3.697	7.18%	0.0%
6.1		4	53	44	63	3.937	7.874	14.86%	-2.91%
12.1		4	55.25	49	64	3.376	6.752	12.22%	-7.28%
24.2		4	49.5	43	55	2.466	4.933	9.97%	3.88%
48.5		4	58	49	62	3.028	6.055	10.44%	-12.62%
97		4	51.75	39	62	5.764	11.53	22.28%	-0.49%

CETIS Analytical Report

Report Date: 09 Sep-14 15:59 (p 2 of 2)
Test Code: 14605 | 20-5005-4014

Lemna Growth Inhibition Test

Nautilus Environmental

Analysis ID: 06-1420-9792
Analyzed: 09 Sep-14 15:58

Endpoint: Frond Count
Analysis: Nonlinear Regression

CETIS Version: CETISv1.8.7
Official Results: Yes

Frond Count Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	52	53	51	50
1.5		55	47	54	63
3		49	48	53	56
6.1		54	44	51	63
12.1		57	49	64	51
24.2		50	50	55	43
48.5		49	62	61	60
97		45	62	61	39

CETIS Analytical Report

Report Date: 09 Sep-14 15:59 (p 1 of 2)
 Test Code: 14605 | 20-5005-4014

Lemna Growth Inhibition Test

Nautilus Environmental

Analysis ID: 03-4440-1163	Endpoint: Total Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 09 Sep-14 15:58	Analysis: Nonlinear Regression	Official Results: Yes
Batch ID: 10-9807-1042	Test Type: Lemna Growth	Analyst: Jeslin Wijaya
Start Date: 29 Aug-14	Protocol: EC/EPS 1/RM/37	Diluent: Modified APHA
Ending Date: 05 Sep-14	Species: Lemna minor	Brine:
Duration: 7d 0h	Source: CPCC#490	Age: 9d
Sample ID: 08-3884-0155	Code: 31FFAF5B	Client: Mount Polley
Sample Date: 28 Aug-14 10:05	Material: Effluent	Project:
Receive Date: 29 Aug-14 09:50	Source: Mount Polley (MT POLLEY)	
Sample Age: 14h (7.2 °C)	Station: QUL-66-40m-140828	

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Log-Gompertz EV [Y=A*exp(log(0.5)*(X/D)^C)]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
13	-8.18	23.22	26.76		Yes	1.056	2.621	0.4089	Non-Significant Lack of Fit

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	28090000	N/A	N/A	0.0000000	NA	NA
IC10	63010000	N/A	N/A	0.0000000	NA	NA
IC15	10250000	N/A	N/A	9.759E-13	NA	NA
IC20	14620000	N/A	N/A	6.838E-13	NA	NA
IC25	19450000	N/A	N/A	5.142E-13	NA	NA
IC40	37040000	N/A	N/A	0.0000000	NA	NA
IC50	52170000	N/A	N/A	1.917E-13	NA	NA

} > 97% (V/V) JW

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	4.381	0.2769	3.838	4.924	15.82	<0.0001	Significant Parameter
C	0.8912	7.1E+10	-1.4E+11	1.39E+11	1.26E-11	1.0000	Non-Significant Parameter
D	5.22E+14	1.22E+27	-2.4E+27	2.38E+27	4.29E-13	1.0000	Non-Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	0	0	1	0	1.0000	Non-Significant
Lack of Fit	3.538787	0.707758	5	1.056	0.4089	Non-Significant
Pure Error	16.08974	0.670406	24			
Residual	19.62852	0.676846	29			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	7.076	14.07	0.4211	Equal Variances
	Mod Levene Equality of Variance	1.119	2.423	0.3836	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9702	0.9338	0.5053	Normal Distribution
	Anderson-Darling A2 Normality	0.3097	2.492	0.5837	Normal Distribution

CETIS Analytical Report

Report Date: 09 Sep-14 15:59 (p 2 of 2)
 Test Code: 14605 | 20-5005-4014

Lemna Growth Inhibition Test

Nautilus Environmental

Analysis ID: 03-4440-1163 Endpoint: Total Dry Weight-mg CETIS Version: CETISv1.8.7
 Analyzed: 09 Sep-14 15:58 Analysis: Nonlinear Regression Official Results: Yes

Total Dry Weight-mg Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	4.337	4.05	4.72	0.1659	0.3318	7.65%	0.0%
1.5		4	4.742	3.54	6.24	0.5742	1.148	24.22%	-9.34%
3		4	4.115	3.38	5.03	0.3576	0.7151	17.38%	5.13%
6.1		4	4.495	3.26	5.91	0.5466	1.093	24.32%	-3.63%
12.1		4	4.742	4.32	5.55	0.2797	0.5593	11.79%	-9.34%
24.2		4	3.955	3.53	4.41	0.1887	0.3774	9.54%	8.82%
48.5		4	4.978	3.99	5.93	0.4012	0.8023	16.12%	-14.76%
97		4	4.372	3.15	5.51	0.5312	1.062	24.3%	-0.81%

Total Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	4.07	4.72	4.51	4.05
1.5		4.26	3.54	4.93	6.24
3		3.76	3.38	4.29	5.03
6.1		4.55	3.26	4.26	5.91
12.1		4.42	4.68	5.55	4.32
24.2		3.8	4.08	4.41	3.53
48.5		3.99	5.93	4.84	5.15
97		3.87	4.96	5.51	3.15

APPENDIX D - *Pseudokirchneriella subcapitata* Toxicity Test Data

Pseudokirchneriella subcapitata Summary Sheet

Client: Mount Palley
Work Order No.: 14604

Start Date: Aug 29/14
Set up by: EMM

Sample Information:

Sample ID: GUL-66-40M-140828
Sample Date: Aug 28, 2014
Date Received: Aug 29, 2014
Sample Volume: 3x20L

Test Organism Information:

Culture Date: aug 22, 2014
Age of culture (Day 0): 7d

Zinc Reference Toxicant Results:

Reference Toxicant ID: SC118
Stock Solution ID: 14Zn01
Date Initiated: Sept 5/14

72-h IC50 (95% CL): 29.2 (25.6 - 32.4) µg/L Zn

72-h IC50 Reference Toxicant Mean and Range: 25.2 (14.8 - 42.8) µg/L Zn CV (%): 30

Test Results:

	Algal Growth
IC25 %(v/v) (95% CL)	<u>795.2</u>
IC50 %(v/v) (95% CL)	<u>795.2</u>

Reviewed by: JCh

Date reviewed: Oct. 6/14

72-h Algal Growth Inhibition Toxicity Test Water Quality Measurements

Client: Mount Polley Setup by: EMM
 Sample ID: QUL-66-40M (190828) Test Date/Time: Aug 29/14 @ 1500
 Work Order No.: 14604 Test Species: Pseudokirchneriella subcapitata

Culture Date: Aug 22/14 Age of Culture: 7d Culture Health: Good
 Culture Count: 1 880 2 864 Average: 872 Culture Cell Density (c1): 872 x 10⁴ cells/ml

$$v1 = \frac{220,000 \text{ cells/ml} \times 50 \text{ ml}}{(c1) \ 872 \times 10^4 \text{ cells/ml}} = 1.26 \text{ ml}$$

Time Zero Counts: 1 26 2 20 Average: 23

No. of Cells/mL: 23 x 10⁷ Initial Density: # cells/mL ÷ 220 µL x 10 µL = 10454.5 x 10⁴ cells/ml

Concentration %(v/v)	Water Quality Measurements					Microplates rotated 2X per day?			
	pH	Temp (°C)				0 h	24 h	48 h	72 h
		0 h	0 h	24 h	48 h				
Control	6.8	24.0	25.5	25.5	25.5	✓	✓	✓	✓
1.5	6.9	24.0	↓	↓	↓	✓	✓	✓	✓
3.0	6.9	24.0				✓	✓	✓	✓
6.0	6.9	24.0				✓	✓	✓	✓
11.9	6.9	24.0				✓	✓	✓	✓
23.8	6.9	24.0				✓	✓	✓	✓
47.6	7.1	24.0				✓	✓	✓	✓
95.2	7.2	24.0				✓	✓	✓	✓
Initials	EMM	EMM				EMM	EMM	EMM	EMM

Initial control pH: Well 1: 6.8 Well 2: 6.8

Final control pH: Well 1: 7.0 Well 2: 7.0

Light intensity (lux): 4100 Date measured: Aug 29/14

Sample Description: turbid, slightly yellow

Comments: _____

Reviewed: JGK Date reviewed: Oct-10/14

Pseudokirchneriella subcapitata Toxicity Test Data Sheet
72-h Algal Cell Counts

Client: Mount Pelley Start Date/Time: Aug 29/14 @ 1500
 Work Order #: 14604 Termination Date: Sept 1/14 @ 1500
 Sample ID: DUL 66-40m Test set up by: EMM
 %(v/v) (140728)

Concentration	Rep	Count 1	Count 2	Count 3	Count 4	Comments	Initials
Control	A	30					EMM
	B	39					
	C	46					
	D	42					
	E	44					
	F	38					
	G	39					
	H	41					
1.5	A	49					
	B	38					
	C	42					
	D	46					
3.0	A	49					
	B	55					
	C	58					
	D	61					
6.0	A	77					
	B	84					
	C	72					
	D	70					
11.9	A	78					
	B	65					
	C	76					
	D	81					
23.8	A	124					
	B	115					
	C	123					
	D	108					
47.6	A	77	85				
	B	95					
	C	109					
	D	110					
95.2	A	62					
	B	56					
	C	64					
	D	47					

Comments: _____

Reviewed by: JBU Date Reviewed: Oct. 10/14

CETIS Analytical Report

Report Date: 04 Sep-14 08:38 (p 1 of 2)
 Test Code: 14604 | 10-6609-9407

EC Alga Growth Inhibition Test

Nautilus Environmental

Analysis ID: 02-3646-0063	Endpoint: Cell Yield	CETIS Version: CETISv1.8.7
Analyzed: 04 Sep-14 8:37	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 10-2874-3788	Test Type: Cell Growth	Analyst: Emma Marus
Start Date: 29 Aug-14 15:00	Protocol: EC/EPS 1/RM/25	Diluent: Deionized Water + nutrients
Ending Date: 01 Sep-14 15:00	Species: Pseudokirchneriella subcapitata	Brine:
Duration: 72h	Source: In-House Culture	Age: 7d
Sample ID: 08-3884-0155	Code: 31FFAF5B	Client: Mount Polley
Sample Date: 28 Aug-14 10:05	Material: Effluent	Project:
Receive Date: 29 Aug-14 09:50	Source: Mount Polley (MT POLLEY)	
Sample Age: 29h (7.2 °C)	Station: QUL-66-40m-140828	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	2142401	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	56.1	51.66	65.78	1.782	1.52	1.936
IC10	66.1	55.91	90.04	1.513	1.111	1.788
IC15	77.84	60.32	N/A	1.285	NA	1.658
IC20	91.63	64.85	N/A	1.091	NA	1.542
IC25	>95.2	N/A	N/A	<1.05	NA	NA
IC40	>95.2	N/A	N/A	<1.05	NA	NA
IC50	>95.2	N/A	N/A	<1.05	NA	NA

>95.2% (v/v)

Cell Yield Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	8	39	33	45	1.427	4.036	10.35%	0.0%
1.5		4	42.75	37	48	2.394	4.787	11.2%	-9.62%
3		4	54.75	48	60	2.562	5.123	9.36%	-40.38%
6		4	74.75	69	83	3.119	6.238	8.35%	-91.67%
11.9		4	74	64	80	3.488	6.976	9.43%	-89.74%
23.8		4	116.5	107	123	3.753	7.506	6.44%	-198.7%
47.6		4	97.75	80	109	6.836	13.67	13.99%	-150.6%
95.2		4	56.25	46	63	3.816	7.632	13.57%	-44.23%

Cell Yield Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	35	38	45	41	43	37	33	40
1.5		48	37	41	45				
3		48	54	57	60				
6		76	83	71	69				
11.9		77	64	75	80				
23.8		123	114	122	107				
47.6		80	94	108	109				
95.2		61	55	63	46				

CETIS Analytical Report

Report Date: 04 Sep-14 08:38 (p 2 of 2)
Test Code: 14604 | 10-6509-9407

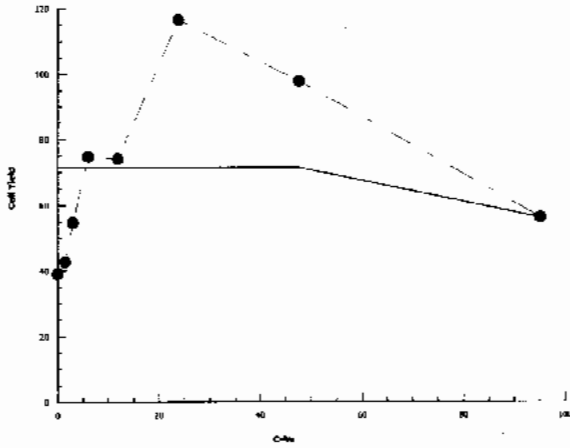
EC Alga Growth Inhibition Test

Nautilus Environmental

Analysis ID: 02-3646-0063 Endpoint: Cell Yield
Analyzed: 04 Sep-14 8:37 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 04 Sep-14 08:38 (p 1 of 2)
 Test Code: 14604 | 10-6509-9407

EC Alga Growth Inhibition Test

Nautilus Environmental

Analysis ID: 10-0211-8512	Endpoint: Cell Yield	CETIS Version: CETISv1.8.7
Analyzed: 04 Sep-14 8:37	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 10-2874-3788	Test Type: Cell Growth	Analyst: Emma Marus
Start Date: 29 Aug-14 15:00	Protocol: EC/EPS 1/RM/25	Diluent: Deionized Water + nutrients
Ending Date: 01 Sep-14 15:00	Species: Pseudokirchneriella subcapitata	Brine:
Duration: 72h	Source: In-House Culture	Age: 7d
Sample ID: 08-3884-0155	Code: 31FFAF5B	Client: Mount Polley
Sample Date: 28 Aug-14 10:05	Material: Effluent	Project:
Receive Date: 29 Aug-14 09:50	Source: Mount Polley (MT POLLEY)	
Sample Age: 29h (7.2 °C)	Station: QUL-66-40m-140828	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C < T	NA	NA	28.3%	1.5	3	2.121	66.67

Dunnnett Multiple Comparison Test

Control	vs C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	1.5	0.8573	2.526	11.05	10	0.6229	CDF	Non-Significant Effect
	3*	3.601	2.526	11.05	10	0.0039	CDF	Significant Effect
	6*	8.173	2.526	11.05	10	<0.0001	CDF	Significant Effect
	11.9*	8.001	2.526	11.05	10	<0.0001	CDF	Significant Effect
	23.8*	17.72	2.526	11.05	10	<0.0001	CDF	Significant Effect
	47.6*	13.43	2.526	11.05	10	<0.0001	CDF	Significant Effect
	95.2*	3.943	2.526	11.05	10	0.0016	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			0.9049	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	23676	3382.286	7	66.28	<0.0001	Significant Effect
Error	1428.75	51.02879	28			
Total	25104.75		35			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	7.844	18.48	0.3465	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9727	0.9166	0.5025	Normal Distribution

Cell Yield Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	8	39	35.63	42.37	39	33	45	1.427	10.35%	0.0%
1.5		4	42.75	35.13	50.37	43	37	48	2.394	11.2%	-9.62%
3		4	54.75	46.6	62.9	55.5	48	60	2.562	9.36%	-40.38%
6		4	74.75	64.82	84.68	73.5	69	83	3.119	8.35%	-91.67%
11.9		4	74	62.9	85.1	76	64	80	3.488	9.43%	-89.74%
23.8		4	116.5	104.6	128.4	118	107	123	3.753	6.44%	-198.7%
47.6		4	97.75	76	119.5	101	80	109	6.836	13.99%	-150.6%
95.2		4	56.25	44.11	68.39	58	46	63	3.816	13.57%	-44.23%

CETIS Analytical Report

Report Date: 04 Sep-14 08:38 (p 2 of 2)
 Test Code: 14604 | 10-6509-9407

EC Alga Growth Inhibition Test

Nautilus Environmental

Analysis ID: 10-0211-8512
 Analyzed: 04 Sep-14 8:37

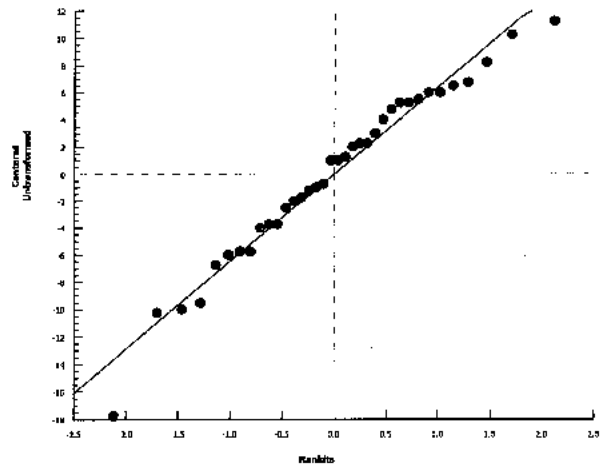
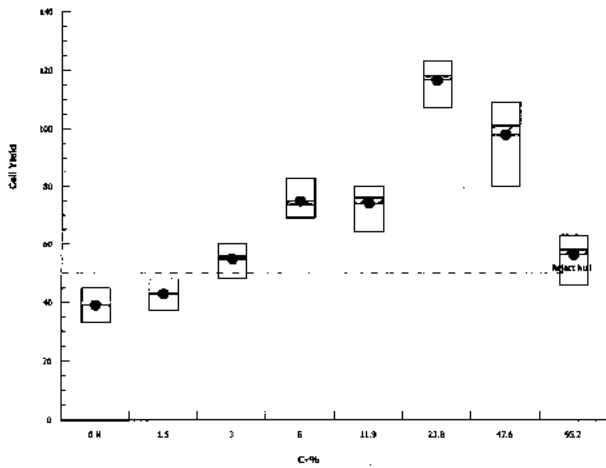
Endpoint: Cell Yield
 Analysis: Parametric-Control vs Treatments

CETIS Version: CETISv1.8.7
 Official Results: Yes

Cell Yield Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	35	38	45	41	43	37	33	40
1.5		48	37	41	45				
3		48	54	57	60				
6		76	83	71	69				
11.9		77	64	75	80				
23.8		123	114	122	107				
47.6		80	94	108	109				
95.2		61	55	63	46				

Graphics



APPENDIX E - Chain of Custody Form

Nautilus Environmental

British Columbia: 8884 Commerce Court, Burnaby, BC, V5A 4N7

Chain of Custody c)
 P0333
 4 _____ Page 1 of 1

wo #

14600
14601
14602
14603
14604
14605

Sample Collection By: McLean Donohoe		ANALYSES REQUIRED	
Report to:	Invoice to:	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 5px;">96h RBT LC50</div> <div style="margin-bottom: 5px;">48 h Daphnia magna LC50</div> <div style="margin-bottom: 5px;">7 Day Ceriodaphnia dubia</div> <div style="margin-bottom: 5px;">7 day fathead Minnow</div> <div style="margin-bottom: 5px;">72h algal growth</div> <div style="margin-bottom: 5px;">Lemna Growth</div> </div>	Receipt Temperature (°C)
Company: Mount Polley Mining Corporation	Mount Polley Mining Corporation		
Address: Box 12	Box 12		
City/Prov/Postal Code: Likely BC V0L 1N0	Likely BC V0L 1N0		
Contact: Colleen Hughes Deb McMillan	Colleen Hughes/		
Phone: (250) 790-2617	(250) 790-2617		
Email: chughes@mountpolley.com dmcmillan@minnow.ca	chughes@mountpolley.com		

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	96h RBT	48 h Daphnia magna	7 Day Ceriodaphnia dubia	7 day fathead Minnow	72h algal growth	Lemna Growth	Receipt Temperature (°C)
1 QUL-66-40m-140828	8/28/2014	10:05	water	60L 20L NY	3		X	X	X	X	X	X	7.2
2													
3													
4													
5													
6													
7													
8													
9													
10													

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)		RELIQUISHED BY (COURIER)	
Client: Mount Polley Mining Corporation		Total # Containers:	3	Signature:		Signature:	
P.O. No.:		Good Condition?	Y	Colleen Hughes		Print:	
Shipped Via: Greyhound		Matches Schedule?	Y	Company: MPMC		Company:	
SPECIAL INSTRUCTIONS/COMMENTS:				Time/Date: 28/08/2014 15:30:00		Time/Date:	
				RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)	
				Signature:		Signature: NY	
				Print:		Print: NAIR YAMAMOTO	
				Company:		Company: NAUTILUS	
		Time/Date:		Time/Date: Aug 29/14 @ 9:50			

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 16

**Toxicity testing on samples identified as HAD-2-140903 and QUL-66-45m-140903:
Samples collected September 3, 2014 (Report date October 24, 2014; Revised
December 4, 2014)**



Nautilus Environmental

**Toxicity testing on samples identified as
HAD-2-140903 and QUL-66-45m-140903**

Samples collected September 3, 2014

Final Report

Report date: October 24, 2014, revised December 4, 2014

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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LIST OF APPENDICES

APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data

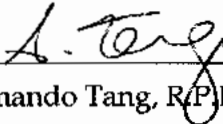
APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

APPENDIX C - Chain of Custody Form

SIGNATURE PAGE



Krysta Pearcy, B.Sc.
Laboratory Biologist



Armando Tang, R.P.Bio.
Laboratory Manager

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted toxicity tests for Mount Polley Mining Corporation on samples identified as HAD-2-140903 and QUL-66-45m-140903. The samples were collected on September 3, 2014 and delivered to the laboratory in Burnaby, BC on September 4, 2014. The samples were each transported in two 20-L plastic carboys and coolers. HAD-2-140903 and QUL-66-45m-140903 were received at temperatures of 10.9 and 7.3°C, respectively, and were stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing. The following sub-lethal toxicity tests were performed on the samples:

- *Ceriodaphnia dubia* survival and reproduction
- 7-d fathead minnow (*Pimephales promelas*) survival and growth

This report describes the results of these toxicity tests. Copies of laboratory data sheets and printouts of statistical analyses for each test are provided in Appendices A and B. The chain-of-custody form is provided in Appendix C. This report was revised from an earlier version to incorporate data for dry weight of fathead minnows, in addition to biomass.

2.0 METHODS

Methods for the toxicity tests are summarized in Tables 1 and 2. Testing was conducted according to procedures described by the Environment Canada protocols (2007 and 2011). Statistical analyses for all tests were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house culture
Test organism age	<24 h old neonates produced within 12 h
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20 mL test tube
Test volume	15 mL
Test replicates	10 test replicates per treatment
Number of organisms	1 per replicate
Control water	20% Perrier water
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	<i>Pseudokirchneriella subcapitata</i> and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada, (2007) EPS 1/RM/21
Statistical software	CETIS (2013)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods
Reference toxicant	Sodium chloride

Table 2. Summary of test conditions: fathead minnow (*Pimephales promelas*) survival and growth test.

Test organism	<i>Pimephales promelas</i>
Test organism source	Aquatic BioSystems, Fort Collins, CO
Test organism age	<24 hours
Test type	Static renewal
Test duration	7 days
Test vessel	375-mL glass containers
Test volume	250 mL
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control water	Moderately-hard water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	Twice a day with newly hatched brine shrimp (<i>Artemia nauplii</i>)
Light intensity	100 – 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test protocol	Environment Canada (2011), EPS 1/RM/22
Statistical software	CETIS (2013)
Test endpoint	Survival and biomass
Test acceptability criteria for controls	≥80% survival, ≥250 µg mean dry weight
Reference toxicant	Sodium Chloride

3.0 RESULTS

Results of the *C. dubia* test are provided in Table 3. No adverse effects were observed on survival or reproduction in HAD-2-140903; the LC50, IC25 and IC50 were >100%. No adverse effects on survival were observed in QUL-66-45m-140903; the LC50 was >100%. Reproduction was inhibited in QUL-66-45m-140903 resulting in an IC25 of 1.8% and an IC50 of 13.6%.

Results of the fathead minnow test are provided in Table 4. Adverse effects on survival and biomass were observed in HAD-2-140903. The LC50 was 84.1% and the IC25 was 24.2%. No adverse effects on survival or biomass were observed in QUL-66-45m-140903; the LC50, IC25 and IC50 were >100%.

Table 3. Results: *Ceriodaphnia dubia* survival and reproduction test.

Concentration (% v/v)	HAD-2-140903		QUL-66-45m-140903	
	Survival (%)	Reproduction (mean ± SD)	Survival (%)	Reproduction (mean ± SD)
Control	100	19.3 ± 5.2	100	19.3 ± 3.4
1.56	100	18.7 ± 7.5	100	14.9 ± 4.6
3.12	100	22.4 ± 5.3	100	11.3 ± 1.5
6.25	90	21.5 ± 11.9	90	13.8 ± 3.8
12.5	100	22.3 ± 6.9	100	9.8 ± 4.5
25	100	17.2 ± 6.7	90	8.6 ± 4.1
50	100	21.3 ± 7.5	80	8.0 ± 5.2
100	100	22.5 ± 3.7	100	3.3 ± 2.5
Test endpoint (%)				
LC50	>100	--	>100	--
IC25 (95% CL)	--	>100	--	1.8 (0.9 – 6.4)
IC50 (95% CL)	--	>100	--	13.6 (9.0 – 53.8)

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits.

Table 4. Results: fathead minnow (*Pimephales promelas*) survival and growth test.

Concentration (% v/v)	HAD-2-140903			QUL-66-45m-140903		
	(mean ± SD)					
	Survival (%)	Biomass (µg)	Dry Weight (µg)	Survival (%)	Biomass (µg)	Dry Weight (µg)
Control	96.7 ± 5.8	651.0 ± 72.0	675.6 ± 89.7	83.3 ± 20.8	646.7 ± 110.6	788.0 ± 72.5
1.56	83.3 ± 28.9	580.3 ± 121.5	727.7 ± 136.9	86.7 ± 5.8	595.0 ± 68.5	686.0 ± 54.1
3.12	83.3 ± 28.9	605.7 ± 231.2	718.7 ± 36.9	96.7 ± 5.8	698.0 ± 50.1	723.4 ± 59.4
6.25	73.3 ± 20.8	555.3 ± 156.8	758.8 ± 30.4	96.7 ± 5.8	689.0 ± 82.4	711.1 ± 45.8
12.5	85.6 ± 17.1	600.7 ± 53.6	713.7 ± 87.1	93.3 ± 11.6	624.3 ± 38.8	672.7 ± 47.4
25	53.3 ± 11.6	421.0 ± 116.3	782.2 ± 65.3	100.0 ± 0.0	736.0 ± 56.4	736.0 ± 56.4
50	73.3 ± 5.8	546.0 ± 27.6	745.7 ± 23.1	96.7 ± 5.8	732.3 ± 50.6	757.3 ± 8.1
100	43.3 ± 30.6	334.3 ± 227.8	773.0 ± 70.3	100.0 ± 0.0	717.7 ± 47.5	717.7 ± 47.5
Test endpoint						
LC50	84.1 (52.1 - 100)	--	--	>100	--	--
IC25 (95% CL)	--	24.2 (N/A - 100)	>100	--	>100	>100
IC50 (95% CL)	--	>100	>100	--	>100	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits, NA = Not Applicable.

4.0 QA/QC

The health history of the test organisms used in the exposures was acceptable and met the requirements of the Environment Canada protocols. The tests met all control acceptability criteria specified in the protocols throughout the tests. Uncertainty associated with these tests is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

On day 5 of the fathead minnow test with HAD-2-140903 the temperature in the 100% concentration was measured as 22.0 °C, which is below the range of $25 \pm 1^\circ\text{C}$ for this test, but well within the range of tolerance for this species. The temperature of the water bath was readjusted and the temperature increased to within the required range. All other water quality parameters measured during the toxicity tests were within the acceptable ranges. There were no other deviations from the test methodologies.

Results of the reference toxicant tests conducted during the testing program are summarized in Table 5. Results for the *C. dubia* test fell within the range for organism performance of mean and two standard deviation range, based on historical results obtained by the laboratory with these tests. Thus, the sensitivity of the organisms used in this test was appropriate.

In the fathead minnow reference toxicant test, mean control survival was 73.3% which was below the acceptability criterion of $\geq 80\%$. One control replicate had 30% survival while the other two control replicates had 90 and 100% survival. Mean control survival in the test with HAD-2-140903 and QUL-66-45m-140903 were 96.7% and 83.3%, respectively, indicating that the organisms used were healthy. Thus, the low survival in the one control replicate for the reference toxicant test was likely an anomalous result. Endpoints, historical means and coefficient of variations were not calculated or reported for the fathead minnow reference toxicant test due to the control failure.

Table 5. Reference toxicant results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>C. dubia</i>	Survival (LC50): 1.8 g/L NaCl	1.8 (1.2 - 2.7)	22	August 26 , 2014
	Reproduction (IC50): 1.3 g/L NaCl	1.4 (1.0 - 1.9)	19	
<i>P. promelas</i> *	Survival (LC50): N/A	N/A	N/A	September 5, 2014
	Biomass (IC50): N/A	N/A	N/A	

SD = Standard Deviation, CV = Coefficient of Variation, IC = Inhibition Concentration, LC = Lethal Concentration, N/A = Not Applicable.

*Results not available for the fathead minnow reference toxicant test. See QA/QC section for further details.

5.0 REFERENCES

Environment Canada. 2007. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. Report EPS 1/RM/21, Second Edition, February 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 74 pp.

Environment Canada. 2011. Biological test method: test of larval growth and survival using fathead minnows. Environmental Protection Series, Report EPS 1/RM/22. February 2011,. Environment Canada, Environmental Protection, Conservation and Protection, Ottawa, ON. 73 pp.

Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.4.29 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: Mount Polley
 Work Order No.: 14614

Start Date/Time: Sept 4/14 @ 1200h
 Set up by: EMM

Sample Information:

Sample ID: HAD-2-140903
 Sample Date: Sept 3/14
 Date Received: Sept 4/14
 Sample Volume: 2X20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 082114
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 43
 Mortality (%) in previous 7 d: 10
 Individual female # used ≥ 8 young on test day: 21, 22, 23, 26, 27, 30, 31, 33, 35, 36, 39

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd117
 Stock Solution ID: 14NaO2
 Date Initiated: Aug 20/14

7-d LC50 (95% CL): 1.8 (1.5-2.2) g/L NaCl
 7-d IC50 (95% CL): 1.3 (1.1-1.5) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.8 (1.2-2.7) g/L NaCl CV (%): 22
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-1.9) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		7100
IC50 % (v/v) (95% CL)		7100

Reviewed by: JGU

Date reviewed: Oct. 10/14

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: HAD-2-1409031
 Work Order #: 14614

Start Date & Time: Sept 4/14 @ 1200h
 Stop Date & Time: Sept 11/14 @ 1400h
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.5
DO (mg/L)	8.0	7.6	7.9	7.4	8.0	7.5	8.0	7.1	8.1	7.2	8.0	7.2	7.9	7.0
pH	8.1	7.6	8.1	7.7	8.0	7.7	8.1	7.7	8.1	7.8	8.1	7.7	7.9	7.5
Cond. (µS/cm)	216	216		217		218		216		216		214		236
Initials	EMM	EMM						EMM		EMM				JBF

Concentration	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.5
DO (mg/L)	8.1	7.6	8.2	7.4	8.0	7.5	8.0	6.9	8.0	7.1	8.3	7.3	7.9	7.1
pH	8.1	7.8	8.0	7.8	8.0	7.9	8.0	7.8	8.0	7.8	8.1	7.8	8.0	7.7
Cond. (µS/cm)	219	218		217		217		216		214		216		220
Initials	EMM	EMM						EMM		EMM				JBF

Concentration	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.5	25.0	24.5	24.5
DO (mg/L)	8.1	7.5	8.2	7.4	8.1	7.5	8.0	6.9	8.0	7.0	8.2	7.2	8.0	7.1
pH	8.1	7.9	8.0	7.8	8.0	8.0	8.0	7.9	8.1	7.7	8.2	7.8	8.1	7.7
Cond. (µS/cm)	216	216		217		218		216		215		215		221
Initials	EMM	EMM						EMM		EMM				JBF

Concentration	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.5
DO (mg/L)	8.0	7.5	8.2	7.5	8.1	7.5	8.1	7.0	8.1	7.0	8.2	7.0	8.0	7.0
pH	8.4	7.9	8.4	7.8	8.4	7.9	8.5	7.7	8.5	7.6	8.4	7.7	8.3	7.6
Cond. (µS/cm)	216	216		216		216		217		214		218		222
Initials	EMM	EMM						EMM		EMM				JBF

	Control	100% (v/v)
Hardness*	100	104
Alkalinity*	82	76

Analysts: EMM, AWC
 Reviewed by: JBF
 Date reviewed: Oct. 10/14

* mg/L as CaCO₃

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5

Sample Description: clear, little ppt.

Comments: Broodboard Used: 082114

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mount Palley
 Sample ID: SHI-6-14-14 HAD-2-140903
 Work Order: 14614

Start Date & Time: Sept 4/14 @ 1200h
 Stop Date & Time: Sept 11/14 @ 1400
 Set up by: EMM

96 (MU)

Days	Concentration: <u>control</u>												Concentration: <u>1.56</u>												Concentration: <u>3.12</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A			
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-			
4	2	4	4	3	3	2	3	3	✓	EMM	3	4	4	4	✓	✓	✓	✓	3	3	3	EMM	4	3	✓	✓	✓	✓	✓	3	✓	4	EMM			
5	6	4	7	7	5	6	6	6	3	EMM	7	6	4	9	4	3	3	6	7	6	EMM	4	8	7	4	5	4	4	6	6	✓	EMM				
6	8	9	11	11	✓	✓	8	10	✓	WML	10	✓	11	12	9	✓	✓	✓	✓	✓	WML	10	✓	8	7	9	10	11	10	9	✓	WML				
7	✓	14	14	✓	9	11	✓	✓	✓	13	JBF	✓	11	7	✓	15	5	✓	12	10	10	JBF	13	10	12	15	14	13	✓	✓	11	✓	JBF			
8																																				
Total	16	27	30	22	17	20	16	19	9	25	JBF	20	21	22	25	28	8	3	21	20	19	JBF	27	22	22	27	26	26	14	20	27	13	JBF			

Days	Concentration: <u>6.25</u>												Concentration: <u>12.5</u>												Concentration: <u>25</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A			
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-			
4	3	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	4	✓	✓	✓	✓	✓	3	✓	4	EMM	✓	✓	✓	✓	4	3	✓	✓	✓	4	EMM			
5	7	5	✓	5	4	✓	5	4	4	EMM	6	5	8	4	5	4	4	7	5	9	EMM	5	3	4	5	8	✓	5	5	6	10	EMM				
6	12	13	✓	8	11	9	8	9	10	WML	11	9	12	8	8	7	8	✓	8	9	WML	8	5	7	8	✓	6	9	8	11	9	WML				
7	✓	16	✓	15	15	✓	12	✓	19	13	JBF	✓	16	✓	17	15	✓	12	12	15	WML	JBF	✓	✓	✓	✓	12	12	15	✓	✓	✓	JBF			
8																																				
Total	22	34	0	28	30	4	25	13	33	26	JBF	17	30	24	29	28	11	12	22	28	28	JBF	13	8	11	13	24	21	29	13	17	23	JBF			

Days	Concentration: <u>50</u>												Concentration: <u>100</u>												Concentration: <u> </u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM														
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A														
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-														
4	3	✓	✓	✓	3	2	3	2	3	4	EMM	4	2	4	5	3	3	4	3	3	4	EMM														
5	6	6	4	4	✓	7	7	6	9	✓	EMM	12	8	✓	7	✓	10	9	8	11	EMM															
6	11	12	7	7	6	12	10	8	✓	13	WML	9	11	9	8	11	4	✓	5	6	12	WML														
7	✓	15	✓	17	✓	✓	✓	✓	12	14	JBF	✓	14	8	✓	17	11	✓	✓	✓	16	JBF														
8																																				
Total	20	33	11	11	26	20	20	16	24	31	JBF	25	21	27	21	21	24	25	17	17	27	JBF														

Notes: X = mortality.

Sample Description: OK, little pit

Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JGw

Date reviewed: Oct. 10/14

CETIS Analytical Report

Report Date: 18 Sep-14 07:56 (p 1 of 2)
 Test Code: 14614a | 20-9667-1885

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 07-8325-4158	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 18 Sep-14 7:48	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 12-9349-7514	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 04 Sep-14 12:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 11 Sep-14 14:00	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 2h	Source: In-House Culture	Age: <24h
Sample ID: 21-1973-5983	Code: 7E589AAF	Client: Mount Polley
Sample Date: 03 Sep-14 13:45	Material: Water Sample	Project:
Receive Date: 04 Sep-14 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 22h (10.9 °C)	Station: HAD-2-140903	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	2099409	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	0	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 18 Sep-14 07:56 (p 2 of 2)
 Test Code: 14614a | 20-9667-1885

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 07-8325-4158
 Analyzed: 18 Sep-14 7:48

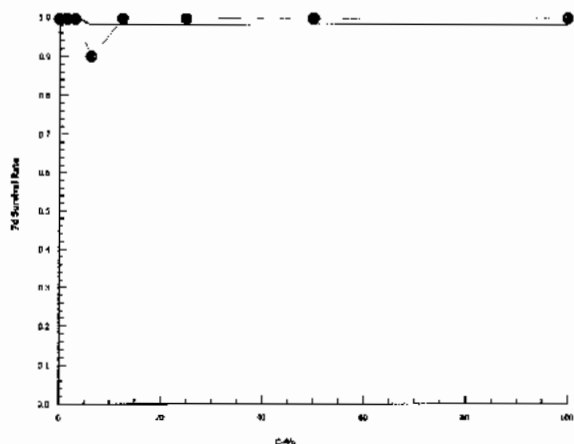
Endpoint: 7d Survival Rate
 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 18 Sep-14 07:56 (p 1 of 2)
 Test Code: 14614a | 20-9667-1885

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 21-2800-8259	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 18 Sep-14 7:48	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 12-9349-7514	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 04 Sep-14 12:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 11 Sep-14 14:00	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 2h	Source: In-House Culture	Age: <24h
Sample ID: 21-1973-5983	Code: 7E589AAF	Client: Mount Polley
Sample Date: 03 Sep-14 13:45	Material: Water Sample	Project:
Receive Date: 04 Sep-14 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 22h (10.9 °C)	Station: HAD-2-140903	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	956171	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	19.3	9	27	1.633	5.165	26.76%	0.0%
1.56		10	18.7	3	28	2.385	7.543	40.34%	3.11%
3.12		10	22.4	13	27	1.681	5.317	23.74%	-16.06%
6.25		10	21.5	0	34	3.766	11.91	55.39%	-11.4%
12.5		10	22.3	11	30	2.196	6.945	31.14%	-15.54%
25		10	17.2	8	29	2.133	6.746	39.22%	10.88%
50		10	21.3	11	33	2.367	7.484	35.14%	-10.36%
100		10	22.5	17	27	1.167	3.689	16.4%	-16.58%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	16	27	22	22	17	20	16	19	9	25
1.56		20	21	22	25	28	8	3	21	20	19
3.12		27	22	22	27	26	26	14	20	27	13
6.25		22	34	0	28	30	4	25	13	33	26
12.5		17	30	24	29	28	11	12	22	28	22
25		13	8	11	13	24	21	29	13	17	23
50		20	33	11	11	26	21	20	16	24	31
100		25	21	27	21	21	24	25	17	17	27

CETIS Analytical Report

Report Date: 18 Sep-14 07:56 (p 2 of 2)
Test Code: 14614a | 20-9667-1885

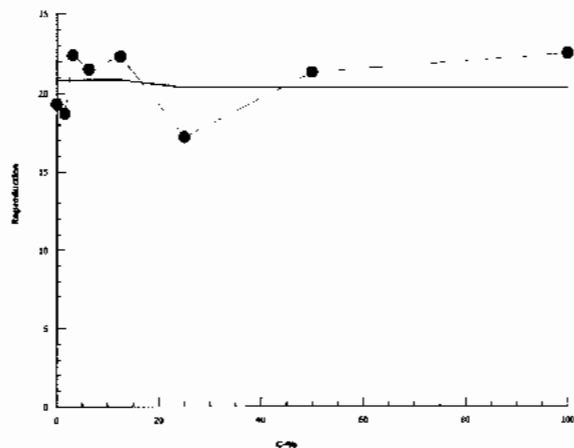
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 21-2800-8259 Endpoint: Reproduction
Analyzed: 18 Sep-14 7:48 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 10 Oct-14 12:11 (p 1 of 2)
 Test Code: 14614a | 20-9667-1885

Ceriodaphnia 7-d Survival and Reproduction Test				Nautilus Environmental			
Analysis ID: 17-7989-6607	Endpoint: Reproduction	CETIS Version: CETISv1.8.7		Official Results: Yes			
Analyzed: 10 Oct-14 12:11	Analysis: Parametric-Control vs Treatments						
Batch ID: 12-9349-7514	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy		Diluent: 20% Perrier Water			
Start Date: 04 Sep-14 12:00	Protocol: EC/EPS 1/RM/21	Brine:		Age: <24h			
Ending Date: 11 Sep-14 14:00	Species: Ceriodaphnia dubia	Source: In-House Culture		Client: Mount Polley			
Duration: 7d 2h	Source: In-House Culture			Project:			
Sample ID: 21-1973-5983	Code: 7E589AAF	Client: Mount Polley		Project:			
Sample Date: 03 Sep-14 13:45	Material: Water Sample						
Receive Date: 04 Sep-14 08:45	Source: Mount Polley (MT POLLEY)						
Sample Age: 22h (10.9 °C)	Station: HAD-2-140903						

Data Transform	Zeta	Alt	Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C < T		NA	NA	39.9%	100	>100	NA	1

Dunnett Multiple Comparison Test									
Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		1.56	-0.1858	2.386	7.705	18	0.9157	CDF	Non-Significant Effect
		3.12	0.9601	2.386	7.705	18	0.4963	CDF	Non-Significant Effect
		6.25	0.6813	2.386	7.705	18	0.6272	CDF	Non-Significant Effect
		12.5	0.9291	2.386	7.705	18	0.5110	CDF	Non-Significant Effect
		25	-0.6504	2.386	7.705	18	0.9739	CDF	Non-Significant Effect
		50	0.6194	2.386	7.705	18	0.6550	CDF	Non-Significant Effect
		100	0.991	2.386	7.705	18	0.4816	CDF	Non-Significant Effect

ANOVA Table						
Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	278.8	39.82857	7	0.764	0.6191	Non-Significant Effect
Error	3753.4	52.13055	72			
Total	4032.2		79			

Distributional Tests					
Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	14.5	18.48	0.0430	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9646	0.9579	0.0259	Normal Distribution

Reproduction Summary											
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	10	19.3	15.61	22.99	19.5	9	27	1.633	26.76%	0.0%
1.56		10	18.7	13.3	24.1	20.5	3	28	2.385	40.34%	3.11%
3.12		10	22.4	18.6	26.2	24	13	27	1.681	23.74%	-16.06%
6.25		10	21.5	12.98	30.02	25.5	0	34	3.766	55.39%	-11.4%
12.5		10	22.3	17.33	27.27	23	11	30	2.196	31.14%	-15.54%
25		10	17.2	12.37	22.03	15	8	29	2.133	39.22%	10.88%
50		10	21.3	15.95	26.65	20.5	11	33	2.367	35.14%	-10.36%
100		10	22.5	19.86	25.14	22.5	17	27	1.167	16.4%	-16.58%

Reproduction Detail											
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	16	27	22	22	17	20	16	19	9	25
1.56		20	21	22	25	28	8	3	21	20	19
3.12		27	22	22	27	26	26	14	20	27	13
6.25		22	34	0	28	30	4	25	13	33	26
12.5		17	30	24	29	28	11	12	22	28	22
25		13	8	11	13	24	21	29	13	17	23
50		20	33	11	11	26	21	20	16	24	31
100		25	21	27	21	21	24	25	17	17	27

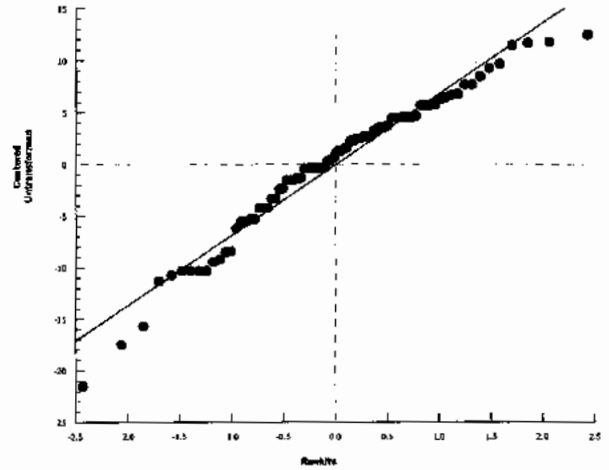
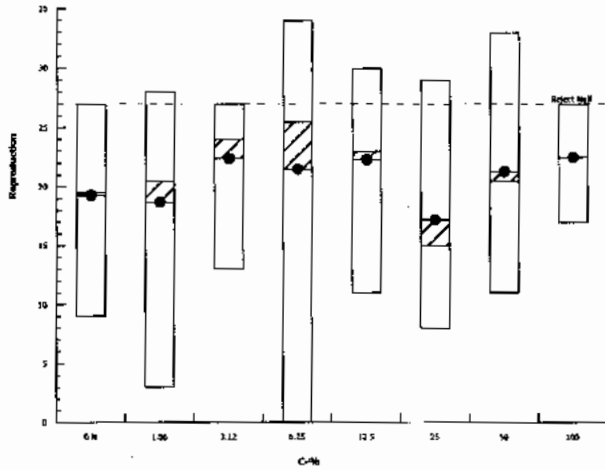
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 17-7989-6807 Endpoint: Reproduction
Analyzed: 10 Oct-14 12:11 Analysis: Parametric-Control vs Treatments

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Ceriodaphnia dubia Summary Sheet

Client: Mount Polley
 Work Order No.: 14624

Start Date/Time: Sept 4/14 @ 1130h
 Set up by: EMM

Sample Information:

Sample ID: QUL-66-45m-140903
 Sample Date: Sept 3/14
 Date Received: Sept 4/14
 Sample Volume: 2X20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 082114
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 43
 Mortality (%) in previous 7 d: 10
 Individual female # used ≥ 8 young on test day: 21, 22, 23, 26, 27, 30, 31, 33, 35, 36, 39

NaCl Reference Toxicant Results:

Reference Toxicant ID: Cd117
 Stock Solution ID: 14Na02
 Date Initiated: Aug 26/14

7-d LC50 (95% CL): 1.8 (1.5-2.2) g/L NaCl
 7-d IC50 (95% CL): 1.3 (1.1-1.5) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.8 (1.2-2.7) g/L NaCl CV (%): 22
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-1.9) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	09.0
IC25 % (v/v) (95% CL)		1.8 (1.56-6.4)
IC50 % (v/v) (95% CL)		13.6 (9.0-53.8)

Reviewed by: JOK

Date reviewed: Oct. 10/14

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: 09116-45M-140903
 Work Order #: 1409

Start Date & Time: Sept 4/14 @ 12:00h ¹¹³⁰
 Stop Date & Time: Sept 11/14 @ 1500h
 Test Species: Ceriodaphnia dubia

Concentration <i>Control</i>	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final	
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.0	
DO (mg/L)	8.0	7.5	7.9	7.8	8.0	7.5	8.0	7.1	8.1	7.1	8.0	7.2	7.9	6.7	
pH	8.1	7.8	8.1	7.7	8.0	7.7	8.1	7.7	8.1	7.6	8.1	7.7	7.9	7.5	
Cond. (µS/cm)	216	216		217		218		216		216		214		239	
Initials	EMM	EMM						EMM		EMM				JBF	

Concentration <i>CVL</i> 1.56%	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final	
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.0	
DO (mg/L)	8.1	7.4	8.1	7.4	8.0	7.4	7.9	7.0	8.0	7.6	8.2	7.3	7.9	6.5	
pH	8.1	7.9	8.1	7.7	8.0	7.8	8.0	7.8	8.1	7.7	8.1	7.7	8.0	7.6	
Cond. (µS/cm)	216	215		217		218		217		215		214		221	
Initials	EMM	EMM						EMM		EMM				JBF	

Concentration <i>CVL</i> 12.5%	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final	
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.5	25.0	24.5	24.0	
DO (mg/L)	8.0	7.4	8.0	7.5	8.0	7.7	7.9	7.0	7.9	6.9	8.2	7.3	7.9	6.6	
pH	8.1	7.9	8.1	7.7	8.0	7.8	8.0	7.7	8.0	7.6	8.2	7.6	8.1	7.7	
Cond. (µS/cm)	207	211		213		215		214		209		208		215	
Initials	EMM	EMM						EMM		EMM				JBF	

Concentration <i>VIV</i> 100%	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final	
Temperature (°C)	24.5	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	25.0	25.0	25.0	24.0	
DO (mg/L)	7.8	7.4	7.6	7.5	7.9	7.4	7.8	6.9	7.9	6.8	8.1	7.3	8.0	6.9	
pH	7.9	7.9	7.8	8.0	7.9	7.8	8.0	7.6	7.8	7.4	7.8	7.5	8.0	7.5	
Cond. (µS/cm)	150	154		153		152		154		154		154		166	
Initials	EMM	EMM						EMM		EMM				JBF	

	Control	100% CVL	
Hardness*	102	70	
Alkalinity*	82	56	

Analysts: EMM, AWD
JBF
 Reviewed by: JBF
 Date reviewed: Oct 10/14

* mg/L as CaCO₃

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5

Sample Description: w/ turbid, ppt present, greyish colour

Comments: Broodboard Used: 092114

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mount Palley 45cm
 Sample ID: HA02 OUL-66-40M-14043
 Work Order: 14614

Start Date & Time: Sept 4 14 @ 1130h
 Stop Date & Time: Sept 11 14 @ 1500h
 Set up by: EMM

9% (VU)

Days	Concentration: <u>control</u>											Concentration: <u>1.56</u>											Concentration: <u>3.12</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	3	4	4	3	✓	4	3	3	4	2	EMM	3	4	4	4	5	4	7	✓	4	6	EMM	4	4	3	4	4	4	✓	3	4	3	EMM
5	7	6	6	6	6	✓	8	7	8	7	EMM	8	7	8	8	7	8	8	7	8	2	EMM	7	8	8	7	6	6	7	7	6	6	EMM
6	9	9	10	✓	10	9	8	10	✓	✓	EMM	8	7	8	8	7	8	8	7	8	2	EMM	7	8	8	7	6	6	7	7	6	6	EMM
7	✓	✓	✓	13	✓	11	✓	✓	✓	13	SBF	✓	✓	✓	11	✓	✓	✓	✓	✓	12	SBF	✓	✓	✓	✓	✓	✓	8	✓	✓	✓	SBF
8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	SBF	✓	✓	✓	✓	✓	✓	✓	✓	✓	12	SBF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	SBF
Total	19	19	20	22	16	24	29	20	12	22	SBF	11	11	23	12	12	12	16	22	12	17	SBF	23	12	11	12	11	10	14	10	11	9	SBF

Days	Concentration: <u>6.25</u>											Concentration: <u>12.5</u>											Concentration: <u>25</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	3	3	2	4	3	6	4	3	3	3	EMM	✓	✓	✓	3	✓	✓	4	4	✓	3	EMM
5	6	4	5	4	4	4	2	4	4	4	EMM	6	5	7	7	6	7	5	5	5	5	EMM	3	6	6	5	5	6	6	6	✓	7	EMM
6	7	8	8	7	7	6	7	7	7	6	EMM	6	5	7	7	6	7	5	5	5	5	EMM	3	6	6	5	5	6	6	6	✓	7	EMM
7	✓	9	✓	✓	6	1	9	✓	✓	✓	SBF	✓	✓	✓	✓	11	2	✓	✓	✓	✓	SBF	1	8	✓	1	6	6	✓	✓	✓	✓	SBF
8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	SBF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	SBF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	SBF
Total	15	21	13	11	17	11	18	11	11	10	SBF	9	8	2	11	10	20	12	10	8	8	SBF	4	14	6	9	11	12	10	10	10	10	SBF

Days	Concentration: <u>50</u>											Concentration: <u>100</u>											Concentration: <u> </u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
4	X	X	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
5	✓	✓	3	3	✓	✓	3	✓	2	✓	EMM	✓	✓	3	✓	3	2	2	3	4	2	EMM											
6	✓	✓	5	4	5	4	5	4	✓	5	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
7	✓	✓	✓	✓	9	6	9	6	7	✓	SBF	✓	✓	✓	5	✓	✓	✓	5	✓	4	SBF											
8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	SBF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	SBF											
Total	0	0	8	7	9	13	14	13	8	12	SBF	0	0	3	5	3	2	2	8	4	6	SBF											

Notes: X = mortality.

Sample Description: turbid, ppt present, greyish colour

Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JG

Date reviewed: Oct-10/14

CETIS Analytical Report

Report Date: 18 Sep-14 07:55 (p 1 of 2)

Test Code: 14614b | 15-7111-4310

Ceriodaphnia 7-d Survival and Reproduction Test				Nautilus Environmental			
Analysis ID: 01-1234-1394	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7					
Analyzed: 18 Sep-14 7:54	Analysis: Linear Regression (MLE)	Official Results: Yes					
Batch ID: 15-1379-3420	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy					
Start Date: 04 Sep-14 11:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water					
Ending Date: 11 Sep-14 15:00	Species: Ceriodaphnia dubia	Brine:					
Duration: 7d 4h	Source: In-House Culture	Age: <24h					
Sample ID: 04-8928-9526	Code: 1D29F736	Client: Mount Polley					
Sample Date: 03 Sep-14 10:30	Material: Water Sample	Project:					
Receive Date: 04 Sep-14 08:45	Source: Mount Polley (MT POLLEY)						
Sample Age: 25h (7.3 °C)	Station: QUL-66-45M-140903						

Linear Regression Options

Model Function	Threshold Option	Threshold	Optimized	Pooled	Het Corr	Weighted
Log-Angle [Asin(P^0.5)=A+B*log(X)]	Control Threshold	1E-07	Yes	Yes	No	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
14	-14.63	41.26	35.49	-0.5652		0.1685				Lack of Fit Not Tested

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	12.14	N/A	N/A	8.239	NA	NA
EC10	61.38	N/A	N/A	1.629	NA	NA
EC15	220.5	N/A	N/A	0.4535	NA	NA
EC20	669.6	N/A	N/A	0.1493	NA	NA
EC25	1838	N/A	N/A	0.05442	NA	NA
EC40	27710	N/A	N/A	0.003608	NA	NA
EC50	154000	N/A	N/A	0.0006622	NA	NA

→ 100% (uv)

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Threshold	6.66E-08	8.16E-05	-0.00016	0.00016	0.000816	0.9994	Non-Significant Parameter
Slope	0.1367	0.09922	-0.05775	0.3312	1.378	0.2267	Non-Significant Parameter
Intercept	0.07728	0.1241	-0.166	0.3206	0.6225	0.5609	Non-Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	3.419605	3.419605	1	3.419	0.1237	Non-Significant
Residual	5.001448	1.00029	5			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	5.001	11.07	0.4157	Non-Significant Heterogeneity
	Likelihood Ratio GOF	6.244	11.07	0.2832	Non-Significant Heterogeneity
Distribution	Shapiro-Wilk W Normality	0.9358	0.6805	0.5700	Normal Distribution
	Anderson-Darling A2 Normality	0.282	2.492	0.6670	Normal Distribution

7d Survival Rate Summary

C-%	Control Type	Count	Calculated Variate(A/B)								
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
50		10	0.8	0	1	0.1333	0.4216	52.7%	20.0%	8	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 01-1234-1394
 Analyzed: 18 Sep-14 7:54

Endpoint: 7d Survival Rate
 Analysis: Linear Regression (MLE)

CETIS Version: CETISv1.8.7
 Official Results: Yes

7d Survival Rate Detail

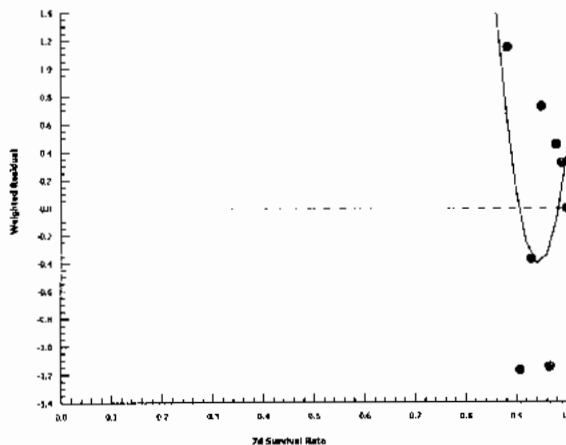
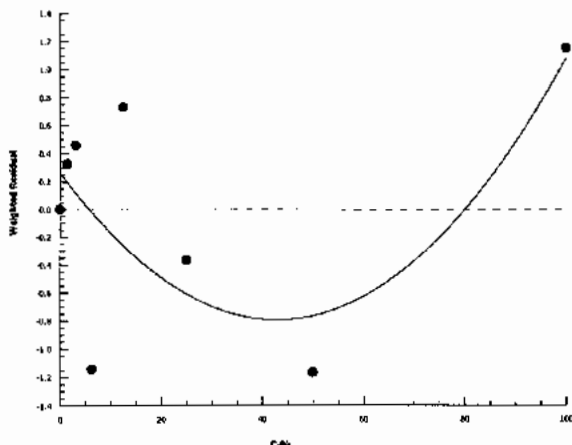
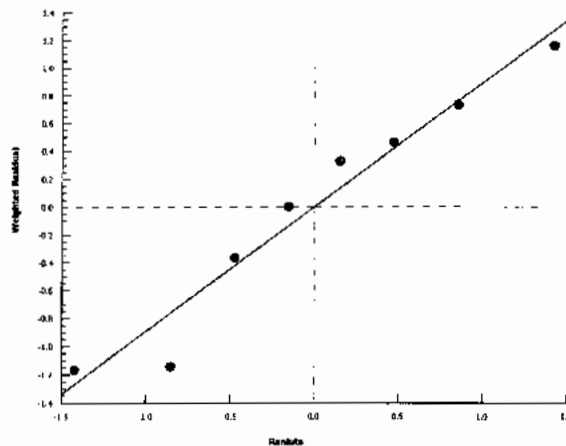
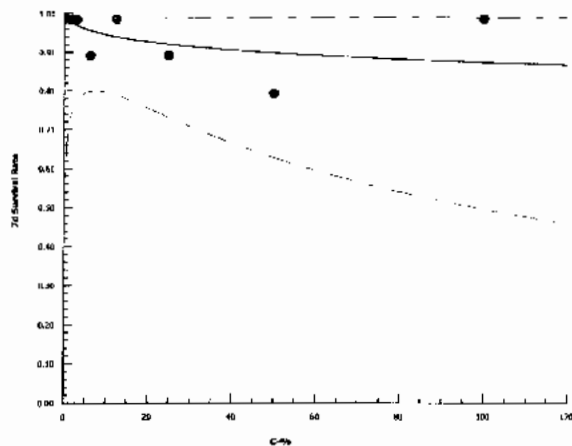
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	0
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	0	1
50		0	0	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1
50		0/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics

Log-Angle [Asin(P^0.5)=A+B*log(X)]



CETIS Analytical Report

Report Date: 18 Sep-14 07:56 (p 1 of 2)
 Test Code: 14614b | 15-7111-4310

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 08-2120-5626	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 18 Sep-14 7:55	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 15-1379-3420	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 04 Sep-14 11:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 11 Sep-14 15:00	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 4h	Source: In-House Culture	Age: <24h
Sample ID: 04-8928-9526	Code: 1D29F736	Client: Mount Polley
Sample Date: 03 Sep-14 10:30	Material: Water Sample	Project:
Receive Date: 04 Sep-14 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 25h (7.3 °C)	Station: QUL-66-45M-140903	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1223653	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.229	0.1362	1.32	436.8	75.74	734.4
IC10	0.5103	0.2909	1.753	196	57.05	343.8
IC15	0.8561	0.4666	2.013	116.8	49.68	214.3
IC20	1.281	0.6663	2.508	78.06	39.88	150.1
IC25	1.79	0.8932	6.423	55.86	15.57	112
IC40	8.028	2.659	15.82	12.46	6.321	37.6
IC50	13.65	9.025	53.79	7.325	1.859	11.08

Reproduction Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	19.3	12	24	1.065	3.368	17.45%	0.0%
1.56		10	14.9	11	23	1.449	4.581	30.75%	22.8%
3.12		10	11.3	9	14	0.4726	1.494	13.23%	41.45%
6.25		10	13.8	10	21	1.191	3.765	27.29%	28.5%
12.5		10	9.8	2	20	1.42	4.492	45.84%	49.22%
25		10	8.6	0	14	1.31	4.142	48.16%	55.44%
50		10	8	0	14	1.633	5.164	64.55%	58.55%
100		10	3.3	0	8	0.8035	2.541	76.99%	82.9%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	19	19	20	22	16	24	19	20	12	22
1.56		11	11	23	12	12	12	17	22	12	17
3.12		13	12	11	12	11	10	14	10	11	9
6.25		15	21	13	11	17	11	18	11	11	10
12.5		9	8	2	11	10	20	12	10	8	8
25		4	14	6	9	11	12	10	10	0	10
50		0	0	8	7	5	13	14	13	8	12
100		0	0	3	5	3	2	2	8	4	6

CETIS Analytical Report

Report Date: 18 Sep-14 07:56 (p 2 of 2)
Test Code: 14814b | 15-7111-4310

Ceriodaphnia 7-d Survival and Reproduction Test

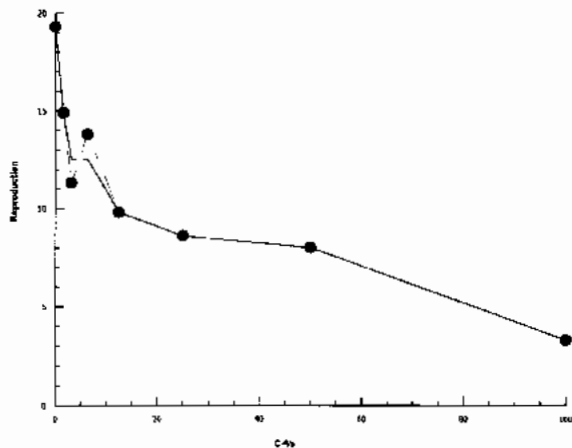
Nautilus Environmental

Analysis ID: 08-2120-5626
Analyzed: 18 Sep-14 7:55

Endpoint: Reproduction
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: HAD-2-140K purple
 Work Order #: 1465

Start Date & Time: Sept 5/14 @ 1500h
 Stop Date & Time: Sept 12/14 @ 1600h
 Test Species: Pimephales promelas

Concentration Control	Days															
	0		1		2		3		4		5		6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	24.5	25.0	24.5	25.0	24.0	25.5	24.0	25.0	26.0	25.5	24.0	25.5	24.0	25.5	24.0
DO (mg/L)	7.4	6.4	7.6	6.3	7.7	6.2	7.6	6.5	7.6	6.3	7.5	4.8	7.8	7.8	6.0	
pH	7.9	7.2	8.0	7.7	8.0	7.8	8.1	7.7	8.0	7.5	7.5	7.4	8.1	7.5		
Cond. (µS/cm)	353		351		353		357		365		366	8.0	369		372	351
Initials	BTL		M		M		JW		JW		KJL		KJL		KJL	

LD/SSD

Concentration 1.56	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	24.0	24.5	25.0	24.5	25.0	24.0	24.0	24.0	24.0	26.0	24.5	24.0	24.0	24.0	24.0
DO (mg/L)	7.5	6.2	7.7	6.1	7.8	6.2	8.15	6.6	7.7	6.3	7.6	5.9	7.8	5.6	
pH	8.0	7.9	7.8	7.8	8.0	7.8	7.8	7.7	7.9	7.7	8.0	7.7	8.1	7.5	
Cond. (µS/cm)	354		365		376		356		361		365		316		361
Initials	BTL		M		M		JW		JW		KJL		KJL	LD	KJL

Concentration 12.5	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	24.0	24.5	25.0	24.5	25.0	24.0	24.0	24.0	24.0	26.0	24.5	24.0	24.0	24.0	24.0
DO (mg/L)	7.6	6.3	7.7	6.1	7.6	6.0	7.8	6.7	7.8	6.3	7.5	5.9	7.5	5.8	
pH	8.1	8.0	7.9	7.8	8.0	7.8	7.8	7.7	8.0	7.5	8.0	7.6	8.1	7.4	
Cond. (µS/cm)	332		321		325		340	8.2	343		350		305		356
Initials	BTL		M		M		JW		JW		KJL		KJL	LD	LD/KJL

Concentration 100	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	24.0	24.5	25.0	24.5	25.5	24.0	24.0	24.0	24.0	26.0	24.5	24.0	24.0	24.0	24.0
DO (mg/L)	8.5	6.2	7.7	6.0	7.8	6.2	8.4	6.7	8.5	6.2	8.3	6.1	8.4	5.5	
pH	8.4	8.0	8.1	8.1	8.2	7.8	8.4	7.8	8.3	7.7	8.3	7.7	8.4	7.4	
Cond. (µS/cm)	216		216		215		230		218		218		218		246
Initials	BTL		M		M		JW		JW		KJL		KJL	LD	KJL/LD

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6.5 to 8.5

LD/SSD

DO meter: 3 pH meter: 3 Conductivity meter: 3

	Control	100% (v/v)		
Hardness*	104	104		
Alkalinity*	04	76		

* mg/L as CaCO₃

Analysts: AWD, JW, KJL

Reviewed by: JOL

Date reviewed: Oct. 14/14

Sample Description: Clear

Comments: _____

7-d Fathead Minnow Toxicity Test Daily Survival

Client: Mount Polley
 Sample ID: HAD-2 (purple)
 Work Order #: 14615

Start Date & Time: Sept 11/14 @ 1500h
 Stop Date & Time: Sept 12/14 @ 1600h
 Test Species: Pimephales promelas

Concentration % (v/v)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	10	10	10	10	10	10	10	
	B			10	10	10	10	9	
	C			10	10	10	10	10	
1.56	A			10	10	10	8	5	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
3.1	A			10	10	10	10	5	
	B			10	10	10	10	6	
	C			10	10	10	10	10	
6.25	A			10	10	10	9	9	
	B			10	10	9	9	8	
	C			10	10	10	8	5	
12.5	A			10	10	10	10	10	
	B			10	10	10	10	9	
	C			10	10	10	6	6	
25	A			9	7	5	6	6	
	B			10	10	9	7	6	
	C			9	7	4	4	4	
50	A			10	10	9	7	7	
	B			10	8	8	8	8	
	C			10	9	9	7	7	
100	A			9	8	5	5	5	
	B			10	10	7	7	7	
	C			10	3	1	1	1	
	A								
	B								
	C								
	A								
	B								
	C								
Tech Initials		A	A	JW	JW	JW	KSL/JSF	KSL	

Comments: ① 1 missing @ T=24.0, DO=5.9, pH=7.5, COND=248
↳ technician error, lost during siphoning.

Reviewed by: JGh Date reviewed: Oct. 10/14

Fathead Minnow Toxicity Test Data Sheet

Dry Weight Data

Client: Mount Polley
 Sample ID: HAD-2 (purple)
 Work Order No.: 14615

Start Date & Time: Sept 5/14 @ 1500h
 Termination Date & Time: Sept 12/14 @ 1600h

Concentration γ-TU(V)	Rep	250 Pan No. Orange	No. alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control	A	13	10	KJL	993.76	1000.91	10	NY
	B	14	9		1051.12	1057.77	9	
	C	15	10		1009.30	1015.03	10	
1.56	A	16	5		1013.32	1017.74	5	
	B	17	10		1004.82	1011.11	10	
	C	18	10		1027.84	1034.54	10	
3.1	A	19	5		995.31	998.70	5	
	B	20	10		983.25	990.53	10	
	C	21	10		1016.88	1024.38	10	
6.25	A	22	9		1039.96	1046.95	9	
	B	23	8		996.64	1002.43	8	
	C	24	5		991.40	995.28	5	
12.5	A	25	10		999.64	1006.09	10	
	B	26	9		999.45	1005.61	9	
	C	27	6		1024.13	1029.00	6	
25	A	28	6		1035.73	1040.85	6	
	B	29	6		990.12	994.73	6	
	C	30	4		1000.47	1003.37	4	
50	A	31	7		1017.13	1022.50	7	
	B	32	8		1011.83	1017.60	8	
	C	33	7		1011.24	1016.48	7	
100	A	34	5		1002.54	1006.80	5	
	B	35	7		989.24	994.26	7	
	C	36	1		1044.51	1045.26	1	

Comments: Reweighed:
17-1011.06 26-1005.55

Reviewed by: Joh

Date Reviewed: Oct. 10/14

CETIS Analytical Report

Report Date: 10 Oct-14 17:22 (p 1 of 2)
 Test Code: 14615 | 01-2778-1179

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 03-3806-0359	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 15 Sep-14 18:33	Analysis: Trimmed Spearman-Kärber	Official Results: Yes
Batch ID: 14-2724-1221	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 05 Sep-14 15:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 12 Sep-14 16:00	Species: Pimephales promelas	Brine:
Duration: 7d 1h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 21-1973-5983	Code: 7E589AAF	Client: Mount Polley
Sample Date: 03 Sep-14 13:45	Material: Water Sample	Project:
Receive Date: 04 Sep-14 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 49h (10.9 °C)	Station: HAD-2-140903	

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0.03333	44.83%	1.925	0.104	84.09	52.09	135.7

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	3	0.9667	0.9	1	0.03333	0.05773	5.97%	0.0%	29	30
1.56		3	0.8333	0.5	1	0.1667	0.2887	34.64%	13.79%	25	30
3.1		3	0.8333	0.5	1	0.1667	0.2887	34.64%	13.79%	25	30
6.25		3	0.7333	0.5	0.9	0.1202	0.2082	28.39%	24.14%	22	30
12.5		3	0.8556	0.6667	1	0.09876	0.1711	19.99%	11.49%	25	29
25		3	0.5333	0.4	0.6	0.06667	0.1155	21.65%	44.83%	16	30
50		3	0.7333	0.7	0.8	0.03333	0.05774	7.87%	24.14%	22	30
100		3	0.4333	0.1	0.7	0.1764	0.3055	70.5%	55.17%	13	30

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	1	0.9	1
1.56		0.5	1	1
3.1		0.5	1	1
6.25		0.9	0.8	0.5
12.5		1	0.9	0.6667
25		0.6	0.6	0.4
50		0.7	0.8	0.7
100		0.5	0.7	0.1

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	10/10	9/10	10/10
1.56		5/10	10/10	10/10
3.1		5/10	10/10	10/10
6.25		9/10	8/10	5/10
12.5		10/10	9/10	6/9
25		6/10	6/10	4/10
50		7/10	8/10	7/10
100		5/10	7/10	1/10

CETIS Analytical Report

Report Date: 10 Oct-14 17:22 (p 2 of 2)
Test Code: 14615 | 01-2778-1179

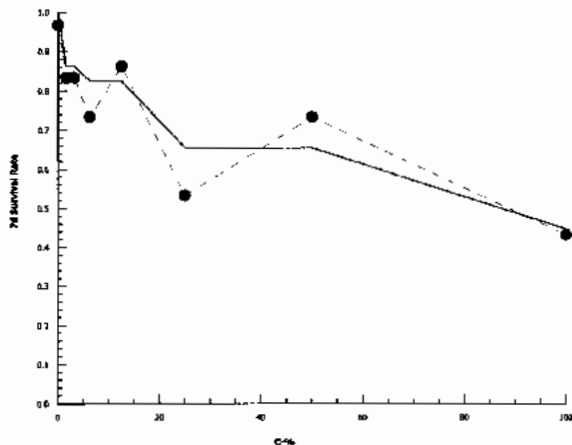
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 03-3806-0359 Endpoint: 7d Survival Rate
Analyzed: 15 Sep-14 18:33 Analysis: Trimmed Spearman-Kärber

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 10 Oct-14 17:22 (p 1 of 2)
 Test Code: 14615 | 01-2778-1179

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 11-0305-9181	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 15 Sep-14 18:33	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 14-2724-1221	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 05 Sep-14 15:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 12 Sep-14 16:00	Species: Pimephales promelas	Brine:
Duration: 7d 1h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 21-1973-5983	Code: 7E589AAF	Client: Mount Polley
Sample Date: 03 Sep-14 13:45	Material: Water Sample	Project:
Receive Date: 04 Sep-14 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 49h (10.9 °C)	Station: HAD-2-140903	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1149381	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.6948	N/A	26.15	143.9	3.824	NA
IC10	4.371	N/A	28.52	22.88	3.506	NA
IC15	15.02	N/A	31.12	6.659	3.214	NA
IC20	19.07	N/A	98.89	5.243	1.011	NA
IC25	24.16	N/A	180.5	4.14	0.554	NA
IC40	77.05	30.2	N/A	1.298	NA	3.311
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.651	0.573	0.715	0.04158	0.07202	11.06%	0.0%
1.56		3	0.5803	0.442	0.67	0.07017	0.1215	20.94%	10.86%
3.1		3	0.6057	0.339	0.75	0.1335	0.2312	38.17%	6.96%
6.25		3	0.5553	0.388	0.699	0.09055	0.1568	28.24%	14.7%
12.5		3	0.6007	0.5411	0.645	0.03095	0.05361	8.92%	7.73%
25		3	0.421	0.29	0.512	0.06713	0.1163	27.62%	35.33%
50		3	0.546	0.524	0.577	0.01595	0.02762	5.06%	16.13%
100		3	0.3343	0.075	0.502	0.1315	0.2278	68.13%	48.64%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.715	0.665	0.573
1.56		0.442	0.629	0.67
3.1		0.339	0.728	0.75
6.25		0.699	0.579	0.388
12.5		0.645	0.616	0.5411
25		0.512	0.461	0.29
50		0.537	0.577	0.524
100		0.426	0.502	0.075

CETIS Analytical Report

Report Date: 10 Oct-14 17:22 (p 2 of 2)
Test Code: 14615 | 01-2778-1179

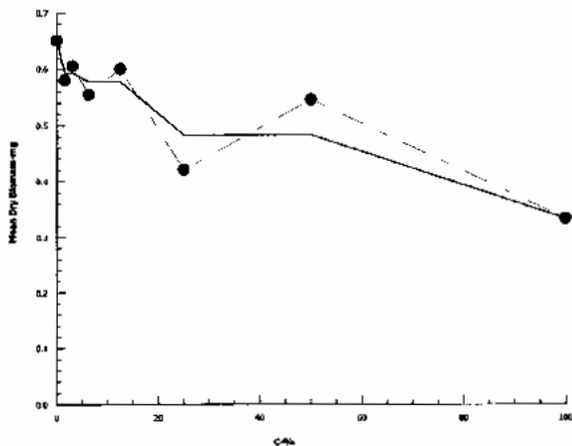
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 11-0305-9181 Endpoint: Mean Dry Biomass-mg
Analyzed: 15 Sep-14 18:33 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 01 Oct-14 09:02 (p 1 of 1)
 Test Code: 14615 | 01-2778-1179

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 05-8397-4183	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 30 Sep-14 17:02	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 14-2724-1221	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 05 Sep-14 15:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 12 Sep-14 16:00	Species: Pimephales promelas	Brine:
Duration: 7d 1h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 21-1973-5983	Code: 7E589AAF	Client: Mount Polley
Sample Date: 03 Sep-14 13:45	Material: Water Sample	Project:
Receive Date: 04 Sep-14 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 49h (10.9 °C)	Station: HAD-2-140903	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	606483	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.6756	0.573	0.7389	0.05177	0.08968	13.27%	0.0%
1.56		3	0.7277	0.629	0.884	0.07906	0.1369	18.82%	-7.7%
3.1		3	0.7187	0.678	0.75	0.0213	0.03689	5.13%	-6.37%
6.25		3	0.7588	0.7237	0.7767	0.01753	0.03036	4.0%	-12.31%
12.5		3	0.7137	0.645	0.8117	0.05029	0.0871	12.2%	-5.64%
25		3	0.7822	0.725	0.8533	0.03769	0.06528	8.35%	-15.78%
50		3	0.7457	0.7212	0.7671	0.01333	0.02309	3.1%	-10.36%
100		3	0.773	0.7171	0.852	0.0406	0.07032	9.1%	-14.42%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.715	0.7389	0.573
1.56		0.884	0.629	0.67
3.1		0.678	0.728	0.75
6.25		0.7767	0.7237	0.776
12.5		0.645	0.6844	0.8117
25		0.8533	0.7683	0.725
50		0.7671	0.7212	0.7486
100		0.852	0.7171	0.75

Fathead Minnow Test Summary Sheet
(7-d *Pimephales promelas* Survival and Growth Test)

Client: Mulent Polley
Work Order No.: 14615

Start Date/Time: Sept 5/14 @ 1500h
Test Species: P. promelas

Sample Information:

Sample ID: QUL-66-4SM-140903
Sample Date: Sept 3/14
Date Received: Sept 4/14
Sample Volume: 2x 400 L

Dilution Water (initial water quality):

Type: Moderately hard
Temperature (°C): 24.0
pH: 7.9
Dissolved Oxygen (mg/L): 7.4
Hardness (mg/L CaCO₃): 104
Alkalinity (mg/L CaCO₃): 64

Test Validity Criteria:

The test is invalid if:

- 1) for the control solutions, the combined and cumulative incidence of any mortalities, or fish showing loss of equilibrium or other signs of atypical swimming behavior, is >20%
- 2) the average dry weight of the surviving control fish does not attain 250 ug when the fish are dried and weighed.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4; pH = 6.5 to 8.5

Test Organism Information:

Batch No.: 090514
Source: Aquatic Biosystems, CO
Age: 224 hrs

NaCl Reference Toxicant Results:

Reference Toxicant ID: PP95
Stock Solution ID: n/a
Date Initiated: Sept 5/14
7-d EC50 (95% CL): n/a } control failure
7-d IC50 (95% CL): n/a }

Survival:

Reference Toxicant Mean and Historical Range: _____ CV (%): _____

Biomass:

Reference Toxicant Mean and Historical Range: _____ CV (%): _____

Test Results:

	Survival	Biomass
LC25 % (v/v) (95% CL)	>100	
LC50 % (v/v) (95% CL)	>100	
IC25 % (v/v) (95% CL)		>100
IC50 % (v/v) (95% CL)		>100

Reviewed by: JOU

Date reviewed: Oct. 10/14

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: QOL-66-45m (Chlack)
 Work Order #: 14615

Start Date & Time: Sept 5/14 @ 1500h
 Stop Date & Time: Sept 12/14 @ 1600h
 Test Species: Pimephales promelas

Concentration <u>Control</u>	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	24.0	25.0	25.0	25.0	25.0	24.0	25.0	25.0	25.0	25.0	25.5	25.5	24.0	25.5	24.0
DO (mg/L)	7.4	6.2	7.6	6.2	7.7	6.0	7.6	6.3	7.6	5.9	7.5	5.6	7.8	6.1	
pH	7.9	7.7	8.0	7.6	8.0	7.8	8.1	7.6	8.0	7.3	8.0	7.5	8.1	7.9	
Cond. (µS/cm)	353		351		353		357		365		366		319		355
Initials	SBF						JW		JW		KJL		KJL		KJL

Concentration <u>1.56</u>	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	24.0	25.0	25.0	25.0	25.0	24.5	24.0	25.0	24.0	25.5	25.0	24.0	24.0	24.0	
DO (mg/L)	7.4	6.3	7.6	6.0	7.7	6.0	7.9	6.3	7.6	5.7	7.5	5.7	7.5	6.2	
pH	8.0	8.0	8.0	7.8	8.0	7.8	7.6	7.7	8.0	7.4	8.0	7.6	8.1	7.9	
Cond. (µS/cm)	350		346		348		356		358		366		315		367
Initials	SBF						BTL		JW		KJL		KJL	LD	KJL/LD

Concentration <u>12.5</u>	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	24.0	25.0	25.0	25.0	25.0	24.0	24.0	25.0	24.0	25.5	24.0	24.0	24.0	24.0	
DO (mg/L)	7.6	6.2	7.5	6.1	7.7	6.0	7.9	6.4	7.7	5.7	7.3	5.7	7.7	6.0	
pH	8.0	8.0	8.0	7.9	8.0	7.8	7.7	7.7	8.0	7.4	8.0	7.6	8.1	7.9	
Cond. (µS/cm)	342.5		335		331		337		335		341		298		346
Initials	SBF						BTL		JW		KJL		KJL	LD	KJL/LD

Concentration <u>100</u>	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	24.0	25.0	25.0	25.0	25.0	24.5	24.0	25.0	25.0	25.5	24.0	24.0	24.0	24.0	
DO (mg/L)	8.2	6.1	7.7	6.0	7.6	6.3	8.1	6.4	8.3	5.3	7.6	5.6	7.7	6.2	
pH	8.0	8.0	8.0	8.0	8.1	7.8	7.5	7.7	7.9	7.3	7.7	7.6	8.0	7.3	
Cond. (µS/cm)	153		152		154		154		155		154		153		176
Initials	SBF						BTL		JW		KJL		KJL	LD	KJL/LD

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6.5 to 8.5

DO meter: 3 pH meter: 3 Conductivity meter: 3

	Control	100% (VIV)		
Hardness*	104	90		
Alkalinity*	64	56		

Analysts: AND, JW

Reviewed by: JGL

Date reviewed: Oct-10/14

Sample Description: _____

Comments: ① 324

7-d Fathead Minnow Toxicity Test Daily Survival

Client: Mount Polley
 Sample ID: QUL66-45M / (black)
 Work Order #: 14615

Start Date & Time: Sept 5/14 @ 1500h
 Stop Date & Time: Sept 12/14 @ 1600h
 Test Species: Pimephales promelas

Concentration %-(v/v)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	10	10	10	10	10	10	10	
	B			10	10	10	10	9	
	C			10	10	10	8	6	
1.56	A			9	9	9	9	8	
	B			10	10	10	10	9	
	C			10	10	10	10	9	
3.1	A			9	9	9	9	9	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
6.25	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
12.5	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	10	10	9	8	
25	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
50	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			9	9	9	9	9	
100	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
	A								
	B								
	C								
	A								
	B								
	C								
Tech Initials				JW	JW	JW	KSL/UMV	KJW	

Comments: ~~1 missing~~

Reviewed by: JOU

Date reviewed: Oct 10/14

Fathead Minnow Toxicity Test Data Sheet

Dry Weight Data

Client: Mount Polley
 Sample ID: QUL-66-45M Chlaur
 Work Order No.: 14615

Start Date & Time: Sept 5/14 @ 1500h
 Termination Date & Time: Sept 12/14 @ 1600h

Concentration % (v/v)	So Rep Per	Pan No.	No. alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control	A	1	10	KJL	1041.13	1048.37	10	NY
	B	2	9		1023.52	1030.48	9	
	C	3	6		1019.27	1024.47	6	
1.56	A	4	8		1037.61	1042.99	8	
	B	5	9		1039.10	1044.86	9	
	C	6	9		1046.38	1053.09	9	
3.1	A	7	9		1050.20	1057.06	9	
	B	8	10		1026.58	1034.11	10	
	C	9	10		1028.04	1034.59	10	
6.25	A	10	10		1008.90	1016.08	10	
	B	11	10		1013.65	1021.18	10	
	C	12	9		1043.65	1049.61	9	
12.5	A	13	10		1008.50	1015.06	10	
	B	14	10		982.82	989.18	10	
	C	15	8		999.18	1004.99	8	
25	A	16	10		1037.83	1045.49	10	
	B	17	10		1027.94	1035.65	10	
	C	18	10		1038.44	1045.15	10	
50	A	19	10		996.93	1004.51	10	
	B	20	10		1013.54	1021.19	10	
	C	21	9		1039.81	1046.55	9	
100	A	22	10		1002.05	1009.71	10	
	B	23	10		1027.77	1034.93	10	
	C	24	10	✓	1044.07	1050.78	10	†

Comments: Reweighed: 7-1057.02 19-1004.49

Reviewed by: Joh

Date Reviewed: Oct. 10/14

CETIS Analytical Report

Report Date: 01 Oct-14 09:02 (p 1 of 2)
 Test Code: 14615b | 04-6368-1539

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 04-4694-0812	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 30 Sep-14 17:03	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 15-7560-6956	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 05 Sep-14 15:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 12 Sep-14 16:00	Species: Pimephales promelas	Brine:
Duration: 7d 1h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 04-8928-9526	Code: 1D29F736	Client: Mount Polley
Sample Date: 03 Sep-14 10:30	Material: Water Sample	Project:
Receive Date: 04 Sep-14 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 52h (7.3 °C)	Station: QUL-66-45M-140903	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	74379	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	3	0.8333	0.6	1	0.1202	0.2082	24.98%	0.0%	25	30
1.56		3	0.8667	0.8	0.9	0.03333	0.05773	6.66%	-4.0%	26	30
3.1		3	0.9667	0.9	1	0.03333	0.05773	5.97%	-16.0%	29	30
6.25		3	0.9667	0.9	1	0.03333	0.05773	5.97%	-16.0%	29	30
12.5		3	0.9333	0.8	1	0.06667	0.1155	12.37%	-12.0%	28	30
25		3	1	1	1	0	0	0.0%	-20.0%	30	30
50		3	0.9667	0.9	1	0.03333	0.05773	5.97%	-16.0%	29	30
100		3	1	1	1	0	0	0.0%	-20.0%	30	30

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	1	0.9	0.6
1.56		0.8	0.9	0.9
3.1		0.9	1	1
6.25		1	1	0.9
12.5		1	1	0.8
25		1	1	1
50		1	1	0.9
100		1	1	1

CETIS Analytical Report

Report Date: 01 Oct-14 09:02 (p 2 of 2)

Test Code: 14615b | 04-6368-1539

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 04-4694-0812

Endpoint: 7d Survival Rate

CETIS Version: CETISv1.8.7

Analyzed: 30 Sep-14 17:03

Analysis: Linear Interpolation (ICPIN)

Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	10/10	9/10	6/10
1.56		8/10	9/10	9/10
3.1		9/10	10/10	10/10
6.25		10/10	10/10	9/10
12.5		10/10	10/10	8/10
25		10/10	10/10	10/10
50		10/10	10/10	9/10
100		10/10	10/10	10/10

CETIS Analytical Report

Report Date: 01 Oct-14 09:02 (p 1 of 1)
 Test Code: 14615b | 04-6368-1539

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 14-7024-9332	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 30 Sep-14 17:03	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 15-7560-6956	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 05 Sep-14 15:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 12 Sep-14 16:00	Species: Pimephales promelas	Brine:
Duration: 7d 1h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 04-8928-9526	Code: 1D29F736	Client: Mount Polley
Sample Date: 03 Sep-14 10:30	Material: Water Sample	Project:
Receive Date: 04 Sep-14 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 52h (7.3 °C)	Station: QUL-66-45M-140903	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	156670	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Mean	Min	Max	Calculated Variate			
						Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.6467	0.52	0.724	0.06385	0.1106	17.1%	0.0%
1.56		3	0.595	0.538	0.671	0.03955	0.0685	11.51%	7.99%
3.1		3	0.698	0.655	0.753	0.02892	0.05009	7.18%	-7.94%
6.25		3	0.689	0.596	0.753	0.04759	0.08242	11.96%	-6.55%
12.5		3	0.6243	0.581	0.656	0.02242	0.03884	6.22%	3.45%
25		3	0.736	0.671	0.771	0.03253	0.05635	7.66%	-13.82%
50		3	0.7323	0.674	0.765	0.02924	0.05064	6.92%	-13.25%
100		3	0.7177	0.671	0.766	0.02744	0.04752	6.62%	-10.98%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.724	0.696	0.52
1.56		0.538	0.576	0.671
3.1		0.686	0.753	0.655
6.25		0.718	0.753	0.596
12.5		0.656	0.636	0.581
25		0.766	0.771	0.671
50		0.758	0.765	0.674
100		0.766	0.716	0.671

Oct-14/14

CETIS Analytical Report

Report Date: 01 Oct-14 09:02 (p 1 of 1)

Test Code: 14615b | 04-6368-1539

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 01-7704-2445	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 30 Sep-14 17:03	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 15-7560-6956	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 05 Sep-14 15:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 12 Sep-14 16:00	Species: Pimephales promelas	Brine:
Duration: 7d 1h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 04-8928-9526	Code: 1D29F736	Client: Mount Polley
Sample Date: 03 Sep-14 10:30	Material: Water Sample	Project:
Receive Date: 04 Sep-14 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 52h (7.3 °C)	Station: QUL-66-45M-140903	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1947819	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.6596	N/A	N/A	151.6	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	Min	Max	Calculated Variate			
						Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.788	0.724	0.8667	0.04183	0.07245	9.19%	0.0%
1.56		3	0.686	0.64	0.7456	0.03121	0.05406	7.88%	12.94%
3.1		3	0.7234	0.655	0.7622	0.03431	0.05943	8.22%	8.2%
6.25		3	0.7111	0.6622	0.753	0.02643	0.04578	6.44%	9.76%
12.5		3	0.6727	0.636	0.7262	0.02737	0.0474	7.05%	14.63%
25		3	0.736	0.671	0.771	0.03253	0.05635	7.66%	6.6%
50		3	0.7573	0.7489	0.765	0.004666	0.008081	1.07%	3.9%
100		3	0.7177	0.671	0.766	0.02744	0.04752	6.62%	8.92%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.724	0.7733	0.8667
1.56		0.6725	0.64	0.7456
3.1		0.7622	0.753	0.655
6.25		0.718	0.753	0.6622
12.5		0.656	0.636	0.7262
25		0.766	0.771	0.671
50		0.758	0.765	0.7489
100		0.766	0.716	0.671

Client: Mount Polley

W.O.#: 14615

Hardness and Alkalinity Datasheet

Alkalinity						Hardness			
Sample ID	Sample Date	Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	Technician
MHW 090314	Sept 12/14	50	3.3	3.4	61	50	5.2	104	KCP
HAD-2	Sept 4/14	50	4.0	4.2	76	50	5.2	104	EMM
QUL60-45M	Sept 4/14	50	2.9	3.0	56	50	3.5	70	EMM

Notes: _____

Reviewed by: JGU

Date Reviewed: Oct. 10/14

APPENDIX C - Chain of Custody Form

P0088

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

14614
14615

Sample Collection By: McLean Donohoe		ANALYSES REQUIRED						
Report to:	Invoice to:	96h RBT	48 h Daphnia magna	7 Day Centodaphnia dubia	7 day flathead Minnow	72h algal growth	Lemma Growth	Receipt Temperature (°C)
Company: Mount Polley Mining Corporation	Mount Polley Mining Corporation							
Address: Box 12	Box 12							
City/Prov/Postal Code: Likely BC V0L 1N0	Likely BC V0L 1N0							
Contact: Colleen Hughes	Colleen Hughes/							
Phone: (250) 790-2617	(250) 790-2617							
Email: chughes@mountpolley.com	chughes@mountpolley.com							

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	96h RBT	48 h Daphnia magna	7 Day Centodaphnia dubia	7 day flathead Minnow	72h algal growth	Lemma Growth	Receipt Temperature (°C)
1 QUL-66-40m-140903 <i>ISM</i>	03/09/2014	10:30	water	<i>40L 20L</i>	2				X	X			7.3
2 HAD-2-140903	03/09/2014	13:45	water	<i>40L 20L</i>	2				X	X			10.0
3													
4													
5													
6													
7													
8													
9													
10													

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUINSHED BY (CLIENT)		RELIQUINSHED BY (COURIER)	
Client: Mount Polley Mining Corporation		Total # Containers:	<i>4</i>	Signature:		Signature:	
P.O. No.:		Good Condition?	<i>Y</i>	Katie McMahan		Print:	
Shipped Via: Greyhound		Matches Schedule?	<i>Y</i>	Company: MPMC		Company:	
SPECIAL INSTRUCTIONS/COMMENTS:				RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)	
				Signature:		Signature: <i>[Signature]</i>	
				Print:		Print: <i>Jacob Frank</i>	
				Company:		Company: <i>Nautilus Environmental</i>	
				Time/Date: 03/09/2014 15:30:00		Time/Date: <i>Sep 4/14 @ 0845</i>	

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 17

**Toxicity testing on samples identified as HAD-1-140910 and QUL-66-48m-140910:
Samples collected September 10, 2014 (Report date October 24, 2014; Revised
December 4, 2014)**



Nautilus Environmental

**Toxicity testing on samples identified as
HAD-1-140910 and QUL-66-48m-140910**

Samples collected September 10, 2014

Final Report

Report date: October 24, 2014, revised December 4, 2014

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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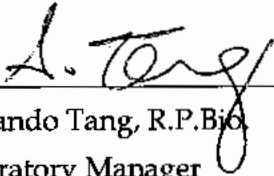
APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

APPENDIX C - Chain of Custody Form

SIGNATURE PAGE



Krysta Pearcy, B.Sc.
Laboratory Biologist



Armando Tang, R.P.Bio
Laboratory Manager

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted toxicity tests for Mount Polley Mining Corporation on samples identified as HAD-1-140910 and QUL-66-48m-140910. The samples were collected on September 10, 2014 and delivered to the laboratory in Burnaby, BC on September 11, 2014. The samples were each transported in two 20-L plastic carboys and coolers. HAD-1-140910 and QUL-66-48m-140910 were received at temperatures of 10.5 and 8.5°C, respectively, and were stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing. The following sub-lethal toxicity tests were performed on the samples:

- *Ceriodaphnia dubia* survival and reproduction
- 7-d fathead minnow (*Pimephales promelas*) survival and growth

This report describes the results of these toxicity tests. Copies of laboratory data sheets and printouts of statistical analyses for each test are provided in Appendices A and B. The chain-of-custody form is provided in Appendix C. This report was revised from an earlier version to incorporate data for dry weight of fathead minnows, in addition to biomass.

2.0 METHODS

Methods for the toxicity tests are summarized in Tables 1 and 2. Testing was conducted according to procedures described by the Environment Canada protocols (2007 and 2011). Statistical analyses for all tests were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house culture
Test organism age	<24 h old neonates produced within 12 h
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20 mL test tube
Test volume	15 mL
Test replicates	10 test replicates per treatment
Number of organisms	1 per replicate
Control water	20% Perrier water
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	<i>Pseudokirchneriella subcapitata</i> and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada, (2007) EPS 1/RM/21
Statistical software	CETIS (2013)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods
Reference toxicant	Sodium chloride

Table 2. Summary of test conditions: fathead minnow (*Pimephales promelas*) survival and growth test.

Test organism	<i>Pimephales promelas</i>
Test organism source	Aquatic BioSystems, Fort Collins, CO
Test organism age	<24 hours
Test type	Static renewal
Test duration	7 days
Test vessel	375-mL glass containers
Test volume	250 mL
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control water	Moderately-hard water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	Twice a day with newly hatched brine shrimp (<i>Artemia nauplii</i>)
Light intensity	100 – 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test protocol	Environment Canada (2011), EPS 1/RM/22
Statistical software	CETIS (2013)
Test endpoint	Survival and biomass
Test acceptability criteria for controls	≥80% survival, ≥250 µg mean dry weight
Reference toxicant	Sodium Chloride

3.0 RESULTS

Results of the *C. dubia* test are provided in Table 3. No adverse effects were observed on survival or reproduction in HAD-1-140910; the LC50, IC25 and IC50 were >100%. No adverse effects on survival were observed in QUL-66-48m-140910; the LC50 was >100%. Reproduction was inhibited in QUL-66-48m-140910 resulting in IC25 and IC50 values of <1.56 and 2.5%, respectively.

Results of the fathead minnow test are provided in Table 4. No adverse effects were observed on survival or biomass in HAD-1-140910 or QUL-66-48m-140910. The LC50, IC25 and IC50 were all >100% for both samples.

Table 3. Results: *Ceriodaphnia dubia* survival and reproduction test.

Concentration (% v/v)	HAD-1-140910		QUL-66-48m-140910	
	Survival (%)	Reproduction (mean ± SD)	Survival (%)	Reproduction (mean ± SD)
Control	100	21.2 ± 3.7	100	23.6 ± 5.5
1.56	100	23.0 ± 4.7	90	13.8 ± 7.0
3.12	100	21.1 ± 4.4	100	10.7 ± 3.4
6.25	90	20.2 ± 7.4	90	7.8 ± 3.7
12.5	100	22.1 ± 4.7	100	7.8 ± 2.0
25	90	17.4 ± 8.8	100	4.8 ± 2.3
50	100	21.1 ± 8.0	80	2.4 ± 1.6
100	100	19.6 ± 5.7	90	1.1 ± 1.3
Test endpoint (%)				
LC50	>100	--	>100	--
IC25	--	>100	--	<1.56
IC50 (95% CL)	--	>100	--	2.5 (1.3 - 4.5)

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits.

Table 4. Results: fathead minnow (*Pimephales promelas*) survival and growth test.

Concentration (% v/v)	HAD-1-140910			QUL-66-48m-140910		
	(mean ± SD)					
	Survival (%)	Biomass (µg)	Dry Weight (µg)	Survival (%)	Biomass (µg)	Dry Weight (µg)
Control	96.7 ± 5.8	550.5 ± 64.6	568.2 ± 34.1	93.3 ± 5.8	506.3 ± 80.0	543.2 ± 88.8
1.56	46.7 ± 20.8	351.7 ± 167.5	745.8 ± 164.3	83.3 ± 20.8	570.0 ± 159.3	679.9 ± 35.9
3.12	76.7 ± 32.2	434.7 ± 172.3	574.4 ± 59.8	86.7 ± 23.1	546.0 ± 127.6	634.7 ± 27.6
6.25	76.7 ± 32.2	495.0 ± 241.1	638.6 ± 87.4	93.3 ± 5.8	567.7 ± 31.1	611.0 ± 68.7
12.5	70.0 ± 10.0	553.7 ± 93.2	790.0 ± 42.1	93.3 ± 11.6	778.3 ± 76.0	836.0 ± 28.5
25	90.0 ± 10.0	579.7 ± 82.2	642.6 ± 21.9	90.0 ± 10.0	684.3 ± 50.8	763.1 ± 48.4
50	86.7 ± 5.8	614.0 ± 98.0	705.4 ± 68.8	90.0 ± 17.3	607.3 ± 52.5	686.0 ± 89.7
100	90.0 ± 17.3	724.0 ± 144.6	804.4 ± 38.5	86.7 ± 5.8	587.0 ± 148.2	677.0 ± 157.3
Test endpoint						
LC50	>100	--	--	>100	--	--
IC25	--	>100	>100	--	>100	>100
IC50	--	>100	>100	--	>100	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

4.0 QA/QC

The health history of the test organisms used in the exposures was acceptable and met the requirements of the Environment Canada protocols. The tests met all control acceptability criteria and water quality parameters remained within ranges specified in the protocols throughout the tests. There were no deviations from the test methodologies. Uncertainty associated with these tests is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

Results of the reference toxicant tests conducted during the testing program are summarized in Table 5. Results for these tests fell within the range for organism performance of mean and two standard deviation range, based on historical results obtained by the laboratory with these tests. Thus, the sensitivity of the organisms used in these tests was appropriate.

Table 5. Reference toxicant results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>C. dubia</i>	Survival (LC50): 2.1 g/L NaCl	1.8 (1.4 - 2.5)	16	September 23 , 2014
	Reproduction (IC50): 1.9 g/L NaCl	1.4 (1.0 - 1.9)	17	
<i>P. promelas</i>	Survival (LC50): 4.2 g/L NaCl	4.5 (3.5 - 5.7)	13	September 12, 2014
	Biomass (IC50): 3.8 g/L NaCl	3.9 (2.9 - 5.4)	17	

SD = Standard Deviation, CV = Coefficient of Variation, IC = Inhibition Concentration, LC = Lethal Concentration.

5.0 REFERENCES

Environment Canada. 2007. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. Report EPS 1/RM/21, Second Edition, February 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 74 pp.

Environment Canada. 2011. Biological test method: test of larval growth and survival using fathead minnows. Environmental Protection Series, Report EPS 1/RM/22. February 2011,. Environment Canada, Environmental Protection, Conservation and Protection, Ottawa, ON. 73 pp.

Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.4.29 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: Mount Polley
 Work Order No.: 14631

Start Date/Time: Sept 11/14 @ 1340h
 Set up by: EMM

Sample Information:

Sample ID: HAD-1-140910
 Sample Date: Sept 10/14
 Date Received: Sept 11/14
 Sample Volume: 2 x 20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:
 T ($^{\circ}\text{C}$) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 082914A
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 30
 Mortality (%) in previous 7 d: 0
 Individual female # used ≥ 8 young on test day: 4,5,6,7,9,10,11,12,14

NaCl Reference Toxicant Results:

Reference Toxicant ID: Cd118
 Stock Solution ID: 14Na02
 Date Initiated: Sept 23/14

7-d LC50 (95% CL): 2.1 (1.5-3.0) g/L NaCl
 7-d IC50 (95% CL): 1.9 (1.1-2.9) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.8 (1.4-2.5) g/L NaCl CV (%): 16
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-1.9) g/L NaCl CV (%): 17

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		7100
IC50 % (v/v) (95% CL)		7100

Reviewed by: JOU

Date reviewed: Oct. 15/14

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Palley
 Sample ID: HAD-Air (140910)
 Work Order #: 14031

Start Date & Time: Sept 11/14 00 1340 h
 Stop Date & Time: Sept 17/14 00 2025 h
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
control														
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.1	7.6	7.9	7.4	8.1	7.5	8.0	7.4	8.1	7.1	8.0	7.4	7.8	
pH	8.0	8.0	8.0	7.7	8.0	7.8	8.0	7.7	8.1	7.8	8.1	7.8		
Cond. (µS/cm)	216	215		216		217		220		218		219		
Initials	EMM	EMM/EC						EMM/EC		EMM/LD		EMM		

Concentration	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
15.6% (v/v)														
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.2	7.7	8.0	7.5	8.1	7.5	8.0	7.6	7.9	7.1	7.7	7.4	7.8	
pH	8.2	8.0	8.2	7.7	8.1	7.9	8.1	7.7	8.1	7.8	8.1	7.8		
Cond. (µS/cm)	221	218		220		224		214		215		216		
Initials	EMM	EMM/EC						EMM/EC		EMM/LD		EMM		

Concentration	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
12.5% (v/v)														
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.2	7.7	7.9	7.5	8.1	7.5	8.1	7.5	7.8	7.2	7.6	7.3	7.8	
pH	8.3	8.0	8.1	8.0	8.2	8.0	8.1	7.7	8.1	7.7	8.0	7.8		
Cond. (µS/cm)	227	220		223		225		216		217		217		
Initials	EMM	EMM/EC						EMM/EC		EMM/LD		EMM		

Concentration	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
100% (v/v)														
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.2	7.7	8.3	7.6	8.1	7.5	8.2	7.4	8.2	7.1	7.8	7.4	7.8	
pH	8.5	8.0	8.5	8.1	8.4	8.0	8.4	7.6	8.4	7.7	8.4	7.8		
Cond. (µS/cm)	227	221		228		227		227		225		226		
Initials	EMM	EMM/EC						EMM/EC		EMM/LD		EMM		

	Control	100% (v/v)		
Hardness*	100	100		
Alkalinity*	82	72		

Analysts: AWB, EMM
KLP
 Reviewed by: JOH
 Date reviewed: Oct. 15/14

* mg/L as CaCO3
 WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5
 Sample Description: clear

Comments: Broodboard Used: 082914A (4-7, 9-12, 14)

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt. Polley
 Sample ID: HAD-7 (11009.10)
 Work Order: (463)

Start Date & Time: Sept 11/14 @ 1340h
 Stop Date & Time: Sept 17/14 @ 2025h
 Set up by: Emm

% (v/v)

Days	Concentration: Control												Concentration: 1.56												Concentration: 3.12											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KUP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	KUP	
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	
4	4	4	5	3	4	4	4	4	4	4	EMM	4	5	4	4	3	4	5	4	3	5	4	EMM	4	3	5	5	4	3	4	4	✓	4	EMM		
5	6	6	8	5	6	7	7	8	8	6	EMM	8	7	10	8	7	8	8	6	6	7	EMM	8	7	7	9	8	8	7	8	6	5	EMM			
6	10	11	✓	10	11	12	13	12	14	12	EMM	11	14	15	✓	14	14	11	12	10	13	EMM	14	13	12	10	11	✓	12	9	11	10	EMM			
7																																				
8																																				
Total	20	21	13	18	21	23	24	24	26	22	EMM	23	26	29	12	24	26	24	22	19	25	EMM	26	23	24	24	23	11	23	21	17	19	EMM			

Days	Concentration: 6.25												Concentration: 12.5												Concentration: 25											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
4	5	3	5	4	5	✓	3	5	5	2	EMM	4	3	4	4	3	6	3	4	5	5	EMM	4	✓	3	4	4	5	4	4	4	4	EMM			
5	6	6	9	8	8	✓	9	7	8	4	EMM	7	8	8	8	9	7	7	8	9	10	EMM	11	✓	9	8	9	✓	11	10	9	7	EMM			
6	9	14	10	9	10	✓	13	13	10	12	EMM	14	13	14	8	8	12	✓	11	10	9	EMM	14	✓	15	✓	8	7	10	✓	10	EMM				
7																																				
8																																				
Total	20	23	24	21	21	20	25	25	23	18	EMM	25	24	26	20	20	25	10	23	24	24	EMM	29	21	12	27	13	13	22	24	13	21	EMM			

Days	Concentration: 50												Concentration: 100												Concentration:											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM														
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM														
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM														
4	5	4	4	4	4	5	3	3	4	5	EMM	4	5	6	4	5	2	✓	4	6	4	EMM														
5	9	10	✓	9	10	10	8	9	10	11	EMM	✓	7	9	11	10	8	9	8	9	7	EMM														
6	12	14	6	✓	✓	13	✓	12	14	13	EMM	10	13	✓	✓	11	8	8	12	13	8	EMM														
7																																				
8																																				
Total	26	28	10	13	14	28	11	24	28	29	EMM	14	25	15	15	26	18	12	24	28	19	EMM														

Notes: X = mortality.

Sample Description: clear

Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JOU

Date reviewed: Oct. 15/14

CETIS Analytical Report

Report Date: 23 Sep-14 10:01 (p 1 of 2)
 Test Code: 14631b | 21-2522-8737

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 19-6884-7869	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 23 Sep-14 10:01	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 21-1847-9671	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 11 Sep-14 13:40	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 17 Sep-14 20:25	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 7h	Source: In-House Culture	Age: <24h
Sample ID: 00-5008-0453	Code: 2FC2AC5	Client: Mount Polley
Sample Date: 10 Sep-14 13:50	Material: Water Sample	Project:
Receive Date: 11 Sep-14 09:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h (10.5 °C)	Station: HAD-1-140910	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1200886	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	0	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	0	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 23 Sep-14 10:01 (p 2 of 2)
 Test Code: 14831b | 21-2522-8737

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

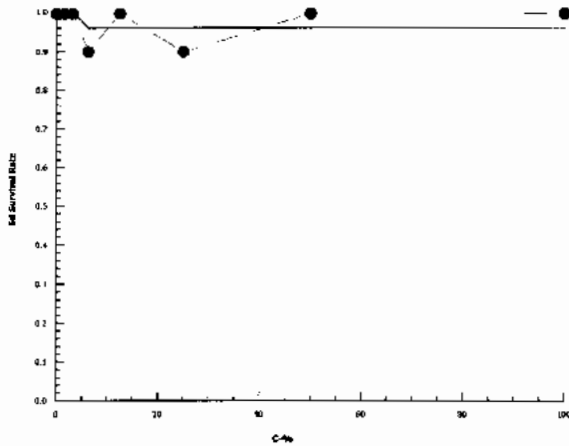
Analysis ID: 19-6884-7869 Endpoint: 6d Survival Rate
 Analyzed: 23 Sep-14 10:01 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 23 Sep-14 10:01 (p 1 of 2)
 Test Code: 14631b | 21-2522-8737

Ceriodaphnia 7-d Survival and Reproduction Test				Nautilus Environmental	
Analysis ID: 11-9223-8486	Endpoint: Reproduction	CETIS Version: CETISv1.8.7			
Analyzed: 23 Sep-14 10:01	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes			
Batch ID: 21-1847-9671	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy			
Start Date: 11 Sep-14 13:40	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water			
Ending Date: 17 Sep-14 20:25	Species: Ceriodaphnia dubia	Brine:			
Duration: 6d 7h	Source: In-House Culture	Age: <24h			
Sample ID: 00-5008-0453	Code: 2FC2AC5	Client: Mount Polley			
Sample Date: 10 Sep-14 13:50	Material: Water Sample	Project:			
Receive Date: 11 Sep-14 09:15	Source: Mount Polley (MT POLLEY)				
Sample Age: 24h (10.5 °C)	Station: HAD-1-140910				

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	158363	200	Yes	Two-Point Interpolation

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	13.21	1.491	N/A	7.57	NA	67.08
IC10	20.41	2.78	N/A	4.899	NA	35.98
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	21.2	13	26	1.162	3.676	17.34%	0.0%
1.56		10	23	12	29	1.483	4.69	20.39%	-8.49%
3.12		10	21.1	11	26	1.394	4.408	20.89%	0.47%
6.25		10	20.2	0	25	2.351	7.436	36.81%	4.72%
12.5		10	22.1	10	26	1.487	4.701	21.27%	-4.25%
25		10	17.4	0	29	2.778	8.784	50.48%	17.92%
50		10	21.1	10	29	2.536	8.02	38.01%	0.47%
100		10	19.6	12	28	1.809	5.719	29.18%	7.55%

Reproduction Detail											
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	20	21	13	18	21	23	24	24	26	22
1.56		23	26	29	12	24	26	24	22	19	25
3.12		26	23	24	24	23	11	23	21	17	19
6.25		20	23	24	21	23	0	25	25	23	18
12.5		25	24	26	20	20	25	10	23	24	24
25		29	0	12	27	13	13	22	24	13	21
50		26	28	10	13	14	28	11	24	28	29
100		14	25	15	15	26	18	12	24	28	19

CETIS Analytical Report

Report Date: 23 Sep-14 10:01 (p 2 of 2)

Test Code: 14631b | 21-2522-8737

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 11-9223-8486

Endpoint: Reproduction

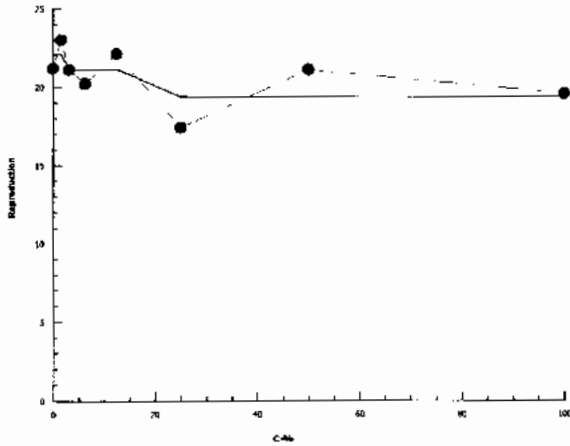
CETIS Version: CETISv1.8.7

Analyzed: 23 Sep-14 10:01

Analysis: Linear Interpolation (ICPIN)

Official Results: Yes

Graphics



Ceriodaphnia dubia Summary Sheet

Client: Mount Kelly
 Work Order No.: 14031

Start Date/Time: Sept 11/14 @ 1350h
 Set up by: EMM

Sample Information:

Sample ID: QUL66-48m-140910
 Sample Date: Sept 10/14
 Date Received: Sept 11/14
 Sample Volume: 2x20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 082914A
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 30
 Mortality (%) in previous 7 d: 0
 Individual female # used ≥ 8 young on test day: 4,5,6,7,9,10,11,12,14

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd118
 Stock Solution ID: 14NaCl
 Date Initiated: Sept 23/14

7-d LC50 (95% CL): 2.1 (1.5-3.0) g/L NaCl
 7-d IC50 (95% CL): 1.9 (1.1-2.9) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.8(1.4-2.5) g/L NaCl CV (%): 16
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4(1.0-1.9) g/L NaCl CV (%): 17

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		<1.56 ^{13.4}
IC50 % (v/v) (95% CL)		2.5 (1.3 to 4.5)

Reviewed by: JOU

Date reviewed: Oct 15/14
JOU

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Valley
 Sample ID: QW-66-18m (140910)
 Work Order #: 1403

Start Date & Time: Sept 11/14 @ 1350h
 Stop Date & Time: Sept 11/14 @ 2100h
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		Final	6	7
<i>control</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.1	7.7	8.0	7.4	8.1	7.5	8.0	7.6	8.1	7.7	8.0	7.2	8.1	7.6
pH	8.0	7.9	7.9	7.8	8.0	7.8	8.0	7.7	8.1	7.7	8.1	7.6	8.1	7.6
Cond. (µS/cm)	216	215		216		217		220		218		217		
Initials	EMM	EMM		M		M		EMM/SSD		EMM/LD		EMM		

Concentration	Days													
	0	1		2		3		4		5		Final	6	7
<i>1.56% (v/v)</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.5	25.0		
DO (mg/L)	8.2	7.7	8.0	7.5	8.1	7.7	8.1	7.6	7.5	7.3	7.9	7.4		
pH	8.1	7.9	7.9	7.9	8.0	7.9	8.0	7.7	7.9	7.8	8.0	7.6		
Cond. (µS/cm)	215	221		223		224		216		214		210		
Initials	EMM	EMM		M		M		EMM/SSD		EMM/LD		EMM		

Concentration	Days													
	0	1		2		3		4		5		Final	6	7
<i>12.5% (v/v)</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	8.1	7.7	7.9	7.6	8.0	7.7	8.1	7.5	7.6	7.3	7.7	7.3		
pH	8.1	7.9	8.2	7.9	8.1	8.0	8.0	7.7	7.9	7.8	8.0	7.8		
Cond. (µS/cm)	213	216		214		215		218		209		208		
Initials	EMM	EMM		M		M		EMM/SSD		EMM/LD		EMM		

Concentration	Days													
	0	1		2		3		4		5		Final	6	7
<i>100% (v/v)</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	25.0	25.0		
DO (mg/L)	7.8	7.7	7.8	7.7	8.0	7.8	8.1	7.6	7.6	7.4	8.0	7.3		
pH	8.0	7.8	7.9	8.0	8.1	7.9	8.0	7.6	7.9	7.9	7.8	7.9		
Cond. (µS/cm)	158	160		155		157		159		158		158		
Initials	EMM	EMM/EC		M		M		EMM/SSD		EMM/LD		EMM		

	Control	100% (v/v)		
Hardness*	100	62		
Alkalinity*	82	58		

Analysts: AWD, EMM
 Reviewed by: Joe
 Date reviewed: Oct. 15/14

* mg/L as CaCO₃
 WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5
 Sample Description: turbid, yellow-green
 Comments: Broodboard Used: 082914A (H# 477, 972, 14)

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt Palley
 Sample ID: QUL65+48m FUGR101 140910
 Work Order: 14631

Start Date & Time: Sept 11/14 @ 1350h
 Stop Date & Time: Sept 17/14 @ 2100h
 Set up by: EMM

4% (V/V)

Days	Concentration: <u>control</u>												Concentration: <u>1.56</u>												Concentration: <u>3.12</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM			
2	/	/	/	/	/	/	/	/	/	/	m	/	/	/	/	/	/	/	/	/	/	m	/	/	/	/	/	/	/	/	/	/	m			
3	/	/	/	/	/	/	/	/	/	/	m	/	/	/	/	/	/	/	/	/	/	m	/	/	/	/	/	/	/	/	/	/	m			
4	5	2	4	4	5	4	4	5	5	4	WUP	X	3	4	✓	✓	3	✓	✓	3	✓	WUP	3	✓	✓	✓	✓	✓	2	✓	4	2	WUP			
5	8	7	9	9	8	9	10	7	8	9	EMM	6	4	4	4	6	5	6	7	4	EMM	7	4	3	4	4	5	6	4	5	7	EMM				
6	14	✓	10	14	13	12	13	9	13	12	EMM	12	13	8	12	✓	9	9	✓	11	EMM	10	6	6	7	7	5	✓	6	✓	✓	EMM				
7																																				
8																																				
Total	27	9	23	27	26	25	27	21	26	25	EMM	0	21	26	12	16	9	14	15	10	15	EMM	20	10	9	11	11	10	8	10	9	9	EMM			

Days	Concentration: <u>6.25</u>												Concentration: <u>12.5</u>												Concentration: <u>25</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM			
2	/	/	/	/	/	/	/	/	/	/	m	/	/	/	/	/	/	/	/	/	/	m	/	/	/	/	/	/	/	/	/	/	m			
3	/	/	/	/	/	/	/	/	/	/	m	/	/	/	/	/	/	/	/	/	/	m	/	/	/	/	/	/	/	/	/	/	m			
4	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	WUP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	WUP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	WUP			
5	3	3	3	4	4	2	3	3	4	EMM	3	2	3	3	2	2	3	4	3	4	EMM	3	3	2	3	3	4	4	3	✓	3	EMM				
6	4	5	✓	6	7	6	7	6	8	EMM	5	5	6	6	7	4	✓	6	6	4	EMM	5	✓	✓	2	4	4	✓	3	2	✓	EMM				
7																																				
8																																				
Total	7	8	3	10	11	8	0	10	9	12	EMM	8	7	9	9	9	6	3	10	9	8	EMM	8	3	2	5	7	8	4	6	2	3	EMM			

Days	Concentration: <u>50</u>												Concentration: <u>100</u>												Concentration:											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	X	✓	✓	✓	✓	✓	✓	X	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM														
2	/	/	/	/	/	/	/	/	/	/	m	/	/	/	/	/	/	/	/	/	/	m														
3	/	/	/	/	/	/	/	/	/	/	m	/	/	/	/	/	/	/	/	/	/	m														
4	/	✓	✓	✓	✓	✓	✓	✓	✓	✓	WUP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	WUP														
5	/	2	✓	3	✓	3	✓	2	3	EMM	3	✓	X	✓	✓	✓	✓	3	✓	✓	EMM															
6	/	2	2	✓	2	2	3	✓	✓	EMM	✓	✓	1	2	✓	✓	2	✓	✓	1	EMM															
7																																				
8																																				
Total	0	4	2	3	2	5	3	0	2	3	EMM	3	0	0	2	0	0	2	3	0	1	EMM														

Notes: X = mortality.

Sample Description: turbid, yellow-grey

Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JGU

Date reviewed: Oct. 15/14

CETIS Analytical Report

Report Date: 23 Sep-14 10:01 (p 1 of 2)
 Test Code: 14631a | 07-6376-1459

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 11-5152-6021	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 23 Sep-14 9:55	Analysis: Linear Regression (MLE)	Official Results: Yes
Batch ID: 07-6252-6805	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 11 Sep-14 13:50	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 17 Sep-14 21:00	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 7h	Source: In-House Culture	Age: <24h
Sample ID: 07-2487-9794	Code: 2B34C9B2	Client: Mount Polley
Sample Date: 10 Sep-14 11:00	Material: Water Sample	Project:
Receive Date: 11 Sep-14 09:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 27h (8.5 °C)	Station: QUL-66-48M-140910	

Linear Regression Options

Model Function	Threshold Option	Threshold	Optimized	Pooled	Het Corr	Weighted
Log-Normal [NED=A+B*log(X)]	Control Threshold	1E-07	Yes	Yes	No	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
7	-17.78	47.56	41.8	6.976	3.967	0.02367				Lack of Fit Not Tested

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	2.825	N/A	N/A	35.4	NA	NA
EC10	78.03	N/A	N/A	1.282	NA	NA
EC15	732.3	N/A	N/A	0.1366	NA	NA
EC20	4340	N/A	N/A	0.02364	NA	NA
EC25	19980	N/A	N/A	0.005006	NA	NA
EC40	936000	N/A	N/A	0.0001068	NA	NA
EC50	9469000	N/A	N/A	0.0000105	NA	NA

>100% (v/w)

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Threshold	1.11E-07	0.000106	-0.00021	0.000207	0.001056	0.9992	Non-Significant Parameter
Slope	0.2521	0.3828	-0.4981	1.002	0.6586	0.5393	Non-Significant Parameter
Intercept	-1.759	0.5137	-2.765	-0.7517	-3.423	0.0188	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	2.001332	2.001332	1	2.17	0.2007	Non-Significant
Residual	4.612001	0.922400	5			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	4.612	11.07	0.4650	Non-Significant Heterogeneity
	Likelihood Ratio GOF	6.048	11.07	0.3016	Non-Significant Heterogeneity
Distribution	Shapiro-Wilk W Normality	0.9149	0.6805	0.3902	Normal Distribution
	Anderson-Darling A2 Normality	0.3442	2.492	0.4911	Normal Distribution

6d Survival Rate Summary

C-%	Control Type	Count	Calculated Variate(A/B)								
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	0.8	0	1	0.1333	0.4216	52.7%	20.0%	8	10
100		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 11-5152-6021
 Analyzed: 23 Sep-14 9:55

Endpoint: 6d Survival Rate
 Analysis: Linear Regression (MLE)

CETIS Version: CETISv1.8.7
 Official Results: Yes

6d Survival Rate Detail

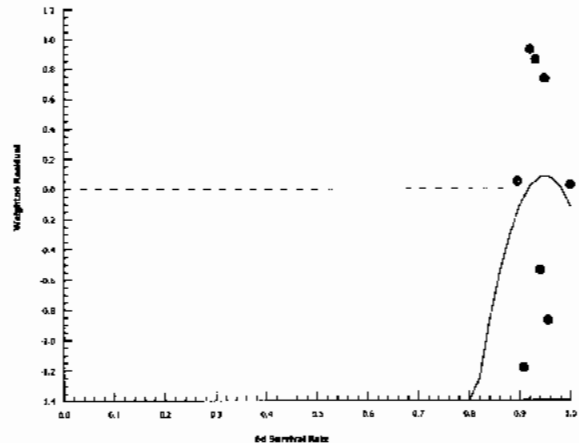
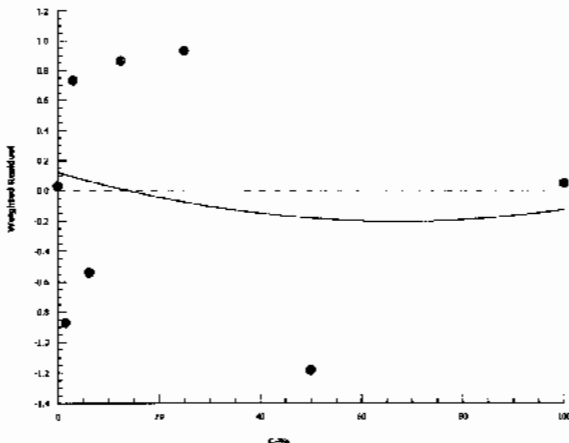
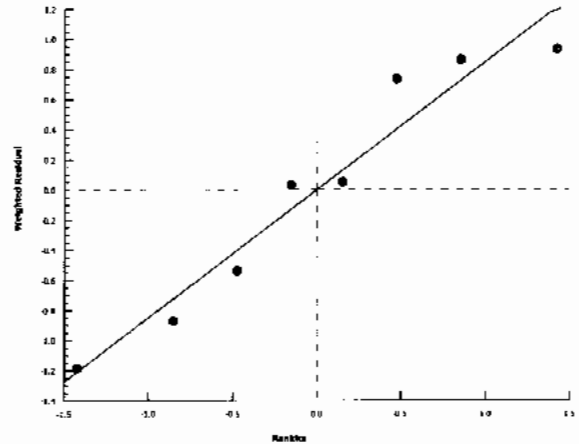
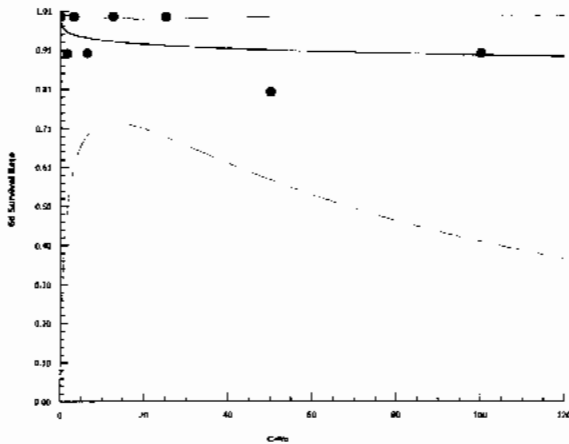
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		0	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	0	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		0	1	1	1	1	1	1	0	1	1
100		1	1	0	1	1	1	1	1	1	1

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		0/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1
100		1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics

Log-Normal [NED=A+B*log(X)]



CETIS Analytical Report

Report Date: 23 Sep-14 10:01 (p 1 of 2)
 Test Code: 14631a | 07-6376-1459

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 14-7728-5395	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 23 Sep-14 9:56	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 07-6252-6805	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Percy
Start Date: 11 Sep-14 13:50	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 17 Sep-14 21:00	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 7h	Source: In-House Culture	Age: <24h
Sample ID: 07-2487-9794	Code: 2B34C9B2	Client: Mount Polley
Sample Date: 10 Sep-14 11:00	Material: Water Sample	Project:
Receive Date: 11 Sep-14 09:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 27h (8.5 °C)	Station: QUL-66-48M-140910	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1448520	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.1198	0.08497	0.2089	834.5	478.7	1177
IC10	0.254	0.1772	0.4614	393.6	216.7	564.5
IC15	0.4043	0.2772	0.7667	247.3	130.4	360.8
IC20	0.5726	0.3857	1.136	174.6	88.04	259.3
IC25	0.7611	0.5034	1.568	131.4	63.76	198.6
IC40	1.473	0.9201	2.809	67.88	35.59	108.7
IC50	2.48	1.26	4.491	40.32	22.27	79.35

Reproduction Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	23.6	9	27	1.733	5.481	23.23%	0.0%
1.56		10	13.8	0	26	2.21	6.989	50.64%	41.53%
3.12		10	10.7	8	20	1.075	3.401	31.78%	54.66%
6.25		10	7.8	0	12	1.172	3.706	47.51%	66.95%
12.5		10	7.8	3	10	0.6464	2.044	26.2%	66.95%
25		10	4.8	2	8	0.7424	2.348	48.91%	79.66%
50		10	2.4	0	5	0.4989	1.578	65.73%	89.83%
100		10	1.1	0	3	0.4069	1.287	117.0%	95.34%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	27	9	23	27	26	25	27	21	26	25
1.56		0	21	26	12	16	9	14	15	10	15
3.12		20	10	9	11	11	10	8	10	9	9
6.25		7	8	3	10	11	8	0	10	9	12
12.5		8	7	9	9	9	6	3	10	9	8
25		8	3	2	5	7	8	4	6	2	3
50		0	4	2	3	2	5	3	0	2	3
100		3	0	0	2	0	0	2	3	0	1

CETIS Analytical Report

Report Date: 23 Sep-14 10:01 (p 2 of 2)

Test Code: 14631a | 07-6376-1459

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 14-7728-5395

Endpoint: Reproduction

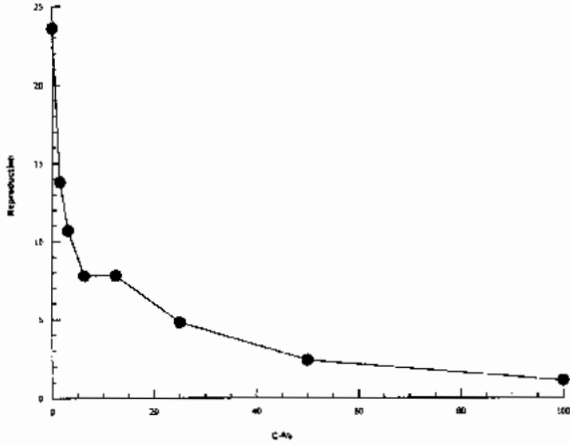
CETIS Version: CETISv1.8.7

Analyzed: 23 Sep-14 9:56

Analysis: Linear Interpolation (ICPIN)

Official Results: Yes

Graphics



Client: Mount Polley

W.O.#: 14631

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/LCaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
HAD-1-140910	Sept 16/14	50	3.9	4.2	72	50	5.0	100	LD
QWL-66-48m-140910	Sept 10/14	50	3.0	3.1	58	50	3.3	66	LD
20% Berner (b)	Sept 16/14	50	4.2	4.3	82	50	5.0	100	EMM

Notes:

Reviewed by:

Job

Date Reviewed:

Oct-15/14

APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

Fathead Minnow Test Summary Sheet
(7-d *Pimephales promelas* Survival and Growth Test)

Client: Mount Polley
Work Order No.: 14632

Start Date/Time: Sept 12/14 @ 1630L
Test Species: *P. promelas*

Sample Information:

Sample ID: HAD-1-140910
Sample Date: Sept 10/14
Date Received: Sept 11/14
Sample Volume: 2x20L

Dilution Water (initial water quality):

Type: Moderately Hard Water
Temperature (°C): 24.0
pH: 7.9
Dissolved Oxygen (mg/L): 8.2
Hardness (mg/L CaCO₃): 98
Alkalinity (mg/L CaCO₃): 62.62

Test Validity Criteria:

The test is invalid if:

- 1) for the control solutions, the combined and cumulative incidence of any mortalities, or fish showing loss of equilibrium or other signs of atypical swimming behavior, is >20%
- 2) the average dry weight of the surviving control fish does not attain 250 ug when the fish are dried and weighed.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4; pH = 6.5 to 8.5

Test Organism Information:

Batch No.: 091214
Source: Aquatic Biosystems, Co
Age: 24hr

NaCl Reference Toxicant Results:

Reference Toxicant ID: PP96
Stock Solution ID: n/a
Date Initiated: Sept 12/14
7-d EC50 (95% CL): 4.2 (3.2-4.9) 4.2 (3.5-4.9)
7-d IC50 (95% CL): 3.3 (2.4-6.3) 3.8 (2.3-6.3)

Survival:

Reference Toxicant Mean and Historical Range: 4.5 (3.5-5.7) CV (%): 13

Biomass:

Reference Toxicant Mean and Historical Range: 3.9 (2.9-5.4) CV (%): 7

Test Results:

	Survival	Biomass
LC25 % (v/v) (95% CL)	>100	
LC50 % (v/v) (95% CL)	>100	
IC25 % (v/v) (95% CL)		>100
IC50 % (v/v) (95% CL)		>100

Reviewed by: JOB

Date reviewed: Oct. 17/14

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Palley
 Sample ID: HAD-1-140910 (purple)
 Work Order #: 14632

Start Date & Time: Sept 12/14 @ 1630h
 Stop Date & Time: Sept 19/14 @ 1630h
 Test Species: Pimephales promelas

Concentration (Control)	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	25.0	25.0	25.0	25.5	25.5	25.0	25.5	24.5	26.0	24.5	26.0	24.0
DO (mg/L)	8.4	6.9	8.4	5.9	8.4	5.8	8.3	4.4	8.3	4.4	8.0	4.3	8.4	5.6
pH	7.9	7.9	8.2	7.8	8.0	7.6	8.0	7.4	7.9	7.5	8.0	7.4	8.1	7.6
Cond. (µS/cm)	319	330		324		326		333		334		317		334
Initials	WJL	JBF		WJL		JBF		JBF		JBF		JBF		JBF

Concentration 1.56	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	25.0	25.0	24.0	25.0	25.0	25.5	24.0	25.0	24.5	24.5	24.0	24.5	24.5	24.0
DO (mg/L)	7.3	7.0	8.0	6.0	8.4	5.5	8.3	4.6	8.4	4.0	8.3	4.2	8.4	4.9
pH	7.9	7.9	8.1	7.9	8.0	7.5	8.1	7.4	8.0	7.4	8.0	7.3	8.0	7.5
Cond. (µS/cm)	316	323		320		323		328		333		319		341
Initials	WJL	JBF		WJL		JBF		JBF		JBF		JBF		JBF

Concentration 12.5	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.5	25.5	24.0	25.0	24.5	24.5	24.0	24.5	24.5	24.0
DO (mg/L)	7.3	6.8	8.1	6.0	8.3	5.6	8.2	4.6	8.4	4.1	8.4	4.5	8.3	5.1
pH	7.9	7.9	8.1	7.9	8.1	7.5	8.1	7.4	8.0	7.4	8.0	7.3	8.0	7.5
Cond. (µS/cm)	307	312		309		312		316		320		307		329
Initials	WJL	JBF		WJL		JBF		JBF		JBF		JBF		JBF

① 8.0

Concentration 100	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	25.0	25.0	24.0	25.0	24.0	25.5	24.0	25.0	24.0	24.5	24.0	24.5	24.5	24.0
DO (mg/L)	7.9	6.8	8.2	5.9	8.4	5.8	8.3	4.0	8.3	4.2	8.4	4.1	8.3	4.6
pH	8.3	8.0	8.5	7.8	8.4	7.6	8.5	7.4	8.3	7.4	8.4	7.3	8.4	7.4
Cond. (µS/cm)	227	228		226		226		226		231		227		245
Initials	WJL	JBF		WJL		JBF		JBF		JBF		JBF		JBF

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6.5 to 8.5

DO meter: 3 pH meter: 3 Conductivity meter: 3

	Control	100% (M/V)	
Hardness*	90	100	/
Alkalinity*	62	72	

* mg/L as CaCO₃

Analysts: JBF, YL
 Reviewed by: JBF
 Date reviewed: Oct 17/14

Sample Description: clear with a yellow tint

Comments: _____

7-d Fathead Minnow Toxicity Test Daily Survival

Client: Mount Pooley
 Sample ID: KAD-1-140910 (purple)
 Work Order #: 14632

Start Date & Time: Sept 12/14 @ 1630h
 Stop Date & Time: Sept 19/14 @ 1630h
 Test Species: Pimephales promelas

Concentration % (v/v)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	10	10	10	10	10	10	10	
	B	10	10	10	10	9	9	9	
	C	10	10	9	9	9	9	9	
1.56	A	10	10	10	10	9	6	3	
	B	10	10	10	9	9	8	7	
	C	10	10	10	10	10	9	4	
3.1	A	10	10	10	9	9	9	9	
	B	10	10	10	10	10	9	4	
	C	10	10	10	10	10	10	10	
6.25	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	7	4	
	C	10	10	10	10	10	10	10	
12.5	A	10	10	9	9	9	8	7	
	B	10	10	10	10	10	8	6	
	C	10	10	10	10	9	10	10	
25	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
50	A	10	9	9	9	9	9	9	
	B	10	10	10	9	9	9	9	
	C	10	10	10	10	9	9	9	
100	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	9	9	9	9	7	
	A								
	B								
	C								
	A								
	B								
	C								
Tech Initials		JBF	WML	JBF	JBF	JBF	JBF	KSL	

Comments: ① Technician error, jar knocked over, toxication test
② Temp: 24°C Cond: 350 pH: 7.2 DO: 4.5 mg/L

Reviewed by: JGU Date reviewed: Oct. 15/14

Fathead Minnow Toxicity Test Data Sheet

Dry Weight Data

Client: Mount Polley

Start Date & Time: Sept 12/14 @ 1636h

Sample ID: HAD-1-140910 (purple)

Termination Date & Time: Sept 19/14 @ 1620h

Work Order No.: 14632

% (v/v)	Concentration	Rep	146 Pan No. purple	No. alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control	A	1	10	10	ESL	972.37	978.27	10	NY
	B	2	9	9		954.83	959.59	9	
	C	3	9	9		963.68	968.95	9	
1.56	A	4	3	3		990.36	992.13	3	
	B	5	7	7		986.45	991.56	7	
	C	6	4	4		994.16	997.83	4	
3.1	A	7	9	9		982.05	987.64	9	
	B	8	4	4		991.67	994.05	4	
	C	9	10	10		967.33	972.40	10	
6.25	A	10	9	9		991.49	996.52	9	
	B	11	4	4		994.06	996.56	4	
	C	12	10	10		991.42	998.74	10	
12.5	A	13	7	7		993.52	998.72	7	
	B	14	6	6		979.96	984.78	6	
	C	15	8	8		984.44	991.03	8	
25	A	16	8	8		984.25	989.19	8	
	B	17	9	9		987.42	993.29	9	
	C	18	10	10		1006.19	1012.77	10	
50	A	19	9	9		994.70	1001.35	9	
	B	20	8	8		984.53	989.54	8	
	C	21	9	9		1000.92	1007.68	9	
100	A	22	10	10		981.79	989.45	10	
	B	23	10	10		977.89	986.32	10	
	C	24	7	7		985.66	991.29	7	

Comments: Reweighed pans - 1-978.30 12-998.66

Reviewed by: JGU

Date Reviewed: Oct. 15/14

CETIS Analytical Report

Report Date: 17 Oct-14 18:10 (p 1 of 2)
 Test Code: 14632b | 13-8214-2051

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 01-3696-6543	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 22 Sep-14 14:44	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 11-9444-8875	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 12 Sep-14 16:30	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 19 Sep-14 16:30	Species: Pimephales promelas	Brine:
Duration: 7d 0h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 00-5008-0453	Code: 2FC2AC5	Client: Mount Polley
Sample Date: 10 Sep-14 13:50	Material: Water Sample	Project:
Receive Date: 11 Sep-14 09:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 51h (10.5 °C)	Station: HAD-1-140910	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	745309	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.9667	0.8 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	0.2563	0.09351	0.722	390.1	138.5	1069
EC10	0.5784	0.1819	1.852	172.9	54	549.9
EC15	0.983	0.2586	N/A	101.7	NA	386.8
EC20	1.491	0.3144	N/A	67.05	NA	318
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	3	0.9667	0.9	1	0.03333	0.05773	5.97%	0.0%	28	29
1.56		3	0.4667	0.3	0.7	0.1202	0.2082	44.61%	51.72%	14	30
3.1		3	0.7667	0.4	1	0.1856	0.3215	41.93%	20.69%	23	30
6.25		3	0.7667	0.4	1	0.1856	0.3215	41.93%	20.69%	23	30
12.5		3	0.7	0.6	0.8	0.05774	0.1	14.29%	27.59%	21	30
25		3	0.9	0.8	1	0.05774	0.1	11.11%	6.9%	27	30
50		3	0.8667	0.8	0.9	0.03333	0.05773	6.66%	10.34%	26	30
100		3	0.9	0.7	1	0.1	0.1732	19.25%	6.9%	27	30

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	1	0.9	1
1.56		0.3	0.7	0.4
3.1		0.9	0.4	1
6.25		0.9	0.4	1
12.5		0.7	0.6	0.8
25		0.8	0.9	1
50		0.9	0.8	0.9
100		1	1	0.7

CETIS Analytical Report

Report Date: 17 Oct-14 18:10 (p 2 of 2)
Test Code: 14632b | 13-8214-2051

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

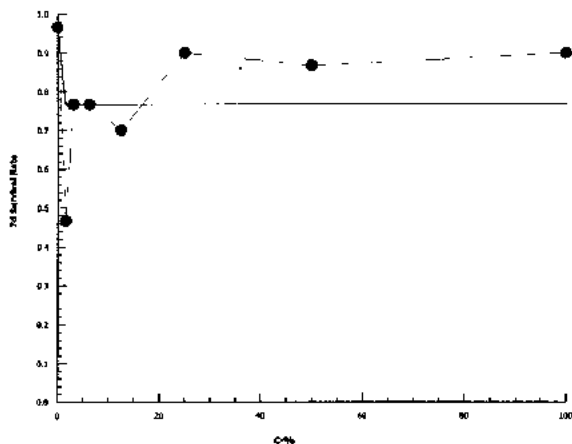
Analysis ID: 01-3696-6543 Endpoint: 7d Survival Rate
Analyzed: 22 Sep-14 14:44 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	10/10	9/10	9/9
1.56		3/10	7/10	4/10
3.1		9/10	4/10	10/10
6.25		9/10	4/10	10/10
12.5		7/10	6/10	8/10
25		8/10	9/10	10/10
50		9/10	8/10	9/10
100		10/10	10/10	7/10

Graphics



CETIS Analytical Report

Report Date: 17 Oct-14 18:08 (p 1 of 2)
 Test Code: 14632b | 13-8214-2051

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 08-3193-4186	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 22 Sep-14 16:04	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 11-9444-8875	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 12 Sep-14 16:30	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 19 Sep-14 16:30	Species: Pimephales promelas	Brine:
Duration: 7d 0h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 00-5008-0453	Code: 2FC2AC5	Client: Mount Polley
Sample Date: 10 Sep-14 13:50	Material: Water Sample	Project:
Receive Date: 11 Sep-14 09:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 51h (10.5 °C)	Station: HAD-1-140910	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1439431	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.5505	0.25 - NL	Yes	Passes Acceptability Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.5505	0.476	0.59	0.03728	0.06457	11.73%	0.0%
1.56		3	0.3517	0.177	0.511	0.09672	0.1675	47.64%	36.12%
3.1		3	0.4347	0.238	0.559	0.09947	0.1723	39.64%	21.04%
6.25		3	0.495	0.25	0.732	0.1392	0.2411	48.71%	10.08%
12.5		3	0.5537	0.482	0.659	0.0538	0.09318	16.83%	-0.57%
25		3	0.5797	0.494	0.658	0.04748	0.08225	14.19%	-5.29%
50		3	0.614	0.501	0.676	0.05659	0.09802	15.96%	-11.53%
100		3	0.724	0.563	0.843	0.08351	0.1446	19.98%	-31.51%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.59	0.476	0.5856
1.56		0.177	0.511	0.367
3.1		0.559	0.238	0.507
6.25		0.503	0.25	0.732
12.5		0.52	0.482	0.659
25		0.494	0.587	0.658
50		0.665	0.501	0.676
100		0.766	0.843	0.563

CETIS Analytical Report

Report Date: 17 Oct-14 18:08 (p 2 of 2)

Test Code: 14632b | 13-8214-2051

Fathead Minnow 7-d Larval Survival and Growth Test

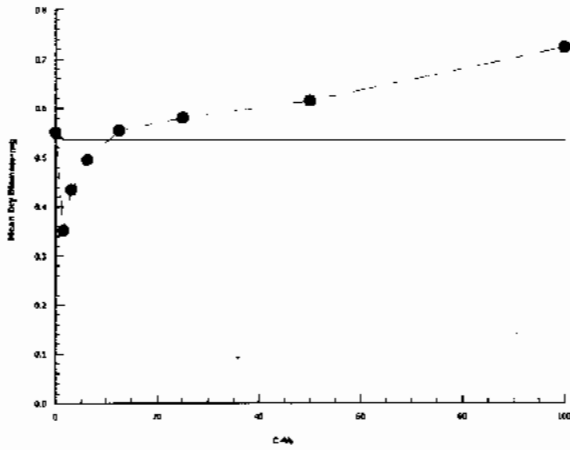
Nautilus Environmental

Analysis ID: 08-3193-4186
Analyzed: 22 Sep-14 16:04

Endpoint: Mean Dry Biomass-mg
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 17 Oct-14 18:08 (p 1 of 2)
 Test Code: 14632b | 13-8214-2051

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 07-5756-1743	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 17 Oct-14 18:08	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 11-9444-8875	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 12 Sep-14 16:30	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 19 Sep-14 16:30	Species: Pimephales promelas	Brine:
Duration: 7d 0h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 00-5008-0453	Code: 2FC2AC5	Client: Mount Polley
Sample Date: 10 Sep-14 13:50	Material: Water Sample	Project:
Receive Date: 11 Sep-14 09:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 51h (10.5 °C)	Station: HAD-1-140910	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C < T	NA	NA	54.7%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		1.56	-1.691	2.558	0.301	4	0.9987	CDF	Non-Significant Effect
		3.1	-0.9849	2.558	0.301	4	0.9891	CDF	Non-Significant Effect
		6.25	-0.472	2.558	0.301	4	0.9565	CDF	Non-Significant Effect
		12.5	0.02674	2.558	0.301	4	0.8682	CDF	Non-Significant Effect
		25	0.2478	2.558	0.301	4	0.8026	CDF	Non-Significant Effect
		50	0.5397	2.558	0.301	4	0.6917	CDF	Non-Significant Effect
		100	1.475	2.558	0.301	4	0.2832	CDF	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.5505	0.25 - NL	Yes	Passes Acceptability Criteria
PMSD	0.5465	0.12 - 0.3	Yes	Above Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.2692685	0.03846693	7	1.854	0.1452	Non-Significant Effect
Error	0.3320521	0.02075326	16			
Total	0.6013206		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.496	18.48	0.7212	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9743	0.884	0.7720	Normal Distribution

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	3	0.5505	0.3901	0.7109	0.5856	0.476	0.59	0.03728	11.73%	0.0%
1.56		3	0.3517	-0.06449	0.7678	0.367	0.177	0.511	0.09672	47.64%	36.12%
3.1		3	0.4347	0.00667	0.8627	0.507	0.238	0.559	0.09947	39.64%	21.04%
6.25		3	0.495	-0.1039	1.094	0.503	0.25	0.732	0.1392	48.71%	10.08%
12.5		3	0.5537	0.3222	0.7851	0.52	0.482	0.659	0.0538	16.83%	-0.57%
25		3	0.5797	0.3754	0.784	0.587	0.494	0.658	0.04748	14.19%	-5.29%
50		3	0.614	0.3705	0.8575	0.665	0.501	0.676	0.05659	15.96%	-11.53%
100		3	0.724	0.3647	1.083	0.766	0.563	0.843	0.08351	19.98%	-31.51%

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

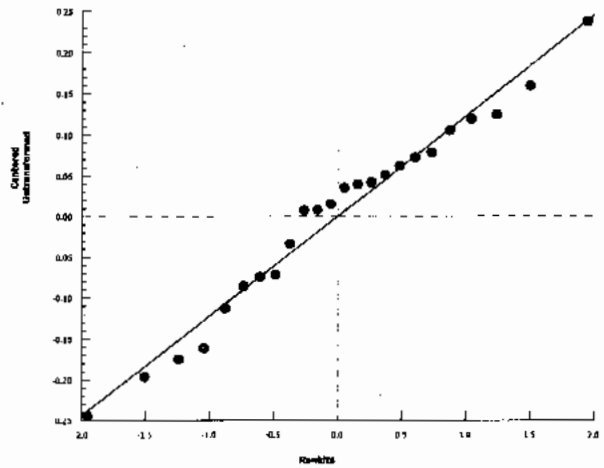
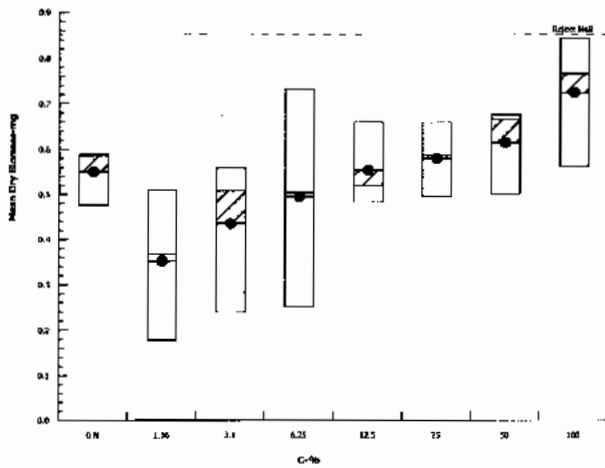
Analysis ID: 07-5756-1743 Endpoint: Mean Dry Biomass-mg
 Analyzed: 17 Oct-14 18:08 Analysis: Parametric-Control vs Treatments

CETIS Version: CETISv1.8.7
 Official Results: Yes

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.59	0.476	0.5856
1.56		0.177	0.511	0.367
3.1		0.559	0.238	0.507
6.25		0.503	0.25	0.732
12.5		0.52	0.482	0.659
25		0.494	0.587	0.658
50		0.665	0.501	0.676
100		0.766	0.843	0.563

Graphics



CETIS Analytical Report

Report Date: 01 Oct-14 09:05 (p 1 of 1)

Test Code: 14632b | 13-8214-2051

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 01-9344-3397	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 01 Oct-14 9:05	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 11-9444-8875	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 12 Sep-14 16:30	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 19 Sep-14 16:30	Species: Pimephales promelas	Brine:
Duration: 7d 0h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 00-5008-0453	Code: 2FC2AC5	Client: Mount Polley
Sample Date: 10 Sep-14 13:50	Material: Water Sample	Project:
Receive Date: 11 Sep-14 09:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 51h (10.5 °C)	Station: HAD-1-140910	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1183098	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	Min	Calculated Variate				
					Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.5682	0.5289	0.59	0.01967	0.03407	6.0%	0.0%
1.56		3	0.7458	0.59	0.9175	0.09487	0.1643	22.03%	-31.27%
3.1		3	0.5744	0.507	0.6211	0.03452	0.05979	10.41%	-1.1%
6.25		3	0.6386	0.5589	0.732	0.05043	0.08736	13.68%	-12.41%
12.5		3	0.79	0.7429	0.8238	0.02429	0.04207	5.33%	-39.04%
25		3	0.6426	0.6175	0.658	0.01265	0.02191	3.41%	-13.1%
50		3	0.7054	0.6262	0.7511	0.03974	0.06884	9.76%	-24.16%
100		3	0.8044	0.766	0.843	0.02223	0.0385	4.79%	-41.59%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.59	0.5289	0.5856
1.56		0.59	0.73	0.9175
3.1		0.6211	0.595	0.507
6.25		0.5589	0.625	0.732
12.5		0.7429	0.8033	0.8238
25		0.6175	0.6522	0.658
50		0.7389	0.6262	0.7511
100		0.766	0.843	0.8043

Fathead Minnow Test Summary Sheet
(7-d *Pimephales promelas* Survival and Growth Test)

Client: Mount Pooley
Work Order No.: 14632

Start Date/Time: Sept 12/14 @ 1630h
Test Species: *P. promelas*

Sample Information:

Sample ID: QUL-66-48M-140910
Sample Date: SEP 10/14
Date Received: SEP 11/14
Sample Volume: 2L 20L

Dilution Water (initial water quality):

Type: Moderately Hard Water
Temperature (°C): 21.0
pH: 7.9
Dissolved Oxygen (mg/L): 8.4
Hardness (mg/L CaCO₃): 98
Alkalinity (mg/L CaCO₃): 68.62
kn

Test Validity Criteria:

The test is invalid if:

- 1) for the control solutions, the combined and cumulative incidence of any mortalities, or fish showing loss of equilibrium or other signs of atypical swimming behavior, is >20%
- 2) the average dry weight of the surviving control fish does not attain 250 ug when the fish are dried and weighed.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4; pH = 6.5 to 8.5

Test Organism Information:

Batch No.: 091214
Source: Aquatic Biosystems, CO
Age: 224hr

NaCl Reference Toxicant Results:

Reference Toxicant ID: PP96
Stock Solution ID: n/a
Date Initiated: Sept 12/14
7-d EC50 (95% CL): 4.2 (2.6-4.9) 4.2 (3.5-4.9)
7-d IC50 (95% CL): 3.7 (2.4-6.3) 3.8 (2.3-6.3)
kn

Survival:

Reference Toxicant Mean and Historical Range: 4.5 (3.5-5.7) CV (%) 13

Biomass:

Reference Toxicant Mean and Historical Range: 3.9 (2.9-5.4) CV (%) 17

Test Results:

	Survival	Biomass
LC25 % (v/v) (95% CL)	>100	>100
LC50 % (v/v) (95% CL)	>100	>100
IC25 % (v/v) (95% CL)	>100	>100
IC50 % (v/v) (95% CL)	>100	>100

Reviewed by: JGh

Date reviewed: Oct. 17/14

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: GAL-66-48M-140910 (blue)
 Work Order #: 14632

Start Date & Time: Sept 12/14 @ 1630h
 Stop Date & Time: Sept 19/14 @ 1630h
 Test Species: Pimephales promelas

%. (v/v) Concentration Control	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final	
Temperature (°C)	24.0	25.0	25.0	25.0	25.0	25.5	25.5	24.0	25.5	24.5	26.0	24.5	26.0	24.5	
DO (mg/L)	8.4	6.9	8.4	6.2	8.4	5.9	8.3	4.5	8.3	4.5	8.0	4.2	8.4	5.6	
pH	7.9	8.0	8.2	7.8	8.0	7.5	8.0	7.5	7.9	7.5	8.0	7.5	8.1	7.6	
Cond. (µS/cm)	319	330		324		326		333		334		317		343	
Initials	LDL	JBF		WML		JBF		JBF		JBF		JBF		JBF	

Concentration 1-56	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final	
Temperature (°C)	24.5	25.0	24.0	25.0	25.0	25.5	24.0	24.0	24.5	24.5	24.0	24.5	25.0	24.0	
DO (mg/L)	7.0	6.8	8.2	6.1	8.4	5.9	8.2	5.2	8.4	4.3	8.4	4.1	7.5	5.5	
pH	7.8	7.9	8.2	7.7	8.0	7.5	8.1	7.5	8.0	7.4	8.0	7.4	8.0	7.6	
Cond. (µS/cm)	317	322		320		323		327		332		314		341	
Initials	LDL	JBF		WML		JBF		JBF		JBF		LD		JBF	

Concentration 12-5	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final	
Temperature (°C)	24.0	25.0	24.0	25.0	24.5	25.5	24.0	24.0	24.5	24.5	24.0	24.5	25.0	24.5	
DO (mg/L)	7.8	6.8	8.0	5.8	8.3	5.5	8.2	4.5	8.4	4.2	8.4	4.2	7.7	5.5	
pH	7.9	7.9	8.1	7.7	8.0	7.5	8.1	7.4	8.0	7.4	8.0	7.3	8.0	7.6	
Cond. (µS/cm)	300	303		301		309		309		311		297		326	
Initials	KJL/LD	JBF		WML		JBF		JBF		JBF		LD		JBF	

Concentration 100	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final	
Temperature (°C)	25.0	25.0	24.0	25.0	24.0	25.5	24.0	24.0	24.5	24.5	24.0	24.5	25.0	24.5	
DO (mg/L)	6.8	7.6	6.8	7.9	6.1	8.3	6.2	8.3	5.3	8.4	4.9	8.4	4.0	5.6	
pH	7.7	7.9	8.0	7.7	8.0	7.5	8.0	7.4	7.9	7.4	7.9	7.3	7.8	7.5	
Cond. (µS/cm)	158	160		159		158		160		161		160		174	
Initials	LD/KJL	JBF		WML		JBF		JBF		JBF		LD		JBF	

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6.5 to 8.5

DO meter: 3 pH meter: 3 Conductivity meter: 3

	Control	100%. (v/v)		
Hardness*	95	66		
Alkalinity*	62	58		

* mg/L as CaCO3

Analysts: JBF, YYL
 Reviewed by: JBF
 Date reviewed: Oct. 17/14

Sample Description: murky grey colour.

Comments: _____

7-d Fathead Minnow Toxicity Test Daily Survival

Client: Mount Polley
 Sample ID: DAL-66-4JM-140910 (blue)
 Work Order #: 14632

Start Date & Time: Sept 12/14 @ 1630h
 Stop Date & Time: Sept 19/14 @ 1630h
 Test Species: Pimephales promelas

Concentration (% L/V)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	9	
	C	10	10	10	9	9	9	9	
1.96	A	10	10	10	10	10	10	10	
	B	10	10	9	9	9	9	9	
	C	10	10	10	10	10	10	6	
3.1	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	9	6	
	C	10	10	10	10	10	10	10	
6.25	A	10	10	10	10	10	10	10	
	B	10	10	10	9	9	9	9	
	C	10	10	10	10	10	9	9	
12.5	A	10	10	10	10	10	10	10	
	B	10	10	9	8	8	8	8	
	C	10	10	10	10	10	10	10	
25	A	10	10	10	10	10	9	9	
	B	10	10	10	10	10	10	9	
	C	10	10	10	10	10	10	6	
50	A	10	10	10	10	10	10	6	
	B	10	10	10	9	9	8	7	
	C	10	10	10	10	10	10	10	
100	A	10	10	10	8	8	8	8	
	B	10	10	10	9	9	9	9	
	C	10	10	10	9	9	9	9	
	A								
	B								
	C								
	A								
	B								
	C								
Tech Initials		SBF	mm	SBF	SBF	SBF	SBF	KJL	

Comments: _____

Reviewed by: Jbh Date reviewed: Oct 15/14

Fathead Minnow Toxicity Test Data Sheet

Dry Weight Data

Client: Mount Polley

Start Date & Time: Sept 12/14 @ 1630h

Sample ID: QUL-66-4&M-140910 (blue)

Termination Date & Time: Sept 19/14 @

Work Order No.: 14632

Concentration	Rep	QUL 66 Pan No. Blue	No. alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control	A	1	10	KTL	1002.75	1007.99	10	NY
	B	2	9		1013.21	1017.40	9	
	C	3	9		981.68	987.44	9	
1.56	A	4	10		982.69	989.47	10	
	B	5	9		969.70	976.15	9	
	C	6	6		994.61	998.48	6	
3.1	A	7	10		976.97	983.08	10	
	B	8	6		978.58	982.57	6	
	C	9	10		980.45	986.73	10	
6.25	A	10	10		1000.85	1006.17	10	
	B	11	9		987.82	993.71	9	
	C	12	9		987.65	993.47	9	
12.5	A	13	10		983.84	991.92	10	
	B	14	8		988.27	995.19	8	
	C	15	10		993.27	1001.62	10	
25	A	16	9		983.91	991.10	9	
	B	17	8		982.11	988.37	8	
	C	18	10		977.53	984.61	10	
50	A	19	10		982.15	988.31	10	
	B	20	7		979.02	984.53	7	
	C	21	10		985.52	992.07	10	
100	A	22	8		982.18	987.54	8	
	B	23	9		984.91	992.45	9	
	C	24	9		1004.51	1009.22	9	

Comments: Reweighed pans - 2 - 1017.42 11 - 993.70

Reviewed by: John

Date Reviewed: Oct. 15/14

CETIS Analytical Report

Report Date: 01 Oct-14 09:04 (p 1 of 2)
 Test Code: 16432 | 18-4640-9208

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 17-8722-2465	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 22 Sep-14 16:22	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 08-6649-8551	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 12 Sep-14 16:30	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 19 Sep-14 16:30	Species: Pimephales promelas	Brine:
Duration: 7d 0h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 07-2487-9794	Code: 2B34C9B2	Client: Mount Polley
Sample Date: 10 Sep-14 11:00	Material: Water Sample	Project:
Receive Date: 11 Sep-14 09:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 53h (8.5 °C)	Station: QUL-66-48M-140910	

Linear Interpolation Options.

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	829534	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	60.75	N/A	N/A	1.646	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	3	0.9333	0.9	1	0.03333	0.05773	6.19%	0.0%	28	30
1.56		3	0.8333	0.6	1	0.1202	0.2082	24.98%	10.71%	25	30
3.1		3	0.8667	0.6	1	0.1333	0.2309	26.65%	7.14%	26	30
6.25		3	0.9333	0.9	1	0.03333	0.05773	6.19%	0.0%	28	30
12.5		3	0.9333	0.8	1	0.06667	0.1155	12.37%	0.0%	28	30
25		3	0.9	0.8	1	0.05774	0.1	11.11%	3.57%	27	30
50		3	0.9	0.7	1	0.1	0.1732	19.25%	3.57%	27	30
100		3	0.8667	0.8	0.9	0.03333	0.05773	6.66%	7.14%	26	30

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	1	0.9	0.9
1.56		1	0.9	0.6
3.1		1	0.6	1
6.25		1	0.9	0.9
12.5		1	0.8	1
25		0.9	0.8	1
50		1	0.7	1
100		0.8	0.9	0.9

CETIS Analytical Report

Report Date: 01 Oct-14 09:04 (p 2 of 2)
Test Code: 16432 | 18-4640-9208

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 17-8722-2465
Analyzed: 22 Sep-14 16:22

Endpoint: 7d Survival Rate
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	10/10	9/10	9/10
1.56		10/10	9/10	6/10
3.1		10/10	6/10	10/10
6.25		10/10	9/10	9/10
12.5		10/10	8/10	10/10
25		9/10	8/10	10/10
50		10/10	7/10	10/10
100		8/10	9/10	9/10

JGA
Oct 14/14

CETIS Analytical Report

Report Date: 17 Oct-14 12:19 (p 1 of 2)
 Test Code: 16432 | 18-4640-9208

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 13-7504-8251	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 22 Sep-14 16:22	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 08-6649-8551	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 12 Sep-14 16:30	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 19 Sep-14 16:30	Species: Pimephales promelas	Brine:
Duration: 7d 0h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 07-2487-9794	Code: 2B34C9B2	Client: Mount Polley
Sample Date: 10 Sep-14 11:00	Material: Water Sample	Project:
Receive Date: 11 Sep-14 09:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 53h (8.5 °C)	Station: QUL-66-48M-140910	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	457483	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.5063	0.419	0.576	0.04617	0.07998	15.8%	0.0%
1.56		3	0.57	0.387	0.678	0.09199	0.1593	27.95%	-12.57%
3.1		3	0.546	0.399	0.628	0.07366	0.1276	23.37%	-7.83%
6.25		3	0.5677	0.532	0.589	0.01795	0.03108	5.48%	-12.11%
12.5		3	0.7783	0.692	0.835	0.04386	0.07598	9.76%	-53.72%
25		3	0.6843	0.626	0.719	0.02934	0.05082	7.43%	-35.15%
50		3	0.6073	0.551	0.655	0.03033	0.05254	8.65%	-19.95%
100		3	0.587	0.471	0.754	0.08558	0.1482	25.25%	-15.93%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.524	0.419	0.576
1.56		0.678	0.645	0.387
3.1		0.611	0.399	0.628
6.25		0.532	0.589	0.582
12.5		0.808	0.692	0.835
25		0.719	0.626	0.708
50		0.616	0.551	0.655
100		0.536	0.754	0.471

CETIS Analytical Report

Report Date: 17 Oct-14 12:19 (p 2 of 2)
Test Code: 16432 | 18-4640-9208

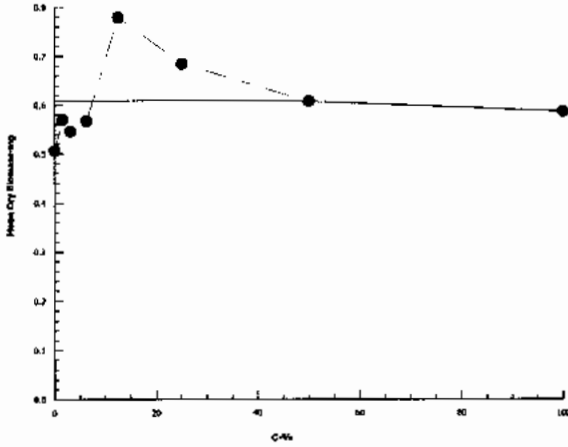
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 13-7504-8251 Endpoint: Mean Dry Biomass-mg
Analyzed: 22 Sep-14 16:22 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 17 Oct-14 17:58 (p 1 of 2)

Test Code: 16432 | 18-4640-9208

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 13-9441-9737	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 17 Oct-14 17:58	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 08-6649-8551	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 12 Sep-14 16:30	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 19 Sep-14 16:30	Species: Pimephales promelas	Brine:
Duration: 7d 0h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 07-2487-9794	Code: 2B34C9B2	Client: Mount Polley
Sample Date: 10 Sep-14 11:00	Material: Water Sample	Project:
Receive Date: 11 Sep-14 09:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 53h (8.5 °C)	Station: QUL-66-48M-140910	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C < T	NA	NA	41.8%	6.25	12.5	8.839	16

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		1.56	0.7696	2.558	0.212	4	0.5900	CDF	Non-Significant Effect
		3.1	0.4795	2.558	0.212	4	0.7166	CDF	Non-Significant Effect
		6.25	0.7414	2.558	0.212	4	0.6028	CDF	Non-Significant Effect
		12.5*	3.288	2.558	0.212	4	0.0122	CDF	Significant Effect
		25	2.152	2.558	0.212	4	0.1024	CDF	Non-Significant Effect
		50	1.221	2.558	0.212	4	0.3848	CDF	Non-Significant Effect
		100	0.9751	2.558	0.212	4	0.4950	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1574862	0.02249803	7	2.192	0.0918	Non-Significant Effect
Error	0.1642388	0.01026493	16			
Total	0.321725		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	6.699	18.48	0.4609	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9708	0.884	0.6861	Normal Distribution

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	3	0.5063	0.3077	0.705	0.524	0.419	0.576	0.04617	15.8%	0.0%
1.56		3	0.57	0.1742	0.9658	0.645	0.387	0.678	0.09199	27.95%	-12.57%
3.1		3	0.546	0.229	0.863	0.611	0.399	0.628	0.07366	23.37%	-7.83%
6.25		3	0.5677	0.4904	0.6449	0.582	0.532	0.589	0.01795	5.48%	-12.11%
12.5		3	0.7783	0.5896	0.9671	0.808	0.692	0.835	0.04386	9.76%	-53.72%
25		3	0.6843	0.5581	0.8106	0.708	0.626	0.719	0.02934	7.43%	-35.15%
50		3	0.6073	0.4768	0.7378	0.616	0.551	0.655	0.03033	8.65%	-19.95%
100		3	0.587	0.2188	0.9552	0.536	0.471	0.754	0.08558	25.25%	-15.93%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.524	0.419	0.576
1.56		0.678	0.645	0.387
3.1		0.611	0.399	0.628
6.25		0.532	0.589	0.582
12.5		0.808	0.692	0.835
25		0.719	0.626	0.708
50		0.616	0.551	0.655
100		0.536	0.754	0.471

CETIS Analytical Report

Report Date: 17 Oct-14 17:58 (p 2 of 2)

Test Code: 18432 | 18-4640-9208

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 13-9441-9737

Endpoint: Mean Dry Biomass-mg

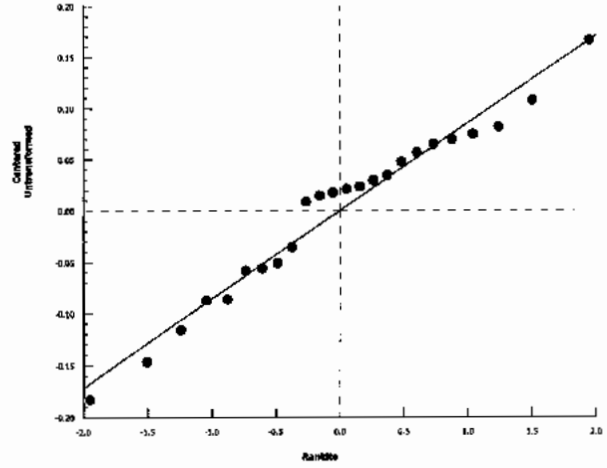
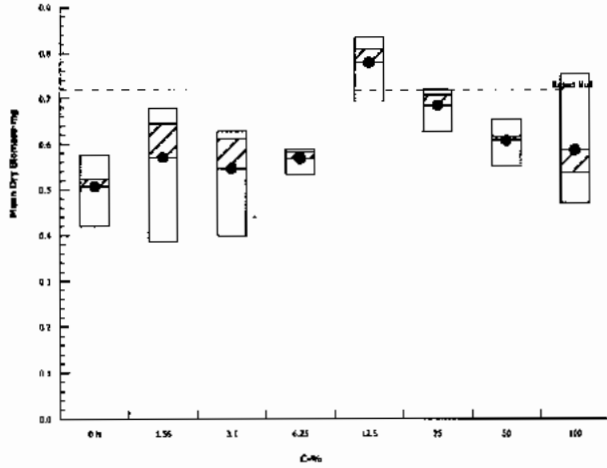
CETIS Version: CETISv1.8.7

Analyzed: 17 Oct-14 17:58

Analysis: Parametric-Control vs Treatments

Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 01 Oct-14 09:05 (p 1 of 1)
 Test Code: 16432 | 18-4640-9208

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 14-5538-7150	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 01 Oct-14 9:04	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 08-6649-8551	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 12 Sep-14 16:30	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 19 Sep-14 16:30	Species: Pimephales promelas	Brine:
Duration: 7d 0h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 07-2487-9794	Code: 2B34C9B2	Client: Mount Polley
Sample Date: 10 Sep-14 11:00	Material: Water Sample	Project:
Receive Date: 11 Sep-14 09:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 53h (8.5 °C)	Station: QUL-66-48M-140910	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	2056086	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.5432	0.4656	0.64	0.05126	0.08879	16.35%	0.0%
1.56		3	0.6799	0.645	0.7167	0.02071	0.03587	5.28%	-25.17%
3.1		3	0.6347	0.611	0.665	0.01594	0.02761	4.35%	-16.84%
6.25		3	0.611	0.532	0.6544	0.03958	0.06856	11.22%	-12.49%
12.5		3	0.836	0.808	0.865	0.01646	0.02851	3.41%	-53.91%
25		3	0.7631	0.708	0.7989	0.02797	0.04844	6.35%	-40.49%
50		3	0.686	0.616	0.7871	0.05179	0.0897	13.07%	-26.3%
100		3	0.677	0.5233	0.8378	0.09084	0.1573	23.24%	-24.64%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.524	0.4656	0.64
1.56		0.678	0.7167	0.645
3.1		0.611	0.665	0.628
6.25		0.532	0.6544	0.6467
12.5		0.808	0.865	0.835
25		0.7989	0.7825	0.708
50		0.616	0.7871	0.655
100		0.67	0.8378	0.5233

Client: Mount Policy

W.O.#: 14632

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/LCaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
HAD-1-40910	Sept 10/14	50	3.9	4.2	72	50	5.0	100	LD
OWL-66-8M-40910	Sept 10/14	50	3.0	3.1	58	50	3.3	66	LD
MHW Control	Sept 10/14	50	3.2	3.3	62 62	50	4.9	98	KJL

Notes: _____

Reviewed by: Jou

Date Reviewed: Oct. 17/14

APPENDIX C - Chain of Custody Form

British Columbia: 8684 Commerce Court, Burnaby, BC, V5A 4N7

Date 10/09/2014 Page 1 of 1

Sample Collection By: McLean Donohoe			ANALYSES REQUIRED							Receipt Temperature (°C)		
Report to:			Invoice to:			96h RBT	48 h Daphnia magna	7 Day Ceriodaphnia dubia	7 day fathead Minnow		72h algal growth	Lemna Growth
Company: Mount Polley Mining Corporation			Mount Polley Mining Corporation									
Address: Box 12			Box 12									
City/Prov/Postal Code: Likely BC VOL 1N0			Likely BC VOL 1N0									
Contact: Colleen Hughes			Colleen Hughes/									
Phone: (250) 790-2617			(250) 790-2617									
Email: chughes@mountpolley.com			chughes@mountpolley.com									

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	96h RBT	48 h Daphnia magna	7 Day Ceriodaphnia dubia	7 day fathead Minnow	72h algal growth	Lemna Growth	Receipt Temperature (°C)
1 QUL-66-48M-140910	10/09/2014	11:00	water	20L 48L	2				X	X			8.5
2 HAD-1-140910	10/09/2014	13:50	water	20L 48L	2				X	X			10.5
3				20L									
4													
5													
6													
7													
8													
9													
10													

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)			RELIQUISHED BY (COURIER)			
Client: Mount Polley Mining Corporation		Total # Containers: 4		Signature:			Signature:			
P.O. No.:		Good Condition? Y		Katie McMahan			Print:			
Shipped Via: Greyhound		Matches Schedule? Y		Company: MPMC			Company:			
SPECIAL INSTRUCTIONS/COMMENTS:					Time/Date: 10/09/2014 15:30:00			Time/Date:		
		RECEIVED BY (COURIER)						RECEIVED BY (LABORATORY)		
		Signature:						Signature: NY		
		Print:						Print: NAIR YAMAMOTO		
		Company:						Company: NAUTILUS		
Time/Date:						Time/Date: Sep 11/14 @ 9:15				

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 18

**Toxicity testing on a sample identified as QUL-66-40m-140916: Samples collected
September 16, 2014 (Report date October 24, 2014)**



Nautilus Environmental

**Toxicity testing on a sample identified as
QUL-66-40m-140916**

Sample collected September 16, 2014

Final Report

Report date: October 24, 2014

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

APPENDIX C - Chain of Custody Form

SIGNATURE PAGE



Krysta Pearcy, B.Sc.
Laboratory Biologist



Armando Tang, R.F. Bio.
Laboratory Manager

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted toxicity tests for Mount Polley Mining Corporation on a sample identified as QUL-66-40m-140916. The sample was collected on September 16, 2014 and delivered to the laboratory in Burnaby, BC on September 17, 2014. The sample was transported in two 20-L plastic carboys and coolers. The sample was received at a temperature of 9.1°C and was stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing. The following sub-lethal toxicity tests were performed on the sample:

- *Ceriodaphnia dubia* survival and reproduction
- 7-d fathead minnow (*Pimephales promelas*) survival and growth

This report describes the results of these toxicity tests. Copies of laboratory data sheets and printouts of statistical analyses for each test are provided in Appendices A and B. The chain-of-custody form is provided in Appendix C.

2.0 METHODS

Methods for the toxicity tests are summarized in Tables 1 and 2. Testing was conducted according to procedures described by the Environment Canada protocols (2007 and 2011). Statistical analyses for all tests were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house culture
Test organism age	<24 h old neonates produced within 12 h
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20 mL test tube
Test volume	15 mL
Test replicates	10 test replicates per treatment
Number of organisms	1 per replicate
Control water	20% Perrier water
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	<i>Pseudokirchneriella subcapitata</i> and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada, (2007) EPS 1/RM/21
Statistical software	CETIS (2013)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods
Reference toxicant	Sodium chloride

Table 2. Summary of test conditions: fathead minnow (*Pimephales promelas*) survival and growth test.

Test organism	<i>Pimephales promelas</i>
Test organism source	Aquatic BioSystems, Fort Collins, CO
Test organism age	<24 hours
Test type	Static renewal
Test duration	7 days
Test vessel	375-mL glass containers
Test volume	250 mL
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control water	Moderately-hard water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	Twice a day with newly hatched brine shrimp (<i>Artemia nauplii</i>)
Light intensity	100 – 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test protocol	Environment Canada (2011), EPS 1/RM/22
Statistical software	CETIS (2013)
Test endpoint	Survival and biomass
Test acceptability criteria for controls	≥80% survival, ≥250 µg mean dry weight
Reference toxicant	Sodium Chloride

3.0 RESULTS

No adverse effects were observed on survival of *C. dubia* (Table 3); the LC50 was >100%. Adverse effects were observed on *C. dubia* reproduction. The IC25 and IC50 were <1.56 and 7.3%, respectively. There were no adverse effects observed on fathead minnow survival or biomass (Table 4); the LC50, IC25 and IC50 were >100%.

Table 3. Results: *Ceriodaphnia dubia* survival and reproduction test.

Concentration (% v/v)	Survival (%)	Reproduction (mean ± SD)
Control	100	20.3 ± 3.3
1.56	90	14.2 ± 6.7
3.12	100	14.0 ± 3.4
6.25	100	10.4 ± 4.4
12.5	100	8.2 ± 2.9
25	100	5.7 ± 2.1
50	100	5.1 ± 1.9
100	100	3.0 ± 2.5
Test endpoint (% v/v)		
LC50	>100	--
IC25	--	<1.56
IC50 (95% CL)	--	7.3 (5.3 - 10.0)

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits.

Table 4. Results: fathead minnow (*Pimephales promelas*) survival and growth test.

Concentration (% v/v)	Mean ± SD	
	Survival (%)	Biomass (µg)
Control	83.3 ± 5.8	700.7 ± 46.9
1.56	73.3 ± 30.6	598.0 ± 189.5
3.1	56.7 ± 5.8	485.3 ± 52.5
6.25	90.0 ± 10.0	717.0 ± 104.5
12.5	80.0 ± 0.0	680.3 ± 65.6
25	83.3 ± 5.8	679.3 ± 28.4
50	66.7 ± 25.2	516.3 ± 118.6
100	93.3 ± 5.8	746.0 ± 24.9
Test endpoint (% v/v)		
LC25	>100	--
LC50	>100	--
IC25	--	>100
IC50	--	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

4.0 QA/QC

The health history of the test organisms used in the exposures was acceptable and met the requirements of the Environment Canada protocols. The tests met all control acceptability criteria and water quality parameters remained within ranges specified in the protocols throughout the tests. There were no deviations from the test methodologies. Uncertainty associated with these tests is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

Results of the reference toxicant tests conducted during the testing program are summarized in Table 5. Results for these tests fell within the range for organism performance of mean and two standard deviation range, based on historical results obtained by the laboratory with these tests. Thus, the sensitivity of the organisms used in these tests was appropriate.

Table 5. Reference toxicant results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>C. dubia</i>	Survival (LC50): 2.1 g/L NaCl	1.8 (1.4 - 2.5)	16	September 23 , 2014
	Reproduction (IC50): 1.9 g/L NaCl	1.4 (1.0 - 1.9)	17	
<i>P. promelas</i>	Survival (LC50): 5.5 g/L NaCl	4.4 (3.5 - 5.7)	13	September 17, 2014
	Biomass (IC50): 4.4 g/L NaCl	3.9 (2.8 - 5.4)	17	

SD = Standard Deviation, CV = Coefficient of Variation, IC = Inhibition Concentration, LC = Lethal Concentration.

5.0 REFERENCES

Environment Canada. 2007. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. Report EPS 1/RM/21, Second Edition, February 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 74 pp.

Environment Canada. 2011. Biological test method: test of larval growth and survival using fathead minnows. Environmental Protection Series, Report EPS 1/RM/22. February 2011,. Environment Canada, Environmental Protection, Conservation and Protection, Ottawa, ON. 73 pp.

Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.4.29 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: Mt. Palley
 Work Order No.: 14651

Start Date/Time: Sept 17/14 @ 1145h
 Set up by: EMM

Sample Information:

Sample ID: 046640-140916
 Sample Date: Sept 16/14
 Date Received: Sept 17/14
 Sample Volume: 2x20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 090314 A+B
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 37
 Mortality (%) in previous 7 d: 3
 Individual female # used ≥ 8 young on test day: 1, 9, 11, 12, 13, 16, 17, 18, 19, 25, 26, 27

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd 118
 Stock Solution ID: 14N402
 Date Initiated: Sept 23/14

7-d LC50 (95% CL): 2.1 (1.5-3.0) g/L NaCl
 7-d IC50 (95% CL): 1.9 (1.1-2.9) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.8 (1.4-2.5) g/L NaCl CV (%): 17/16
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-1.9) g/L NaCl CV (%): 16/17

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		1.56 (1.1-2.1) <u>1.56 (1.0-2.4)</u>
IC50 % (v/v) (95% CL)		7.3 (5.3-10.0)

Reviewed by: JGh

Date reviewed: Oct 21/14

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Palley
 Sample ID: GULL640 C140916
 Work Order #: 1465

Start Date & Time: Sept 17/14 @ 1145h
 Stop Date & Time: Sept 23/14 @ 1500h
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		Final 6		7
control	Init.	old	new	old	new	old	new	old	new	old	new	old	new	Final
Temperature (°C)	25.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.1	7.7	8.0	7.4	8.0	7.5	8.0	7.4	8.0	7.2	8.0	7.4	8.0	7.4
pH	8.0	7.7	8.0	7.6	8.0	7.7	8.1	7.7	8.0	7.6	8.1	7.7	8.0	7.7
Cond. (µS/cm)	211	215	214			217		219		216		229		
Initials	EMM/EL	EMM/EL	EMM							EMM/EL		EMM		

Concentration	Days													
	0	1		2		3		4		5		Final 6		7
1.56% (v/v)	Init.	old	new	old	new	old	new	old	new	old	new	old	new	Final
Temperature (°C)	24.0	25.0	25.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	7.4	7.6	7.7	7.5	8.0	7.6	8.0	7.5	8.1	7.2	7.7	7.3	8.1	7.3
pH	7.8	7.7	7.8	7.7	8.2	7.7	8.2	7.7	8.2	7.6	8.2	7.6	8.2	7.6
Cond. (µS/cm)	214	215	213			218		216		218		229		
Initials	EMM/EL	EMM/EL	EMM							EMM/EL		EMM		

Concentration	Days													
	0	1		2		3		4		5		Final 6		7
12.5% (v/v)	Init.	old	new	old	new	old	new	old	new	old	new	old	new	Final
Temperature (°C)	24.0	25.0	25.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	7.4	7.6	7.7	7.4	8.0	7.6	8.0	7.6	8.1	7.3	7.8	7.2	8.1	7.2
pH	7.7	7.8	7.9	7.6	8.0	7.6	8.2	7.6	8.2	7.7	8.2	7.7	8.2	7.7
Cond. (µS/cm)	206	204	206			209		208		209		210		
Initials	EMM/EL	EMM/EL	EMM							EMM/EL		EMM		

Concentration	Days													
	0	1		2		3		4		5		Final 6		7
100% (v/v)	Init.	old	new	old	new	old	new	old	new	old	new	old	new	Final
Temperature (°C)	25.0	25.0	25.0	25.0	24.5	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.0	7.8	8.3	7.1	8.1	7.4	8.2	7.5	8.1	7.4	8.1	7.2	8.1	7.2
pH	7.3	7.6	7.7	7.4	7.8	7.6	8.0	7.5	8.1	7.4	8.1	7.3	8.1	7.3
Cond. (µS/cm)	134	128	130			132		134		176		178		
Initials	EMM/EL	EMM/EL	EMM							EMM/EL		EMM		

	Control	100% (v/v)		
Hardness*	98	64		
Alkalinity*	10080	48		

Analysts: AWD EMM
 Reviewed by: JOC
 Date reviewed: Oct. 15/14

* mg/L as CaCO₃
 WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5
 Sample Description: ① Greyish, Turbid

Comments: Broodboard Used: C90314ATB (1, 9, 11, 12, 13, 16, 17, 18, 19, 25, 26, 27)

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: MH. Polley
 Sample ID: 001-5350 (140916)
 Work Order: 14651

Start Date & Time: Sept 17/14 @ 1145h
 Stop Date & Time: Sept 23/14 @ 1500h
 Set up by: EMM

96 (1/1)

Days	Concentration: <u>Control</u>												Concentration: <u>1.56</u>												Concentration: <u>3.12</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM			
2	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM			
3	/	/	/	/	/	/	/	/	/	/	^	/	/	/	X	/	/	/	/	/	/	^	/	/	/	/	/	/	/	/	/	/	^			
4	3	3	3	3	3	3	3	3	3	3	^	3	2	3	/	3	2	3	3	3	3	^	3	2	3	3	3	2	2	2	2	2	^			
5	8	9	9	7	/	9	8	7	9	8	^	7	6	5	/	6	5	6	5	5	5	^	7	5	4	5	4	7	7	7	5	6	^			
6	9	10	8	10	10	12	11	11	12	6	EMM	12	10	9	/	12	10	10	10	6	6	EMM	9	5	8	7	7	7	9	11	10	EMM				
7																																				
8																																				
Total	20	22	20	20	13	24	22	21	24	17	EMM	22	18	17	0	21	15	21	9	18	13	9	EMM	10	16	9	16	14	9	16	15	18	16	EMM		

Days	Concentration: <u>6.25</u>												Concentration: <u>12.5</u>												Concentration: <u>25</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM			
2	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM			
3	/	/	/	/	/	/	/	/	/	/	^	/	/	/	/	/	/	/	/	/	/	^	/	/	/	/	/	/	/	/	/	/	^			
4	3	/	2	2	/	2	2	3	2	2	^	3	2	2	3	2	3	2	2	3	3	^	4	3	2	3	/	/	/	/	2	2	^			
5	3	3	3	4	5	3	6	2	/	6	^	5	4	/	4	/	/	/	4	/	4	^	3	3	4	4	6	4	3	2	2	2	^			
6	9	8	8	8	4	8	8	9	4	7	EMM	7	4	4	6	6	4	4	4	4	4	EMM	3	3	4	4	6	4	3	3	3	3	EMM			
7																																				
8																																				
Total	16	3	13	14	9	13	8	6	7	15	EMM	15	6	6	11	8	9	6	6	7	8	EMM	3	7	7	6	9	7	6	2	5	5	EMM			

Days	Concentration: <u>50</u>												Concentration: <u>100</u>												Concentration:											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM														
2	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM														
3	/	/	/	/	/	/	/	/	/	/	^	/	/	/	/	/	/	/	/	/	/	^														
4	/	/	2	/	/	/	3	/	/	/	^	/	/	/	/	/	/	/	/	/	/	^														
5	2	3	/	2	2	1	/	/	2	3	^	2	2	2	2	2	2	2	2	2	2	^														
6	2	3	3	2	4	2	4	5	6	6	EMM	2	4	4	6	4	2	2	2	2	2	EMM														
7																																				
8																																				
Total	4	6	5	2	4	5	5	4	7	9	EMM	2	6	0	8	4	2	4	2	0	2	EMM														

Notes: X = mortality.

Sample Description: _____
 Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JGw

Date reviewed: Oct 15/14

CETIS Analytical Report

Report Date: 30 Sep-14 17:07 (p 1 of 2)
 Test Code: 14651 | 19-1019-2420

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 02-2011-7940	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 30 Sep-14 17:04	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 02-9041-4385	Test Type: Reproduction-Survival (7d)	Analyst: Emma Marus
Start Date: 17 Sep-14 11:45	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 23 Sep-14 15:00	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 3h	Source: In-House Culture	Age: <24h
Sample ID: 19-2857-4380	Code: 72F3B5AC	Client: Mount Polley
Sample Date: 16 Sep-14 10:30	Material: Water Sample	Project:
Receive Date: 17 Sep-14 08:30	Source: Mount Polley (MT POLLEY)	
Sample Age: 25h (9.1 °C)	Station: QUL-66-40M-140916	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1307835	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	0	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 30 Sep-14 17:07 (p 2 of 2)
 Test Code: 14651 | 19-1019-2420

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

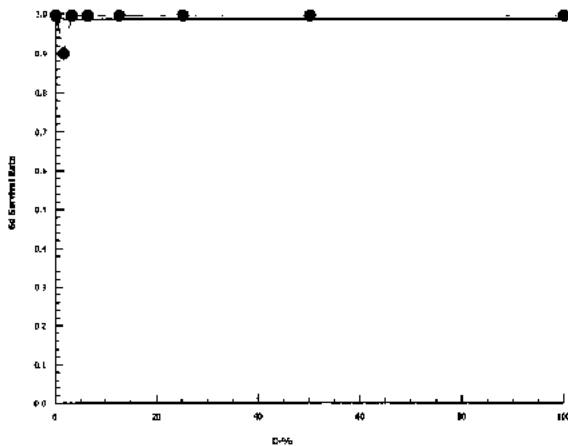
Analysis ID: 02-2011-7940 Endpoint: 6d Survival Rate
 Analyzed: 30 Sep-14 17:04 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 30 Sep-14 17:07 (p 1 of 2)
 Test Code: 14651 | 19-1019-2420

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 04-2406-5215	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 30 Sep-14 17:06	Analysis: Nonlinear Regression	Official Results: Yes
Batch ID: 02-9041-4385	Test Type: Reproduction-Survival (7d)	Analyst: Emma Marus
Start Date: 17 Sep-14 11:45	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 23 Sep-14 15:00	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 3h	Source: In-House Culture	Age: <24h
Sample ID: 19-2857-4380	Code: 72F3B5AC	Client: Mount Polley
Sample Date: 16 Sep-14 10:30	Material: Water Sample	Project:
Receive Date: 17 Sep-14 08:30	Source: Mount Polley (MT POLLEY)	
Sample Age: 25h (9.1 °C)	Station: QUL-66-40M-140916	

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Log-Logistic EV [Y=A/(1+(X/D)^C)]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
5	-141.2	288.7	295.5	0.6903	Yes	0.3643	2.342	0.8713	Non-Significant Lack of Fit

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.08188	N/A	0.4397	1221	227.4	NA
IC10	0.256	0.0193	0.7232	390.7	138.3	5181
IC15	0.5184	0.1495	1.133	192.9	88.29	668.7
IC20	0.8818	0.3721	1.674	113.4	59.73	268.8
IC25	1.368	0.701	2.363	73.12	42.32	142.7
IC40	3.937	2.664	5.707	25.4	17.52	37.54
IC50	7.307	5.328	10.02	13.68	9.978	18.77

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	20.27	1.128	18.06	22.48	17.97	<0.0001	Significant Parameter
C	0.6556	0.09329	0.4727	0.8384	7.027	<0.0001	Significant Parameter
D	7.307	1.825	3.73	10.89	4.003	0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	2320.525	2320.525	1	178.1	<0.0001	Significant
Lack of Fit	24.76269	4.952538	5	0.3643	0.8713	Non-Significant
Pure Error	978.7	13.59306	72			
Residual	1003.463	13.03198	77			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Mod Levene Equality of Variance	2.529	2.14	0.0220	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.9539	0.9691	0.0058	Non-normal Distribution
	Anderson-Darling A2 Normality	0.5269	2.492	0.1828	Normal Distribution

Reproduction Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	20.3	13	24	1.044	3.302	16.26%	0.0%
1.56		10	14.2	0	22	2.112	6.68	47.04%	30.05%
3.12		10	14	9	18	1.065	3.367	24.05%	31.03%
6.25		10	10.4	3	16	1.384	4.377	42.08%	48.77%
12.5		10	8.2	6	15	0.9165	2.898	35.34%	59.61%
25		10	5.7	2	9	0.6506	2.058	36.1%	71.92%
50		10	5.1	2	9	0.6046	1.912	37.49%	74.88%
100		10	3	0	8	0.8028	2.539	84.62%	85.22%

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 04-2406-5215
 Analyzed: 30 Sep-14 17:06

Endpoint: Reproduction
 Analysis: Nonlinear Regression

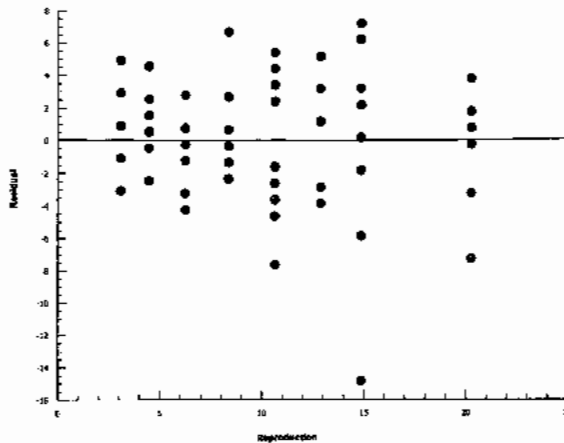
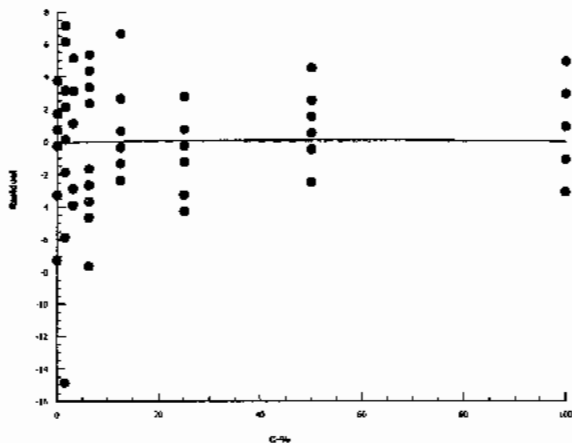
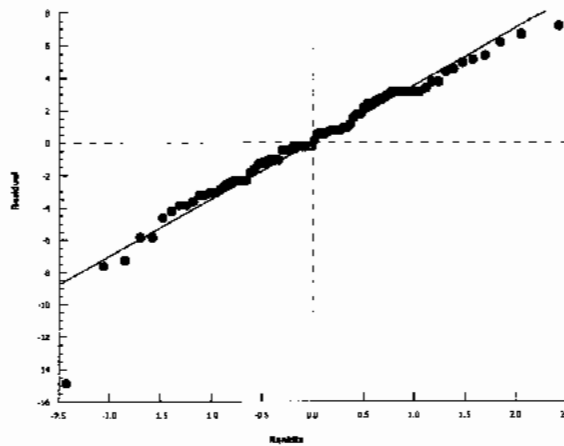
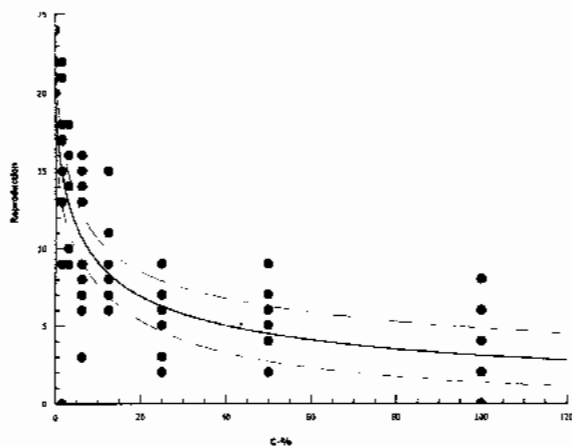
CETIS Version: CETISv1.8.7
 Official Results: Yes

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	20	22	20	20	13	24	22	21	24	17
1.56		22	18	17	0	21	15	9	18	13	9
3.12		10	16	9	16	14	9	16	16	18	16
6.25		16	3	13	14	9	13	8	6	7	15
12.5		15	6	6	11	8	9	6	6	7	8
25		3	7	7	6	9	7	6	2	5	5
50		4	6	5	2	4	5	5	4	7	9
100		2	6	0	8	4	2	4	2	0	2

Graphics

3P Log-Logistic EV [Y=A/(1+(X/D)^C)]



APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

Fathead Minnow Test Summary Sheet

(7-d *Pimephales promelas* Survival and Growth Test)

Client: Mount Polley
 Work Order No.: 14652

Start Date/Time: Sept 17/14 @ 1350h
 Test Species: P. promelas

Sample Information:

Sample ID: QUL-66-40M-140916
 Sample Date: Sept 16/14
 Date Received: Sept 17/14
 Sample Volume: 3x 20L

Test Validity Criteria:

The test is invalid if:

- 1) for the control solutions, the combined and cumulative incidence of any mortalities, or fish showing loss of equilibrium or other signs of atypical swimming behavior, is >20%
- 2) the average dry weight of the surviving control fish does not attain 250 ug when the fish are dried and weighed.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4; pH = 6.5 to 8.5

Dilution Water (initial water quality):

Type: Moderately Hard Water
 Temperature (°C): 26.0
 pH: 7.9
 Dissolved Oxygen (mg/L): 7.9
 Hardness (mg/L CaCO₃): 98
 Alkalinity (mg/L CaCO₃): 68

Test Organism Information:

Batch No.: 091714
 Source: Aquatic Biosystems, CO
 Age: 224 hrs

NaCl Reference Toxicant Results:

Reference Toxicant ID: pp97
 Stock Solution ID: n/a
 Date Initiated: Sept 17/14
 7-d EC50 (95% CL): 5.5 (4.7-6.4)
 7-d IC50 (95% CL): 4.4 (3.8-5.4)

Survival:

Reference Toxicant Mean and Historical Range: 4.4 (3.5-5.7) g/L NaCl CV (%): 13

Biomass:

Reference Toxicant Mean and Historical Range: 3.9 (2.8-5.4) g/L NaCl CV (%): 17

Test Results:

	Survival	Biomass
LC25 % (v/v) (95% CL)	7100	
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		7100
IC50 % (v/v) (95% CL)		7100

Reviewed by: John

Date reviewed: Oct. 21/14

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley (black)
 Sample ID: QUL-66-40M-140A16
 Work Order #: 14652

Start Date & Time: Sept 17/14 @ 1350h
 Stop Date & Time: Sept 24/14 @ 1300h
 Test Species: Pimephales promelas

% (v/v) Concentration Control	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	26.0	26.0	26.0	26.0	25.0	25.5	24.5	25.5	24.5	24.0	25.0	25.0	26.0	25.0	25.0
DO (mg/L)	7.9	5.5	8.4	6.6	8.0	6.3	7.7	6.0	7.7	6.5	8.0	5.9	7.2	4.5	
pH	7.9	7.8	8.1	7.8	7.4	7.8	8.0	7.7	8.0	7.6	8.0	7.3	7.8	7.4	
Cond. (µS/cm)	339		317		321		325		326		329		333		356
Initials	LD		JBF		JBF/LDN		A		m		LD/KJL		KJL		LD

Concentration 1.56	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	25.5	26.0	24.5	26.0	24.0	25.5	24.5	25.5	24.5	24.0	24.0	25.0	26.0	25.0	
DO (mg/L)	7.5	5.3	8.0	6.5	7.8	6.2	7.8	6.1	6.8	6.3	7.5	6.0	7.6	4.1	
pH	7.8	7.7	7.8	7.8	7.5	7.8	7.9	7.8	7.9	7.5	7.9	7.4	7.7	7.4	
Cond. (µS/cm)	332		314		321		318		321		323		326		355
Initials	LD		LD		JBF/KJL		A		m		LD/KJL		KJL		LD

Concentration 12.5	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	25.5	26.0	24.5	26.0	24.5	25.5	25.0	25.5	25.0	24.0	24.0	25.0	25.5	25.0	
DO (mg/L)	7.9	5.5	7.3	6.4	7.9	6.0	7.8	6.0	7.8	6.3	7.4	6.1	7.3	4.7	
pH	7.9	7.7	8.0	7.8	7.5	7.8	7.9	7.8	7.9	7.5	7.8	7.4	7.8	7.1	
Cond. (µS/cm)	309		293		298		300		301		301		305		334
Initials	LD		LD		JBF/LDN		m		m		LD/KJL		KJL		LD

Concentration 100	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	25.5	26.0	25.5	26.0	25.0	25.5	25.0	25.5	25.0	24.0	24.0	25.0	24.0	25.5	
DO (mg/L)	8.2	4.4	8.3	6.5	8.2	6.0	7.8	5.8	7.9	6.1	7.9	5.9	8.0	4.2	
pH	7.5	7.6	7.8	7.8	7.4	7.9	7.9	7.8	7.9	7.6	7.7	7.4	7.6	7.2	
Cond. (µS/cm)	128		127.58		135		128		128		127		125		144
Initials	LD		LD		LD/KJL		m		m		LD/KJL		KJL		LD

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6.5 to 8.5

DO meter: 3 pH meter: 3 Conductivity meter: 3

	Control	100% (v/v)	
Hardness*	98	64	98/100
Alkalinity*	68	48	68

* mg/L as CaCO₃

Analysts: KJL, AWD
 Reviewed by: JGU
 Date reviewed: Oct-15/14

Sample Description: clear but a little murky, pale yellow

Comments: _____

7-d Fathead Minnow Toxicity Test Daily Survival

Client: Mount Polley
 Sample ID: QUL-06-40M-40916 (black)
 Work Order #: 14652

Start Date & Time: Sept 17/14 @ 1350h
 Stop Date & Time: Sept 24/14 @ 1300h
 Test Species: Pimephales promelas

Concentration % (v/v)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	10	10	10	10	9	9	9	
	B	10	10	10	10	8	8	8	not organism missing no organism missing
	C	10	10	10	8	8	8	8	
1.56	A	10	10	10	10	10	10	10	
1.56	B	10	10	10	10	4	4	4	
	C	10	10	10	10	10	8	8	
	3.1	A	10	10	9	6	6	6	6
3.1	B	10	10	10	6	6	6	6	
	C	10	10	10	7	5	5	5	
	6.25	A	10	10	10	9	9	9	9
6.25	B	10	10	10	10	10	10	10	
	C	10	10	10	10	9	9	8	
	12.5	A	10	10	10	9	9	9	8
12.5	B	10	10	9	8	8	8	8	
	C	10	10	10	9	8	8	8	
	25	A	10	10	9	9	9	9	10
25	B	10	10	10	8	8	8	8	
	C	10	10	9	8	8	8	8	
	50	A	10	10	10	9	8	7	7
50	B	10	10	9	9	9	9	9	
	C	10	10	6	5	4	4	4	
	100	A	10	10	10	10	9	9	9
100	B	9	9	9	9	9	9	9	
	C	10	10	10	10	10	10	10	
		A							
	B								
	C								
	A								
	B								
	C								
Tech Initials		KJL	KJL	A	A	KJL	KJL	KJL/LD	

Comments: _____

Reviewed by: JON

Date reviewed: Oct-15/14

Fathead Minnow Toxicity Test Data Sheet

Dry Weight Data

Client: Mount Polley

Start Date & Time: Sept 17/14 @ 13:50h

Sample ID: QUL-66-40M-140916

Termination Date & Time: Sept 24/14 @ 13:00h

Work Order No.: 14652

Concentration % (v/v)	Rep	0917 Pan No. orange	No. alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control	A	1	9	KSL/LD	983.50	990.71	9	NY
	B	2	8		979.29	986.63	8	
	C	3	8		985.27	991.74	8	
1.56	A	4	10		1006.25	1013.73	10	
	B	5	4		991.10	994.95	4	
	C	6	8		990.33	996.94	8	
3.1	A	7	6		987.90	993.29	6	
	B	8	6		1001.00	1005.83	6	
	C	9	5		994.92	999.26	5	
6.25	A	10	9		984.75	991.80	9	
	B	11	10		989.32	997.59	10	
	C	12	8		999.70	1005.89	8	
12.5	A	13	8		991.43	997.82	8	
	B	14	8		980.88	988.44	8	
	C	15	8		976.69	983.15	8	
25	A	16	8 ⁹		999.78	1006.90	9	
	B	17	8		988.72	995.32	8	
	C	18	8 ⁸		984.22	990.88	8	
50	A	19	7 ⁷		994.41	999.24	7	
	B	20	9		989.36	995.84	9	
	C	21	4		987.64	991.82	4	
100	A	22	9		996.37	1004.07	9	
	B	23	9		984.22	991.41	9	
	C	24	10	J	980.14	987.65	10	J

Comments: Reweighed pan 7-993.27 17-995.21

Reviewed by: JOU

Date Reviewed: Oct. 15/14

CETIS Analytical Report

Report Date: 02 Oct-14 12:50 (p 1 of 2)
 Test Code: 14652 | 05-6179-5473

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 09-5736-4889	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 29 Sep-14 9:04	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 12-2636-9003	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 17 Sep-14 13:50	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 24 Sep-14 13:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 19-2857-4380	Code: 72F3B5AC	Client: Mount Polley
Sample Date: 16 Sep-14 10:30	Material: Water Sample	Project:
Receive Date: 17 Sep-14 08:30	Source: Mount Polley (MT POLLEY)	
Sample Age: 27h (9.1 °C)	Station: QUL-66-40M-140916	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1867597	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	0.9846	N/A	N/A	101.6	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	3	0.8333	0.8	0.9	0.03333	0.05774	6.93%	0.0%	25	30
1.56		3	0.7333	0.4	1	0.1764	0.3055	41.66%	12.0%	22	30
3.1		3	0.5667	0.5	0.6	0.03333	0.05773	10.19%	32.0%	17	30
6.25		3	0.9	0.8	1	0.05774	0.1	11.11%	-8.0%	27	30
12.5		3	0.8	0.8	0.8	0	0	0.0%	4.0%	24	30
25		3	0.8333	0.8	0.9	0.03333	0.05774	6.93%	0.0%	25	30
50		3	0.6667	0.4	0.9	0.1453	0.2517	37.75%	20.0%	20	30
100		3	0.9333	0.9	1	0.03333	0.05773	6.19%	-12.0%	28	30

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.9	0.8	0.8
1.56		1	0.4	0.8
3.1		0.6	0.6	0.5
6.25		0.9	1	0.8
12.5		0.8	0.8	0.8
25		0.9	0.8	0.8
50		0.7	0.9	0.4
100		0.9	0.9	1

CETIS Analytical Report

Report Date: 02 Oct-14 12:50 (p 2 of 2)
Test Code: 14652 | 05-6179-5473

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 09-5736-4889 Endpoint: 7d Survival Rate
Analyzed: 29 Sep-14 9:04 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	9/10	8/10	8/10
1.56		10/10	4/10	8/10
3.1		6/10	6/10	5/10
6.25		9/10	10/10	8/10
12.5		8/10	8/10	8/10
25		9/10	8/10	8/10
50		7/10	9/10	4/10
100		9/10	9/10	10/10

CETIS Analytical Report

Report Date: 17 Oct-14 12:24 (p 1 of 2)
 Test Code: 14652 | 05-6179-5473

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 03-5722-3619	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 29 Sep-14 9:04	Analysis: Linear interpolation (ICPIN)	Official Results: Yes
Batch ID: 12-2636-9003	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 17 Sep-14 13:50	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 24 Sep-14 13:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 19-2857-4380	Code: 72F3B5AC	Client: Mount Polley
Sample Date: 16 Sep-14 10:30	Material: Water Sample	Project:
Receive Date: 17 Sep-14 08:30	Source: Mount Polley (MT POLLEY)	
Sample Age: 27h (9.1 °C)	Station: QUL-66-40M-140916	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	138990	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.6154	N/A	N/A	162.5	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Mean	Calculated Variate					
				Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.7007	0.647	0.734	0.0271	0.04693	6.7%	0.0%
1.56		3	0.598	0.385	0.748	0.1094	0.1895	31.69%	14.65%
3.1		3	0.4853	0.434	0.539	0.03033	0.05254	10.82%	30.73%
6.25		3	0.717	0.619	0.827	0.06034	0.1045	14.58%	-2.33%
12.5		3	0.6803	0.639	0.756	0.03789	0.06562	9.65%	2.9%
25		3	0.6793	0.66	0.712	0.01642	0.02845	4.19%	3.04%
50		3	0.5163	0.418	0.648	0.06846	0.1186	22.96%	26.31%
100		3	0.746	0.719	0.768	0.01436	0.02488	3.34%	-6.47%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.721	0.734	0.647
1.56		0.748	0.385	0.661
3.1		0.539	0.483	0.434
6.25		0.705	0.827	0.619
12.5		0.639	0.756	0.646
25		0.712	0.66	0.666
50		0.483	0.648	0.418
100		0.768	0.719	0.751

CETIS Analytical Report

Report Date: 17 Oct-14 12:24 (p 2 of 2)
Test Code: 14652 | 05-6179-5473

Fathead Minnow 7-d Larval Survival and Growth Test

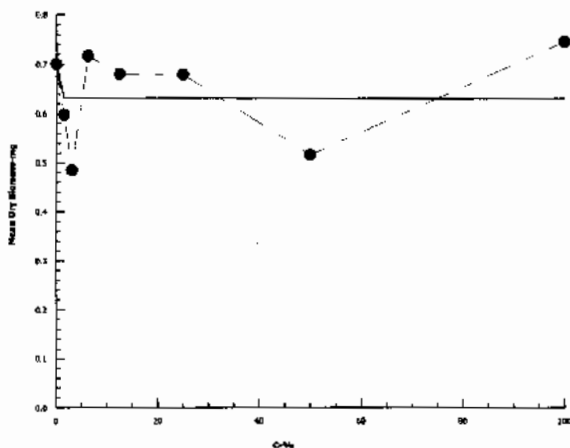
Nautilus Environmental

Analysis ID: 03-5722-3619
Analyzed: 29 Sep-14 9:04

Endpoint: Mean Dry Biomass-mg
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 02 Oct-14 12:50 (p 1 of 1)
 Test Code: 14852 | 05-6179-5473

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 07-7676-3637	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 02 Oct-14 12:50	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 12-2636-9003	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 17 Sep-14 13:50	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 24 Sep-14 13:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 19-2857-4380	Code: 72F3B5AC	Client: Mount Polley
Sample Date: 16 Sep-14 10:30	Material: Water Sample	Project:
Receive Date: 17 Sep-14 08:30	Source: Mount Polley (MT POLLEY)	
Sample Age: 27h (9.1 °C)	Station: QUL-66-40M-140918	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1561934	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	81.17	N/A	N/A	1.232	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.8425	0.8011	0.9175	0.03759	0.06511	7.73%	0.0%
1.56		3	0.8456	0.748	0.9625	0.06267	0.1086	12.84%	-0.37%
3.1		3	0.8571	0.805	0.8983	0.02748	0.04761	5.55%	-1.74%
6.25		3	0.7947	0.7738	0.827	0.01639	0.02839	3.57%	5.67%
12.5		3	0.8504	0.7988	0.945	0.04736	0.08203	9.65%	-0.95%
25		3	0.8162	0.7911	0.8325	0.01273	0.02205	2.7%	3.12%
50		3	0.8183	0.69	1.045	0.1137	0.1969	24.06%	2.86%
100		3	0.8011	0.751	0.8533	0.02956	0.0512	6.39%	4.91%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.8011	0.9175	0.8087
1.56		0.748	0.9625	0.8262
3.1		0.8983	0.805	0.868
6.25		0.7833	0.827	0.7738
12.5		0.7988	0.945	0.8075
25		0.7911	0.825	0.8325
50		0.69	0.72	1.045
100		0.8533	0.7989	0.751

APPENDIX C - Chain of Custody Form

British Columbia, 8564 Commerce Court, Burnaby, BC, V5A 4N7

Date Sep 16/14 Page 1 of 1

Sample Collection By:		Report to:	Invoice to:
Company	Mount Polley Mining Corp.		SAME AS REPORT
Address	Box 10 1000		
City/Prov/Postal Code	Likely, BC, V0L 2N0		
Contact	Colleen Hughes		
Phone	(250) 790-2215 x 2617		
Email	chughes@mountpolley.com		

Ceriselephnia (Sublethal)
 Feathered minnow (Sublethal)
 Full MMR (except PBT acute)

ANALYSES REQUIRED									

Receipt Temperature (°C)

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS
1 QUL-66-40M-140916	16-Sep-14	10:30	water	20 L	2	
2	16-Sep-14		water	20 L	2	
3						
4						
5						
6						
7						
8						
9						
10						

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)		RELIQUISHED BY (COURIER)	
Client: MPMC	Total # Containers: 2	Signature: <i>Katle McMahon</i>	Signature:	Print: Katle McMahon	Print:	Company: MPMC	Company:
P.O. No.:	Good Condition? Y	Time/Date: 16-Sep-14 15:30	Time/Date:	Shipped Via: Greyhound	Matches Schedule? Y	Time/Date: 16-Sep-14 15:30	Time/Date:
SPECIAL INSTRUCTIONS/COMMENTS: For full MMR suite, no acute rainbow trout required (lab indicated not available this week) N/A				RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)	
				Signature:		Signature: <i>SA</i>	
				Print:		Print: <i>MPM</i>	
				Company:		Company: Nautilus	
		Time/Date:		Time/Date: Sep 17/14 @ 0830			

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 19

**Toxicity testing on a sample identified as POL-6-14m-140916: Samples collected
September 16, 2014 (Report date September 23, 2014)**



Mount Polley Mining Corporation
ATTN: Colleen Hughes
Box 12
Likely, BC
VOL 1N0

Report Date: September 23, 2014
Work Order: 14661

Data Report

Species: *Daphnia magna*
Protocol: EPS 1/RM/14 (Second Ed. 2000)

Table 1. Results for the 48-h *Daphnia magna* acute toxicity test.

Sample ID	Collection Date and Time	48-h LC50 (%v/v)
POL-6-14m-140916	September 16, 2014 @ 1005	>100

Tests met performance criteria and there were no deviations from the test methods. The results relate only to the sample tested.

Yvonne Lam, B.Sc.
Laboratory Biologist

Reviewed By:
Julianna Kalocai, M.Sc., R.P.Bio
QA Officer

Daphnia magna Summary Sheet

Client: Mount Polley
Work Order No.: 14661

Start Date/Time: September 18, 2014 @ 1700
Test Species: Daphnia magna
Set up by: WML

Sample Information:

Sample ID: PO-L-6-14m-140916
Sample Date: September 16, 2014
Date Received: September 18, 2014
Sample Volume: 2 x 20L

Test Validity Criteria:
≥ 90% mean control survival (no more than 2 mortalities in any control replicate)
WQ Ranges:
T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

Test Organism Information:

Broodstock No.: 090314A
Age of young (Day 0): <24 h
Avg No. young per brood in previous 7 d: 18
Mortality (%) in previous 7 d: 0
Days to first brood: 9

NaCl Reference Toxicant Results:

Reference Toxicant ID: DM126
Stock Solution ID: 14Na02
Date Initiated: September 18, 2014
48-h LC50 (95% CL): 3.9 (2.8-5.5) g/L NaCl

Reference Toxicant Mean and Historical Range: 4.0 (3.7-4.3) g/L NaCl
Reference Toxicant CV (%): 9

Test Results: The 48-h LC50 is estimated to be >100% (v/v)

Reviewed by: JGh

Date reviewed: Sept. 23/14

Freshwater Acute 48 Hour Toxicity Test Data Sheet

Client: Mount Polley
 Sample ID: POL-14m-146916
 Work Order No.: 14661

Start Date/Time: Sept 18/14 @ 1700
 No. Organisms/volume: 10/200mL
 Test Organism: D. magna
 Set up by: YTL

DO meter: 3 pH meter: 3 Conductivity meter: 3

Concentration % (v/v)	Number of Live Organisms Rep	24		48		No. Immobilized 48	Temperature (°C)			Dissolved oxygen (mg/L)			pH			Conductivity (µS/cm)	
		24	48	0	24		48	0	24	48	0	24	48	0	48		
Control	A	10	10	0	20.0	20.0	20.0	8.5	8.3	8.4	7.8	7.9	8.0	349	350		
	B																
	C																
	D																
6.25	A	10	10	0	20.0	20.0	20.0	8.4	8.3	8.4	7.8	7.9	8.0	344	347		
	B																
	C																
	D																
12.5	A	10	10	0	20.0	20.0	20.0	8.4	8.1	8.4	7.8	7.9	8.0	340	345		
	B																
	C																
	D																
25	A	10	10	0	20.0	20.0	20.0	8.4	8.0	8.4	7.7	7.8	8.0	337	342		
	B																
	C																
	D																
50	A	10	10	0	20.0	20.0	20.0	8.3	8.0	8.4	7.6	7.8	7.9	329	341		
	B																
	C																
	D																
100	A	10	10	0	19.5	20.0	20.0	8.3	7.6	8.3	7.4	7.8	7.9	321	329		
	B																
	C																
	D																
Technician Initials	YTL	YTL	YTL	YTL	YTL	YTL	YTL	YTL	YTL	YTL	YTL	YTL	YTL	YTL	YTL		

WQ Ranges: T (°C) = 20 ± 2; DO (mg/L) = 3.6 to 9.4; pH = 6 to 8.5

	Hardness*	Alkalinity*
Conc.	*(mg/L as CaCO ₃)	
Control (MHW)	100	68
Highest conc.	132	86

	Initial WQ	Adjustment	Adjusted WQ
Temp (°C)	19.5		
DO (mg/L)	6.3		
pH	7.4		
Cond (µS/cm)	321		

Sample Description: light yellow colour, some particulates
 Comments: Batch: 090314RS 7-d previous # young/brood: 18 Day of 1st Brood: 9 Previous 7-d % Mortality: 0
 Reviewed by: JOU Date reviewed: Sept. 23/14

Client: Mount Polley

W.O.#: 14661

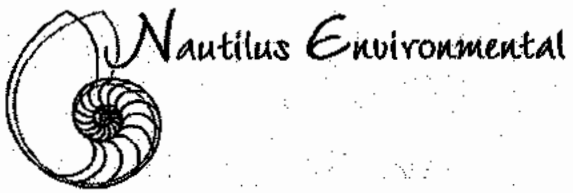
Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	Technician
POL-6-14m-140916	Sept 17/14	50 ml	4.4	4.5	86	50 ml	6.6	132	SSD
MHW	↓	50	3.5	3.6	68	50	5.0	100	MML

Notes: _____

Reviewed by: JGh

Date Reviewed: Sept. 23/14



British Columbia
 8664 Commerce Court
 Burnaby, British Columbia, Canada V5A 4N3
 Phone 604.420.8773

Date Sep 16, 2014 Page 1 of 1

COPY

Sample Collection By:		Invoice To:	
Report to:		Company:	
Company:	<u>Mount Polley Mining Corp.</u>	Company:	<u>Same as reporting address</u>
Address:	<u>Box 12</u>	Address:	
City/State/Zip:	<u>Likely BC VOL 1NO</u>	City/State/Zip:	
Contact:	<u>Colleen Hughes</u>	Contact:	
Phone:	<u>(250) 790-2617</u>	Phone:	
Email:	<u>chughes@mountpolley.com</u>	Email:	

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	ANALYSES REQUIRED							
							Full MMER Suite	7-d Cd	48-h D magna LC50	7-d Cdubia	7-d Forthradimow	7-d Psubcigata	7-d L.minor	
1	<u>POL-G-14</u>	<u>140916</u>	<u>Sep 16, 2014</u>	<u>15:00</u>	<u>20L</u>	<u>2</u>	<u>No rainbow trout available</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2				<u>20L</u>										
3				<u>NY</u>										
4														
5														
6														
7														
8														
9														
10														

PROJECT INFORMATION		RELINQUISHED BY (CLIENT)		RELINQUISHED BY (COURIER)	
Client:		(Signature)	(Time)	(Signature)	(Time)
PO No.:		(Printed Name)	(Date) (Date)	(Printed Name)	(Date) (Date)
Shipped Via:		(Company)		(Company)	
<p>Confirmed tests to be run w/ client Sept 18th xlf</p>		RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)	
		(Signature)	(Time)		
		(Printed Name)	(Date)		
(Company)					

PART 20

**Toxicity testing on a sample identified as POL-6-14m-140916: Samples collected
September 16, 2014 (Report date October 24, 2014)**



Nautilus Environmental

**Toxicity testing on a sample identified as
POL-6-14m-140916**

Sample collected September 16, 2014

Final Report

Report date: October 24, 2014

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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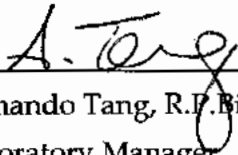
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- APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data
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- APPENDIX E - Chain of Custody Form

SIGNATURE PAGE



Krysta Pearcy, B.Sc.
Laboratory Biologist



Armando Tang, R.P.Bio.
Laboratory Manager

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted toxicity tests for Mount Polley Mining Corporation on a sample identified as POL-6-14m-140916. The sample was collected on September 16, 2014 and delivered to the laboratory in Burnaby, BC on September 18, 2014. The sample was transported in two 20-L plastic carboys and coolers. The sample was received at a temperature of 9.5°C and was stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing. The following sub-lethal toxicity tests were performed on the sample:

- *Ceriodaphnia dubia* survival and reproduction
- 7-d fathead minnow (*Pimephales promelas*) survival and growth
- 7-d duckweed (*Lemna minor*) growth inhibition
- 72-h algal (*Pseudokirchneriella subcapitata*) growth inhibition

This report describes the results of these toxicity tests. Copies of laboratory data sheets and printouts of statistical analyses for each test are provided in Appendices A to D. The chain-of-custody form is provided in Appendix E.

2.0 METHODS

Methods for the toxicity tests are summarized in Tables 1 to 4. Testing was conducted according to procedures described by the Environment Canada protocols (2007a, 2007b, 2007c and 2011). Statistical analyses for all tests were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house culture
Test organism age	<24 h old neonates produced within 12 h
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20 mL test tube
Test volume	15 mL
Test replicates	10 test replicates per treatment
Number of organisms	1 per replicate
Control water	20% Perrier water
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	<i>Pseudokirchneriella subcapitata</i> and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada, (2007a) EPS 1/RM/21
Statistical software	CETIS (2013)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods
Reference toxicant	Sodium chloride

Table 2. Summary of test conditions: fathead minnow (*Pimephales promelas*) survival and growth test.

Test organism	<i>Pimephales promelas</i>
Test organism source	Aquatic BioSystems, Fort Collins, CO
Test organism age	<24 hours
Test type	Static renewal
Test duration	7 days
Test vessel	375-mL glass containers
Test volume	250 mL
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control water	Moderately-hard water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	Twice a day with newly hatched brine shrimp (<i>Artemia nauplii</i>)
Light intensity	100 – 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test protocol	Environment Canada (2011), EPS 1/RM/22
Statistical software	CETIS (2013)
Test endpoint	Survival and biomass
Test acceptability criteria for controls	≥80% survival, ≥250 µg mean dry weight
Reference toxicant	Sodium Chloride

Table 3. Summary of test conditions: *Lemna minor* growth inhibition test.

Test organism	<i>Lemna minor</i>
Test organism source	In-house culture, obtained from Canadian Phycological Culture Centre, and originally isolated from Wainfleet, Stinking Barn, Niagara Peninsula, Ontario, Canada
Test organism age	7-to 10-day old
Test type	Static
Test duration	7 days
Test vessel	250 mL glass containers
Test volume	100 mL
Test replicates	4 test replicates per treatment
No. of organisms	Two 3-frond plants per replicate
Control water	Deionized water with nutrients added
Test solution renewal	None
Test temperature	25 ± 2°C
Feeding	None
Light intensity	4000 to 5600 lux full spectrum light
Photoperiod	24 hours light
Aeration	None
Test protocol	Environment Canada (2007b), EPS 1/RM/37
Statistical software	CETIS (2013)
Test endpoint	Number of fronds and dry weight
Test acceptability criteria for controls	≥ 8-fold increase in number of fronds
Reference toxicant	Potassium chloride

Table 4. Summary of test conditions: *Pseudokirchneriella subcapitata* growth inhibition test.

Test organism	<i>Pseudokirchneriella subcapitata</i> , strain UTCC #37
Test organism source	In-house culture, obtained from Canadian Phycological Culture Center, and originally isolated from Nitelva River, Norway.
Test organism age	3- to 7-day old culture in logarithmic growth phase
Test type	Static
Test duration	72 hours
Test vessel	Microplate
Test volume	220 µL
Test replicates	4 replicates per treatment; 8 replicates for control
Number of organisms	10,000 cells/mL
Control water	Deionized water with supplemented nutrients
Test solution renewal	None
Test temperature	24 ± 2°C
Feeding	None
Light intensity	3600 to 4400 lux
Photoperiod	24 hours light
Aeration	None
Test protocol	Environment Canada (2007c), EPS1/RM/25
Statistical software	CETIS (2013)
Test endpoint	Algal cell growth inhibition
Test acceptability criteria for controls	≥ 16-fold increase in number of algal cells; CV ≤ 20%; no trend when analyzed using Mann-Kendall test
Reference toxicant	Zinc

3.0 RESULTS

Adverse effects were observed only on *C. dubia* reproduction (Table 5). The IC25 and IC50 values were 3.8 and 5.3%, respectively. There were no adverse effects observed on survival of *C. dubia*, survival and growth of fathead minnow (Table 6), frond count and dry weight of *L. minor* (Table 7) or cell yield of *P. subcapitata* (Table 8). The LC and IC values were therefore greater than the highest concentration tested for each of these endpoints in these toxicity tests. In addition, a stimulatory effect was observed for *P. subcapitata* cell yield; percent stimulation ranged from 43.6 to 330.3%.

Table 5. Results: *Ceriodaphnia dubia* survival and reproduction test.

Concentration (% v/v)	Survival (%)	Reproduction (mean ± SD)
Control	100	21.5 ± 2.6
1.56	100	21.8 ± 4.6
3.12	100	19.8 ± 4.9
6.25	100	16.0 ± 4.3
12.5	100	11.3 ± 3.4
25	100	13.9 ± 4.7
50	100	13.2 ± 5.7
100	100	9.7 ± 4.0
Test endpoint (% v/v)		
LC50	>100	--
IC25 (95% CL)	--	3.8 (N/A - 5.6)
IC50 (95% CL)	--	5.3 (3.7 - 7.5)

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits, N/A = Not Applicable.

Table 6. Results: fathead minnow (*Pimephales promelas*) survival and growth test.

Concentration (% v/v)	Mean ± SD	
	Survival (%)	Biomass (µg)
Control	100.0 ± 0.0	868.7 ± 82.9
1.56	96.7 ± 5.8	884.3 ± 100.6
3.1	96.7 ± 5.8	877.0 ± 59.6
6.25	80.0 ± 17.3	742.7 ± 140.8
12.5	93.3 ± 11.6	825.3 ± 53.1
25	73.3 ± 25.2	707.0 ± 184.5
50	90.0 ± 0.0	978.3 ± 79.5
100	100.0 ± 0.0	894.3 ± 97.0
Test endpoint (% v/v)		
LC25	>100	--
LC50	>100	--
IC25	--	>100
IC50	--	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

Table 7. Results: *Lemna minor* growth inhibition test.

Concentration (% v/v)	Frond Growth (No. of Fronds)	Dry Weight (mg)
	(Mean ± SD)	(Mean ± SD)
Control	69.0 ± 14.1	6.5 ± 1.0
1.5	68.2 ± 1.7	7.3 ± 0.3
3.0	63.5 ± 12.4	6.5 ± 1.0
6.1	57.5 ± 18.3	6.2 ± 1.7
12.1	73.2 ± 23.8	7.0 ± 2.6
24.2	73.8 ± 21.7	7.3 ± 2.1
48.5	65.5 ± 6.0	5.6 ± 0.6
97	76.2 ± 16.3	6.9 ± 1.6
Test endpoint		
IC25	>97	>97
IC50	>97	>97

SD = Standard Deviation, IC = Inhibition Concentration.

Table 8. Results: *Pseudokirchneriella subcapitata* growth inhibition test.

Concentration (% v/v)	Cell Density (x 10 ⁴ cells/mL) (Mean ± SD)	Stimulation (%)
Control	41.2 ± 3.7	--
1.5	59.2 ± 7.1*	43.6
3.0	68.5 ± 5.2*	66.1
6.0	94.0 ± 9.5*	127.9
11.9	108.0 ± 9.6*	161.8
23.8	170.3 ± 19.3*	312.7
47.6	177.5 ± 9.3*	330.3
95.2	159.3 ± 10.8*	286.1
Test endpoint (% v/v)		
IC25	>95.2	--
IC50	>95.2	--

SD = Standard Deviation, IC = Inhibition Concentration.

*Indicates cell yield that were significantly greater than the control.

4.0 QA/QC

The health history of the test organisms used in the exposures was acceptable and met the requirements of the Environment Canada protocols. The tests met all control acceptability criteria and water quality parameters remained within ranges specified in the protocols throughout the tests. There were no deviations from the test methodologies. Uncertainty associated with these tests is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

Results of the reference toxicant tests conducted during the testing program are summarized in Table 9. Results for these tests fell within the range for organism performance of mean and two standard deviation range, based on historical results obtained by the laboratory with these tests. Thus, the sensitivity of the organisms used in these tests was appropriate.

Table 9. Reference toxicant results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>C. dubia</i>	Survival (LC50): 2.1 g/L NaCl	1.8 (1.4 - 2.5)	16	September 23 , 2014
	Reproduction (IC50): 1.9 g/L NaCl	1.4 (1.0 - 1.9)	17	
<i>P. promelas</i>	Survival (LC50): 4.0 g/L NaCl	4.4 (3.4 - 5.8)	14	September 19, 2014
	Biomass (IC50): 3.2 g/L NaCl	3.9 (2.9 - 5.3)	17	
<i>L. minor</i>	No. Fronds (IC50) 5.3 g/L KCl	4.2 (3.1 - 5.7)	16	October 3, 2014
<i>P. subcapitata</i>	Growth (IC50) 29.2 µg/L Zn	25.2 (14.8 - 42.8)	30	September 5, 2014

SD = Standard Deviation, CV = Coefficient of Variation, IC = Inhibition Concentration, LC = Lethal Concentration.

5.0 REFERENCES

- Environment Canada. 2007a. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. Report EPS 1/RM/21, Second Edition, February 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 74 pp.
- Environment Canada. 2007b. Biological test method: tests for measuring the inhibition of growth using the freshwater macrophyte, *Lemna minor*. Environmental Protection Series, Report EPS 1/RM/37. Second Edition. January 2007. Environment Canada, Method Development and Application Section, Environmental Technology Centre, Ottawa, ON. 112 pp.
- Environment Canada. 2007c. Biological test method: growth inhibition test using the freshwater alga. Environmental Protection Series, Report EPS 1/RM/25. Second Edition, March 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 53 pp.
- Environment Canada. 2011. Biological test method: test of larval growth and survival using fathead minnows. Environmental Protection Series, Report EPS 1/RM/22. February 2011,. Environment Canada, Environmental Protection, Conservation and Protection, Ottawa, ON. 73 pp.
- Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.4.29 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: Mt. Palley
 Work Order No.: 14662

Start Date/Time: Sept 18/14 @ 1023h
 Set up by: EMM/EC

Sample Information:

Sample ID: POL-6-14M-140916
 Sample Date: Sept 16/14
 Date Received: Sept 18/14
 Sample Volume: 2 x 20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 091014B
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 21
 Mortality (%) in previous 7 d: 0
 Individual female # used ≥ 8 young on test day: 24, 25, 27, 29, 30, 31, 32

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd 118
 Stock Solution ID: 14NaO2
 Date Initiated: Sept 23/14

7-d LC50 (95% CL): 2.1 (1.5-3.0) g/L NaCl
 7-d IC50 (95% CL): 1.9 (1.1-2.9) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.8 (1.4-2.5) g/L NaCl CV (%): 16
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-1.9) g/L NaCl CV (%): 17

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	>100	
IC25 % (v/v) (95% CL)		3.8 (n/a - 5.6)
IC50 % (v/v) (95% CL)		5.3 (3.7 - 7.5)

Reviewed by: Jole

Date reviewed: Oct. 16/14

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Polley
 Sample ID: POL-6-14M-140916
 Work Order #: 14662

Start Date & Time: Sept 18/14 @ 10:23h
 Stop Date & Time: Sept 24/14 @ 12:30h
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		Final 6		7
Control	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	14.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	8.0	7.6	8.0	7.5	8.0	7.4	8.0	7.4	8.0	7.3	7.9	7.1		
pH	8.0	7.0	8.0	7.7	8.1	7.7	8.0	7.6	8.1	7.7	7.0	7.8		
Cond. (µS/cm)	215	214		217		219		218		225		229		
Initials	EMM/EC	EMM		~		~		EMM/EC		EC		EMM		

Concentration	Days													
	0	1		2		3		4		5		Final 6		7
1.569% (v/v)	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	14.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	7.9	7.6	7.9	7.6	8.0	7.5	7.9	7.3	7.8	7.4	7.8	7.2		
pH	8.0	7.8	7.6	7.6	8.1	7.7	8.1	7.7	8.0	7.7	7.5	7.8		
Cond. (µS/cm)	227	226		230		235		220		217		217		
Initials	EMM/EC	EMM		~		~		EMM/EC		EC		EMM		

Concentration	Days													
	0	1		2		3		4		5		Final 6		7
12.59% (v/v)	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	14.0	25.0	24.5	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	7.7	7.4	7.9	7.5	7.8	7.4	7.6	7.3	7.7	7.3	7.8	7.2		
pH	7.7	7.7	7.9	7.5	8.0	7.5	8.0	7.9	8.0	7.9	7.5	7.9		
Cond. (µS/cm)	227	229		233		238		232		228		228		
Initials	EMM/EC	EMM		~		~		EMM/EC		EC		EMM		

Concentration	Days													
	0	1		2		3		4		5		Final 6		7
100% (v/v)	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	14.0	25.0	25.0	25.0	24.0	25.0	24.0	25.0	24.5	25.0	24.0	25.0		
DO (mg/L)	6.0	5.9	6.4	7.0	7.2	6.8	7.1	7.3	7.4	7.3	8.0	7.3		
pH	8.0	7.2	7.2	7.4	7.6	7.3	7.7	7.9	7.4	7.9	7.5	7.9		
Cond. (µS/cm)	325	32		325		322		326		323		329		
Initials	EMM/EC	EMM		~		~		EMM/EC		EC		EMM		

7.3

	Control	100% (v/v)
Hardness*	98	160
Alkalinity*	80.	88

Analysts: AWB, EMM
 Reviewed by: JGL
 Date reviewed: Oct. 16/14

* mg/L as CaCO₃
 WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5
 Sample Description: Clear, PPT present
 Comments: Broodboard Used: 091014B (H#24,25,27,29,30,31,32)

Chronic Freshwater Toxicity Test
C. dubia Reproduction Data

Client: mt. Polley
Sample ID: Pol-6-14M-140916
Work Order: 14662

% (V/V) 156

Start Date & Time: Sept 18/14 @ 1023h
Stop Date & Time: Sept 24/14 @ 1230h
Set up by: EMM/EC

Days	Concentration: <u>control</u>												Concentration: <u>156</u>												Concentration: <u>312</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM			
2	/	/	/	/	/	/	/	/	/	/	A	/	/	/	/	/	/	/	/	/	/	A	/	/	/	/	/	/	/	/	/	A				
3	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	~				
4	4	4	4	4	5	4	4	3	4	3	mm	4	4	5	3	4	4	3	2	4	mm	3	4	3	3	4	4	4	4	4	4	mm				
5	7	8	8	9	9	7	6	8	8	7	EMM	8	9	9	7	8	8	8	7	7	8	EMM	9	8	8	7	7	8	7	8	8	9	EMM			
6	10	11	11	9	12	10	8	10	11	7	EMM	11	13	13	11	11	10	12	✓	14	11	EMM	9	13	10	10	13	✓	✓	9	6	12	EMM			
7																																				
8																																				
Total	21	23	23	22	26	21	18	21	23	17	EMM	23	26	27	21	23	22	20	10	23	23	EMM	21	25	21	20	24	12	11	21	18	25	EMM			

Days	Concentration: <u>6.25</u>												Concentration: <u>12.5</u>												Concentration: <u>25</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM			
2	/	/	/	/	/	/	/	/	/	/	A	/	/	/	/	/	/	/	/	/	/	A	/	/	/	/	/	/	/	/	/	A				
3	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	~				
4	3	4	3	3	3	4	3	2	2	2	mm	2	4	4	3	3	3	2	3	2	3	mm	2	4	3	2	4	3	3	2	mm					
5	6	8	6	7	7	8	7	9	6	4	EMM	4	8	✓	6	7	6	9	6	7	7	EMM	7	7	6	6	7	7	4	8	8	6	EMM			
6	11	✓	11	✓	9	8	10	✓	8	8	EMM	7	✓	10	✓	✓	✓	8	✓	✓	✓	EMM	✓	✓	✓	10	11	✓	9	12	✓	8	EMM			
7																																				
8																																				
Total	20	12	20	10	19	20	20	11	16	12	EMM	11	11	14	10	10	9	20	8	10	10	EMM	9	11	9	16	20	11	13	23	11	16	EMM			

Days	Concentration: <u>50</u>												Concentration: <u>100</u>												Concentration:											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM														
2	/	/	/	/	/	/	/	/	/	/	A	/	/	/	/	/	/	/	/	/	/	A														
3	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~														
4	4	4	4	3	2	2	2	2	3	2	mm	3	4	4	3	2	2	2	2	2	2	mm														
5	4	7	3	8	7	7	7	9	8	8	EMM	8	4	4	3	6	6	4	3	3	3	EMM														
6	✓	12	9	✓	8	✓	✓	9	✓	4	EMM	6	6	9	✓	✓	✓	8	7	8	✓	EMM														
7																																				
8																																				
Total	4	23	12	12	18	9	9	20	11	14	EMM	17	10	13	3	8	8	12	10	11	5	EMM														

Notes: X = mortality.

Sample Description: ①

Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JGK

Date reviewed: Oct. 16/14

CETIS Analytical Report

Report Date: 30 Sep-14 16:55 (p 1 of 2)
 Test Code: 14662 | 09-9236-3444

Ceriodaphnia 7-d Survival and Reproduction Test **Nautilus Environmental**

Analysis ID: 02-8618-5425	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 30 Sep-14 16:53	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 18-9743-9607	Test Type: Reproduction-Survival (7d)	Analyst: Emma Marus
Start Date: 18 Sep-14 10:23	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 24 Sep-14 12:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 2h	Source: In-House Culture	Age: <24h
Sample ID: 03-1220-3372	Code: 129BD86C	Client: Mount Polley
Sample Date: 16 Sep-14 15:00	Material: Water Sample	Project:
Receive Date: 18 Sep-14 09:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 43h (9.5 °C)	Station: POL-6-14m-140916	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	2113377	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

C-%	Control Type	Count	Mean	Min	Max	Calculated Variate(A/B)					
						Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 30 Sep-14 16:55 (p 2 of 2)
 Test Code: 14862 | 09-9236-3444

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 02-8618-5425
 Analyzed: 30 Sep-14 16:53

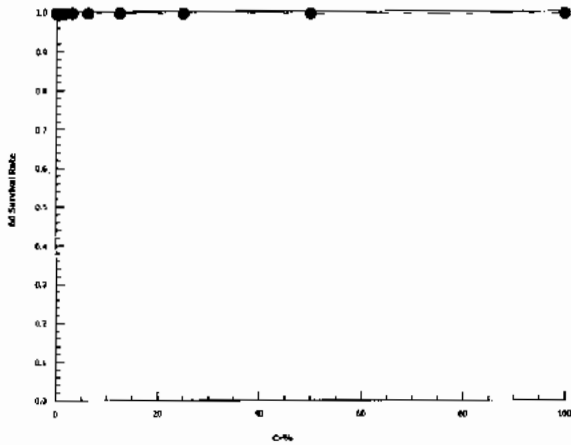
Endpoint: 6d Survival Rate
 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 30 Sep-14 16:55 (p 1 of 2)
 Test Code: 14662 | 09-9236-3444

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 15-2399-2909	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 30 Sep-14 16:54	Analysis: Nonlinear Regression	Official Results: Yes
Batch ID: 18-9743-9607	Test Type: Reproduction-Survival (7d)	Analyst: Emma Marus
Start Date: 18 Sep-14 10:23	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 24 Sep-14 12:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 2h	Source: In-House Culture	Age: <24h
Sample ID: 03-1220-3372	Code: 129BD86C	Client: Mount Polley
Sample Date: 16 Sep-14 15:00	Material: Water Sample	Project:
Receive Date: 18 Sep-14 09:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 43h (9.5 °C)	Station: POL-6-14m-140916	

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
4P Cumulative Log-Normal EV [Y=B+(A-B)*(1- Φ(log(X/D)/C))]	None	None	Normal [W=1]	Off [Y=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
25	-157.4	323.3	332.3	0.4622	Yes	1.558	2.499	0.1947	Non-Significant Lack of Fit

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	2.364	N/A	3.773	42.3	26.5	NA
IC10	2.826	N/A	4.351	35.38	22.98	NA
IC15	3.188	N/A	4.843	31.37	20.65	NA
IC20	3.508	N/A	5.261	28.51	19.01	NA
IC25	3.808	N/A	5.628	26.26	17.77	NA
IC40	4.683	2.996	6.651	21.35	15.04	33.37
IC50	5.304	3.728	7.546	18.85	13.25	26.82

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	21.56	1.052	19.5	23.62	20.5	<0.0001	Significant Parameter
B	12	0.7713	10.49	13.51	15.55	<0.0001	Significant Parameter
C	0.4912	0.2703	-0.03865	1.021	1.817	0.0732	Non-Significant Parameter
D	5.304	1.056	3.234	7.373	5.024	<0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	1402.942	1402.942	1	70.88	<0.0001	Significant
Lack of Fit	119.8585	29.96462	4	1.558	0.1947	Non-Significant
Pure Error	1384.4	19.22778	72			
Residual	1504.258	19.79288	76			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	6.357	14.07	0.4988	Equal Variances
	Mod Levene Equality of Variance	0.7713	2.14	0.6132	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9841	0.9691	0.4220	Normal Distribution
	Anderson-Darling A2 Normality	0.5118	2.492	0.1990	Normal Distribution

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 15-2399-2909 Endpoint: Reproduction CETIS Version: CETISv1.8.7
 Analyzed: 30 Sep-14 16:54 Analysis: Nonlinear Regression Official Results: Yes

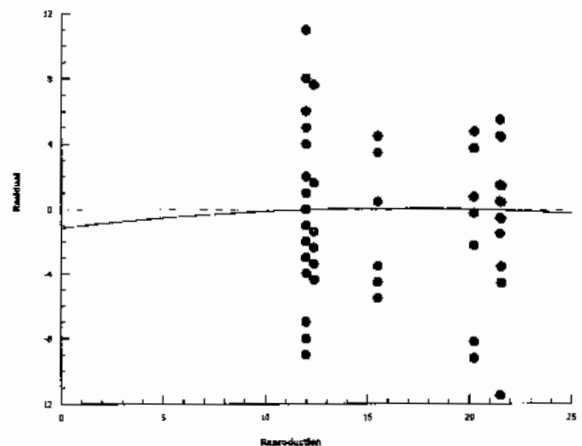
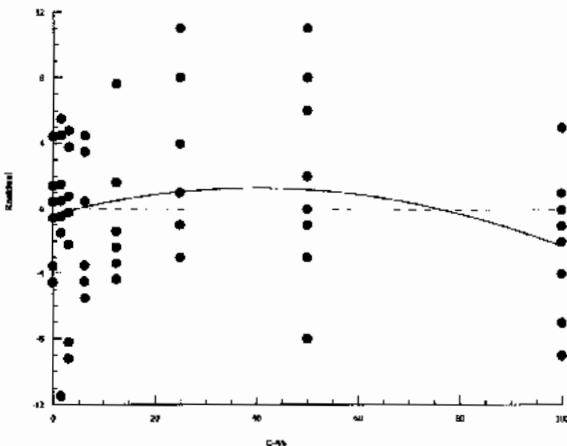
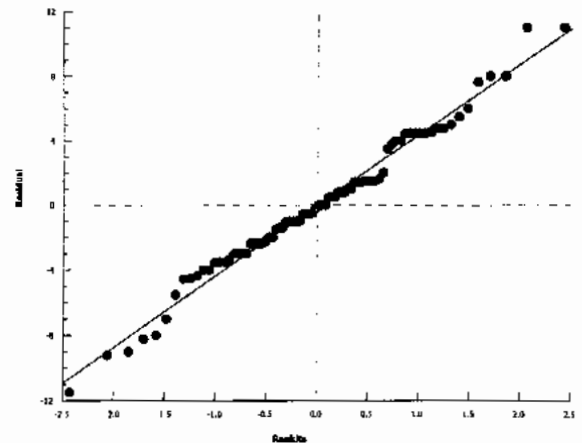
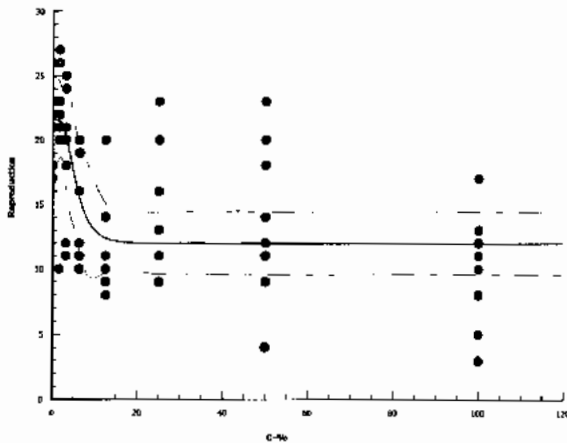
Reproduction Summary			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	21.5	17	26	0.8199	2.593	12.06%	0.0%
1.56		10	21.8	10	27	1.467	4.638	21.28%	-1.4%
3.12		10	19.8	11	25	1.555	4.917	24.83%	7.91%
6.25		10	16	10	20	1.358	4.295	26.84%	25.58%
12.5		10	11.3	8	20	1.086	3.433	30.38%	47.44%
25		10	13.9	9	23	1.501	4.748	34.16%	35.35%
50		10	13.2	4	23	1.806	5.712	43.27%	38.6%
100		10	9.7	3	17	1.265	4.001	41.25%	54.88%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	21	23	23	22	26	21	18	21	23	17
1.56		23	26	27	21	23	22	20	10	23	23
3.12		21	25	21	20	24	12	11	21	18	25
6.25		20	12	20	10	19	20	20	11	16	12
12.5		11	11	14	10	10	9	20	8	10	10
25		9	11	9	16	20	11	13	23	11	16
50		4	23	12	12	18	9	9	20	11	14
100		17	10	13	3	8	8	12	10	11	5

Graphics

4P Cumulative Log-Normal EV [Y=B+(A-B)*(1- Φ(log(X/D)/C))]



Client: Mt. Polley

W.O.#: 14662

Hardness and Alkalinity Datasheet

Alkalinity						Hardness			
Sample ID	Sample Date	Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	Technician
POL-6-14M (140916)	Sept 18/14	50	4.5	4.6	88	50	8.0	160	EC
20% Perrux (t/l)	Sept 18/14	50	4.2	4.4	80	50	4.9	98	EMM

Notes:

Reviewed by:

vjgk

Date Reviewed:

Oct. 16/14

APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

Fathead Minnow Test Summary Sheet
(7-d *Pimephales promelas* Survival and Growth Test)

Client: Mowat Polley
Work Order No.: 14663

Start Date/Time: Sept 19/14 @ 1200h
Test Species: P. promelas

Sample Information:

Sample ID: POL-6-14M-140916
Sample Date: Sept 16/14
Date Received: Sept 16/14
Sample Volume: 2x20L

Dilution Water (initial water quality):

Type: Moderately Hard Water
Temperature (°C): 25.0
pH: 7.4
Dissolved Oxygen (mg/L): 6.0
Hardness (mg/L CaCO₃): 88
Alkalinity (mg/L CaCO₃): 64

Test Validity Criteria:

The test is invalid if:

- 1) for the control solutions, the combined and cumulative incidence of any mortalities, or fish showing loss of equilibrium or other signs of atypical swimming behavior, is >20%
- 2) the average dry weight of the surviving control fish does not attain 250 ug when the fish are dried and weighed.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4; pH = 6.5 to 8.5

Test Organism Information:

Batch No.: 091914
Source: Aquatic Biosystems, CO
Age: <24hrs

NaCl Reference Toxicant Results:

Reference Toxicant ID: PP98
Stock Solution ID: n/a
Date Initiated: Sept 19/14
7-d EC50 (95% CL): 4.0 (3.4 - 4.7)
7-d IC50 (95% CL): 3.2 (2.9 - 3.6)

Survival:

Reference Toxicant Mean and Historical Range: 4.4 (3.4 - 5.8) CV (%): 14

Biomass:

Reference Toxicant Mean and Historical Range: 3.9 (2.9 - 5.3) CV (%): 17

Test Results:

	Survival	Biomass
LC25 % (v/v) (95% CL)	>100	
LC50 % (v/v) (95% CL)	>100	
IC25 % (v/v) (95% CL)		>100
IC50 % (v/v) (95% CL)		>100

Reviewed by: JGU

Date reviewed: Oct-21/14

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: FOL-G-14M-140916 (CRD)
 Work Order #: 14663

Start Date & Time: Sept 14th 14 @ 12:00h
 Stop Date & Time: Sept 21st 14 @ 13:00h
 Test Species: Pimephales promelas

Concentration (Control)	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	25.0	25.0	24.5	25.0	24.5	25.0	25.0	25.0	26.0	24.0	26.0	25.6	26.0	24.0
DO (mg/L)	8.0	6.0	7.7	5.9	7.7	6.4	8.0	5.9	7.2	4.9	7.3	4.8	7.8	4.2
pH	7.4	7.7	8.0	7.7	8.0	7.6	8.0	7.3	7.8	7.1	7.9	7.3	7.8	7.3
Cond. (µS/cm)	321	325		326		324		333		333		336		360
Initials	LD	A		M		LD/KSL		KSL/LD		LD		LD		SBF

Concentration 1.56	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	25.0	25.0	24.5	25.0	24.5	25.0	25.0	25.0	26.0	24.0	25.0	25.0	25.0	24.5
DO (mg/L)	7.5	6.1	7.8	6.0	7.8	6.2	7.5	5.8	7.0	4.5	7.2	4.6	7.3	4.0
pH	7.6	7.8	7.9	7.8	7.8	7.6	7.9	7.4	7.7	7.6	7.8	7.3	7.8	7.3
Cond. (µS/cm)	319	322		320		328		329		331		337		366
Initials	LD	A		M		LD		KSL/LD		LD		LD		SBF

Concentration 12.5	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	25.0	25.0	24.5	25.0	24.5	25.0	25.0	25.0	25.5	24.0	25.0	25.0	24.5	24.5
DO (mg/L)	7.6	6.0	7.8	6.0	7.8	6.1	8.0	6.0	7.5	4.9	7.2	4.6	7.1	4.0
pH	7.7	7.8	7.9	7.8	7.8	7.6	8.0	7.5	7.7	7.5	7.8	7.4	7.9	7.4
Cond. (µS/cm)	317	321		320		327		325		330		335		362
Initials	LD	A		M		LD		KSL/LD		LD		LD		SBF

Concentration 100	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	24.0	24.0	24.5	25.0	24.0	24.5
DO (mg/L)	7.2	6.0	7.7	5.8	7.8	6.1	7.5	5.9	7.5	4.9	7.5	4.5	7.4	4.2
pH	7.4	7.8	7.6	7.8	7.6	7.6	7.6	7.5	7.4	7.6	7.4	7.5	7.6	7.5
Cond. (µS/cm)	326	326		327		326		324		329		323		354
Initials	LD	A		M		LD		KSL/LD		LD		LD		SBF

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6.5 to 8.5

DO meter: 3 pH meter: 3 Conductivity meter: 3

	Control	100% (V/V)	
Hardness*	88	160	
Alkalinity*	64	88	

* mg/L as CaCO₃

Analysts: AWD, KTL

Reviewed by: JOU

Date reviewed: Oct. 16/14

Sample Description: Pale orange, clear, tiny specks floating around

Comments: _____

7-d Fathead Minnow Toxicity Test Daily Survival

Client: Mount Polley
 Sample ID: POL-G-14M-140916 (red)
 Work Order #: 14663

Start Date & Time: Sept 19/14 @ 1200h
 Stop Date & Time: Sept 26/14 @ 1300h
 Test Species: Pimephales promelas

Concentration % (v/v)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	10	10	10	10	10	10	10	
	B			6	10	10	10	10	
	C			10	10	10	10	10	
1.56	A			10	10	10	10	10	
	B			9	9	9	9	9	
	C			10	10	10	10	10	
3.1	A			10	10	10	9	9	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
6.25	A			10	10	9	9	9	
	B			10	9	9	9	9	
	C			10	7	6	6	6	
12.5	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	8	8	8	8	
25	A			10	7	6	5	5	
	B			10	10	7	7	7	
	C			10	10	10	10	10	
50	A			10	10	10	10	9	
	B			10	9	9	9	9	
	C			10	9	9	9	9	
100	A			10	10	10	10	10	
	B			10	10	10	10	10	
	C			10	10	10	10	10	
	A								
	B								
	C								
	A								
	B								
	C								
Tech Initials		n	n	KSL	KSL	SBF	KSL	SBF	

Comments: _____

Reviewed by: Jbu Date reviewed: Oct 16/14

Fathead Minnow Toxicity Test Data Sheet

Dry Weight Data

Client: Mount Polley

Start Date & Time: Sept 17/14 @ 12:00h

Sample ID: POL-6-14M-140916

Termination Date & Time: Sept 24/14 @ 13:00h
26

Work Order No.: 14663

Concentration % (v/v)	Rep	0917 Pan No. green	No. alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control	A	1	10	JBF	977.56	987.12	10	LD
	B	2	10		995.17	1003.76	10	
	C	3	10		974.63	982.54	10	
1.56	A	4	10		987.96	996.93	10	
	B	5	9		971.22	979.00	9	
	C	6	10		982.62	992.40	10	
3.1	A	7	9		1001.58	1009.83	9	
	B	8	10		988.27	997.69	10	
	C	9	10		985.74	994.38	10	
6.25	A	10	9		980.35	987.88	9	
	B	11	9		986.14	994.92	9	
	C	12	6		994.26	1000.23	6	
12.5	A	13	10		988.22	977.08	10	
	B	14	8 10		992.72	1000.75	10	
	C	15	8		971.41	979.28	8	
25	A	16	5		990.36	995.68 ¹⁰ 67	5	
	B	17	7		993.91	1000.82	7	
	C	18	10		975.22	984.21	10	
50	A	19	9		980.01	990.65	9	
	B	20	9		973.97	983.64	9	
	C	21	9		969.81	979.45	9	
100	A	22	10		996.47	1004.30	10	
	B	23	10		991.75	1001.14	10	
	C	24	10	J	1005.40	1015.01	10	✓

Comments: Re-weighed pans: 7-1009.79 17-1000.71

Reviewed by: JGU

Date Reviewed: Oct. 17/14

CETIS Analytical Report

Report Date: 17 Oct-14 12:33 (p 1 of 2)
 Test Code: 14663 | 18-4267-5061

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 01-5292-4529	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 17 Oct-14 12:33	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 07-9071-1138	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 19 Sep-14 12:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 26 Sep-14 13:00	Species: Pimephales promelas	Brine:
Duration: 7d 1h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 03-1220-3372	Code: 129BD86C	Client: Mount Polley
Sample Date: 16 Sep-14 15:00	Material: Water Sample	Project:
Receive Date: 18 Sep-14 09:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 69h (9.5 °C)	Station: POL-6-14m-140916	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	2131857	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	3.539	N/A	22.36	28.25	4.473	NA
EC10	5.16	2.356	N/A	19.38	NA	42.44
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	3	1	1	1	0	0	0.0%	0.0%	30	30
1.56		3	0.9667	0.9	1	0.03333	0.05773	5.97%	3.33%	29	30
3.1		3	0.9667	0.9	1	0.03333	0.05773	5.97%	3.33%	29	30
6.25		3	0.8	0.6	0.9	0.1	0.1732	21.65%	20.0%	24	30
12.5		3	0.9333	0.8	1	0.06667	0.1155	12.37%	6.67%	28	30
25		3	0.7333	0.5	1	0.1453	0.2517	34.32%	26.67%	22	30
50		3	0.9	0.9	0.9	0	0	0.0%	10.0%	27	30
100		3	1	1	1	0	0	0.0%	0.0%	30	30

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	1	1	1
1.56		1	0.9	1
3.1		0.9	1	1
6.25		0.9	0.9	0.6
12.5		1	1	0.8
25		0.5	0.7	1
50		0.9	0.9	0.9
100		1	1	1

07/14

CETIS Analytical Report

Report Date: 17 Oct-14 12:33 (p 2 of 2)
 Test Code: 14663 | 18-4267-5061

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

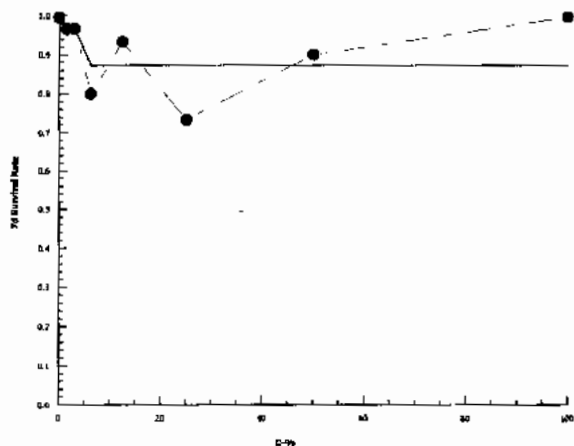
Analysis ID: 01-5292-4529 Endpoint: 7d Survival Rate
 Analyzed: 17 Oct-14 12:33 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	10/10	10/10	10/10
1.56		10/10	9/10	10/10
3.1		9/10	10/10	10/10
6.25		9/10	9/10	6/10
12.5		10/10	10/10	8/10
25		5/10	7/10	10/10
50		9/10	9/10	9/10
100		10/10	10/10	10/10

Graphics



CETIS Analytical Report

Report Date: 17 Oct-14 15:07 (p 1 of 2)
 Test Code: 14663 | 18-4267-5061

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 16-6294-0380	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 30 Sep-14 13:05	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 07-9071-1138	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 19 Sep-14 12:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 26 Sep-14 13:00	Species: Pimephales promelas	Brine:
Duration: 7d 1h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 03-1220-3372	Code: 129BD86C	Client: Mount Polley
Sample Date: 16 Sep-14 15:00	Material: Water Sample	Project:
Receive Date: 18 Sep-14 09:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 69h (9.5 °C)	Station: POL-6-14m-140916	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1388739	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	5.966	N/A	N/A	16.76	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.8687	0.791	0.956	0.04788	0.08292	9.55%	0.0%
1.56		3	0.8843	0.778	0.978	0.05808	0.1006	11.38%	-1.8%
3.1		3	0.877	0.825	0.942	0.03439	0.05957	6.79%	-0.96%
6.25		3	0.7427	0.597	0.878	0.08128	0.1408	18.96%	14.51%
12.5		3	0.8253	0.787	0.886	0.03068	0.05314	6.44%	4.99%
25		3	0.707	0.531	0.899	0.1065	0.1845	26.1%	18.61%
50		3	0.9783	0.907	1.064	0.04589	0.07948	8.12%	-12.62%
100		3	0.8943	0.783	0.961	0.05603	0.09704	10.85%	-2.96%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.956	0.859	0.791
1.56		0.897	0.778	0.978
3.1		0.825	0.942	0.864
6.25		0.753	0.878	0.597
12.5		0.886	0.803	0.787
25		0.531	0.691	0.899
50		1.064	0.907	0.964
100		0.783	0.939	0.961

CETIS Analytical Report

Report Date: 17 Oct-14 15:07 (p 2 of 2)
Test Code: 14663 | 18-4267-5061

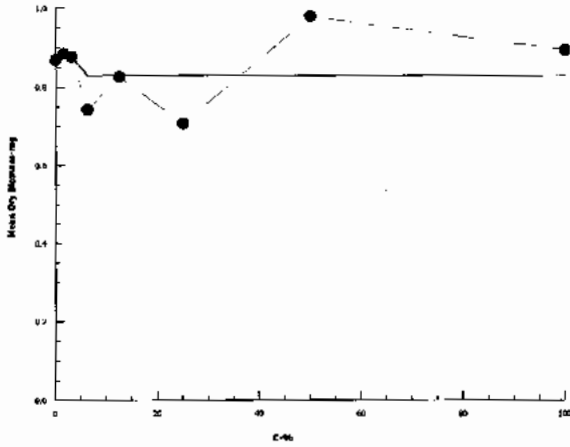
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 16-6294-0380 Endpoint: Mean Dry Biomass-mg
Analyzed: 30 Sep-14 13:05 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 17 Oct-14 15:07 (p 1 of 2)

Test Code: 14663 | 18-4267-5061

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 05-3080-2705	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 17 Oct-14 15:07	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 07-9071-1138	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 19 Sep-14 12:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 26 Sep-14 13:00	Species: Pimephales promelas	Brine:
Duration: 7d 1h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 03-1220-3372	Code: 129BD86C	Client: Mount Polley
Sample Date: 16 Sep-14 15:00	Material: Water Sample	Project:
Receive Date: 18 Sep-14 09:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 69h (9.5 °C)	Station: POL-6-14m-140916	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C < T	NA	NA	25.9%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	1.56	0.178	2.558	0.225	4	0.8253	CDF	Non-Significant Effect
	3.1	0.09467	2.558	0.225	4	0.8500	CDF	Non-Significant Effect
	6.25	-1.431	2.558	0.225	4	0.9972	CDF	Non-Significant Effect
	12.5	-0.4923	2.558	0.225	4	0.9587	CDF	Non-Significant Effect
	25	-1.837	2.558	0.225	4	0.9992	CDF	Non-Significant Effect
	50	1.246	2.558	0.225	4	0.3741	CDF	Non-Significant Effect
	100	0.2916	2.558	0.225	4	0.7878	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.159619	0.02280272	7	1.962	0.1252	Non-Significant Effect
Error	0.1859455	0.0116216	16			
Total	0.3455645		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.169	18.48	0.7602	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9884	0.884	0.9912	Normal Distribution

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	3	0.8687	0.6627	1.075	0.859	0.791	0.956	0.04788	9.55%	0.0%
1.56		3	0.8843	0.6344	1.134	0.897	0.778	0.978	0.05808	11.38%	-1.8%
3.1		3	0.877	0.729	1.025	0.864	0.825	0.942	0.03439	6.79%	-0.96%
6.25		3	0.7427	0.3929	1.092	0.753	0.597	0.878	0.08128	18.96%	14.51%
12.5		3	0.8253	0.6933	0.9574	0.803	0.787	0.888	0.03068	6.44%	4.99%
25		3	0.707	0.2486	1.165	0.691	0.531	0.899	0.1065	26.1%	18.61%
50		3	0.9783	0.7809	1.176	0.964	0.907	1.064	0.04589	8.12%	-12.62%
100		3	0.8943	0.6533	1.135	0.939	0.783	0.961	0.05603	10.85%	-2.96%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.956	0.859	0.791
1.56		0.897	0.778	0.978
3.1		0.825	0.942	0.864
6.25		0.753	0.878	0.597
12.5		0.886	0.803	0.787
25		0.531	0.691	0.899
50		1.064	0.907	0.964
100		0.783	0.939	0.961

CETIS Analytical Report

Report Date: 17 Oct-14 15:08 (p 2 of 2)

Test Code: 14663 | 18-4267-5061

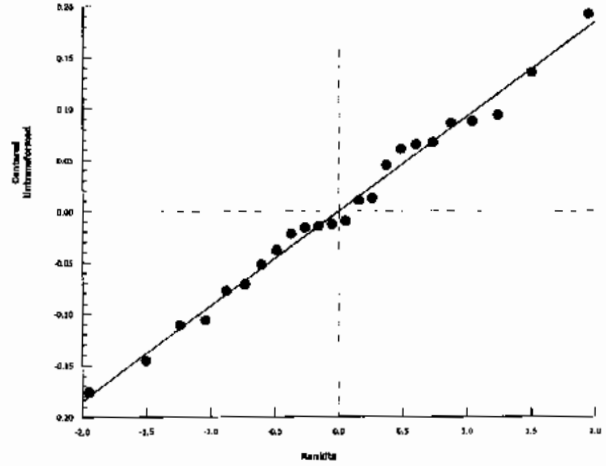
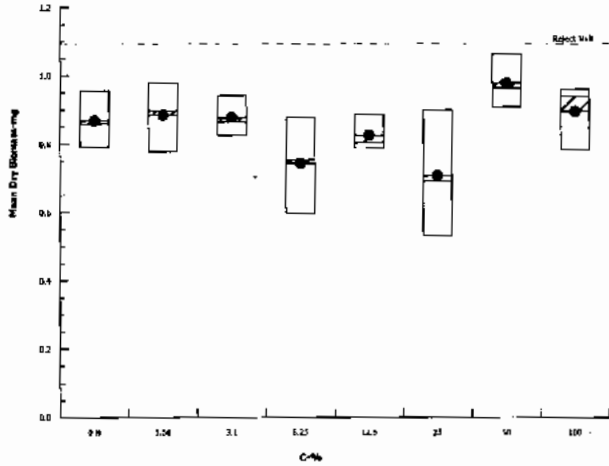
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 05-3080-2705 Endpoint: Mean Dry Biomass-mg
Analyzed: 17 Oct-14 15:07 Analysis: Parametric-Control vs Treatments

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 17 Oct-14 15:10 (p 1 of 1)

Test Code: 14663 | 18-4267-5061

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 04-5050-3861	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 17 Oct-14 15:10	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 07-9071-1138	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 19 Sep-14 12:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 26 Sep-14 13:00	Species: Pimephales promelas	Brine:
Duration: 7d 1h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 03-1220-3372	Code: 129BD86C	Client: Mount Polley
Sample Date: 16 Sep-14 15:00	Material: Water Sample	Project:
Receive Date: 18 Sep-14 09:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 69h (9.5 °C)	Station: POL-6-14m-140916	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	19.3%	100	>100	NA	1

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		1.56	-0.6797	2.558	0.167	4	0.9745	CDF	Non-Significant Effect
		3.1	-0.5942	2.558	0.167	4	0.9681	CDF	Non-Significant Effect
		6.25	-1.025	2.558	0.167	4	0.9903	CDF	Non-Significant Effect
		12.5	-0.3401	2.558	0.167	4	0.9402	CDF	Non-Significant Effect
		25	-1.743	2.558	0.167	4	0.9989	CDF	Non-Significant Effect
		50	-3.337	2.558	0.167	4	1.0000	CDF	Non-Significant Effect
		100	-0.3922	2.558	0.167	4	0.9472	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1038618	0.0148374	7	2.31	0.0785	Non-Significant Effect
Error	0.1027846	0.006424035	16			
Total	0.2066464		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.617	18.48	0.9780	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9346	0.884	0.1235	Normal Distribution

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	3	0.8687	0.6627	1.075	0.859	0.791	0.956	0.04788	9.55%	0.0%
1.56		3	0.9131	0.7679	1.058	0.897	0.8644	0.978	0.03376	6.4%	-5.12%
3.1		3	0.9076	0.8087	1.006	0.9167	0.864	0.942	0.02297	4.38%	-4.48%
6.25		3	0.9357	0.7212	1.15	0.9756	0.8367	0.995	0.04985	9.23%	-7.72%
12.5		3	0.8909	0.6662	1.116	0.886	0.803	0.9838	0.05224	10.16%	-2.56%
25		3	0.9827	0.78	1.185	0.9871	0.899	1.062	0.0471	8.3%	-13.13%
50		3	1.087	0.8677	1.306	1.071	1.008	1.182	0.05098	8.12%	-25.14%
100		3	0.8943	0.6533	1.135	0.939	0.783	0.961	0.05603	10.85%	-2.96%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.956	0.859	0.791
1.56		0.897	0.8644	0.978
3.1		0.9167	0.942	0.864
6.25		0.8367	0.9756	0.995
12.5		0.886	0.803	0.9838
25		1.062	0.9871	0.899
50		1.182	1.008	1.071
100		0.783	0.939	0.961

APPENDIX C - *Lemna Minor* Toxicity Test Data

Lemna minor Summary Sheet

Client: Mount Polley
Work Order No.: 14665

Start Date: Sept 19/14
Set up by: KLP

Sample Information:

Sample ID: POL-6-14m-140916
Sample Date: Sept 16/14
Date Received: Sept 18/14
Sample Volume: 2x20L

Test Organism Information:

Culture Date: 09/21/14
Age of culture (Day 0): 7 days
>8X growth in APHA?: yes (30 fronds)

KCI Reference Toxicant Results:

Reference Toxicant ID: LM 109
Date Initiated: October 3, 2014

7-d No. of Fronds IC50 (95% CL): 5.3 (4.3 - 6.4)

7-d No. Fronds IC50 Reference Toxicant Mean (2 SD Range): 4.2 (3.1 - 5.3) CV (%): 16

	Number of Fronds	Dry Weight
Test Results: IC25 %(v/v) (95% CL)	797	797
IC50 %(v/v) (95% CL)	797	797

Reviewed by: Jbu

Date reviewed: Oct. 20/14

Plant Growth Inhibition Toxicity Test Water Quality Measurements

Client: Mount Polley Setup by: KLL
 Sample ID: POL-6-14M-140916 Test Date: Sept 19/14
 Work Order No.: 14665 Test Species: Lemna minor
 Culture Source: CPCC #490
 Test Culture Age: 7 days > 8X Growth? (Y/N): Yes (30 fronds)
 Light Intensity Range: 4200-4900 lux Date Measured: Sept 19/14

Day	0	1	2	3	4	5	6	7
Shelf Temp (°C)	25.5	26.0	26.0	26.0	26.0	26.0	26.0	26.5
Initials	KLP	A	A	EMM	KLP	KLP	EMM	KLP

Sample Characteristics: Initial Water Quality Adjusted Water Quality
 Temperature (°C) 23.5 Aeration?: 20 min 23.0
 DO (mg/L) 7.0 Nutrients added?: Yes → 7.6
 pH 7.5 7.8-8.1
 Conductivity (µS) 319 1074

Concentration % (v/v)	Temperature (°C)		pH		Conductivity (µS) 0 h
	Day 0	Day 7	Day 0	Day 7	
Control	24.5	24.5	8.3	8.5	880
1.5	23.5	24.5	8.3	8.4	881
3.0	23.5	24.0	8.3	8.3	880
6.1	23.5	25.0	8.2	8.5	887
12.1	23.5	25.0	8.2	8.5	900
24.2	23.5	25.0	8.2	8.5	926
48.5	23.5	25.0	8.2	8.6	978
97	23.0	25.0	8.1	8.8	1074
Initials	KLP	KLP	KLP	KLP	KLP

Thermometer: Calibrated Thermometer Cond. Meter: 2 pH meter: 4

Sample Description: clear, ppt present

Comments: _____

Reviewed: JGU Date Reviewed: Oct 16/14

Lemna minor Toxicity Test Data Sheet - 7-d Frond Counts

Client: Mount Pooley
 Sample ID: POL-6-14M-140916
 Work Order #: 14665

Start Date: Sept 11/14
 Termination Date: Sept 26/14
 Test set up by: KLP

Concentration % (v/v)	Rep	No. of fronds		Chlorosis	Necrosis	Yellow	Abnormal size	Gibbosity	Single fronds	Root destruction	Loss of buoyancy	Comments	Initials
		Day 0	Day 7										
Control	A	6	95										KLP
	B		70										
	C		73										
	D		62										
1.5	A		74										
	B		76										
	C		72										
	D		73										
3.0	A		85										
	B		59										
	C		74										
	D		60										
6.1	A		54										
	B		46										
	C		88										
	D		66										
12.1	A		70										
	B		114										
	C		60										
	D		73										
24.2	A		86										
	B		75										
	C		55										
	D	✓	53										✓

Comments: _____

Reviewed by: JKL

Date Reviewed: Oct-16/14

Lemna minor Toxicity Test Data Sheet - 7-d Frond Counts

Client: Mount Polley
 Sample ID: Pol-6-NM-140916
 Work Order #: 14065

Start Date: Sept 19/14
 Termination Date: Sept 26/14
 Test set up by: KLP

Concentration % (w/v)	Rep	No. of fronds		Chlorosis	Necrosis	Yellow	Abnormal size	Gibbosity	Single fronds	Root destruction	Loss of buoyancy	Comments	Initials
		Day 0	Day 7										
48.5	A	6	74										KLP
	B		70										
	C		64										
	D		78										
9.7	A		99										↓
	B		60										
	C		84										
	D	↓	86										
	A												
	B												
	C												
	D												
	A												
	B												
	C												
	D												
	A												
	B												
	C												
	D												

Comments: _____

Reviewed by: JGh

Date Reviewed: Oct. 16/14

pg 1 of 2

7-d Lemna minor Weight Data Sheet

Client: Mount Palley
Sample ID: POL-6-14m-140916
Work Order #: 14665

Start Date: Sept 19/14
Termination Date: Sept 26/14

Concentration (µg/L)	Rep	(mL total) Pan No.	Pan weight (mg)	Pan + plant (mg)	Initials
Control	A	1	991.16	998.83	BTL/INY
	B	2	968.02	973.64	
	C	3	1007.69	1013.48	
	D	4	981.52	988.35	
15	A	5	998.24	1005.77	
	B	6	997.08	1003.93	
	C	7	979.63	987.14	
	D	8	974.07	981.50	
3.0	A	9	995.79	1002.95	
	B	10	964.83	971.15	
	C	11	983.35	990.67	
	D	12	986.53	991.65	
6.1	A	13	972.10	977.17	
	B	14	983.31	987.78	
	C	15	982.25	990.23	
	D	16	990.61	997.69	
12.1	A	17	997.58	1003.06	
	B	18	989.22	999.99	
	C	19	977.52	982.63	
	D	20	985.77	992.26	
24.2	A	21	984.51	993.02	
	B	22	997.41	1003.88	
	C	23	982.07	991.44	
	D	24	987.38	992.16	
48.5	A	25	996.64	1002.39	
	B	26	980.84	986.30	
	C	27	977.86	982.62	
	D	28	981.15	987.39	

Comments: 10% reweigh of Pan#2 = 973.36 mg Pan#17 = 1002.75 mg
Pan#27 = 982.35 mg

Reviewed by: JOU

Date Reviewed: Oct. 16/14

7-d Lemna minor Weight Data Sheet

Client: Mount Polley
 Sample ID: POL-6-14m-140916
 Work Order #: 14665

Start Date: Sept 19/14
 Termination Date: Sept 26/14

Concentration	Rep	Pan No.	Pan weight (mg)	Pan + plant (mg)	Initials
97	A	29	998.35	1006.03	BTL
	B	30	991.62	996.36	↓
	C	31	986.20	993.16	↓
	D	32	978.40	986.69	↓
	A				
	B				
	C				
	D				
	A				
	B				
	C				
	D				
	A				
	B				
	C				
	D				
	A				
	B				
	C				
	D				

Comments: _____

Reviewed by: JGB

Date Reviewed: Oct. 16/14

CETIS Analytical Report

Report Date: 01 Oct-14 12:41 (p 1 of 2)
 Test Code: 14665 | 21-2975-6763

Lemna Growth Inhibition Test

Nautilus Environmental

Analysis ID: 16-1588-1275	Endpoint: Frond Count	CETIS Version: CETISv1.8.7
Analyzed: 01 Oct-14 12:40	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 12-1593-3431	Test Type: Lemna Growth	Analyst: Krysta Pearcy
Start Date: 19 Sep-14	Protocol: EC/EPS 1/RM/37	Diluent: APHA
Ending Date: 26 Sep-14	Species: Lemna minor	Brine:
Duration: 7d 0h	Source: CPCC#490	Age: 7d
Sample ID: 03-1220-3372	Code: 129BD86C	Client: Mount Polley
Sample Date: 16 Sep-14 15:00	Material: Water Sample	Project:
Receive Date: 18 Sep-14 09:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 57h (9.5 °C)	Station: POL-6-14m-140916	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	137183	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>97	N/A	N/A	<1.031	NA	NA
IC10	>97	N/A	N/A	<1.031	NA	NA
IC15	>97	N/A	N/A	<1.031	NA	NA
IC20	>97	N/A	N/A	<1.031	NA	NA
IC25	>97	N/A	N/A	<1.031	NA	NA
IC40	>97	N/A	N/A	<1.031	NA	NA
IC50	>97	N/A	N/A	<1.031	NA	NA

Frond Count Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	69	56	89	7.059	14.12	20.46%	0.0%
1.5		4	68.25	66	70	0.8539	1.708	2.5%	1.09%
3		4	63.5	53	79	6.198	12.4	19.52%	7.97%
6.1		4	57.5	40	82	9.142	18.28	31.8%	16.67%
12.1		4	73.25	54	108	11.91	23.82	32.52%	-6.16%
24.2		4	73.75	47	99	10.86	21.72	29.45%	-6.88%
48.5		4	65.5	58	72	2.986	5.972	9.12%	5.07%
97		4	76.25	54	93	8.128	16.26	21.32%	-10.51%

Frond Count Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	89	64	67	56
1.5		68	70	66	69
3		79	53	68	54
6.1		48	40	82	60
12.1		64	108	54	67
24.2		80	69	99	47
48.5		68	64	58	72
97		93	54	78	80

CETIS Analytical Report

Report Date: 01 Oct-14 12:41 (p 2 of 2)
Test Code: 14665 | 21-2975-6763

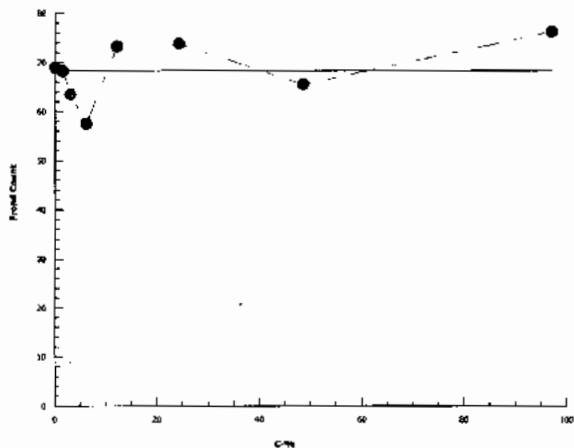
Lemna Growth Inhibition Test

Nautilus Environmental

Analysis ID: 16-1588-1275 Endpoint: Frond Count
Analyzed: 01 Oct-14 12:40 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 01 Oct-14 12:41 (p 1 of 2)
 Test Code: 14665 | 21-2975-6763

Lemna Growth Inhibition Test

Nautilus Environmental

Analysis ID: 14-5744-9838	Endpoint: Total Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 01 Oct-14 12:41	Analysis: Nonlinear Regression	Official Results: Yes
Batch ID: 12-1593-3431	Test Type: Lemna Growth	Analyst: Krysta Pearcy
Start Date: 19 Sep-14	Protocol: EC/EPS 1/RM/37	Diluent: APHA
Ending Date: 26 Sep-14	Species: Lemna minor	Brine:
Duration: 7d 0h	Source: CPCC#490	Age: 7d
Sample ID: 03-1220-3372	Code: 129BD86C	Client: Mount Polley
Sample Date: 16 Sep-14 15:00	Material: Water Sample	Project:
Receive Date: 18 Sep-14 09:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 57h (9.5 °C)	Station: POL-6-14m-140916	

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
2P Exponential EV [Y=A*exp(log(0.5)*X/D)]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
8	-27.57	59.55	62.07		Yes	0.7261	2.508	0.6329	Non-Significant Lack of Fit

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	273	N/A	5465	0.3663	0.0183	NA
IC10	560.8	N/A	N/A	0.1783	NA	NA
IC15	865	N/A	N/A	0.1156	NA	NA
IC20	1188	N/A	N/A	0.08419	NA	NA
IC25	1531	N/A	N/A	0.06531	NA	NA
IC40	2719	N/A	N/A	0.03678	NA	NA
IC50	3689	N/A	N/A	0.0271	NA	NA

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	6.674	0.3306	6.026	7.322	20.19	<0.0001	Significant Parameter
D	3689	24840	-45000	52380	0.1485	0.8829	Non-Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	0.047686	0.047686	1	0.0217	0.8839	Non-Significant
Lack of Fit	10.13055	1.688424	6	0.7261	0.6329	Non-Significant
Pure Error	55.80705	2.325294	24			
Residual	65.9376	2.19792	30			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	12.79	14.07	0.0774	Equal Variances
	Mod Levene Equality of Variance	1.371	2.423	0.2623	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9539	0.9338	0.1858	Normal Distribution
	Anderson-Darling A2 Normality	0.397	2.492	0.3729	Normal Distribution

Total Dry Weight-mg Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	6.477	5.62	7.67	0.4791	0.9582	14.79%	0.0%
1.5		4	7.33	6.85	7.53	0.1615	0.3229	4.41%	-13.16%
3		4	6.48	5.12	7.32	0.5036	1.007	15.54%	-0.04%
6.1		4	6.15	4.47	7.98	0.8268	1.654	26.89%	5.06%
12.1		4	6.962	5.11	10.77	1.302	2.604	37.41%	-7.49%
24.2		4	7.283	4.78	9.37	1.032	2.065	28.35%	-12.43%
48.5		4	5.552	4.76	6.24	0.3093	0.6187	11.14%	14.28%
97		4	6.917	4.74	8.29	0.7751	1.55	22.41%	-6.79%

Lemna Growth Inhibition Test

Nautilus Environmental

Analysis ID: 14-5744-9838
 Analyzed: 01 Oct-14 12:41

Endpoint: Total Dry Weight-mg
 Analysis: Nonlinear Regression

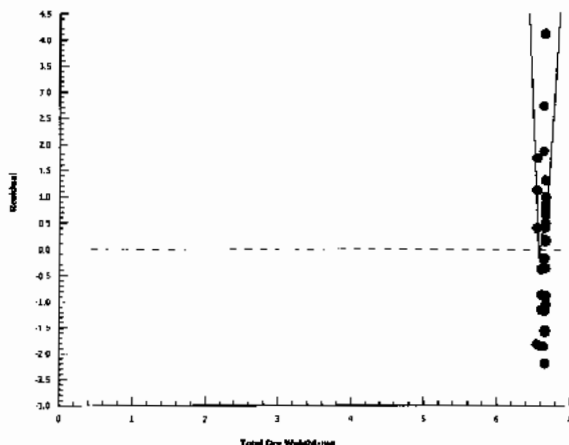
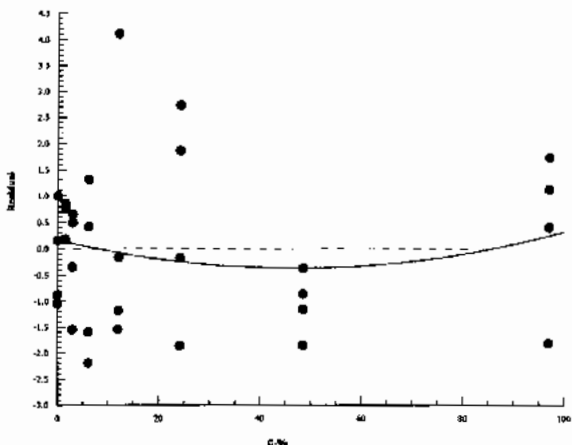
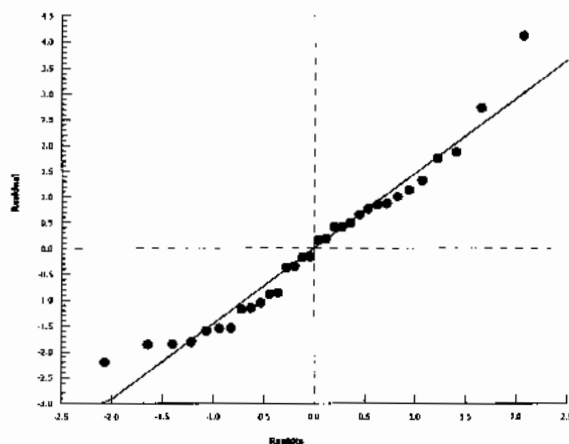
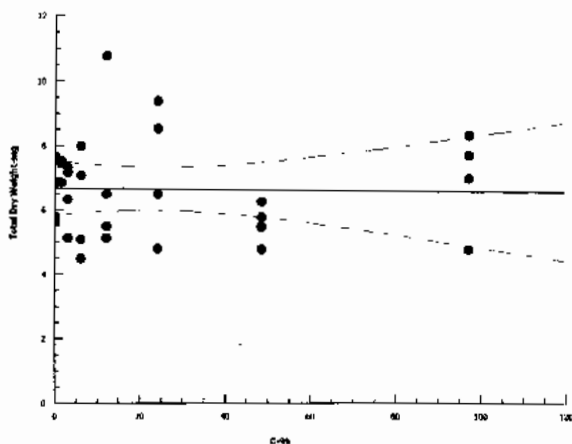
CETIS Version: CETISv1.8.7
 Official Results: Yes

Total Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	7.67	5.62	5.79	6.83
1.5		7.53	6.85	7.51	7.43
3		7.16	6.32	7.32	5.12
6.1		5.07	4.47	7.98	7.08
12.1		5.48	10.77	5.11	6.49
24.2		8.51	6.47	9.37	4.78
48.5		5.75	5.46	4.76	6.24
97		7.68	4.74	6.96	8.29

Graphics

2P Exponential EV [Y=A*exp(log(0.5)*X/D)]



APPENDIX D - *Pseudokirchneriella subcapitata* Toxicity Test Data

Pseudokirchneriella subcapitata Summary Sheet

Client: Mt. Palley
Work Order No.: 14664

Start Date: Sept 19, 2014
Set up by: EMM

Sample Information:

Sample ID: POL-6-14m-140916
Sample Date: Sept 16, 2014
Date Received: Sept 18, 2014
Sample Volume: 2 x 20L

Test Organism Information:

Culture Date: Sept 12, 2014
Age of culture (Day 0): 7d

Zinc Reference Toxicant Results:

Reference Toxicant ID: SC118
Stock Solution ID: 14ZnO
Date Initiated: Sept 5, 2014

72-h IC50 (95% CL): 29.2 (25.6 - 32.4) µg/L Zn

72-h IC50 Reference Toxicant Mean and Range: ^{emm} 25.2 (14.8 - 42.8) µg/L Zn CV (%): ^{emm} 25.30
25.2

Test Results:

	Algal Growth
IC25 %(v/v) (95% CL)	795.2
IC50 %(v/v) (95% CL)	795.2

Reviewed by: JGh

Date reviewed: Oct. 16/14

72-h Algal Growth Inhibition Toxicity Test Water Quality Measurements

Client: Mt. Polley Setup by: EMM
 Sample ID: POL-G-14M-140916 Test Date/Time: Sept 19/14 @ 7:00h
 Work Order No.: 14664 Test Species: Pseudokirchneriella subcapitata

Culture Date: Sept 12/14 Age of Culture: 7d Culture Health: Good
 Culture Count: 1549 2605 Average: 577 Culture Cell Density (c1): 577 x 10⁴ cells/mL

$$v1 = \frac{220,000 \text{ cells/mL} \times 100 \text{ mL}}{(c1) 577 \times 10^4 \text{ cells/mL}} = 3.8 \text{ mL}$$

Time Zero Counts: 1 18 2 23 Average: 20.5

No. of Cells/mL: 20.5 x 10⁴ Initial Density: # cells/mL + 220 μL x 10 μL = 9318 cells/mL

Concentration %(v/v)	Water Quality Measurements					Microplates rotated 2X per day?			
	pH	Temp (°C)				0 h	24 h	48 h	72 h
		0 h	0 h	24 h	48 h				
Control	6.9	25.0	25.75	25.75	26.0	✓	/	/	✓
1.5	6.9	25.0				✓	/	/	✓
3.0	7.0	25.0				✓	/	/	✓
6.0	7.0	25.0				✓	/	/	✓
11.9	7.0	25.0				✓	/	/	✓
23.8	7.1	25.0				✓	/	/	✓
47.6	7.0	25.0				✓	/	/	✓
95.2	7.3	25.0	✓	✓	✓	✓	/	/	✓
Initials	EMM	EMM	EMM	EMM	EMM	EMM	EMM	EMM	EMM

Initial control pH: Well 1: 6.8 Well 2: 6.8

Final control pH: Well 1: 6.8 Well 2: 6.8

Light intensity (lux): 3900 Date measured: Sept 19/14

Sample Description: clear, ppt present

Comments: _____

Reviewed: JGB Date reviewed: Oct. 16/14

***Pseudokirchneriella subcapitata* Toxicity Test Data Sheet**
72-h Algal Cell Counts

Client: Mt. Palley Start Date/Time: Sept 19/14 @ 0700h
 Work Order #: 14664 Termination Date: Sept 22/14 @ 0700h
 Sample ID: POL-6-14m-140916 Test set up by: EMM
 %(v/v)

Concentration	Rep	Count 1	Count 2	Count 3	Count 4	Comments	Initials
Control	A	42					EMM
	B	44					
	C	41					
	D	40					
	E	36					
	F	49					
	G	43					
	H	43					
1.5	A	54					
	B	63					
	C	69					
	D	55					
3.0	A	72					
	B	75					
	C	63					
	D	68					
6.0	A	93					
	B	96					
	C	107					
	D	84					
11.9	A	114					
	B	119					
	C	97					
	D	106					
23.8	A	155					
	B	175					
	C	197					
	D	158					
47.6	A	189					
	B	176					
	C	167					
	D	182					
95.2	A	170					
	B	153					
	C	149					
	D	169					

Comments: _____

Reviewed by: JGK Date Reviewed: Oct. 16/14

***Pseudokirchneriella subcapitata* Algal Counts**

Client: Mt. Polley
 WO#: 14664
 Sample ID: POL-6-14m-140916

Start Date/Time: 19-Sep-14 0700h
 Termination Date: 22-Sep-14 0700h

Initial Cell Density: 9318 cell/mL
 205000
 0.22
 0.01
 9318.182

Concentration % v/v	Rep	Count 1 (x 10 ⁴)	Count 2 (x 10 ⁴)	Count 3 (x 10 ⁴)	Count 4 (x 10 ⁴)	Mean (x 10 ⁴)	Cell Yield (x 10 ⁴) cell/mL		
Control	A	42				42	41.1	mean	41.3
	B	44				44	43.1	SD	3.693624
	C	41				41	40.1	CV	8.939464
	D	40				40	39.1		
	E	36				36	35.1		
	F	49				49	48.1		
	G	43				43	42.1		
	H	43				43	42.1		
1.5	A	54				54	53.1		
	B	63				63	62.1		
	C	69				69	68.1		
	D	55				55	54.1		
3	A	72				72	71.1		
	B	75				75	74.1		
	C	63				63	62.1		
	D	68				68	67.1		
6	A	93				93	92.1		
	B	96				96	95.1		
	C	107				107	106.1		
	D	84				84	83.1		
11.9	A	114				114	113.1		
	B	119				119	118.1		
	C	97				97	96.1		
	D	106				106	105.1		
23.8	A	155				155	154.1		
	B	175				175	174.1		
	C	197				197	196.1		
	D	158				158	157.1		
47.6	A	189				189	188.1		
	B	176				176	175.1		
	C	167				167	166.1		
	D	182				182	181.1		
95.2	A	170				170	169.1		
	B	153				153	152.1		
	C	149				149	148.1		
	D	169				169	168.1		

JGL
 Oct. 16/14

CETIS Analytical Report

Report Date: 23 Sep-14 10:25 (p 1 of 2)
 Test Code: 14664 | 03-6919-6721

EC Alga Growth Inhibition Test			Nautilus Environmental		
Analysis ID: 10-4850-3761	Endpoint: Cell Yield	CETIS Version: CETISv1.8.7			
Analyzed: 23 Sep-14 10:24	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes			
Batch ID: 11-4374-5198	Test Type: Cell Growth	Analyst: Emma Marus			
Start Date: 19 Sep-14 07:00	Protocol: EC/EPS 1/RM/25	Diluent: Deionized Water + nutrients			
Ending Date: 22 Sep-14 07:00	Species: Pseudokirchneriella subcapitata	Brine:			
Duration: 72h	Source: In-House Culture	Age: 7d			
Sample ID: 03-1220-3372	Code: 129BD86C	Client: Mount Polley			
Sample Date: 16 Sep-14 15:00	Material: Water Sample	Project:			
Receive Date: 18 Sep-14 09:15	Source: Mount Polley (MT POLLEY)				
Sample Age: 64h (9.5 °C)	Station: POL-6-14m-140916				

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	496373	200	Yes	Two-Point Interpolation

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			1.0000	Non-significant Trend in Controls

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>95.2	N/A	N/A	<1.05	NA	NA
IC10	>95.2	N/A	N/A	<1.05	NA	NA
IC15	>95.2	N/A	N/A	<1.05	NA	NA
IC20	>95.2	N/A	N/A	<1.05	NA	NA
IC25	>95.2	N/A	N/A	<1.05	NA	NA
IC40	>95.2	N/A	N/A	<1.05	NA	NA
IC50	>95.2	N/A	N/A	<1.05	NA	NA

Cell Yield Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	8	41.25	35	48	1.306	3.694	8.95%	0.0%
1.5		4	59.25	53	68	3.544	7.089	11.96%	-43.64%
3		4	68.5	62	74	2.598	5.196	7.59%	-66.06%
6		4	94	83	106	4.743	9.487	10.09%	-127.9%
11.9		4	108	96	118	4.813	9.626	8.91%	-161.8%
23.8		4	170.3	154	196	9.647	19.29	11.33%	-312.7%
47.6		4	177.5	166	188	4.664	9.327	5.26%	-330.3%
95.2		4	159.3	148	169	5.406	10.81	6.79%	-286.1%

Cell Yield Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	41	43	40	39	35	48	42	42
1.5		53	62	68	54				
3		71	74	62	67				
6		92	95	106	83				
11.9		113	118	96	105				
23.8		154	174	196	157				
47.6		188	175	166	181				
95.2		169	152	148	168				

QA: JGL
Oct. 16/14

CETIS Analytical Report

Report Date: 23 Sep-14 10:25 (p 2 of 2)
Test Code: 14664 | 03-6919-6721

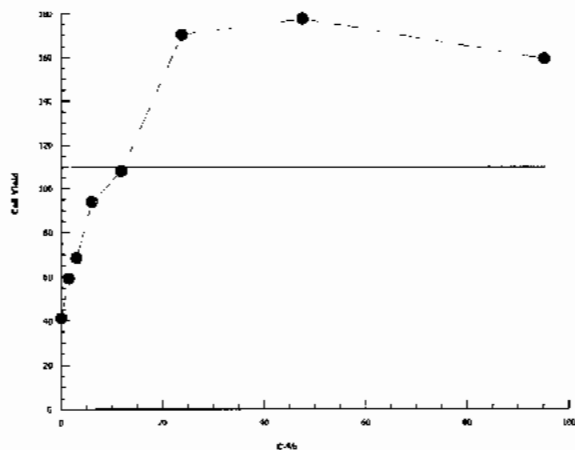
EC Alga Growth Inhibition Test

Nautilus Environmental

Analysis ID: 10-4850-3761 Endpoint: Cell Yield
Analyzed: 23 Sep-14 10:24 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 23 Sep-14 10:25 (p 1 of 2)
 Test Code: 14664 | 03-6919-6721

EC Alga Growth Inhibition Test				Nautilus Environmental			
Analysis ID: 06-3037-8126	Endpoint: Cell Yield	CETIS Version: CETISv1.8.7					
Analyzed: 23 Sep-14 10:25	Analysis: Parametric-Control vs Treatments	Official Results: Yes					
Batch ID: 11-4374-5198	Test Type: Cell Growth	Analyst: Emma Marus					
Start Date: 19 Sep-14 07:00	Protocol: EC/EPS 1/RM/25	Diluent: Deionized Water + nutrients					
Ending Date: 22 Sep-14 07:00	Species: Pseudokirchneriella subcapitata	Brine:					
Duration: 72h	Source: In-House Culture	Age: 7d					
Sample ID: 03-1220-3372	Code: 129BD86C	Client: Mount Polley					
Sample Date: 16 Sep-14 15:00	Material: Water Sample	Project:					
Receive Date: 18 Sep-14 09:15	Source: Mount Polley (MT POLLEY)						
Sample Age: 64h (9.5 °C)	Station: POL-6-14m-140916						

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C < T	NA	NA	36.2%	<1.5	1.5	NA	>66.67

Dunnnett Multiple Comparison Test

Control	vs C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	1.5*	3.048	2.526	14.92	10	0.0153	CDF	Significant Effect
	3*	4.615	2.526	14.92	10	0.0003	CDF	Significant Effect
	6*	8.933	2.526	14.92	10	<0.0001	CDF	Significant Effect
	11.9*	11.3	2.526	14.92	10	<0.0001	CDF	Significant Effect
	23.8*	21.85	2.526	14.92	10	<0.0001	CDF	Significant Effect
	47.6*	23.07	2.526	14.92	10	<0.0001	CDF	Significant Effect
	95.2*	19.98	2.526	14.92	10	<0.0001	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Control Trend	Mann-Kendall Trend			1.0000	Non-significant Trend in Controls

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	96266.55	13752.37	7	147.9	<0.0001	Significant Effect
Error	2603.75	92.99107	28			
Total	98870.3		35			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	12.95	18.48	0.0734	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9707	0.9166	0.4448	Normal Distribution

Cell Yield Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	8	41.25	38.16	44.34	41.5	35	48	1.306	8.95%	0.0%
1.5		4	59.25	47.97	70.53	58	53	68	3.544	11.96%	-43.64%
3		4	68.5	60.23	76.77	69	62	74	2.598	7.59%	-66.06%
6		4	94	78.9	109.1	93.5	83	106	4.743	10.09%	-127.9%
11.9		4	108	92.68	123.3	109	96	118	4.813	8.91%	-161.8%
23.8		4	170.3	139.5	201	165.5	154	196	9.647	11.33%	-312.7%
47.6		4	177.5	162.7	192.3	178	166	188	4.664	5.26%	-330.3%
95.2		4	159.3	142	176.5	160	148	169	5.406	6.79%	-286.1%

CETIS Analytical Report

Report Date: 23 Sep-14 10:25 (p 2 of 2)

Test Code: 14664 | 03-6919-6721

EC Alga Growth Inhibition Test

Nautilus Environmental

Analysis ID: 06-3037-8126

Endpoint: Cell Yield

CETIS Version: CETISv1.8.7

Analyzed: 23 Sep-14 10:25

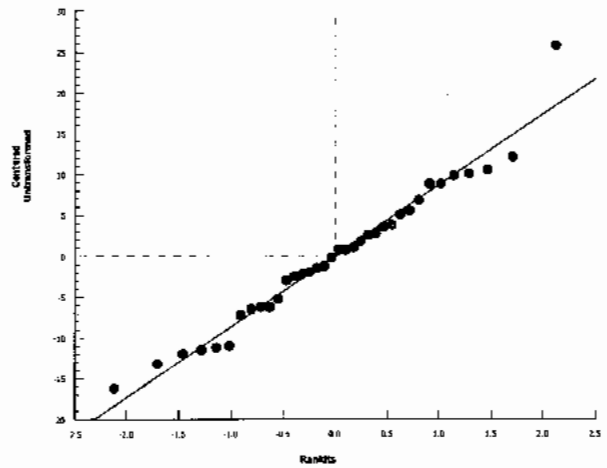
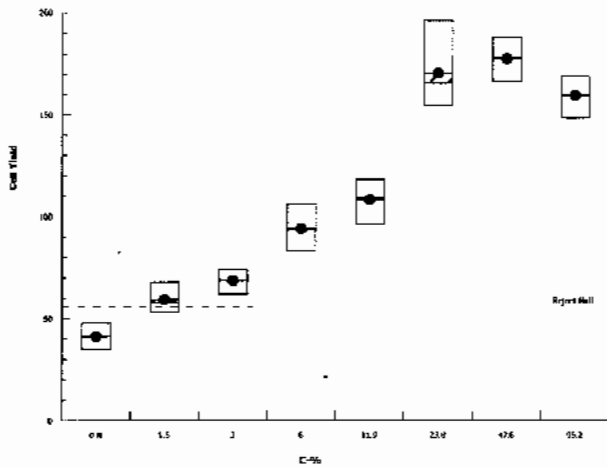
Analysis: Parametric-Control vs Treatments

Official Results: Yes

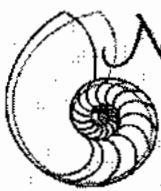
Cell Yield Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Negative Control	41	43	40	39	35	48	42	42
1.5		53	62	68	54				
3		71	74	62	67				
6		92	95	106	83				
11.9		113	118	96	105				
23.8		154	174	196	157				
47.6		188	175	166	181				
95.2		169	152	148	168				

Graphics



APPENDIX E - Chain of Custody Form



British Columbia
8654 Commerce Court
Burnaby, British Columbia, Canada V5A 4N3
Phone 604.420.8773

Date Sep 16, 2014 Page 1 of 1

Sample Collection By:		ANALYSES REQUIRED	
Report to:	Invoice To:		
Company: <u>Mount Polley Mining Corp.</u>	Company: <u>Same as reporting address</u>		
Address: <u>Box 12</u>	Address: _____		
City/State/Zip: <u>Likely BC VOL 1NO</u>	City/State/Zip: _____		
Contact: <u>Colleen Hughes</u>	Contact: _____		
Phone: <u>(250) 740-2617</u>	Phone: _____		
Email: <u>chughes@mountpolley.com</u>	Email: _____		

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Full Water Sample	7-d C. dubia	48-h D. magna LC50	7-d C. dubia	7-d Fathead minnow	7-d P. subcapitata	7-d L. minor	Receipt Temperature (°C)
1	<u>POK-6-14</u>	<u>14-09-16</u>	<u>Sep 16, 2014</u>	<u>15:00</u>	<u>20L</u>	<u>2</u>	<u>No rainbow trout available</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>15</u>
2				<u>20L</u>										
3				<u>NY</u>										
4														
5														
6														
7														
8														
9														
10														

PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY (CLIENT)		RELINQUISHED BY (COURIER)	
Client:		Total No. of Containers:	<u>2</u>	(Signature)	(Time)	(Signature)	(Time)
PO No.:		Received Good Condition?	<u>Y</u>	(Printed Name)	(Date) (Date)	(Printed Name)	(Date) (Date)
Shipped Via:		Matches Test Schedule?	<u>Y</u>	(Company)		(Company)	
<u>Confirmed tests to be run w/ client</u> <u>Sept 18/14</u> <u>rlf</u>				RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)	
				(Signature)	(Time)	(Signature)	(Time)
				(Printed Name)	(Date)	(Printed Name)	(Date)
				(Company)		(Company)	
						<u>NY</u> <u>NAIR YAMAMOTO</u> <u>NAUTILUS - Sep 18/14 @ 9:15</u>	

PART 21

**Toxicity testing on a sample identified as POL-6-12m: Samples collected
September 30, 2014 (Report date October 17, 2014)**



Mount Polley Mining Corporation
ATTN: Colleen Hughes
Box 12
Likely, BC
VOL 1N0

Report Date: October 17, 2014
Work Order: 14697

Data Report

Species: Rainbow trout (*Oncorhynchus mykiss*)
Protocol: EPS 1/RM/13 (Second Ed. with 2007 amendments)

Table 1. Results for the 96-h rainbow trout acute toxicity test.

Sample ID	Collection Date and Time	96-h LC50 (%v/v)
POL-6-12M	September 30, 2014 @ 1350h	>100

Test met performance criteria and there were no deviations from the test method. The results relate only to the sample tested.

Jacob Frank, B.Sc.
Laboratory Biologist

Reviewed By:
Julianna Kalocai, M.Sc., R.P.Bio
QA Officer

Rainbow Trout Summary Sheet

Client: Mount Polley Mining Corp.

Start Date/Time: October 3/14 @ 1000

Work Order No.: 14697

Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: POL-6-12M
Sample Date: September 30/14 @ 1350
Date Received: October 1/14 @ 0830
Sample Volume: 1 x 20L
Other: _____

Test Validity Criteria:

≥ 90% control survival

WQ Ranges:

T (°C) = 15 ± 1; DO (mg/L) = 7.0 to 10.3; pH = 5.5 to 8.5

Dilution Water:

Type: Dechlorinated Municipal Tap Water
Hardness (mg/L CaCO₃): 10
Alkalinity (mg/L CaCO₃): 10

Test Organism Information:

Batch No.: 073114
Source: Trout Lodge
No. Fish/Volume (L): 10/10
Loading Density (g/L): 0.36
Mean Length ± SD (mm): 35 ± 3
Mean Weight ± SD (g): 0.36 ± 0.10

Range: 30 - 39
Range: 0.21 - 0.54

NaNO₂ Reference Toxicant Results:

Reference Toxicant ID: RTN667
Stock Solution ID: 14NE01
Date Initiated: September 26/14
96-h LC50 (95% CL): 7.6 (6.6 - 8.6) mg/L NaNO₂

Reference Toxicant Mean and Historical Range: 4.9 (2.0 - 12.0) mg/L NaNO₂
Reference Toxicant CV (%): 56

Test Results: The 96-h LC50 is >100% (W/N).

Reviewed by: JGH

Date reviewed: Oct. 14/14

96-Hour Rainbow Trout Toxicity Test Data Sheet

Client/Project#: Mount Polley Mining Corp.
 Sample I.D. POL-6-12M
 W.O. # 14697
 RBT Batch #: 073114
 Date Collected/Time: September 30/14 @ 1360
 Date Setup/Time: October 3/14 @ 1000
 Sample Setup By: JBF

Number Fish/Volume: 10/10
 7-d % Mortality: 0.30
 Total Pre-aeration Time (mins): 30
 Aeration rate adjusted to 6.5 ± 1 mL/min/L? (Y/N): Y

D.O. meter: 1/2
 pH meter: 1
 Cond. Meter: 2/4

Undiluted Sample WQ			
Parameters	Initial WQ	Adjustment	30 min WQ
Temp °C	15.0	/	14.5
pH	8.0	/	7.9
D.O. (mg/L)	9.6	/	9.8
Cond. (µS/cm)	258	/	257

Concentration (% v/v)	# Survivors							Temperature (°C)					Dissolved Oxygen (mg/L)					pH					Conductivity (µS/cm)	
	1	2	4	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
control				10	10	10	10	14.0	14.5	14.5	14.5	14.0	10.1	9.9	9.8	9.9	9.9	7.2	6.9	6.9	6.8	7.0	35	40
6.25				10	10	10	10	14.5	14.5	14.5	14.5	14.0	10.0	9.9	9.9	9.8	10.0	7.5	7.1	7.0	7.4	7.5	58	64
12.5				10	10	10	10	14.5	14.5	14.5	14.5	14.0	10.0	9.8	9.8	9.8	10.0	7.5	7.2	7.3	7.4	7.5	66	71
25				10	10	10	9	14.5	14.5	14.5	14.5	14.0	9.8	9.8	9.9	9.9	9.9	7.5	7.3	7.5	7.4	7.5	96	102
50				10	10	10	10	14.5	14.5	14.5	14.5	14.0	9.9	9.9	9.8	9.9	9.8	7.7	7.5	7.6	7.5	7.6	148	154
100				10	10	10	10	14.5	14.5	14.5	14.5	14.0	9.8	9.9	9.9	10.0	9.9	7.9	7.7	7.8	7.9	7.8	257	262
Initials						JBF	JBF	JBF			JBF	JBF	JBF			JBF	JBF	JBF			JBF	JBF	JBF	JBF

WQ Ranges: T (°C) = 15 ± 1; DO (mg/L) = 7.0 to 10.3; pH = 5.5 to 8.5

Sample Description/Comments: clear, yellow

Fish Description at 96 h remaining fish appear OK Number of Stressed Fish at 96 h 0

Other Observations: _____

Reviewed by: JBF

Date Reviewed: Oct. 14/14

California: 5550 Morehouse Drive, Suite 150, San Diego, CA 92121
 Washington: 5009 Pacific Highway East, Suite 2, Tacoma, WA 98424
 British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

Sample Collection By: Colleen Hughes		ANALYSES REQUIRED									
Report to:	Colleen Hughes	Invoice to:	Colleen Hughes								
Company	Mount Polley Mining Corporation	Same									
Address	Box 12										
City/State/Zip	Likely BC V0L 1N0										
Contact	Colleen Hughes										
Phone	(250) 790-2617										
Email	chughes@mountpolley.com										

RBT Acute
LESO
14697

Receipt Temperature (°C)

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS													
POL-6-12M	30/09/2014	13:50	water	20L	1		X												

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUINSHED BY (CLIENT)				RELIQUINSHED BY (COURIER)			
Client: MPMC		Total # Containers:		Signature:				Signature:			
P.O. No.:		Good Condition?		Print: Sphauna Litke				Print:			
Shipped Via: Greyhound		Matches Schedule?		Company: Mount Polley Mining Corporation				Company:			
				Time/Date: 30/09/2014 15:30				Time/Date:			
SPECIAL INSTRUCTIONS/COMMENTS:				RECEIVED BY (COURIER)				RECEIVED BY (LABORATORY)			
				Signature:				Signature:			
				Print:				Print: Jacob Frank			
				Company:				Company: Nautilus Environmental			
				Time/Date:				Time/Date: October 1/14 @ 0830			

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

APPENDIX B

Reference Values for Condition-Specific British Columbia Water Quality Guidelines (Aquatic Life) and Resulting Guideline Values

Appendix Table B.1: Reference Values and Condition-Specific Guidelines for the Protection fo Aquatic Life in Polley Lake/Hazeltine Creek Water and in Quesnel Lake/River Water

A) Reference Water Quality

Analyte	Units	Polley Lake		Hazeltine Discharge					Summary Statistics			
		POL-2	POL-6-14M	HAD-1	HAD-1	HAD-1	HAD-1	HAD-2	Mean	Median	Min	Max
		2014 08 09	2014 09 16	2014 08 13	2014 08 20	2014 08 27	2014 09 10	2014 09 03				
Hardness	(mg/L)	96.7	144	97.4	102	106	107	107	109	106	96.7	144
pH (field)	(pH)	-	6.94	9.11	-	8.83	8.66	8.2	8.35	8.66	6.94	9.11
pH (lab)	(pH)	8.87	8.03	8.80	8.21	8.35	8.26	8.38	8.41	8.35	8.03	8.87
Temperature (field)	(C)	-	8.3	21.2	-	18.8	14.9	21.6	17.0	18.8	8.3	21.6
Chloride	(mg/L)	< 0.5	1.88	< 0.5	< 0.5	<0.5	0.52	< 0.5	1.20	1.20	0.52	1.88

Analyte	Units	Quesnel River		Quesnel Lake				Summary Statistics			
		QUR-1	QUR-1(10:40)	QUL66-40M	QUL-66-40M	QUL-66-45M	QUL-66-40M	Mean	Median	Min	Max
		2014 08 06	2014 08 22	2014 08 21	2014 08 28	2014 09 03	2014 09 16				
Hardness	(mg/L)	48.5	51.6	69.4	67.5	67.8	66	62	67	48.5	69.4
pH (field)	(pH)	8.08	8.05	8.09	7.92	-	-	8.04	8.07	7.92	8.09
pH (lab)	(pH)	7.94	7.91	7.9	8	8.06	8.01	7.97	7.97	7.9	8.06
Temperature (field)	(C)	17.3	14.3	6.8	6.3	6.8	-	10.3	6.8	6.3	17.3
Chloride	(mg/L)	< 0.5	< 0.5	0.56	0.52	0.57	< 0.5	0.55	0.56	0.52	0.57

B) Selected Reference Values

Analyte	Units	Polley/Hazeltine	Quesnel
Hardness	(mg/L)	100	60
pH (field)	(pH)	8.0	8.0
Temperature (field)	(C)	20	20
Chloride	(mg/L)	1.2	0.5

C) Condition-Specific Guidelines

Analyte	Jurisdiction	Approved or Working	Chronic or Acute	Condition or Equation	Applicable Guideline					
					Apply to Polley / Hazeltine		Apply to Quesnel			
					ug/L	mg/L	ug/L	mg/L		
Ammonia	BC	Approved	Chronic	use tables	760	0.76	760	0.76		
			Acute	use tables	5,600	5.6	5,600	5.6		
Nitrite	BC	Approved	Condition:	Cl <2 mg/L	Cl 2 -4 mg/L	Cl 4-6 mg/L				
			Chronic	0.02	0.04	0.06	20	0.02	20	0.02
			Acute	0.06	0.12	0.18	60	0.06	60	0.06
Fluoride	BC	Approved	Maximum	$-51.73 + 92.57(\log(\text{hardness})) \times 0.1$			1,334	1.3	1,129	1.1
Sulphate	BC	Approved	Condition:	$H^1 \leq 31-75 \text{ mg/L}$	$H^1 \leq 76-180 \text{ mg/L}$	$H^1 \leq 181-250 \text{ mg/L}$				
			30-day average	218	309	429	309,000	309	218,000	218
Cadmium	BC (old)	-	Long - Term	$10^{(.86(\log(\text{hardness}))-3.2)}$			0.068	0.000068	0.040	0.000040
	CCME	Working	Long - Term	$10^{(0.83(\log(\text{hardness}))-2.46)}$			0.158	0.000158	0.104	0.000104
			Short - Term	$10^{(1.016(\log(\text{hardness}))-1.71)}$			2.10	0.0021	1.25	0.0012
Copper	BC	Approved	30-day average	$0.04 \times \text{hardness}$			4	0.004	2.4	0.002
			Maximum	$0.094 \times \text{hardness} + 2$			11.4	0.0114	7.64	0.0076
Lead	BC	Approved	30-day average	$3.31 + e^{(1.273(\ln(\text{hardness}))-4.704)}$			6.5	0.0065	5.0	0.0050
			Maximum	$e^{(1.273(\ln(\text{hardness}))-1.46)}$			82	0.082	43	0.043
Manganese	BC	Approved	30-day average	$0.0044 \times \text{hardness} - 0.605$			1045	1.045	869	0.869
			Maximum	$0.01102 \times \text{hardness} + 0.54$			1642	1.642	1201	1.201
Nickel	BC	Working	Maximum	when hardness < 60: 25 ug/L						
				when hardness > 60: $e^{(0.76(\ln(\text{hardness}))+1.06)}$			96	0.096	65	0.065
Silver	BC	Approved	Condition:	$H^1 \leq 100 \text{ mg/L}$	$H^1 > 100 \text{ mg/L}$					
			30-day average	0.05	1.5		0.05	0.00005	0.05	0.00005
			Maximum	0.1	3		0.1	0.0001	0.1	0.0001
Zinc	BC	Approved	30-day average	when hardness <90: 7.5 ug/L					7.5	0.0075
				when hardness >90: $7.5 + 0.75 \times (\text{hardness}-90)$			15	0.015		
			Maximum	when hardness <90: 33 ug/L					33	0.033
			when hardness >90: $33 + 0.75 \times (\text{hardness}-90)$			40.5	0.0405			

¹ H = hardness

APPENDIX C

Summary of Biotic Ligand Model-Derived Predictions of Copper Toxicity and No-Effect Concentrations (PNECs)

Table C.1: Overview of the Copper Biotic Ligand Models Applied to Predict Copper Toxicity and No-Effect Concentrations

Model	Input Data Requirements	Model Output
<p>HydroQual / United States Environmental Protection Agency</p> <p>DiToro et al. 2001; Santore et al. 2001; HydroQual 2007; USEPA 2007</p>	<p>Temperature, pH, dissolved organic carbon, humic acid content, calcium, magnesium, sodium, potassium, sulphate, chloride and alkalinity</p>	<p>Final Acute Value, Instantaneous Criterion Maximum Concentration (CMC; acute criterion), Instantaneous Criterion Chronic Concentration (CCC; chronic criterion) and acute toxic units (copper concentration divided by the CMC)</p>
<p>Bio-Met Bioavailability Tool</p> <p>ECHA 2008; Bio-Met 2013</p>	<p>pH, dissolved organic carbon and calcium</p>	<p>Local Environmental Quality Standard (EQS; based on a generic EQS of 1 µg/L for bioavailable copper [local EQS = generic EQS/bioavailable fraction]), bioavailable fraction (BioF) and Risk Characterization Ratio (RCR; copper concentration divided by the PNEC; RCR values greater than 1 indicate potential ecotoxicological risk)</p>
<p>Deltares PNEC.pro</p> <p>Verschoor et al. 2012; Deltares 2013</p>	<p>Required: dissolved organic carbon Optional: pH, calcium, magnesium and sodium</p>	<p>Predicted no-effect concentration (PNEC), Risk Characterization Ratio (RCR; copper concentration divided by the PNEC; RCR values greater than 1 indicate potential ecotoxicological risk) and p (probability that the calculated PNEC is exceeded based on residual standard error and the normal distribution)</p>

Table C.2: BLM-Predicted Acute Toxicity of Copper to Fathead Minnow under Specific Water Quality Conditions Associated with MPMC Toxicity Test Waters, August and September 2014 (HydroQual, Version 2.2.3)

Sample Area	Sample Location	Sample Depth	Sample Date	Model Mode ¹	Dissolved Copper	Predicted LC50		Acute Toxic Units ²
					µg/L	mol/L	µg/L	
Polley Lake	POL-2	surface	9-Aug-14	LC50	3.19	1.69E-05	1,075	0.003
	POL-6	14 m	16-Sep-14	LC50	0.86	9.30E-06	591	0.001
Hazeltine Discharge (Polley Lake water)	HAD-1	surface	13-Aug-14	LC50	2.41	1.56E-05	989	0.002
		surface	20-Aug-14	LC50	3.31	1.15E-05	730	0.005
		surface	27-Aug-14	LC50	2.78	1.27E-05	807	0.003
		surface	3-Sep-14	LC50	2.82	1.12E-05	715	0.004
	HAD-2	surface	3-Sep-14	LC50	3.08	1.35E-05	855	0.004
Quesnel Lake	QUL66	40 m	21-Aug-14	LC50	5.52	3.00E-06	191	0.029
		40 m	28-Aug-14	LC50	5.71	3.52E-06	224	0.026
		45 m	3-Sep-14	LC50	6.20	3.64E-06	231	0.027
		48 m	11-Sep-14	LC50	5.01	2.93E-06	186	0.027
		40 m	16-Sep-14	LC50	5.45	3.14E-06	200	0.027
Quesnel River	QUR-1	surface	6-Aug-14	LC50	0.72	2.95E-06	187	0.004
		surface	22-Aug-14	LC50	0.81	3.01E-06	191	0.004

¹ HydroQual BLM, Version 2.2.3 has two modes: speciation mode and toxicity prediction mode

² Acute toxic units are the dissolved copper concentration divided by the predicted LC50 value

Sample Area	Sample Size	Mean Predicted LC50	Standard Deviation	Coefficient of Variation	Standard Error	L95% CL ¹	U95%CL ²
Hazeltine Discharge	5	819	111	14%	49	682	956
Quesnel Lake (40 - 48 m depth)	5	206	20	10%	9	181	231
Quesnel River	2	189	3	1%	2	166	212

¹ lower 95% confidence limit of the mean

² upper 95% confidence limit of the mean

Table C.3: Summary of Biotic Ligand Model Results under Specific Water Quality Conditions Associated with MPMC Toxicity Test Waters, August and September 2014¹

Sample Area	Sample Location	Sample Depth	Sample Date	Dissolved Copper	Biotic Ligand Model Applied										Maximum TU or RCR
					HydroQual / USEPA				Deltares PNEC Pro			Bio-Met Bioavailability Tool			
					CMC ²	ATU ³	CCC ⁴	CTU ⁵	PNEC ⁶	p ⁷	RCR ⁸	EQS ⁹	BioF ¹⁰	RCR ⁸	
					µg/L	unitless	µg/L	unitless	µg/L	unitless	unitless	µg/L	unitless	unitless	
Polley Lake	POL-2	surface	9-Aug-14	3.19	107.5	0.03	66.7	0.05	18.0	0.02	0.18	9.3	0.11	0.34	0.34
	POL-6	14 m	16-Sep-14	0.86	36.4	0.02	22.6	0.04	15.0	0.02	0.06	14.5	0.07	0.06	0.06
Hazeltine Discharge (Polley Lake water)	HAD-1	surface	13-Aug-14	2.41	95.5	0.03	59.3	0.04	16.5	0.03	0.15	9.3	0.11	0.26	0.26
		surface	20-Aug-14	3.31	57.9	0.06	36.0	0.09	20.2	0.01	0.16	13.8	0.07	0.24	0.24
		surface	27-Aug-14	2.78	67.1	0.04	41.7	0.07	19.8	0.01	0.14	11.3	0.09	0.25	0.25
		surface	3-Sep-14	2.82	53.7	0.05	33.3	0.08	19.0	0.01	0.15	13.8	0.07	0.20	0.20
	HAD-2	surface	3-Sep-14	3.08	73.9	0.04	45.9	0.07	19.6	0.01	0.16	11.3	0.09	0.27	0.27
Quesnel Lake	QUL66	40 m	21-Aug-14	5.52	10.1	0.55	6.3	0.88	11.8	0.19	0.47	5.1	0.20	1.09	1.09
		40 m	28-Aug-14	5.71	12.9	0.44	8.0	0.71	12.2	0.18	0.47	6.4	0.16	0.90	0.90
		45 m	3-Sep-14	6.2	13.6	0.45	8.5	0.73	11.8	0.22	0.53	7.2	0.14	0.86	0.86
		48 m	11-Sep-14	5.01	10.0	0.50	6.2	0.81	11.5	0.18	0.43	5.8	0.17	0.86	0.86
		40 m	16-Sep-14	5.45	11.2	0.49	7.0	0.78	11.4	0.20	0.48	5.8	0.17	0.94	0.94
Quesnel River	QUR-1	surface	6-Aug-14	0.72	11.3	0.06	7.0	0.10	13.7	0.04	0.05	8.5	0.12	0.08	0.10
		surface	22-Aug-14	0.81	11.1	0.07	6.9	0.12	13.5	0.04	0.06	8.5	0.12	0.10	0.12

¹ all Instantaneous Water Quality Criteria (IWQC), Predicted No-Effect Concentrations (PNECs), and Environmental Quality Standards (EQS) apply only to the specific water quality combinations for which they were calculated

² Criterion Maximum Concentration (acute criterion) = the USEPA national water quality criterion for the highest instream concentration of a toxicant to which organisms can be exposed for a brief period of time without causing an acute effect

³ Acute Toxic Units = dissolved copper concentration divided by the Criterion Maximum Concentration

⁴ Criterion Continuous Concentration (chronic criterion) = the USEPA national water quality criterion for the highest instream concentration of a toxicant to which organisms can be exposed indefinitely without causing unacceptable effect

⁵ Chronic Toxic Units = dissolved copper concentration divided by the Criterion Continuous Concentration


⁶ Predicted No-Effect Concentration


⁷ p-value represents the probability that concentrations exceed the predicted no-effect concentration.

⁸ Risk Characterization Ratio = the ratio of the predicted copper concentration to the concurrent (instantaneous) criterion, standard or predicted no-effect concentration.

⁹ Environmental Quality Standard based bioavailability and a 5th percentile hazard concentration (HC5).

¹⁰ BioF is the bioavailability factor - the ratio of condition-specific bioavailability to generic bioavailability (reference EQS / condition-specific EQS).

 indicates a toxic unit value or a risk characterization ratio of 0.5 to 1.0

 indicates a toxic unit value or a risk characterization ratio > 1.0

Sample Area	Sample Size	Mean RCR ¹	Standard Deviation	Coefficient of Variation	Standard Error	L95% CL ²	U95% CL ³
Hazeltine Discharge	5	0.24	0.03	11%	0.01	0.21	0.28
Quesnel Lake (40 - 48 m depth)	5	0.93	0.10	10%	0.04	0.81	1.05
Quesnel River	2	0.11	0.01	13%	0.01	-0.02	0.24



¹ maximum TU or RCR (last column in top table) used to calculate summary statistics

² lower 95% confidence limit of the mean

³ upper 95% confidence limit of the mean

Table C.4: Summary of Biotic Ligand Model Results under Specific Water Quality Conditions Associated with all Quesnel Lake Water Samples Collected by MPMC at QUL-66, August and September 2014¹

Sample Date	Sample Depth	Dissolved Copper	Biotic Ligand Model Applied										Maximum TU or RCR
			HydroQual / USEPA				Deltares PNEC Pro			Bio-Met Bioavailability Tool			
			CMC ²	ATU ³	CCC ⁴	CTU ⁵	PNEC ⁶	p ⁷	RCR ⁸	EQS ⁹	BioF ¹⁰	RCR ⁸	
µg/L	µg/L	unitless	µg/L	unitless	µg/L	unitless	unitless	µg/L	unitless	unitless			
19-Aug-14	40	5.58	11.3	0.49	7.0	0.79	21.1	0.02	0.26	4.4	0.23	1.28	1.28
21-Aug-14	40	5.52	10.1	0.55	6.3	0.88	21.8	0.01	0.25	5.1	0.20	1.09	1.09
26-Aug-14	0	0.96	14.0	0.07	8.7	0.11	10.4	0.10	0.09	8.5	0.12	0.11	0.11
26-Aug-14	10	2.93	12.9	0.23	8.0	0.37	15.4	0.04	0.19	8.5	0.12	0.35	0.37
26-Aug-14	58	5.26	13.4	0.39	8.3	0.63	19.8	0.02	0.27	5.3	0.19	0.98	0.98
28-Aug-14	0	0.54	16.8	0.03	10.4	0.05	9.3	0.11	0.06	8.5	0.12	0.06	0.06
28-Aug-14	18	3.43	12.5	0.27	7.8	0.44	16.8	0.03	0.20	8.5	0.12	0.40	0.44
28-Aug-14	40	5.71	12.9	0.44	8.0	0.71	21.8	0.01	0.26	6.3	0.16	0.90	0.90
30-Aug-14	0	0.58	12.1	0.05	7.5	0.08	9.5	0.11	0.06	8.5	0.12	0.07	0.08
30-Aug-14	16	3.97	11.2	0.36	6.9	0.57	18.3	0.02	0.22	5.8	0.17	0.68	0.68
30-Aug-14	39	6.01	12.3	0.49	7.6	0.79	22.3	0.01	0.27	6.3	0.16	0.95	0.95
3-Sep-14	0	0.74	12.8	0.06	7.9	0.09	9.9	0.10	0.07	8.5	0.12	0.09	0.09
3-Sep-14	14	1.67	10.9	0.15	6.8	0.25	12.2	0.07	0.14	8.5	0.12	0.20	0.25
3-Sep-14	45	6.2	13.6	0.45	8.5	0.73	22.8	0.01	0.27	7.2	0.14	0.86	0.86
7-Sep-14	0	0.70	12.1	0.06	7.5	0.09	9.8	0.10	0.07	8.5	0.12	0.08	0.09
7-Sep-14	10	1.61	11.5	0.14	7.2	0.23	12.3	0.07	0.13	8.5	0.12	0.19	0.23
7-Sep-14	50	6.56	12.4	0.53	7.7	0.85	23.7	0.01	0.28	6.3	0.16	1.03	1.03
11-Sep-14	0	1.14	9.9	0.11	6.2	0.18	11.2	0.08	0.10	5.8	0.17	0.20	0.20
11-Sep-14	34	6.38	10.2	0.63	6.3	1.01	23.8	0.01	0.27	4.4	0.23	1.47	1.47
11-Sep-14	50	5.01	10.0	0.50	6.2	0.81	20.5	0.02	0.24	5.8	0.17	0.86	0.86
13-Sep-14	0	0.58	9.2	0.06	5.7	0.10	10.3	0.09	0.06	6.7	0.15	0.09	0.10
13-Sep-14	10	1.47	9.2	0.16	5.7	0.26	12.6	0.06	0.12	6.7	0.15	0.22	0.26
13-Sep-14	48	6.21	9.5	0.66	5.9	1.06	23.8	0.01	0.26	5.1	0.20	1.23	1.23
15-Sep-14	0	0.5	9.0	0.06	5.6	0.09	9.1	0.11	0.05	5.8	0.17	0.09	0.09
15-Sep-14	24	2.74	9.1	0.30	5.7	0.48	14.9	0.05	0.18	5.8	0.17	0.47	0.48
15-Sep-14	48	6.04	10.7	0.56	6.7	0.91	22.5	0.01	0.27	4.4	0.23	1.39	1.39
16-Sep-14	0	0.5	10.0	0.05	6.2	0.08	9.0	0.12	0.06	5.8	0.17	0.09	0.09
16-Sep-14	40	5.45	11.2	0.49	7.0	0.78	21.2	0.01	0.26	5.8	0.17	0.94	0.94

¹ all Instantaneous Water Quality Criteria (IWQC), Predicted No-Effect Concentrations (PNECs), and Environmental Quality Standards (EQS) apply only to the specific water quality combinations for which they were calculated
² Criterion Maximum Concentration (acute criterion) = the USEPA national water quality criterion for the highest instream concentration of a toxicant to which organisms can be exposed for a brief period of time without causing an acute effect
³ Acute Toxic Units = dissolved copper concentration divided by the Criterion Maximum Concentration
⁴ Criterion Continuous Concentration (chronic criterion) = the USEPA national water quality criterion for the highest instream concentration of a toxicant to which organisms can be exposed indefinitely without causing unacceptable effect
⁵ Chronic Toxic Units = dissolved copper concentration divided by the Criterion Continuous Concentration
⁶ Predicted No-Effect Concentration
⁷ p-value represents the probability that concentrations exceed the predicted no-effect concentration.
⁸ Risk Characterization Ratio = the ratio of the predicted copper concentration to the concurrent (instantaneous) criterion, standard or predicted no-effect concentration.
⁹ Environmental Quality Standard based bioavailability and a 5th percentile hazard concentration (HC5).
¹⁰ BioF is the bioavailability factor - the ratio of condition-specific bioavailability to generic bioavailability (reference EQS / condition-specific EQS).
 indicates a toxic unit value or a risk characterization ratio of 0.5 to 1.0
 indicates a toxic unit value or a risk characterization ratio ≥ 1.0

Depth	Sample Size	Mean RCR ¹	Standard Deviation	Coefficient of Variation	Standard Error	L95% CL ²	U95% CL ³
surface	9	0.10	0.04	37%	0.01	0.07	0.13
10 to 24	7	0.39	0.16	43%	0.06	0.23	0.54
≥ 34	12	1.08	0.21	19%	0.06	0.95	1.21

¹ maximum TU or RCR (last column in top table) used to calculate summary statistics
² lower 95% confidence limit of the mean
³ upper 95% confidence limit of the mean

Memorandum

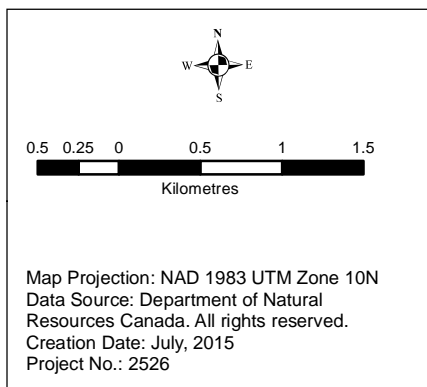
Date: July 10, 2015
To: Dale Reimer, Mount Polley Mining Corporation
From: Pierre Stecko, Minnow Environmental Inc.
Cc: Colleen Hughes, Katie McMahan, Mount Polley Mining Corporation
Lee Nikl, Golder Associates

Re: Summary and Interpretation of Water Toxicity Tests (Nov 2014 to Apr 2015)

This memorandum provides a brief summary and interpretation of toxicity test results associated with water samples collected between November 2014 and April 2015 as part of continued monitoring following the Mount Polley Mine tailings dam failure (August 4, 2014). This memo provides an update relative to an initial memorandum of toxicity test results from August and September 2014 (Minnow 2015). The water toxicity testing discussed within this memorandum was conducted on samples collected from Polley Lake, Quesnel Lake, and the Quesnel River (Figure 1). Based on the results and interpretation of these tests, recommendations for future toxicity testing are also provided.

Methods

Toxicity testing included sub-lethal tests recommended under the federal Metal Mining Effluent Regulations (MMER; Government of Canada 2015). No acute lethality was reported in association with water samples collected during the initial response to the dam failure (Minnow 2015), therefore toxicity testing conducted between November 2014 and April 2015 was limited to sub-lethal testing. All tests were conducted by a laboratory (Nautilus Environmental) accredited by the Canadian Association for Laboratory Accreditation (CALA), and were conducted under standard protocols. The sublethal tests conducted included the 30-day test of early life stages (embryo/alevin) of rainbow trout (*Oncorhynchus mykiss*) (Environment Canada 1998), the 7-day test of rainbow trout swim-up fry survival and growth (Lazorchak and Smith 2007), the 7-day test of fathead minnow (*Pimephales promelas*) larval survival and growth (Environment Canada 2011), and the 7-day test of *Ceriodaphnia dubia* (invertebrate) survival and reproduction (Environment Canada 2007). Samples were collected using grab techniques in accordance with provincial and federal guidance (BCWLAP 2003; BCMOE 2012; Environment Canada 2012) and were supported by field meter measurements and



Legend	
●	Water Toxicity Sampling Location
■	Bootjack Creek Dam
■	Seepage Collection Pond
	Mine Infrastructure
	Water Collection Ditch
	Roads

—	Quesnel Lake Bathymetry (10 m Intervals)
—	Bootjack Lake Bathymetry (5 m Intervals)
—	Polley Lake Bathymetry (10 m Intervals)
■	Waterbody
—	Watercourse
➔	Water Flow Direction

Figure 1: Water Toxicity Sampling Locations

Please note: Quesnel Lake bathymetry lines are an approximate representation only and may not precisely delineate accurate depths at larger scales.

concurrent water samples, which were submitted to a CALA accredited analytical laboratory (ALS Environmental) for chemical analysis. To investigate potential causes of responses observed in August and September 2014 (Minnow 2015), the sublethal test of *Ceriodaphnia dubia* (invertebrate) survival and reproduction (Environment Canada 2007) conducted on samples collected from Quesnel Lake and Quesnel River were run on both unfiltered and filtered samples (0.45 µm pore diameter filter). Filtration of the samples was performed by Nautilus Environmental prior to testing.

Results

A total of 46 toxicity tests were conducted on water samples collected by the Mount Polley Mining Corporation (MPMC) between November 25th 2014 and April 14th 2015 (Table 1; Appendix A). Ten of the tests did not meet validity requirements due to poor control survival or growth and not discussed herein. No effects were observed on the survival and development of rainbow trout at the embryo/alevin stages, or on the survival and growth of rainbow trout swim-up fry. No effects to the survival of fathead minnow or *C. dubia* were observed; however some reduced growth or reproduction (respectively) was observed in these test organisms. All toxicity test results are discussed below, by test type, including an examination of the reported responses in relation to concurrent water quality (Table 2).

Survival and Development – Rainbow trout embryo and alevin stages

Tests of the survival and development of rainbow trout early life stages (embryo and alevin stages) indicated no effects on either the survival of these sensitive life stages, nor to their normal development in any of the Quesnel River waters tested (Table 1).

Survival and Growth – Rainbow trout swim-up fry

Tests of the survival and growth of rainbow trout swim-up fry (3 to 6 day post-swim-up) indicated no effects to either survival or growth in any of the waters tested (Table 1).

Survival and Growth - Fathead minnow

Tests of the survival and growth of fathead minnow (*Pimephales promelas*) indicated no effects on survival, and all 50% inhibitory concentrations (IC50s - growth) were greater than 100% (Table 1). However, growth inhibition was observed in 25% inhibitory concentrations (IC25s, as evaluated using total biomass) in two water samples from Quesnel Lake collected from the surface and from 85 m depth on January 15th 2015, with 25% inhibitory concentrations (IC25s) of 83.2 and 95.6% v/v, respectively (Table 1). The

Table 1: Summary of Water Toxicity Testing in Support of Mount Polley Mine Tailings Dam Breach Impact Assessment, November 2014 to April 2015.

Test	Location	Sample ID	Sample Date	LC50 (% v/v) ¹ (Median Lethal Concentration)	IC25 (% v/v) ¹ (25th Percentile Inhibitory Concentration)	IC50 (% v/v) ¹ (Median Inhibitory Concentration)
30-d rainbow trout embryo-alevin	Quesnel River	QUR-1-141125	November 25/2014	>100	>100	>100
	Quesnel River	QUR-1-141209	December 9/2014	>100	>100	>100
7-d rainbow trout survival and growth	Polley Lake	POL-4	December 16/2014	n/a ⁴	n/a ⁴	n/a ⁴
	Polley Lake	P2-Surface	January 6/2015	>100	>100	>100
	Polley Lake	P2-Surface	April 14/2015	>100	>100	>100
	Quesnel Lake	QUL-66-0M-141215	December 15/2014	n/a ⁴	n/a ⁴	n/a ⁴
	Quesnel Lake	QUL-66-40M-141215	December 15/2014	n/a ⁴	n/a ⁴	n/a ⁴
	Quesnel Lake	QUL-66-0m	January 15/2015	>100	>100	>100
	Quesnel Lake	QUL-66-85m	January 15/2015	>100	>100	>100
	Quesnel Lake	QUL-66-0M	March 2/2015	n/a ⁵	n/a ⁵	n/a ⁵
	Quesnel River	QUR-1	December 16/2014	n/a ⁴	n/a ⁴	n/a ⁴
	Quesnel River	QUR-1	January 7/2015	>100	>100	>100
	Quesnel River	QUR-1	March 3/2015	n/a ⁵	n/a ⁵	n/a ⁵
7-d fathead minnow survival and growth	Polley Lake	POL-4	December 16/2014	n/a ⁴	n/a ⁴	n/a ⁴
	Polley Lake	P2-S	January 6/2015	>100	>100	>100
	Polley Lake	P2-S	April 14/2015	>100	>100	>100
	Quesnel Lake	QUL-66-0M-141215	December 15/2014	n/a ⁴	n/a ⁴	n/a ⁴
	Quesnel Lake	QUL-66-40M-141215	December 15/2014	n/a ⁴	n/a ⁴	n/a ⁴
	Quesnel Lake	QUL-66-0m	January 15/2015	>100	83.2 (46.7-100); >100 ²	>100
	Quesnel Lake	QUL-66-85m	January 15/2015	>100	95.6 (25.4-100); >100 ²	>100
	Quesnel Lake	QUL-66-0M	March 2/2015	>100	>100	>100
	Quesnel River	QUR-1	December 16/2014	n/a ⁴	n/a ⁴	n/a ⁴
	Quesnel River	QUR-1	January 7/2015	>100	>100	>100
	Quesnel River	QUR-1	February 10/2015	>100	>100	>100
Quesnel River	QUR-1	March 3/2015	>100	>100	>100	
7-d C. dubia survival and reproduction	Polley Lake	POL-4	December 16/2014	>100	>100	>100
	Polley Lake	P2-S	January 6/2015	>100	>100	>100
	Polley Lake	P2-S	April 14/2015	>100	>100	>100
	Quesnel Lake	QUL-66-0m-141125	November 25/2014	>100	29.3 (10.9-40.2)	>100
	Quesnel Lake	QUL-66-0m-141125 (Filtered)	November 25/2014	>100	>100	>100
	Quesnel Lake	QUL-66-20m-141125	November 25/2014	>100	6.2 (3.0-32.5)	>100
	Quesnel Lake	QUL-66-20m-141125 (Filtered)	November 25/2014	>100	>100	>100
	Quesnel Lake	QUL-66-45m-141125	November 25/2014	>100	22.1 (5.4-57.7)	>100
	Quesnel Lake	QUL-66-45m-141125 (Filtered)	November 25/2014	>100	92.5 (43.4-na ³)	>100
	Quesnel Lake	QUL-66-0m	January 15/2015	>100	11.1 (7.2-29.1)	>100
	Quesnel Lake	QUL-66-0m (Filtered)	January 15/2015	>100	>100	>100
	Quesnel Lake	QUL-66-85m	January 15/2015	>100	8.3 (2.3-23.0)	>100
	Quesnel Lake	QUL-66-85m (Filtered)	January 15/2015	>100	>100	>100
	Quesnel Lake	QUL-66-0M	March 2/2015	>100	74.2 (5.7-na ³)	>100
	Quesnel Lake	QUL-66-0M (Filtered)	March 2/2015	>100	>100	>100
	Quesnel River	QUR-1-141125	November 25/2014	>100	8.2 (2.4-34.4)	>100
	Quesnel River	QUR-1	December 16/2014	>100	50.6 (37.6-60.4)	>100
	Quesnel River	QUR-1	January 7/2015	>100	>100	>100
	Quesnel River	QUR-1 (Filtered)	January 7/2015	>100	>100	>100
Quesnel River	QUR-1	February 10/2015	>100	>100	>100	
Quesnel River	QUR-1	March 3/2015	>100	95.9 (50.0-na ³)	>100	

¹ Effect concentration; in instances where an effect was observed, 95% confidence limits are also provided (where calculable).

² in instances where an effect to fathead minnow growth is reported, IC25 values are provided for both total biomass (first number) and individual dry weight (second number).

³ na = not applicable; could not be calculated.

⁴ test results were considered invalid according to QA/QC protocols (control survival and growth performance); test results are not presented.

⁵ test results were considered invalid according to QA/QC protocols (control survival and growth performance); test results are not presented. Toxicity tests are being repeated using newly collected sample from this sampling area.

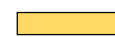
 highlight indicates a reported effect.

Table 2: Water Quality Data Collected Concurrent with Toxicity Test Samples, Mount Polley Mine, November 2014 to April 2015.

Analyte	Units	BCWQG ^a applicable to Polley Lake and Hazelton Discharge			Polley Lake			BCWQG ^a applicable to Quesnel Lake and River			Quesnel Lake						Quesnel River							
		Type	Chronic	Acute	POL-4	P2-Surface	P2-Surface	Type	Chronic	Acute	QUL-66-0m	QUL-66-20m	QUL-66-45m	QUL-66-0m	QUL-66-40m	QUL-66-0m	QUL-66-85m	QUL-66-0m	QUR-1	QUR-1	QUR-1	QUR-1	QUR-1	QUR-1
					16-Dec-14	6-Jan-15	14-Apr-15				25-Nov-14	25-Nov-14	25-Nov-14	15-Dec-14	15-Dec-14	15-Jan-15	15-Jan-15	2-Mar-15	25-Nov-14	9-Dec-14	16-Dec-14	7-Jan-15	10-Feb-15	3-Mar-15
Total Metals																								
Aluminum	(µg/L)				35.2	13.6	22.4				391	393	362	418	359	178	212	58.5	248	417	410	185	82.6	63.2
Antimony	(µg/L)	W	9		0.17	0.21	0.15	W	9		0.12	0.12	0.11	0.13	0.13	<0.10	<0.10	<0.10	0.16	0.12	0.12	<0.10	<0.10	<0.10
Arsenic	(µg/L)	A		5	0.98	1.22	0.99	A	5		0.37	0.36	0.36	0.39	0.36	0.27	0.28	0.19	0.29	0.41	0.43	0.34	0.30	0.23
Barium	(µg/L)	W	1,000		12.4	15.1	13.2	W	1,000		17.7	18.3	17.4	18.3	17.5	12.5	13.2	7.52	13.5	19.4	18.6	12.0	8.73	7.93
Beryllium	(µg/L)	W	0.13		<0.10	<0.10	<0.10	W	0.13		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Bismuth	(µg/L)				<0.50	<0.50	<0.050				<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Boron	(µg/L)	A		1,200	27.0	29.0	29.0	A	1,200		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Cadmium	(µg/L)	A	0.211 ^d	0.588 ^d	<0.010	<0.010	<0.005	A	0.145 ^d	0.348 ^d	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Calcium	(µg/L)				40,600	44,700	42,800				19,000	18,600	18,900	19,400	19,300	18,600	18,800	18,800	18,700	20,300	20,100	20,300	20,100	19,600
Chromium	(µg/L)	W	1 ^e		<0.50	<0.50	<0.50	W	1 ^e		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cobalt	(µg/L)	A	4	110	<0.10	<0.10	<0.10	A	4	110	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Copper	(µg/L)	A	4.0	11	2.39	2.43	2.49	A	2.4	7.6	7.51	7.4	7.46	6.87	6.55	4.27	4.85	<2.5	4.93	7.86	7.16	4.04	2.41	2.12
Iron	(µg/L)	A		1,000	41.0	<30	<30	A		1,000	125	140	132	131	110	54	55	<30	95	122	125	54	35	<30
Lead	(µg/L)	A	6.5	82	<0.050	<0.050	<0.050	A	5.0	43	0.116	0.256	0.147	0.117	0.171	0.051	0.161	<0.050	0.090	0.120	0.106	0.054	<0.050	<0.050
Lithium	(µg/L)				1.02	0.76	<1.0				0.8	0.81	0.8	0.75	0.73	<0.50	<0.50	0.62	0.72	0.9	0.82	0.96	1.06	0.73
Magnesium	(µg/L)				5,470	6,170	5,650				2,160	2,130	2,150	2,190	2,160	2,090	2,080	2,120	2,140	2,320	2,290	2,280	2,170	2,220
Manganese	(µg/L)	A	1,045	1,642	47.4	59.2	102	A	869	1,201	4.08	4.22	4.15	4.16	3.67	1.98	2.02	1.42	3.20	3.92	4.02	2.05	1.62	1.55
Molybdenum	(µg/L)	A	1,000	2,000	11.1	12.7	11.2	A	1,000	2,000	1.99	1.92	1.91	1.95	1.91	1.65	1.70	0.886	1.46	2.28	2.08	1.48	1.05	1.1
Nickel	(µg/L)	W	96		<0.50	<0.50	<0.50	W	65		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Potassium	(µg/L)				1,200	1,500	1,370				847	830	825	887	843	703	745	558	704	899	880	704	588	571
Selenium	(µg/L)	A	2		0.93	1.11	0.98	A	2		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Silicon	(µg/L)				4,340	4,310	4,220				2,550	2,580	2,510	2,800	2,590	2,130	2,230	1,800	2,240	2,640	2,790	2,080	1,960	1,840
Silver	(µg/L)	A	0.05	0.1	<0.010	<0.010	<0.010	A	0.05	0.1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Sodium	(µg/L)				9,650	10,300	9,580				1,760	1,690	1,740	1,730	1,750	1,560	1,600	1,220	1,480	1,960	1,960	1,610	1,350	1,340
Strontium	(µg/L)				309	354	319				155	149	152	155	153	147	149	131	145	159	159	159	142	146
Thallium	(µg/L)	W	0.8		<0.010	<0.010	<0.010	W	0.8		<0.010	<0.010	<0.010	0.012	<0.010	<0.010	0.010	<0.010	<0.010	<0.010	0.011	<0.010	<0.010	<0.010
Tin	(µg/L)				<0.10	<0.10	<0.10				<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium	(µg/L)				<10	<10	<10				11	12	11	13	11	<10	<10	<10	<10	13	12	<10	<10	<10
Uranium	(µg/L)	W	8.5		0.283	0.339	0.287	W	8.5		0.297	0.283	0.294	0.305	0.297	0.276	0.280	0.185	0.243	0.315	0.281	0.250	0.213	0.211
Vanadium	(µg/L)				1.10	1.10	1.03				<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Zinc	(µg/L)	A	15	41	<3.0	<3.0	<3.0	A	7.5	33	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

yellow highlight indicates concentration greater than the applicable BCWQG for the protection of aquatic life (30-day average, where available)
orange highlight indicates concentration greater than the applicable BCWQG for the protection of aquatic life (maximum)

^a British Columbia Water Quality Guidelines (BCMOE 2015a, 2015b); W=Working guideline; A=Approved guideline. See Appendix Table B.1 for derivation of condition-specific guidelines.

^b guidelines for turbidity and TSS are for induced values above reference or background (background of 1.0 NTU turbidity and 3.0 mg/L TSS used for screening).

^c The BCWQG guideline for phosphorus is based on non-toxic endpoints associated with phosphorus. The phosphorus guideline was not applied to the grab samples in this table because the presented samples were collected in support of water toxicity test samples.

^d guideline for dissolved cadmium is displayed and applied to total cadmium concentrations.

^e applies to chromium as Cr (IV); guideline for Cr(III) is 9 µg/L.

total biomass endpoint integrates effects on both survival and growth by measuring dry weight of surviving fish per test chamber (Environment Canada 2011). Examination of the toxicity test data (Appendix A) indicated that the effects on biomass observed for these Quesnel Lake samples were associated with low level mortality (fewer organisms result in lower total biomass per test chamber) and the consideration of individual dry weight data (i.e., average weight of surviving fish only) indicated no inhibition of individual biomass (Table 1) ¹.

Examination of concurrent water quality data associated with the tests (i.e., from samples collected at the same location and time as the test water) indicated that turbidity and total copper concentrations exceeded the applicable chronic British Columbia Water Quality Guidelines (BCWQG) for the protection of aquatic life (BCMoE 2015a,b) in waters where effects to fathead minnow total biomass were observed (QUL-66; January 15, 2015), as well as in waters where no effects were observed (Table 2; see Appendix B for reference values supporting applicable BCWQG). Total metals do not effectively represent bioavailable metals (Allen 1993; Bergman et al 1997; Markich et al. 2001; ICMM and Eurometaux 2005), and dissolved copper (which is better characterized as “filtered” [$<0.45 \mu\text{m}$] copper) is a better representation of bioavailable copper. In all samples tested, dissolved copper concentrations were below corresponding total copper guideline levels. Dissolved copper may remain an overestimate of bioavailable copper due to the presence of small particles, colloids and complexation with dissolved ligands such as dissolved organic carbon (e.g., Morel 1983; Pagenkopf 1983; Markich et al. 2001; Grosell 2012). Therefore, biotic ligand modeling (BLM) was employed (using supporting water quality characteristics) to model the median lethal concentration [LC50] of dissolved copper for the waters tested for fathead minnow survival and growth, as well as the lowest dissolved copper concentration associated with chronic effects (Appendix C). These BLM modeled values indicated that lowest chronic effects associated with dissolved copper (i.e., effects to the most sensitive species and life stage) would not be expected at concentrations below $7.2 \mu\text{g/L}$ in Quesnel Lake (see Appendix C). Therefore, the observed effects to the growth of fathead appear not to be related to dissolved copper.

Turbidity greater than the applicable chronic BCWQG was observed in the Quesnel Lake water samples that were associated with effects to fathead minnow biomass, however

¹ Total biomass and individual biomass (dry weight) can be influenced by low level test mortality resulting in fewer test organisms per chamber. Total biomass is generally lower in tests with fewer surviving organisms, although individual biomass can be higher due to density dependent growth of surviving test organisms. The latter does not appear to have occurred for the QUL-66 samples (surface and 85m depth) collected on January 15, 2015.

elevated turbidity above BCWQG was also observed in a Quesnel River water sample which exhibited no effects to biomass (January 7, 2015; Table 2). Due to a lack of concordance between the toxicity test results and water chemistry, there is no apparent cause of the effects observed in the fathead minnow tests. This was previously noted based on data collected in August and September 2014 (Minnow 2015), and the initiation of rainbow trout survival and growth testing was recommended to augment the existing fathead minnow testing. The limited effects observed to fathead minnow were not supported by the rainbow trout testing results reported for the same samples (i.e. collected at the same time and location), which indicated no effects (Table 1). Fathead minnows are susceptible to disease, are of less relevance to the water bodies being evaluated than rainbow trout, and have not demonstrated toxicity effects in concordance with water quality results. Therefore, it is recommended that fathead minnow survival and growth testing be discontinued and that it is replaced with testing of rainbow trout survival and growth.

Survival and Reproduction - Ceriodaphnia dubia

Tests of the survival and reproduction of *C. dubia* (a copper-sensitive cladoceran; USEPA 2007) indicated no lethality in any of the waters tested, and no reproductive impairment associated with Polley Lake water. All 50% inhibitory concentrations (IC50s - reproduction) were greater than 100% (Table 1). However, reproductive inhibition was observed in 25% inhibitory concentrations (IC25s) in a number of water samples from Quesnel Lake and the Quesnel River (Table 1). In the previous memorandum, testing of concurrent filtered (0.45 µm pore diameter filter) and unfiltered water samples from Quesnel Lake and Quesnel River was recommended in order to investigate the influence of suspended solids on *C. dubia* reproduction (Minnow 2015). All unfiltered samples from Quesnel Lake (surface and deep; n=6) and 3 of 5 unfiltered samples from the Quesnel River were associated with impaired *C. dubia* reproduction (IC25 <100%), resulting in a total of 9 of the 11 unfiltered samples tested between November 2014 and April 2015 exhibiting effects on reproduction (Table 1). Turbidity and total copper concentrations exceeded the applicable chronic BCWQG in 7 of these 9 samples (3.11-6.37 NTU and 4.27-7.51 µg/L), but were below guidelines in the remaining 2 samples (approximately 1 NTU and <2.5 µg/L; Table 2). As previously indicated, total metals do not effectively represent bioavailable metals, and concentrations of dissolved copper were lower than the total copper guideline in all samples associated with reproductive effects. Reproductive impairment was not associated with any of the filtered Quesnel Lake and Quesnel River

waters tested, with the exception of one filtered sample collected from Quesnel Lake (November 25, 2014) which had a reported IC25 of 92.5% (v/v). Dissolved copper concentrations present in all the filtered samples tested for toxicity were below the total copper BCWQG. Given the matching dissolved copper concentrations in the concurrent filtered and unfiltered toxicity samples, the differing effects on reproduction observed in filtered versus unfiltered toxicity samples indicate that suspended solids may be responsible for the observed reproductive impairment rather than copper concentrations. This is supported by the relationship observed between suspended solid concentrations in unfiltered water samples (as measured by turbidity or total suspended solids) and reproductive impairment of *C. dubia* (Appendix D), with lower IC25 concentrations (and therefore greater reproductive impairment) associated with greater suspended solid concentrations. This relationship also explains the occurrence of low IC25 concentrations associated with samples containing low concentrations of dissolved copper, which was also noted previously (Minnow 2015). The suspended solid-related responses observed for *C. dubia* are in contrast to the apparent lack of concordance between fathead minnow growth (total biomass) effects and water quality results, further corroborating the recommendation to discontinue fathead minnow testing.

Summary

Overall, toxicity testing conducted between November 2014 and April 2015 indicated limited adverse effects. No effects to the survival or development of rainbow trout early life stages or to rainbow trout swim-up fry were observed, and no effects were observed in any of the test organisms exposed to Polley Lake water. However, some biological responses were associated with Quesnel Lake and Quesnel River waters, with effects observed to fathead minnow growth and *C. dubia* reproduction.

Reported effects to fathead minnow did not corroborate well with water chemistry results (as previously observed), nor with the reported rainbow trout toxicity results (no reported effects). Impaired reproduction of *C. dubia* was only associated with unfiltered water samples, despite matching dissolved copper concentrations present in each paired filtered and unfiltered sample. This indicates that suspended solids, not copper, were likely responsible for the observed reproductive impairment associated with unfiltered samples. The majority of Quesnel Lake and Quesnel River samples associated with reproductive impairment in *C. dubia* had elevated turbidity, although the turbidity was lower than reported for toxicity samples collected in August and September 2014 (Minnow 2015) indicating improved water

quality. Continued testing at a lower frequency is recommended to monitor potential toxicity associated with changing conditions within Quesnel Lake, Quesnel River and Polley Lake.

Recommendations for Toxicity Testing

Based on the toxicity data collected between November 2014 and April 2015, the following recommendations are provided for toxicity testing within the waterbodies affected by the tailings dam failure (Table 3).

- Discontinue the rainbow trout embryo-alevin testing which was applied in the Quesnel River, and which reported no effects.
- Discontinue the 7-day fathead minnow survival and growth test (Environment Canada 2011) due to the apparent lack of concordance with water quality.
- Continue the 7-day rainbow trout survival and growth test (Lazorchak and Smith 2007) at all proposed surveillance monitoring locations (Table 3) when high quality rainbow trout of an appropriate life stage are available.
- Continue the 7-day *Ceriodaphnia dubia* survival and reproduction test (Environment Canada 2007) at all proposed surveillance monitoring locations (Table 3).

Table 3: Recommended Surveillance Monitoring Water Toxicity Testing Program for Mount Polley, Summer and Fall 2015.

Location	Tests	Frequency ¹
Polley Lake	7-d rainbow trout survival and growth	quarterly ^{2, 3}
	7-d <i>Ceriodaphnia dubia</i> survival and reproduction	quarterly ^{2, 3}
Quesnel Lake	7-d rainbow trout survival and growth	quarterly ^{2, 3}
	7-d <i>Ceriodaphnia dubia</i> survival and reproduction	quarterly ^{2, 3, 4}
Quesnel River	7-d rainbow trout survival and growth	quarterly ²
	7-d <i>Ceriodaphnia dubia</i> survival and reproduction	quarterly ^{2, 4}

¹ frequency to be re-evaluated in fall of 2015 following receipt and interpretation of results from May 2015 to October 2015

² four times per year, not less than one month apart

³ one of the quarterly sampling events in lakes (summer) should include two samples - one above the thermocline and one near bottom

⁴ if field turbidity exceeds 3 NTU, collect a second sample to be filtered in the laboratory prior to testing

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APPENDIX A

Toxicity Test Reports (Nautilus Environmental)

CONTENTS OF APPENDIX A

- Part 1: Toxicity testing of samples identified as QUR-1-141125, QUL-66-0M-141125, QUL-66-20M-141125 and QUL-66-45M-141125 on *Ceriodaphnia dubia*: Samples collected November 25, 2014, Work Order #14927
- Part 2: Toxicity testing of a sample identified as QUR-1 for the rainbow trout (*Oncorhynchus mykiss*) embryo-alevin test: Samples collected November 25 to December 22, 2014, Work Order #14928
- Part 3: Toxicity testing of a sample identified as QUR-1 for the rainbow trout (*Oncorhynchus mykiss*) embryo-alevin test: Samples collected December 10, 2014 to January 7, 2015, Work Order #14972
- Part 4: Toxicity testing of samples identified as QUR-1 and POL-4 on *Ceriodaphnia dubia*: Samples collected December 16, 2014, Work Order #14984
- Part 5: Toxicity testing of samples identified as P2-S and QUR-1 on *Ceriodaphnia dubia*, rainbow trout (swim up) and fathead minnows: Samples collected January 6 and 7, 2015, Work Order #15019-15021 and #15023-15025
- Part 6: Toxicity testing of samples identified as QUL-66-0M and QUL-66-85M on *Ceriodaphnia dubia*, rainbow trout (swim up) and fathead minnows: Samples collected January 15, 2015, Work Order #15042-15044
- Part 7: Toxicity testing of a sample identified as QUR-1 on *Ceriodaphnia dubia* and fathead minnows: Sample collected February 10, 2015, Work Order #15082 and 15083
- Part 8: Toxicity testing of samples identified as QUR-1 and QUL-66-0M on *Ceriodaphnia dubia* and fathead minnows: Samples collected March 2 and 3, 2015, Work Order #15134, 15135, 15137, 15139

Part 9: Toxicity testing of a sampled identified as P2-S on *Ceriodaphnia dubia*, rainbow trout (swim up) and fathead minnows: Sample collected April 14, 2015, Work Order #15298-15300

PART 1

Toxicity testing of samples identified as QUR-1-141125, QUL-66-0M-141125, QUL-66-20M-141125 and QUL-66-45M-141125 on *Ceriodaphnia dubia*: Samples collected November 25, 2014, Work Order #14927



Nautilus Environmental

**Toxicity testing on samples identified as QUR-1-141125, QUL-66-0M-141125, QUL-66-20M-141125 and QUL-66-45M-141125
(*Ceriodaphnia dubia*)**

Samples collected November 25, 2014

Final Report

Report date: February 2, 2015

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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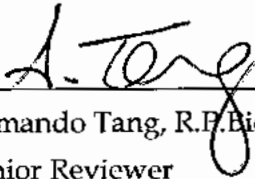
APPENDIX B - Chain of Custody Form

SIGNATURE PAGE



Krysta Pearcy, B.Sc.

Testing Manager



Armando Tang, R.F.Bio.

Senior Reviewer

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted a toxicity test for Mount Polley Mining Corporation on samples identified as QUR-1-141125, QUL-66-0M-141125, QUL-66-20M-141125 and QUL-66-45M-141125. The samples were collected on November 25, 2014 and delivered to the laboratory in Burnaby, BC on November 26, 2014. The samples were transported in 1-L plastic bottles and 20-L plastic carboys inside coolers. Samples were received at temperatures ranging from 3.3 to 4.5°C and were stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing.

Samples QUL-66-0M-141125, QUL-66-20M-141125 and QUL-66-45M-141125 were vacuum filtered through 0.45µm filter paper and tested in addition to unfiltered sample testing. Sample QUR-1-141125 was tested unfiltered.

This report describes the results of the toxicity test conducted on the samples using *Ceriodaphnia dubia*. Copies of laboratory data sheets and printouts of statistical analyses for the test are provided in Appendix A. The chain of custody form is provided in Appendix B.

2.0 METHODS

Methods for the toxicity test using *C. dubia* are summarized in Table 1. Testing was conducted according to procedures described by Environment Canada (2007). Statistical analyses for the test were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house culture
Test organism age	<24 h old neonates produced within 12 h
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20 mL test tube
Test volume	15 mL
Test replicates	10 test replicates per treatment
Number of organisms	1 per replicate
Control water	20% Perrier water
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	<i>Pseudokirchneriella subcapitata</i> and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada, (2007) EPS 1/RM/21
Statistical software	CETIS (2013)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods
Reference toxicant	Sodium chloride

3.0 RESULTS

Results of the toxicity test conducted on samples QUR-1-141125, QUL-66-0M-141125, QUL-66-20M-141125 and QUL-66-45M-141125 using *C. dubia* are provided in Tables 2 to 5. No adverse effects on survival were observed, resulting in LC50 values of >100% for all samples.

There were adverse effects on reproduction in sample QUR-1-141125; the IC25 was 8.2% and the IC50 was >100%. Adverse effects on reproduction were observed on the unfiltered samples QUL-66-0M-141125, QUL-66-20M-141125 and QUL-66-45M-141125; the IC25 values were 29.3, 6.2 and 22.1%, respectively. The corresponding filtered samples exhibited reduced toxicity with IC25 values of >100% in QUL-66-0M-141125 and QUL-66-20M-141125, and 92.5% in QUL-66-45M-141125. IC50 values in the filtered and unfiltered samples were all >100%.

Table 2. Results: *Ceriodaphnia dubia* survival and reproduction test with sample QUR-1-141125.

Concentration (% v/v)	Survival (%)	Reproduction (Mean ± SD)
Control	100	21.9 ± 1.7
1.56	100	19.5 ± 4.6
3.12	100	16.4 ± 6.2
6.25	100	17.9 ± 1.3
12.5	90	14.8 ± 6.5
25	90	15.7 ± 5.3
50	100	14.9 ± 3.0
100	100	11.3 ± 4.5
Test endpoint (% v/v)		
LC50	>100	--
IC25 (95% CL)	--	8.2 (2.4 - 34.4)
IC50	--	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits.

Table 3. Results: *Ceriodaphnia dubia* survival and reproduction test with sample QUL-66-0M-141125.

Concentration (% v/v)	Unfiltered		Filtered	
	Survival (%)	Reproduction (Mean ± SD)	Survival (%)	Reproduction (Mean ± SD)
Control	100	21.5 ± 2.7	100	18.8 ± 3.4
1.56	100	20.6 ± 4.9	100	19.2 ± 4.4
3.12	100	21.2 ± 2.9	90	19.5 ± 7.0
6.25	100	20.2 ± 2.0	100	20.8 ± 4.6
12.5	90	17.5 ± 3.5	90	20.1 ± 7.2
25	100	16.7 ± 4.7	90	21.3 ± 4.0
50	100	12.1 ± 3.7	90	18.5 ± 7.5
100	100	16.2 ± 3.5	100	22.0 ± 6.6*
Test endpoint (% v/v)				
LC50	>100	--	>100	--
IC25 (95% CL)	--	29.3 (10.9 - 40.2)	--	>100
IC50	--	>100	--	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits.

Table 4. Results: *Ceriodaphnia dubia* survival and reproduction test with sample QUL-66-20M-141125.

Concentration (% v/v)	Unfiltered		Filtered	
	Survival (%)	Reproduction (Mean ± SD)	Survival (%)	Reproduction (Mean ± SD)
Control	100	21.2 ± 1.8	100	20.8 ± 3.6
1.56	100	22.2 ± 4.4	90	21.0 ± 4.4
3.12	90	19.1 ± 6.0	100	21.1 ± 5.3
6.25	80	14.7 ± 8.1	100	19.8 ± 1.8
12.5	100	17.7 ± 3.2	100	21.2 ± 1.7
25	100	16.4 ± 1.5	100	19.2 ± 4.0
50	100	13.8 ± 2.6	100	21.1 ± 2.4
100	100	14.1 ± 2.1	100	20.8 ± 1.6
Test endpoint (% v/v)				
LC50	>100	--	>100	--
IC25 (95% CL)	--	6.2 (3.0 - 32.5)	--	>100
IC50	--	>100	--	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits.

Table 5. Results: *Ceriodaphnia dubia* survival and reproduction test with sample QUL-66-45M-141125.

Concentration (% v/v)	Unfiltered		Filtered	
	Survival (%)	Reproduction (Mean ± SD)	Survival (%)	Reproduction (Mean ± SD)
Control	100	21.6 ± 1.4	100	20.1 ± 3.7
1.56	90	21.8 ± 4.6	90	18.9 ± 7.7
3.12	100	20.0 ± 3.8	100	18.1 ± 6.7
6.25	90	16.8 ± 7.1	100	22.0 ± 3.8
12.5	100	19.2 ± 2.6	100	19.7 ± 4.3
25	100	15.9 ± 4.2	100	20.5 ± 6.9
50	100	15.3 ± 5.2	90	18.8 ± 6.3
100	100	11.2 ± 5.0	80	14.6 ± 8.7
Test endpoint (% v/v)				
LC50	>100	--	>100	--
IC25 (95% CL)	--	22.1 (5.4 - 57.7)	--	92.5 (43.4 - N/A)
IC50	--	>100	--	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits, N/A = Not Applicable.

4.0 QA/QC

The health history of the test organisms used in the exposure was acceptable and met the requirements of the Environment Canada protocol. The test met all control acceptability criteria and water quality parameters remained within ranges specified in the protocol throughout the test. There were no deviations from the test methodology. Uncertainty associated with this test is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

Results of the reference toxicant test conducted during the testing program are summarized in Table 6. Results for this test fell within the range for organism performance of mean and two standard deviation range, based on historical results obtained by the laboratory with this test. Thus, the sensitivity of the organisms used in this test was appropriate.

Table 6. Reference toxicant test results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>C. dubia</i>	Survival (LC50): 1.8 g/L NaCl	1.9 (1.5 - 2.4) g/L NaCl	12	November 19, 2014
	Reproduction (IC25): 1.2 g/L NaCl	1.4 (1.0 - 2.0) g/L NaCl	19	

SD = Standard Deviation, CV = Coefficient of Variation, LC = Lethal Concentration, IC = Inhibition Concentration.

5.0 REFERENCES

Environment Canada. 2007. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. EPS 1/RM/21, February 2007.

Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.7.16 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: Mount Polley
 Work Order No.: 14927

Start Date/Time: Nov 26/14 @ 1330h
 Set up by: EMM

Sample Information:

Sample ID: QUR-1-141125
 Sample Date: Nov 25/14
 Date Received: Nov 26/14
 Sample Volume: 6 x 20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 111214B
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 36
 Mortality (%) in previous 7 d: 5
 Individual female # used ≥ 8 young on test day: 21 \rightarrow 26, 28 \rightarrow 39

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd120
 Stock Solution ID: 14NaO2
 Date Initiated: Nov 19/14

7-d LC50 (95% CL): 1.8 (1.6-2.2) g/L NaCl
 7-d IC50 (95% CL): 1.2 (0.9-1.5) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.9 (1.5-2.4) g/L NaCl CV (%): 12
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-2.0) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		8.2 (2.4-34.4)
IC50 % (v/v) (95% CL)		7100

Reviewed by: JGh

Date reviewed: Jan. 7/15

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Polley
 Sample ID: QWR-1-14125
 Work Order #: 14927

Start Date & Time: NOV 26/14 @ 1330
 Stop Date & Time: Dec 2/14 @ 1410
 Test Species: Ceriodaphnia dubia

Concentration	Days							Final
	0	1	2	3	4	5	6	
<i>control</i>								
Temperature (°C)	24.0	25.0	24.0	24.0	25.0	24.0	24.0	24.0
DO (mg/L)	8.1	7.8	8.1	7.7	8.2	7.4	8.1	7.3
pH	8.1	7.8	7.8	7.7	8.0	7.7	7.8	7.5
Cond. (µS/cm)	214	220	221	219	220	219	220	220
Initials	EMM	EMM	JW	WML	EMM	EMM	EC	

Concentration	Days							Final
	0	1	2	3	4	5	6	
<i>1.56% (V/V)</i>								
Temperature (°C)	24.0	25.0	24.0	24.0	25.0	24.0	24.0	24.0
DO (mg/L)	8.1	7.8	7.9	7.6	8.3	7.6	8.2	7.3
pH	7.9	7.8	7.9	7.6	8.0	7.7	7.9	7.6
Cond. (µS/cm)	216	221	226	218	220	219	217	217
Initials	EMM	EMM	JW	WML	EMM	EMM	EC	

Concentration	Days							Final
	0	1	2	3	4	5	6	
<i>12.5% (V/V)</i>								
Temperature (°C)	24.0	25.0	24.0	24.0	25.0	24.0	24.0	24.0
DO (mg/L)	8.1	7.8	7.9	7.7	8.3	7.6	8.3	7.2
pH	7.9	7.7	7.8	7.7	8.0	7.7	7.8	7.6
Cond. (µS/cm)	206	211	216	205	209	210	201	201
Initials	EMM	EMM	JW	WML	EMM	EMM	EC	

Concentration	Days							Final
	0	1	2	3	4	5	6	
<i>100% (V/V)</i>								
Temperature (°C)	24.0	25.0	24.0	24.0	25.0	24.0	24.0	24.0
DO (mg/L)	8.1	7.5	7.9	7.7	8.4	7.7	8.3	7.5
pH	7.6	7.6	7.6	7.5	7.7	7.6	7.6	7.5
Cond. (µS/cm)	118	119	124	123	121	124	125	125
Initials	EMM	EMM	JW	WML	EMM	EMM	EC	

	Control	100% (V/V)
Hardness*	100	62
Alkalinity*	86	44

Analysts: EMM, EC, AND JUY, KAP, WML
 Reviewed by: JLU
 Date reviewed: Jan. 7/15

* mg/L as CaCO3
 WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5
 Sample Description: clear

Comments: Broodboard Used: 111214B (CH# 272628739)

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt. Polley
 Sample ID: QUR-1-14125
 Work Order: 14927

Start Date & Time: NOV 26/14 @ 1330
 Stop Date & Time: Dec 2/14 @ 1410
 Set up by: EMM

% CVI (v)

Days	Concentration: <u>control</u>												Concentration: <u>1.56</u>												Concentration: <u>3.12</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC			
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW			
3	3	3	3	3	4	3	3	3	3	3	M	3	3	3	3	3	3	3	3	3	3	M	3	3	3	3	3	3	3	3	3	3	M			
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
5	8	6	9	10	8	9	9	8	6	9	EC	7	6	7	7	8	8	6	7	8	8	EC	7	6	6	7	2	6	7	6	6	5	EC			
6	11	11	11	9	10	10	9	11	13	EC	10	9	9	10	11	13	9	11	12	EC	10	10	10	12	✓	✓	10	10	10	7	EC					
7																																				
8																																				
Total	22	20	23	24	21	22	22	20	20	25	JW	20	18	19	20	8	24	24	18	21	23	JW	20	19	19	22	5	10	20	20	21	8	JW			

Days	Concentration: <u>6.25</u>												Concentration: <u>12.5</u>												Concentration: <u>25</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC			
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW			
3	✓	3	3	3	3	3	3	2	3	3	M	✓	3	3	✓	3	3	✓	3	3	3	M	✓	3	3	3	3	4	2	3	3	3	M			
4	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	3	✓	✓	4	✓	✓	✓	4	✓	✓	EMM	3	✓	✓	✓	X	✓	✓	✓	✓	✓	EMM			
5	4	5	6	6	7	7	6	8	7	8	EC	8	5	5	4	✓	5	4	5	6	4	EC	6	6	6	6	1	6	5	5	7	2	EC			
6	8	8	9	9	8	7	8	8	10	8	EC	11	6	11	✓	8	9	11	9	8	8	EC	10	11	10	10	✓	8	8	8	8	5	EC			
7																																				
8																																				
Total	16	16	18	18	18	19	17	18	20	19	JW	22	14	19	8	OK	16	16	20	18	15	JW	19	20	19	19	3X	18	15	16	18	10	JW			

Days	Concentration: <u>50</u>												Concentration: <u>100</u>												Concentration:											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC														
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW														
3	✓	3	✓	3	3	✓	3	✓	3	3	M	✓	✓	✓	4	✓	✓	✓	✓	2	3	M														
4	4	✓	5	✓	3	✓	4	3	✓	✓	EMM	✓	3	✓	4	3	3	3	✓	✓	✓	EMM														
5	8	4	5	5	4	6	6	6	5	5	EC	✓	3	4	3	✓	3	5	1	5	5	EC														
6	✓	5	7	7	5	10	7	9	2	8	EC	4	8	9	9	6	8	✓	✓	8	7	EC														
7																																				
8																																				
Total	12	12	17	15	12	19	16	19	11	16	JW	4	14	13	16	10	14	8	4	15	15	JW														

Notes: X = mortality.

Sample Description: clear
 Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JGU Date reviewed: Jan. 7/15

CETIS Analytical Report

Report Date: 16 Dec-14 10:14 (p 1 of 2)
 Test Code: 14927g | 09-0736-0613

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 11-7517-0592	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 16 Dec-14 10:13	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 16-6663-2912	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Percy
Start Date: 26 Nov-14 13:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 02 Dec-14 14:10	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 1h	Source: In-House Culture	Age: <24h
Sample ID: 20-2235-2851	Code: 788AA7D3	Client: Mount Polley
Sample Date: 25 Nov-14 10:30	Material: Water Sample	Project:
Receive Date: 26 Nov-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 27h	Station: QUR-1-141125	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	673963	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

C-%	Control Type	Count	Mean	Calculated Variate(A/B)							
				Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
25		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	0	1	1	1	1	1
25		1	1	1	1	0	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

QA: *JOk*
Jan-7/15

CETIS Analytical Report

Report Date: 16 Dec-14 10:14 (p 2 of 2)
 Test Code: 14927g | 09-0736-0613

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 11-7517-0592
 Analyzed: 16 Dec-14 10:13

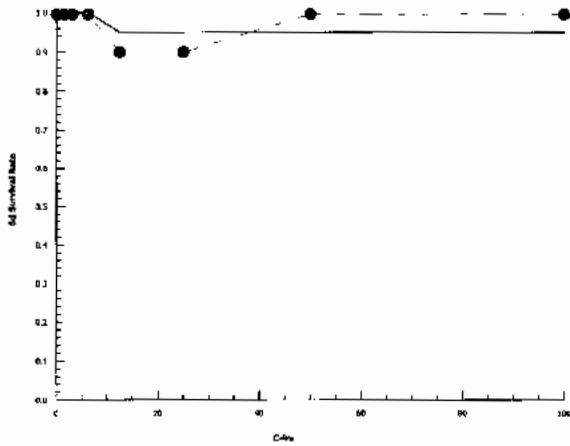
Endpoint: 6d Survival Rate
 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 16 Dec-14 10:14 (p 1 of 2)
 Test Code: 14927g | 09-0736-0613

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 14-8814-2923	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 16 Dec-14 10:13	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 16-6663-2912	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Percy
Start Date: 26 Nov-14 13:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 02 Dec-14 14:10	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 1h	Source: In-House Culture	Age: <24h
Sample ID: 20-2235-2851	Code: 788AA7D3	Client: Mount Polley
Sample Date: 25 Nov-14 10:30	Material: Water Sample	Project:
Receive Date: 26 Nov-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 27h	Station: QUR-1-141125	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1018893	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.5355	0.2178	1.867	186.7	53.55	459.1
IC10	1.358	0.4831	2.406	73.65	41.56	207
IC15	2.062	0.8062	6.295	48.49	15.88	124
IC20	2.823	1.2	18.96	35.43	5.275	83.36
IC25	8.191	2.369	34.41	12.21	2.906	42.22
IC40	70.23	42.46	N/A	1.424	NA	2.355
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	21.9	20	25	0.5467	1.729	7.89%	0.0%
1.56		10	19.5	8	24	1.462	4.625	23.72%	10.96%
3.12		10	16.4	5	22	1.962	6.204	37.83%	25.11%
6.25		10	17.9	16	20	0.4069	1.287	7.19%	18.26%
12.5		10	14.8	0	22	2.043	6.46	43.65%	32.42%
25		10	15.7	3	20	1.687	5.334	33.98%	28.31%
50		10	14.9	11	19	0.9481	2.998	20.12%	31.96%
100		10	11.3	4	16	1.438	4.547	40.24%	48.4%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	22	20	23	24	21	22	22	20	20	25
1.56		20	18	19	20	8	24	24	18	21	23
3.12		20	19	19	22	5	10	20	20	21	8
6.25		16	16	18	18	18	19	17	18	20	19
12.5		22	14	19	8	0	16	16	20	18	15
25		19	20	19	19	3	18	15	16	18	10
50		12	12	17	15	12	19	16	19	11	16
100		4	14	13	16	10	14	8	4	15	15

CETIS Analytical Report

Report Date: 16 Dec-14 10:14 (p 2 of 2)
Test Code: 14927g | 09-0736-0613

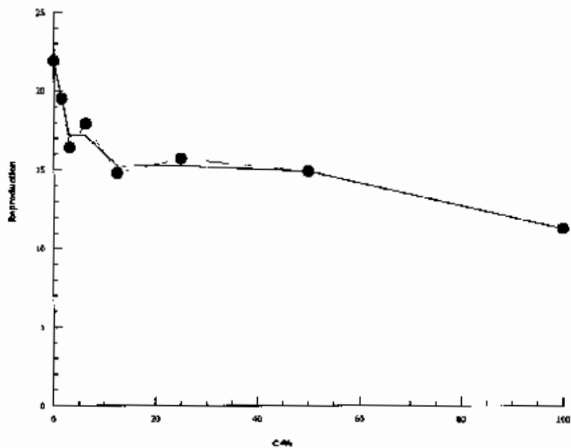
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 14-8814-2923 Endpoint: Reproduction
Analyzed: 16 Dec-14 10:13 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Ceriodaphnia dubia Summary Sheet

Client: Mount Polley
 Work Order No.: 14927

Start Date/Time: Nov 26 114 @ 1200h
 Set up by: EMM

Sample Information:

Sample ID: QUL-66-0m-141125
 Sample Date: Nov 25 14
 Date Received: Nov 26 14
 Sample Volume: 15 x 12

Test Validity Criteria:

- 1) Mean survival of first generation controls is ≥80 %
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 111214B
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 36
 Mortality (%) in previous 7 d: 5
 Individual female # used ≥8 young on test day: 21→26, 28-39

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd120
 Stock Solution ID: 14Na02
 Date Initiated: Nov 19 14

7-d LC50 (95% CL): 1.8 (1.6-2.2) g/L NaCl
 7-d IC50 (95% CL): 1.2 (0.9-1.5) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.9 (1.5-2.4) g/L NaCl CV (%): 12
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-2.0) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		29.3 (10.9-40.2)
IC50 % (v/v) (95% CL)		7100

Reviewed by: JCh

Date reviewed: Jan 7/15

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Polley
 Sample ID: CEL-66-0m-11125
 Work Order #: 14927

Start Date & Time: NOV 26/14 @ 1200
 Stop Date & Time: Dec 2/14 @ 1520h
 Test Species: Ceriodaphnia dubia

Concentration	Days							Final
	0	1	2	3	4	5	6	7
<i>control</i>								
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	24.0	24.0	24.0
DO (mg/L)	8.1	7.6	8.1	7.7	8.2	7.4	8.1	7.4
pH	8.1	7.8	7.8	7.6	8.0	7.7	7.8	7.4
Cond. (µS/cm)	219	220	221	219	220	219	225	
Initials	EMM	EMM	EMM	WML	EMM	EMM	EC	

Concentration	Days							Final
	0	1	2	3	4	5	6	7
<i>1.56% (V/V)</i>								
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	24.0	24.0	24.0
DO (mg/L)	8.2	7.6	8.1	7.6	8.0	7.5	8.1	7.4
pH	8.0	7.7	7.9	7.6	7.9	7.7	7.9	7.5
Cond. (µS/cm)	222	216	225	217	220	219	213	
Initials	EMM	EMM	EMM	WML	EMM	EMM	EC	

Concentration	Days							Final
	0	1	2	3	4	5	6	7
<i>12.5% (V/V)</i>								
Temperature (°C)	24.0	25.0	24.0	24.5	24.0	24.0	24.0	24.0
DO (mg/L)	8.2	7.6	8.1	7.7	8.0	7.5	8.3	7.4
pH	7.8	7.7	7.8	7.6	7.7	7.6	7.8	7.6
Cond. (µS/cm)	209	210	214	207	209	210	204	
Initials	EMM	EMM	EMM	WML	EMM	EMM	EC	

Concentration	Days							Final
	0	1	2	3	4	5	6	7
<i>(unfiltered) 100% (V/V)</i>								
Temperature (°C)	24.0	25.0	24.0	24.5	25.0	24.0	24.0	24.0
DO (mg/L)	8.3	7.8	8.1	7.8	8.0	7.6	8.1	7.5
pH	7.3	7.8	7.4	7.5	7.4	7.2	7.5	7.5
Cond. (µS/cm)	118	119	121	122	121	126	125	
Initials	EMM	EMM	EMM	WML	EMM	EMM	EC	

	Control	<i>(unfiltered) 100% (V/V)</i>
Hardness*	100	58
Alkalinity*	86	46

Analysts: EMM, EC, AWD
JULY KRPW 44L
 Reviewed by: JGL
 Date reviewed: Jan. 7/15

* mg/L as CaCO3
 WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5
 Sample Description: clear unfiltered

Comments: Broodboard Used: 111214B (11 → 21, 26, 28 → 39)

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt. Polley
 Sample ID: QUL66-5M-141125
 Work Order: 14927

Start Date & Time: NOV 26/14 @ 1200
 Stop Date & Time: Dec 2/14 @ 1520h
 Set up by: EMM

% (V/V)

Days	Concentration: <u>control</u>												Init	Concentration: <u>1.56</u>												Init	Concentration: <u>3.12</u>												Init					
	A	B	C	D	E	F	G	H	I	J	A	B		C	D	E	F	G	H	I	J	A	B	C	D		E	F	G	H	I	J												
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC	
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	
3	✓	3	3	4	3	✓	✓	3	✓	3	✓	EMM	✓	4	4	4	4	3	4	3	4	✓	✓	✓	EMM	✓	3	3	3	✓	4	✓	4	4	4	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	✓	✓	✓	✓	✓	3	3	✓	✓	✓	✓	EMM	✓	3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	3	✓	✓	✓	4	✓	3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
5	✓	8	9	8	9	8	9	11	10	8	8	JW	10	11	7	9	11	8	8	9	5	8	8	JW	9	4	8	9	8	8	9	6	9	9	9	9	JW							
6	13	15	11	11	10	9	10	8	7	11	✓	CL	11	12	12	✓	9	✓	12	9	10	10	✓	CL	13	10	7	9	11	10	10	7	10	11	✓	CL								
7																																												
8																																												
Total	17	26	23	23	22	20	24	19	19	22	JW	24	29	21	13	24	12	23	22	18	22	JW	25	22	18	21	23	22	22	17	23	24	JW											

Days	Concentration: <u>6.25</u>												Init	Concentration: <u>12.5</u>												Init	Concentration: <u>25</u>												Init					
	A	B	C	D	E	F	G	H	I	J	A	B		C	D	E	F	G	H	I	J	A	B	C	D		E	F	G	H	I	J												
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC		
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW		
3	✓	4	3	3	4	4	3	4	4	✓	✓	EMM	✓	3	✓	✓	2	3	4	4	✓	✓	✓	EMM	✓	4	✓	✓	✓	✓	✓	✓	✓	3	3	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	3	✓	✓	✓	✓	✓	✓	✓	✓	4	✓	EMM	✓	4	3	✓	✓	✓	✓	4	3	✓	✓	EMM	✓	3	4	4	3	3	4	3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	
5	8	5	8	8	8	5	6	9	9	6	✓	JW	10	6	6	7	5	5	7	5	6	6	✓	JW	9	7	9	5	5	5	5	7	6	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	
6	9	11	9	11	9	11	9	9	10	6	✓	CL	9	9	8	8	7	10	8	1	10	10	✓	CL	8	11	7	9	11	8	6	✓	6	6	✓	CL								
7																																												
8																																												
Total	20	20	20	22	21	20	18	22	23	16	JW	22	19	17	17	15	19	19	9	19	19	JW	20	23	18	22	19	16	15	10	15	9	JW											

Days	Concentration: <u>50</u>												Init	Concentration: <u>100</u>												Init	Concentration:												Init					
	A	B	C	D	E	F	G	H	I	J	A	B		C	D	E	F	G	H	I	J	A	B	C	D		E	F	G	H	I	J												
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC																				
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW																				
3	✓	✓	3	✓	✓	✓	✓	✓	3	4	✓	EMM	✓	4	3	3	✓	3	✓	✓	✓	✓	✓	EMM																				
4	5	4	✓	4	3	3	✓	2	✓	✓	✓	EMM	4	✓	✓	✓	3	✓	3	2	3	3	✓	EMM																				
5	5	6	7	6	4	5	6	7	5	5	✓	JW	6	7	6	7	7	6	7	3	6	5	✓	JW																				
6	7	✓	6	✓	✓	✓	6	✓	7	6	✓	CL	8	9	9	6	9	9	7	8	6	✓	CL																					
7																																												
8																																												
Total	17	10	16	10	7	8	14	9	15	15	JW	18	20	18	16	19	18	17	13	15	8	JW																						

Notes: X = mortality.

Sample Description: clear, unfiltered 25% (V/V) DAY 5, REP A : 8

Comments: Total # Young only based on the first 3 broods. Fourth and subsequent broods not included in total count.

Reviewed by: JBC

Date reviewed: Jan. 7/15

CETIS Analytical Report

Report Date: 16 Dec-14 10:03 (p 1 of 2)
 Test Code: 14927e | 05-1811-9494

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 15-0401-2385	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 16 Dec-14 10:02	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 17-2401-4825	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Percy
Start Date: 26 Nov-14 12:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 02 Dec-14 15:20	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 3h	Source: In-House Culture	Age: <24h
Sample ID: 08-7335-7798	Code: 340E61E6	Client: Mount Polley
Sample Date: 25 Nov-14 11:40	Material: Water Sample	Project:
Receive Date: 26 Nov-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h	Station: QUL-66-0m-141125	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1595321	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	0	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

QA: *JG*
 -Jan. 7/1

CETIS Analytical Report

Report Date: 16 Dec-14 10:03 (p 2 of 2)
 Test Code: 14927e | 05-1811-9494

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

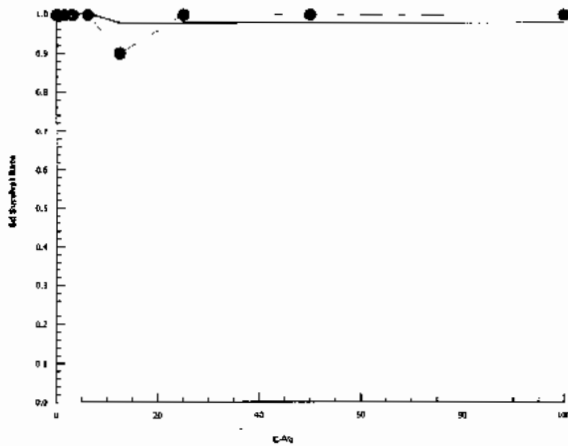
Analysis ID: 15-0401-2385 Endpoint: 6d Survival Rate
 Analyzed: 16 Dec-14 10:02 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 16 Dec-14 10:03 (p 1 of 2)
 Test Code: 14927e | 05-1811-9494

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 05-2697-4260	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 16 Dec-14 10:03	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 17-2401-4825	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 26 Nov-14 12:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 02 Dec-14 15:20	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 3h	Source: In-House Culture	Age: <24h
Sample ID: 08-7335-7798	Code: 340E61E6	Client: Mount Polley
Sample Date: 25 Nov-14 11:40	Material: Water Sample	Project:
Receive Date: 26 Nov-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h	Station: QUL-66-0m-141125	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	350575	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	5.046	0.4841	8.228	19.82	12.15	206.6
IC10	7.817	1.203	12.12	12.79	8.254	83.16
IC15	10.29	6.048	26.76	9.715	3.737	16.53
IC20	16.26	8.319	32.26	6.15	3.1	12.02
IC25	29.27	10.87	40.18	3.417	2.489	9.203
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	21.5	17	26	0.8596	2.718	12.64%	0.0%
1.56		10	20.6	12	27	1.536	4.858	23.58%	4.19%
3.12		10	21.2	17	25	0.9165	2.898	13.67%	1.4%
6.25		10	20.2	16	23	0.6464	2.044	10.12%	6.05%
12.5		10	17.5	9	22	1.108	3.504	20.02%	18.6%
25		10	16.7	9	23	1.476	4.668	27.95%	22.33%
50		10	12.1	7	17	1.159	3.665	30.29%	43.72%
100		10	16.2	8	20	1.114	3.521	21.74%	24.65%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	17	26	23	23	22	20	24	19	19	22
1.56		24	27	21	13	24	12	23	22	18	22
3.12		25	17	18	21	23	22	22	17	23	24
6.25		20	20	20	22	21	20	18	22	23	16
12.5		22	19	17	17	15	19	19	9	19	19
25		20	23	18	22	19	16	15	10	15	9
50		17	10	16	10	7	8	14	9	15	15
100		18	20	18	16	19	18	17	13	15	8

CETIS Analytical Report

Report Date: 16 Dec-14 10:03 (p 2 of 2)
Test Code: 14927e | 05-1811-9494

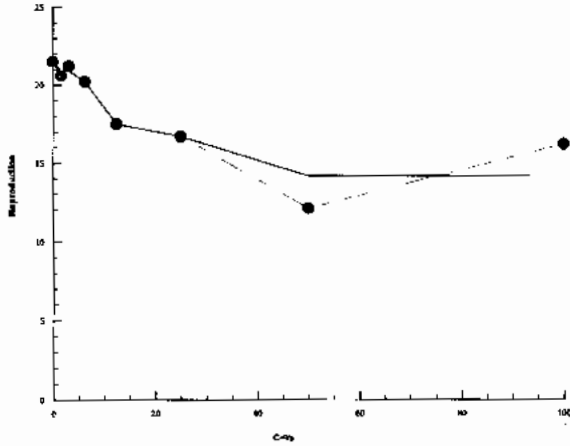
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 05-2697-4260 Endpoint: Reproduction
Analyzed: 16 Dec-14 10:03 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Ceriodaphnia dubia Summary Sheet

Client: Mount Polley
 Work Order No.: 14927

Start Date/Time: Nov 26/14 @ 1200h
 Set up by: EMM

Sample Information:

Sample ID: QUL-66-0m-141125 (Filtered)
 Sample Date: Nov 25/14
 Date Received: Nov 26/14
 Sample Volume: 15 x 1 L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 11214B
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 36
 Mortality (%) in previous 7 d: 5
 Individual female # used ≥ 8 young on test day: 21-26, 28-39

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd120
 Stock Solution ID: 14Na02
 Date Initiated: Nov 19/14

7-d LC50 (95% CL): 1.8 (1.6-2.2) g/L NaCl
 7-d IC50 (95% CL): 1.2 (0.9-1.5) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.9 (1.5-2.4) g/L NaCl CV (%): 12
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-2.0) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		7100
IC50 % (v/v) (95% CL)		7100

Reviewed by: JGU

Date reviewed: Jan 7/15

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Polley Start Date & Time: NOV 26/14 @ 12:00
 Sample ID: QML-665-0m-141125 filtered Stop Date & Time: Dec 2/14 @ 13:40
 Work Order #: 14927 Test Species: Ceriodaphnia dubia

Concentration	Days							Final
	0	1	2	3	4	5	6	
<u>control</u>								
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.0
DO (mg/L)	8.1	7.6	8.1	7.7	8.2	7.9	8.1	7.6
pH	8.1	7.6	7.8	7.7	8.0	7.7	7.8	8.1
Cond. (µS/cm)	219	220	221	219	220	219	220	225
Initials	EMM	EMM	EMM	YML	EMM	EMM	EMM	EL

Concentration	Days							Final
	0	1	2	3	4	5	6	
<u>1.56% (v/v)</u>								
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.0
DO (mg/L)	8.2	7.6	8.1	7.7	7.8	7.9	8.1	7.7
pH	8.0	7.8	8.0	7.7	8.0	7.7	7.8	7.9
Cond. (µS/cm)	217	218	229	217	220	218	218	214
Initials	EMM	EMM	EMM	YML	EMM	EMM	EMM	EL

Concentration	Days							Final
	0	1	2	3	4	5	6	
<u>12.5% (v/v)</u>								
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.0
DO (mg/L)	8.2	7.6	8.1	7.7	7.9	7.7	8.2	7.7
pH	7.9	7.7	7.8	7.7	7.6	7.7	7.8	8.0
Cond. (µS/cm)	208	210	216	206	209	209	209	203
Initials	EMM	EMM	EMM	YML	EMM	EMM	EMM	EL

Concentration	Days							Final
	0	1	2	3	4	5	6	
<u>100% (v/v) filtered</u>								
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.0
DO (mg/L)	8.2	7.6	8.1	7.8	7.9	7.6	8.3	7.6
pH	7.3	7.5	7.4	7.5	7.3	7.5	7.3	7.5
Cond. (µS/cm)	119	120	122	122	121	123	123	124
Initials	EMM	EMM	EMM	YML	EMM	EMM	EMM	EL

	Control	<u>100% (v/v) filtered</u>
Hardness*	102	58
Alkalinity*	86	46

Analysts: EMM, EL, AUD
 Reviewed by: JLB
 Date reviewed: Jan 7/15

* mg/L as CaCO3
 WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5
 Sample Description: clear, sample filtered through 0.45µm filter paper
 Comments: Broodboard Used: 111214B (lit # 21, 26, 28, 39)

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt. Palley
 Sample ID: QUL 65 5m - 14175 filtered
 Work Order: 14927

Start Date & Time: NOV 26/14 @ 1200
 Stop Date & Time: Dec 2/14 @ 1340
 Set up by: EMM

%(CLV)

Days	Concentration: <u>control</u>												Concentration: <u>1.56</u>												Concentration: <u>3.12</u>											
	A	B	C	D	E	F	G	H	I	J	Ink	A	B	C	D	E	F	G	H	I	J	Ink	A	B	C	D	E	F	G	H	I	J	Ink			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EL	
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	
3		3	3	3	✓	3	3	3	3	3	A	3	3	✓	3	3	✓	3	✓	3	3	✓	A	2	3	✓	3	X	✓	✓	✓	✓	3	3	A	
4	3	✓	✓	✓	4	✓	✓	✓	✓	✓	EMM	✓	✓	3	✓	✓	3	✓	4	✓	✓	✓	EMM	✓	✓	4	✓	✓	4	3	4	✓	✓	✓	EMM	
5	8	9	9	8	7	8	8	7	8	7	JW	9	8	7	8	8	10	9	7	10	9	JW	9	7	9	8		8	8	8	11	9	JW			
6	7	10	10	9	✓	11	7	6	8	10	CL	8	8	✓	10	11	✓	10	11	11	7	CL	11	8	8	10		11	11	9	10	10	CL			
7																																				
8		22																																		
Total	18	21	22	20	11	22	18	16	19	20	JW	20	19	10	21	22	13	22	22	24	19	JW	23	18	21	21	OK	23	22	21	24	22	JW			

Days	Concentration: <u>6.25</u>												Concentration: <u>12.5</u>												Concentration: <u>25</u>											
	A	B	C	D	E	F	G	H	I	J	Ink	A	B	C	D	E	F	G	H	I	J	Ink	A	B	C	D	E	F	G	H	I	J	Ink			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EL	
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	
3		3	3	3	3	3	3	3	3	3	A	3	2	3	3	X	3	✓	3	3	3	✓	A	3	3	✓	3	3	3	3	2	✓	✓	✓	A	
4	4	3	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	4	✓	✓	✓	✓	✓	3	4	EMM		
5	9	11	8	7	7	7	9	7	11	8	JW	10	10	9	9		8	9	11	8	7	JW	9	11	9	8	8	10	10	7	8	9	JW			
6	11	11	8	10	12	✓	8	9	13	11	CL	11	12	10	11		12	10	8	11	10	CL	8	10		9	10	14	13	10	10	10	CL			
7																																				
8																																				
Total	24	25	19	20	22	10	20	19	27	22	JW	24	24	22	23	OK	23	21	22	22	20	JW	19	24	13	20	21	27	26	19	21	23	JW			

Days	Concentration: <u>50</u>												Concentration: <u>100</u>												Concentration:											
	A	B	C	D	E	F	G	H	I	J	Ink	A	B	C	D	E	F	G	H	I	J	Ink	A	B	C	D	E	F	G	H	I	J	Ink			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EL													
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW													
3		2	3	3	3	✓	3	3	X	3	A	✓	2	3	3	3	2	3	3	3	3	A														
4	3	✓	✓	✓	✓	4	✓	✓	✓	✓	EMM	3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM													
5	5	8	10	9	5	9	9	10		8	JW	10	10	9	9	9	9	9	9	10	1	JW														
6	8	12	✓	11	13	12	8	12		9	CL	12	11	13	10	9	13	13	11	15	✓	CL														
7																																				
8																																				
Total	16	22	13	23	21	25	20	25	OK	20	JW	25	23	25	22	21	24	25	23	28	4	JW														

Notes: X = mortality.

Sample Description: clear, filtered sample through 0.45um

Comments: Total # Young only based on the first 3 broods. Fourth and subsequent broods not included in total count.

Reviewed by: JW

Date reviewed: Jan. 7/15

CETIS Analytical Report

Report Date: 16 Dec-14 10:07 (p 1 of 2)
 Test Code: 14927f | 09-7124-4634

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 05-4501-2511	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 16 Dec-14 10:07	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 05-0352-5882	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Percy
Start Date: 26 Nov-14 12:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 02 Dec-14 13:40	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 2h	Source: In-House Culture	Age: <24h
Sample ID: 07-1307-4463	Code: 2A80A71F	Client: Mount Polley
Sample Date: 25 Nov-14 11:40	Material: Water Sample	Project:
Receive Date: 26 Nov-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h	Station: QUL-66-0m-141125 (filtered)	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1757046	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	6.25	2.248	N/A	16	NA	44.49
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
25		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
50		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	0	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	0	1	1	1	1	1
25		1	1	0	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	0	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 16 Dec-14 10:07 (p 2 of 2)
 Test Code: 14927f | 09-7124-4634

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

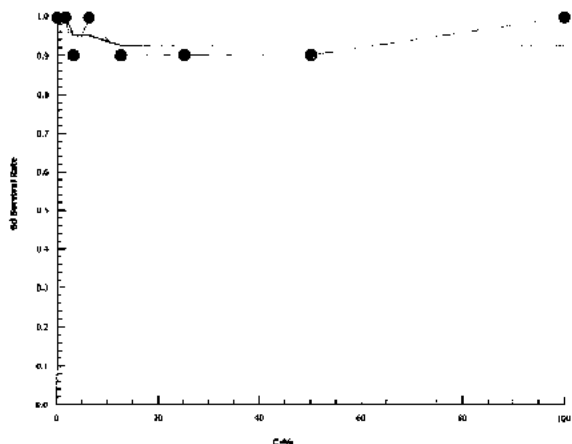
Analysis ID: 05-4501-2511 Endpoint: 6d Survival Rate
 Analyzed: 16 Dec-14 10:07 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 16 Dec-14 10:08 (p 1 of 2)
 Test Code: 14927f | 09-7124-4634

Ceriodaphnia 7-d Survival and Reproduction Test			Nautilus Environmental		
Analysis ID: 00-4212-6563	Endpoint: Reproduction	CETIS Version: CETISv1.8.7	Analyst: Krysta Percy	Official Results: Yes	
Analyzed: 16 Dec-14 10:07	Analysis: Linear Interpolation (ICPIN)		Diluent: 20% Perrier Water		
Batch ID: 05-0352-5882	Test Type: Reproduction-Survival (7d)		Brine:		
Start Date: 26 Nov-14 12:00	Protocol: EC/EPS 1/RM/21		Age: <24h		
Ending Date: 02 Dec-14 13:40	Species: Ceriodaphnia dubia				
Duration: 6d 2h	Source: In-House Culture				
Sample ID: 07-1307-4463	Code: 2A80A71F	Client: Mount Polley			
Sample Date: 25 Nov-14 11:40	Material: Water Sample	Project:			
Receive Date: 26 Nov-14 09:05	Source: Mount Polley (MT POLLEY)				
Sample Age: 24h	Station: QUL-66-0m-141125 (filtered)				

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1549095	200	Yes	Two-Point Interpolation

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	18.8	11	22	1.073	3.393	18.05%	0.0%
1.56		10	19.2	10	24	1.389	4.392	22.87%	-2.13%
3.12		10	19.5	0	24	2.227	7.044	36.12%	-3.72%
6.25		10	20.8	10	27	1.467	4.638	22.3%	-10.64%
12.5		10	20.1	0	24	2.268	7.172	35.68%	-6.92%
25		10	21.3	13	27	1.274	4.029	18.92%	-13.3%
50		10	18.5	0	25	2.372	7.502	40.55%	1.6%
100		10	22	4	28	2.092	6.616	30.07%	-17.02%

Reproduction Detail											
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	18	22	22	20	11	22	18	16	19	20
1.56		20	19	10	21	22	13	22	22	24	19
3.12		23	18	21	21	0	23	22	21	24	22
6.25		24	25	19	20	22	10	20	19	27	22
12.5		24	24	22	23	0	23	21	22	22	20
25		19	24	13	20	21	27	26	19	21	23
50		16	22	13	23	21	25	20	25	0	20
100		25	23	25	22	21	24	25	23	28	4

CETIS Analytical Report

Report Date: 16 Dec-14 10:08 (p 2 of 2)
Test Code: 14927f | 09-7124-4634

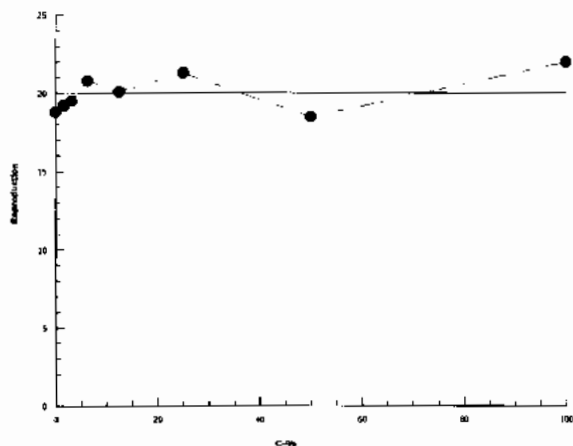
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 00-4212-6563 Endpoint: Reproduction
Analyzed: 16 Dec-14 10:07 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Ceriodaphnia dubia Summary Sheet

Client: Mount Polley
 Work Order No.: 14927

Start Date/Time: Nov 26/14 @ 1230h
 Set up by: EMM

Sample Information:

Sample ID: QUL-66-20m-141125
 Sample Date: Nov 25/14
 Date Received: Nov 26/14
 Sample Volume: 1x 20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 111814
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 21
 Mortality (%) in previous 7 d: 0
 Individual female # used ≥ 8 young on test day: 1-10

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd120
 Stock Solution ID: 14Na02
 Date Initiated: Nov 19/14

7-d LC50 (95% CL): 1.8 (1.6-2.2) g/L NaCl
 7-d IC50 (95% CL): 1.2 (0.9-1.5) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.9 (1.5-2.4) g/L NaCl CV (%): 12
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-2.0) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		6.2 (3.0-32.5)
IC50 % (v/v) (95% CL)		7100

Reviewed by: JGH

Date reviewed: Jan 7/15

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Polley
 Sample ID: 011-66-20m-141125
 Work Order #: 14927

Start Date & Time: NOV 26/14 @ 1230
 Stop Date & Time: Dec 2/14 @ 1340h
 Test Species: Ceriodaphnia dubia

Concentration	Days											
	0	1	2	3	4	5	6	7				
control												
Temperature (°C)	24.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0		
DO (mg/L)	8.1	7.3	8.1	7.9	8.2	7.7	8.1	7.8	8.2	7.5	8.1	7.3
pH	8.1	7.4	7.8	7.6	8.0	7.9	7.8	7.8	8.0	7.6	8.0	7.6
Cond. (µS/cm)	219	220	221	219	220	219	220	219	219	219	213	
Initials	EMM	EMM	JW	YML	EMM	EMM	EMM	JW				

Concentration	Days											
	0	1	2	3	4	5	6	7				
1.56% (v/v)												
Temperature (°C)	24.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0		
DO (mg/L)	8.0	6.4	7.9	7.9	8.2	7.7	8.1	7.8	8.2	9.6	8.2	7.3
pH	7.7	7.5	7.8	7.6	8.0	7.7	7.8	7.7	7.9	7.6	8.0	7.6
Cond. (µS/cm)	216	218	225	217	220	219	220	219	219	214	214	
Initials	SSD	EMM	JW	YML	EMM	EMM	EMM	JW				

Concentration	Days											
	0	1	2	3	4	5	6	7				
12.5% (v/v)												
Temperature (°C)	24.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0		
DO (mg/L)	7.7	7.3	7.9	7.7	8.2	7.7	8.2	7.8	8.2	7.6	8.3	7.3
pH	7.7	7.6	7.8	7.6	8.0	7.6	7.8	7.6	7.9	7.7	7.9	7.6
Cond. (µS/cm)	205	212	216	207	209	209	210	210	210	204	204	
Initials	SSD	EMM	JW	YML	EMM	EMM	EMM	JW				

Concentration	Days											
	0	1	2	3	4	5	6	7				
(unfiltered) 100% (v/v)												
Temperature (°C)	24.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0		
DO (mg/L)	8.2	7.3	7.9	7.6	8.3	7.5	8.4	7.7	8.3	7.5	8.3	7.4
pH	7.2	7.4	7.3	7.4	7.7	7.4	7.6	7.2	7.4	7.7	7.5	7.5
Cond. (µS/cm)	119	120	125	123	121	121	122	122	122	125	125	
Initials	EMM	EMM	JW	YML	EMM	EMM	EMM	JW				

	Control	(unfiltered) 100% (v/v)
Hardness*	100	60
Alkalinity*	86	44

Analysts: EMM, EC, AUD
JUN KIP 446
 Reviewed by: JOK
 Date reviewed: Jan. 7/15

* mg/L as CaCO₃
 WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5
 Sample Description: clear, unfiltered

Comments: Broodboard Used: 111814 (H 1710)

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt. Polley
 Sample ID: QUL-66-20m-141125
 Work Order: 14927

Start Date & Time: NOV 26/14 @ 1230
 Stop Date & Time: DEC 2/14 @ 1340h
 Set up by: EMM

% (VIV)

Days	Concentration: <u>control</u>											Concentration: <u>1.56</u>											Concentration: <u>3.12</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW
3	4	4	4	4	3	4	4	4	5	4	EMM	4	4	4	4	3	3	✓	✓	3	✓	4	EMM	4	4	4	5	✓	3	4	✓	3	✓	EMM
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	4	5	✓	4	EMM	✓	✓	✓	✓	4	✓	4	✓	4	✓	EMM	
5	8	8	9	8	7	8	7	7	8	7	EMM	9	8	8	9	9	8	6	7	8	8	6	EMM	8	6	6	7	5	8	8	8	1	9	EMM
6	10	11	10	9	6	11	9	9	10	10	JW	11	11	12	11	12	11	✓	13	11	12	JW	11	13	8	10	8	10	8	9	✓	10	JW	
7																																		
8																																		
Total	22	23	23	21	17	22	20	20	22	22	JW	24	23	24	24	24	22	10	25	22	24	JW	23	23	18	22	17	21	20	21	3X	23	JW	

Days	Concentration: <u>6.25</u>											Concentration: <u>12.5</u>											Concentration: <u>25</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW
3	✓	4	✓	4	✓	4	✓	3	X	4	EMM	2	4	4	✓	4	4	3	2	4	4	EMM	✓	4	3	✓	3	✓	3	4	✓	3	EMM
4	X	5	✓	4	✓	4	✓	4	✓	✓	EMM	✓	✓	✓	4	3	✓	✓	✓	✓	✓	EMM	3	✓	✓	4	✓	4	✓	✓	3	✓	EMM
5	✓	5	8	6	6	7	6	10	8	✓	EMM	7	7	6	7	8	8	6	6	6	5	EMM	7	6	7	3	6	5	5	7	5	6	EMM
6	✓	10	8	9	5	10	10	✓	8	✓	JW	8	9	10	9	✓	10	8	9	9	5	JW	7	9	8	8	8	8	7	5	8	5	JW
7																																	
8																																	
Total	18	18	21	19	19	21	20	14	19	0X	JW	17	20	20	20	11	22	18	21	17	14	JW	17	19	18	15	17	17	15	16	16	14	JW

Days	Concentration: <u>50</u>											Concentration: <u>100</u>											Concentration:										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW											
3	2	✓	3	4	✓	3	✓	✓	2	4	EMM	✓	✓	✓	✓	2	3	✓	2	2	✓	EMM											
4	✓	4	✓	✓	3	4	✓	3	3	✓	EMM	✓	3	✓	3	✓	4	✓	✓	4	✓	EMM											
5	4	7	6	5	3	2	5	5	4	6	EMM	5	3	5	5	6	7	6	8	6	5	EMM											
6	8	7	7	4	6	8	7	✓	7	6	JW	7	9	9	7	8	1	7	1	8	5	JW											
7																																	
8																																	
Total	14	18	16	13	12	14	15	8	14	14	JW	12	15	14	15	16	11	17	11	16	14	JW											

Notes: X = mortality.

Sample Description: clear unfiltered

Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JGB

Date reviewed: Jan-7/15

CETIS Analytical Report

Report Date: 16 Dec-14 09:54 (p 1 of 2)
 Test Code: 14927c | 10-1883-2333

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 08-9208-5356	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 16 Dec-14 9:53	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 16-6833-0010	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Percy
Start Date: 26 Nov-14 12:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 02 Dec-14 13:40	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 1h	Source: In-House Culture	Age: <24h
Sample ID: 00-3303-2022	Code: 1F80756	Client: Mount Polley
Sample Date: 25 Nov-14 12:10	Material: Water Sample	Project:
Receive Date: 26 Nov-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h	Station: QUL-66-20m-141125	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1228906	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
6.25		10	0.8	0	1	0.1333	0.4216	52.7%	20.0%	8	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	0	1
6.25		0	1	1	1	1	1	1	1	1	0
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

QA: *John*
Jan 7/15

CETIS Analytical Report

Report Date: 16 Dec-14 09:54 (p 2 of 2)
 Test Code: 14927c | 10-1883-2333

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 08-9208-5356
 Analyzed: 16 Dec-14 9:53

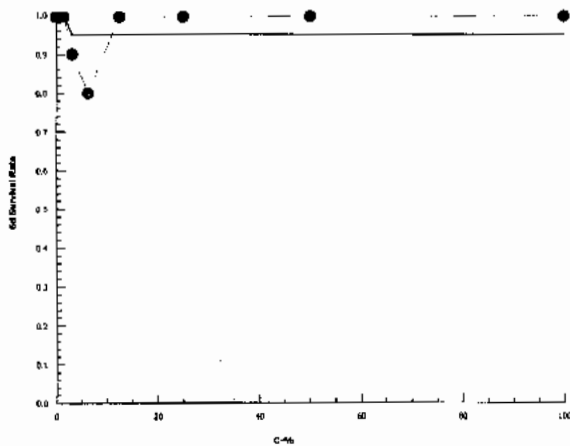
Endpoint: 6d Survival Rate
 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1
6.25		0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 16 Dec-14 09:54 (p 1 of 2)
 Test Code: 14927c | 10-1883-2333

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 11-4628-2740	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 16 Dec-14 9:54	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 16-6833-0010	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 26 Nov-14 12:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 02 Dec-14 13:40	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 1h	Source: In-House Culture	Age: <24h
Sample ID: 00-3303-2022	Code: 1F80756	Client: Mount Polley
Sample Date: 25 Nov-14 12:10	Material: Water Sample	Project:
Receive Date: 26 Nov-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h	Station: QUL-66-20m-141125	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	844058	200	Yes	Two-Point interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	2.122	0.7021	3.719	47.12	26.89	142.4
IC10	2.808	1.83	4.854	35.61	20.6	54.65
IC15	3.695	2.34	8.945	27.06	11.18	42.74
IC20	4.829	2.66	21.34	20.71	4.685	37.59
IC25	6.238	3.002	32.52	16.03	3.075	33.31
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	21.2	17	23	0.5735	1.814	8.55%	0.0%
1.56		10	22.2	10	25	1.389	4.392	19.78%	-4.72%
3.12		10	19.1	3	23	1.906	6.027	31.55%	9.91%
6.25		10	14.7	0	21	2.556	8.084	54.99%	30.66%
12.5		10	17.7	11	22	1.023	3.234	18.27%	16.51%
25		10	16.4	14	19	0.4761	1.506	9.18%	22.64%
50		10	13.8	8	18	0.8273	2.616	18.96%	34.91%
100		10	14.1	11	17	0.6741	2.132	15.12%	33.49%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	22	23	23	21	17	22	20	20	22	22
1.56		24	23	24	24	24	22	10	25	22	24
3.12		23	23	18	22	17	21	20	21	3	23
6.25		0	18	21	19	15	21	20	14	19	0
12.5		17	20	20	20	11	22	18	18	17	14
25		17	19	18	15	17	17	15	16	16	14
50		14	18	16	13	12	14	15	8	14	14
100		12	15	14	15	16	11	17	11	16	14

QA: *JGK*
Jan. 7/15

CETIS Analytical Report

Report Date: 16 Dec-14 09:54 (p 2 of 2)
Test Code: 14927c | 10-1883-2333

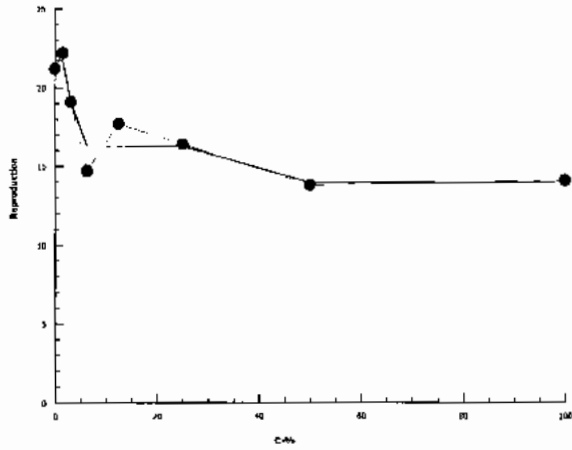
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 11-4628-2740 Endpoint: Reproduction
Analyzed: 16 Dec-14 9:54 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Ceriodaphnia dubia Summary Sheet

Client: Mount Polley
 Work Order No.: 14927

Start Date/Time: Nov 26/14 @ 1230h
 Set up by: EMM

Sample Information:

Sample ID: QUL-66-20m-141125 (Filtered)
 Sample Date: Nov 25/14
 Date Received: Nov 26/14
 Sample Volume: 1x20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 111814
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 21
 Mortality (%) in previous 7 d: 0
 Individual female # used ≥ 8 young on test day: 1-710

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd120
 Stock Solution ID: 14Na02
 Date Initiated: Nov 19/14

7-d LC50 (95% CL): 1.8 (1.16-2.2) g/L NaCl
 7-d IC50 (95% CL): 1.2 (0.9-1.5) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.9 (1.5-2.4) g/L NaCl CV (%): 12
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-2.0) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		7100
IC50 % (v/v) (95% CL)		7100

Reviewed by: JGU

Date reviewed: Jan-7/15

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Polley
 Sample ID: QUL-66-20m-141125 filtered
 Work Order #: 14927

Start Date & Time: NOV 26/14 @ 1230
 Stop Date & Time: Dec 2/14 @ 140h
 Test Species: Ceriodaphnia dubia

Concentration	Days							
	0	1	2	3	4	5	6	7
<i>control</i>								
Temperature (°C)	24.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0
DO (mg/L)	8.1	7.6	8.1	7.5	8.2	7.5	8.1	8.0
pH	8.1	7.4	7.8	7.6	8.0	7.8	7.8	8.0
Cond. (µS/cm)	219	220	221	219	220	219	216	216
Initials	EMM	EMM	JW	MM	EMM	EC	JW	

Concentration	Days							
	0	1	2	3	4	5	6	7
<i>1.56% (v/v)</i>								
Temperature (°C)	24.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0
DO (mg/L)	8.1	7.6	8.0	7.6	8.3	7.5	8.1	7.5
pH	8.0	7.6	7.8	7.6	8.0	7.7	7.8	7.7
Cond. (µS/cm)	217	220	227	217	221	221	213	213
Initials	EMM	EMM	JW	MM	EMM	EC	JW	

Concentration	Days							
	0	1	2	3	4	5	6	7
<i>12.5% (v/v)</i>								
Temperature (°C)	24.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0
DO (mg/L)	8.2	7.7	8.0	7.6	8.2	7.5	8.1	7.4
pH	7.8	7.6	7.8	7.6	8.0	7.7	7.8	7.7
Cond. (µS/cm)	205	210	216	207	209	209	202	202
Initials	EMM	EMM	JW	MM	EMM	EC	JW	

Concentration	Days							
	0	1	2	3	4	5	6	7
<i>(filtered) 100% (v/v)</i>								
Temperature (°C)	24.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0
DO (mg/L)	8.1	7.7	8.0	7.4	8.4	7.5	8.2	7.4
pH	7.7	7.5	7.4	7.4	7.7	7.4	7.6	7.5
Cond. (µS/cm)	119	119	124	123	120	123	124	124
Initials	EMM	EMM	JW	MM	EMM	EC	JW	

	Control	<i>(Filtered) 100% (v/v)</i>
Hardness*	100	60
Alkalinity*	86	44

Analysts: EMM, EC, AUD
JW, KRW, YHL
 Reviewed by: JW
 Date reviewed: Jan. 7/15

* mg/L as CaCO₃
 WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5

Sample Description: clear, sample filtered through 0.45µm filter paper

Comments: Broodboard Used: 111814 (H#1 >10)

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt. Polley
 Sample ID: QUL-66-20m-141125 Filtered
 Work Order: 14927

Start Date & Time: NOV 26/14 @ 1230
 Stop Date & Time: Dec 2/14 @ 1410 h
 Set up by: EMM

% (VIV)

Days	Concentration: <u>control</u>												Concentration: <u>1.56</u>												Concentration: <u>3.12</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW			
3	3	4	4	3	4	3	4	4	4	4	EMM	4	4	4	4	4	4	4	3	3	4	EMM	4	4	4	3	3	4	4	4	4	4	EMM			
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	4	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	4	5	EMM		
5	8	6	8	9	7	5	7	10	8	6	EC	7	8	8	7	6	9	8	7	6	7	EC	5	8	7	6	10	9	7	8	5	10	EC			
6	11	6	10	9	11	8	10	13	12	7	JW	11	10	10	12	11	12	10	11	1	12	JW	12	13	10	7	13	12	8	12	✓	10	JW			
7																																				
8																																				
Total	22	16	22	21	22	16	21	27	24	17	JW	22	22	22	23	21	25	22	21	9X	23	JW	21	25	21	16	26	25	19	24	9	25	JW			

Days	Concentration: <u>6.25</u>												Concentration: <u>12.5</u>												Concentration: <u>25</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW			
3	3	3	2	5	3	4	4	3	4	4	EMM	3	3	4	2	3	4	3	4	4	4	EMM	✓	✓	2	3	4	4	4	4	4	4	EMM			
4	✓	✓	✓	5	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	4	4	✓	✓	5	✓	✓	4	✓	✓	EMM			
5	9	7	8	9	7	6	7	8	7	8	EC	8	10	8	10	8	8	6	5	7	9	EC	5	✓	7	6	8	8	8	6	9	8	EC			
6	7	10	9	7	5	9	9	11	9	10	JW	10	8	10	9	11	8	9	11	13	10	JW	9	10	12	9	✓	12	11	6	10	10	JW			
7																																				
8																																				
Total	19	20	19	21	17	18	20	23	19	22	JW	21	21	22	21	22	20	18	20	23	23	JW	18	14	21	18	13	24	23	16	23	22	JW			

Days	Concentration: <u>50</u>												Concentration: <u>100</u>												Concentration:											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM														
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW														
3	4	4	4	3	4	4	2	4	4	4	EMM	✓	4	✓	✓	4	4	2	4	3	3	EMM														
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	3	✓	3	4	✓	✓	✓	✓	✓	✓	EMM														
5	4	7	8	8	7	8	9	7	8	9	EC	8	7	7	8	8	7	7	7	9	8	EC														
6	8	8	9	10	11	11	9	11	10	12	JW	8	11	9	9	12	8	11	10	9	11	JW														
7																																				
8																																				
Total	16	19	21	21	22	23	20	21	22	25	JW	19	22	19	21	24	19	20	21	21	22	JW														

Notes: X = mortality.

Sample Description: clear, filtered sample through 0.45um.

Comments: Total # Young only based on the first 3 broods. Fourth and subsequent broods not included in total count.

Reviewed by: JCW

Date reviewed: Jan 7/15

CETIS Analytical Report

Report Date: 16 Dec-14 09:58 (p 1 of 2)
 Test Code: 14927d | 06-3168-5894

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 07-3028-3856	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 16 Dec-14 9:58	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 16-6658-6399	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Percy
Start Date: 26 Nov-14 12:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 02 Dec-14 14:10	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 2h	Source: In-House Culture	Age: <24h
Sample ID: 04-0238-5943	Code: 17FBEC17	Client: Mount Polley
Sample Date: 25 Nov-14 12:10	Material: Water Sample	Project:
Receive Date: 26 Nov-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h	Station: QUL-66-20m-141125 (filtered)	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1881928	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	0	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 16 Dec-14 09:58 (p 2 of 2)
 Test Code: 14927d | 06-3168-5894

Ceriodaphnia 7-d Survival and Reproduction Test

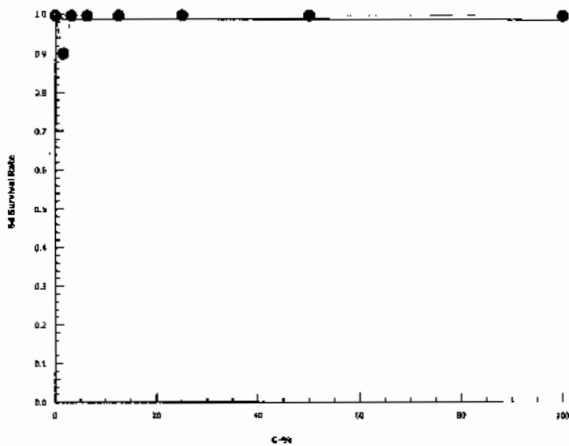
Nautilus Environmental

Analysis ID: 07-3028-3856 Endpoint: 6d Survival Rate CETIS Version: CETISv1.8.7
 Analyzed: 16 Dec-14 9:58 Analysis: Linear Interpolation (ICPIN) Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 16 Dec-14 09:58 (p 1 of 2)
 Test Code: 14927d | 06-3168-5894

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 13-5786-3822	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 16 Dec-14 9:58	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 16-6658-5399	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 26 Nov-14 12:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 02 Dec-14 14:10	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 2h	Source: In-House Culture	Age: <24h
Sample ID: 04-0238-5943	Code: 17FBEC17	Client: Mount Polley
Sample Date: 25 Nov-14 12:10	Material: Water Sample	Project:
Receive Date: 26 Nov-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h	Station: QUL-66-20m-141125 (filtered)	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1189184	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

C-%	Control Type	Count	Mean	Min	Calculated Variate				
					Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	20.8	16	27	1.123	3.553	17.08%	0.0%
1.56		10	21	9	25	1.382	4.372	20.82%	-0.96%
3.12		10	21.1	9	26	1.683	5.322	25.22%	-1.44%
6.25		10	19.8	17	23	0.5735	1.814	9.16%	4.81%
12.5		10	21.2	18	24	0.5333	1.687	7.96%	-1.92%
25		10	19.2	13	24	1.254	3.967	20.66%	7.69%
50		10	21.1	16	25	0.7667	2.424	11.49%	-1.44%
100		10	20.8	19	24	0.5121	1.619	7.79%	0.0%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	22	16	22	21	22	16	21	27	24	17
1.56		22	22	22	23	21	25	22	21	9	23
3.12		21	25	21	16	26	25	19	24	9	25
6.25		19	20	19	21	17	18	20	23	19	22
12.5		21	21	22	21	22	20	18	20	24	23
25		18	14	21	18	13	24	23	16	23	22
50		16	19	21	21	22	23	20	22	22	25
100		19	22	19	21	24	19	20	21	21	22

QA: *John*
Jan 7/15

CETIS Analytical Report

Report Date: 16 Dec-14 09:58 (p 2 of 2)
Test Code: 14927d | 06-3168-5894

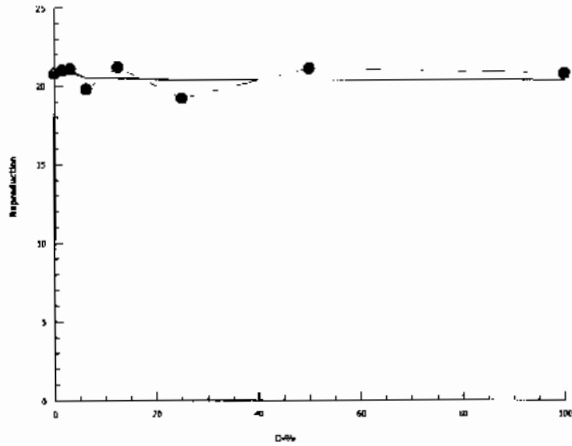
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 13-5786-3822 Endpoint: Reproduction
Analyzed: 16 Dec-14 9:58 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Ceriodaphnia dubia Summary Sheet

Client: Mount Pooley
 Work Order No.: 14927

Start Date/Time: Nov 26 11/4 @ 1300h
 Set up by: EMM

Sample Information:

Sample ID: QUL-166-45m-141125
 Sample Date: Nov 25/14
 Date Received: Nov 26/14
 Sample Volume: 1 x 20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 111214A
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 35
 Mortality (%) in previous 7 d: EMM 5 10
 Individual female # used ≥ 8 young on test day: 1-8, 10, 11, 13-17, 20

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd120
 Stock Solution ID: 14NaO2
 Date Initiated: Nov 19/14

7-d LC50 (95% CL): 1.8 (1.6-2.2) g/L NaCl
 7-d IC50 (95% CL): 1.2 (0.9-1.5) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.4 (1.5-2.4) g/L NaCl CV (%): 12
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-2.0) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		22.1 (5.4-57.7)
IC50 % (v/v) (95% CL)		7100

Reviewed by: JGh

Date reviewed: Jan. 7/15

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Polley
 Sample ID: 0111-66-45m-141125
 Work Order #: 14927

Start Date & Time: NOV 26/14 @ 1300
 Stop Date & Time: Dec 2/14 @ 1445h
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		6		7
<i>control</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	21.0	24.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	24.0		
DO (mg/L)	8.1	7.2	8.1	7.8	8.2	7.6	8.1	7.5	8.2	7.9	8.1	7.6		
pH	8.1	7.4	7.8	7.6	8.0	7.9	7.8	7.7	8.0	7.6	8.0	7.6		
Cond. (µS/cm)	214	220		221		219		220		219		218		
Initials	EMM	EMM		JW		YML		EMM		EMM		JW		

Concentration	Days													
	0	1		2		3		4		5		6		7
<i>1.5% (v/v)</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	21.0	24.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	24.0		
DO (mg/L)	8.1	7.4	7.9	7.6	8.2	7.6	8.1	7.6	8.2	7.9	8.2	7.6		
pH	7.9	7.6	7.8	7.6	7.9	7.9	7.8	7.9	8.0	7.6	8.0	7.6		
Cond. (µS/cm)	217	220		228		218		219		219		213		
Initials	EMM	EMM		JW		YML		EMM		EMM		JW		

Concentration	Days													
	0	1		2		3		4		5		6		7
<i>12.5% (v/v)</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	24.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	24.0		
DO (mg/L)	8.0	7.4	7.9	7.6	8.3	7.5	8.1	7.6	8.2	7.8	8.2	7.3		
pH	7.8	7.6	7.7	7.6	8.0	7.8	7.8	7.6	7.9	7.6	7.9	7.6		
Cond. (µS/cm)	206	211		216		207		209		209		203		
Initials	EMM	EMM		JW		YML		EMM		EMM		JW		

Concentration	Days													
	0	1		2		3		4		5		6		7
<i>(unfiltered) 100% (v/v)</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	24.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	24.0		
DO (mg/L)	7.9	7.4	7.9	7.6	8.4	7.5	8.3	7.6	8.2	7.8	8.3	7.3		
pH	7.4	7.4	7.4	7.4	7.5	7.3	7.6	7.2	7.5	7.5	7.5	7.5		
Cond. (µS/cm)	149.2	120		121		122		120		121		124		
Initials	EMM	EMM		JW		YML		EMM		EMM		JW		

	Control	<i>unfiltered 100% (v/v)</i>
Hardness*	100	62
Alkalinity*	86	44

Analysts: EMM, EC, AUD
JW, YML, YML
 Reviewed by: JW
 Date reviewed: Jan - 7/15

* mg/L as CaCO3
 WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5
 Sample Description: clear, unfiltered

Comments: Broodboard Used: 111214A (17, 8, 10, 11, 13 → 17, 20)

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt. Polley
 Sample ID: GLW-665 45m-141125
 Work Order: 14027

Start Date & Time: NOV 26/14 @ 1300
 Stop Date & Time: Dec 2/14 @ 1415h
 Set up by: EMM

% CVIV)

Days	Concentration: <u>control</u>											Concentration: <u>1.56</u>											Concentration: <u>3.12</u>												
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init		
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
3	4	4	4	4	4	4	4	4	4	4	EMM	3	4	3	4	4	4	3	4	4	4	4	EMM	3	2	4	4	4	4	4	4	4	4	4	EMM
4	4	4	✓	✓	✓	✓	✓	✓	✓	5	EMM	✓	✓	✓	✓	✓	✓	✓	5	✓	4	4	EMM	3	✓	4	4	4	4	4	4	4	4	4	EMM
5	6	7	6	8	8	7	7	7	7	6	EC	4	8	9	10	7	6	5	7	6	7	6	EC	6	8	8	7	8	8	6	8	4	7	6	EC
6	12	10	9	8	12	11	12	11	10	11	JW	10	12	13	13	12	12	10*	11	13	8	8	JW	7	10	8	12	13	8	5	12	8	12	8	JW
7																																			
8																																			
Total	22	21	19	20	24	22	23	22	21	22	JW	22	24	25	27	23	22	10*	23	23	19	JW	16	21	18	23	25	20	14	24	16	23	JW		

Days	Concentration: <u>6.25</u>											Concentration: <u>12.5</u>											Concentration: <u>25</u>												
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init		
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
3	✓	✓	3	✓	4	2	4	✓	4	4	EMM	4	3	✓	✓	4	4	4	4	4	4	4	EMM	4	4	✓	✓	✓	4	4	4	4	4	4	EMM
4	5	4	✓	3	✓	✓	✓	5	✓	✓	EMM	✓	✓	4	5	4	4	✓	✓	4	4	4	EMM	4	✓	3	4	4	4	4	✓	✓	3	4	EMM
5	6	5	6	3	6	X	5	8	5	8	EC	8	6	7	7	8	4	6	7	7	7	7	EC	6	6	6	✓	6	8	7	7	4	6	6	EC
6	9	9	10	✓	9	✓	11	12	9	11	JW	9	10	8	10	8	6	7	7	12	8	8	JW	9	9	9	8	9	10	✓	5	6	✓	6	JW
7																																			
8																																			
Total	20	18	19	6	19	2*	20	25	18	21	JW	21	19	19	22	20	14	17	18	23	19	JW	19	19	18	12	19	22	11	16	14	9	JW		

Days	Concentration: <u>50</u>											Concentration: <u>100</u>											Concentration: <u> </u>												
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init		
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EC												
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM												
3	3	4	2	✓	✓	✓	4	✓	3	✓	EMM	✓	✓	✓	✓	✓	✓	✓	3	✓	✓	✓	EMM												
4	✓	✓	✓	3	4	4	✓	4	✓	4	EMM	4	3	3	2	2	✓	4	✓	3	3	✓	EMM												
5	7	8	6	6	7	6	4	4	8	7	EC	7	8	3	6	3	3	4	6	7	7	✓	EC												
6	9	9	9	✓	9	✓	10	✓	9	✓	JW	✓	8	✓	✓	✓	5	✓	8	7	6	✓	JW												
7																																			
8																																			
Total	19	21	17	9	20	10	18	8	20	11	JW	11	19	6	8	5	8	8	17	17	13	JW													

Notes: X = mortality.

Sample Description: clear, unfiltered
 Comments: Total # Young only based on the first 3 broods. Fourth and subsequent broods not included in total count.

Reviewed by: JOB Date reviewed: Jan - 7/15

CETIS Analytical Report

Report Date: 16 Dec-14 09:42 (p 1 of 2)
 Test Code: 14927a | 10-0637-9544

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 08-0217-4651	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 16 Dec-14 9:41	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 13-2948-1504	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 26 Nov-14 13:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 02 Dec-14 14:45	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 2h	Source: In-House Culture	Age: <24h
Sample ID: 12-8259-5703	Code: 4C72DB77	Client: Mount Polley
Sample Date: 25 Nov-14 12:45	Material: Water Sample	Project:
Receive Date: 26 Nov-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h	Station: QUL-66-45m-141125	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1866641	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	0	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	0	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

QA: *JOB*
 Jan 2/15

CETIS Analytical Report

Report Date: 16 Dec-14 09:42 (p 2 of 2)
 Test Code: 14927a | 10-0637-9544

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 08-0217-4651
 Analyzed: 16 Dec-14 9:41

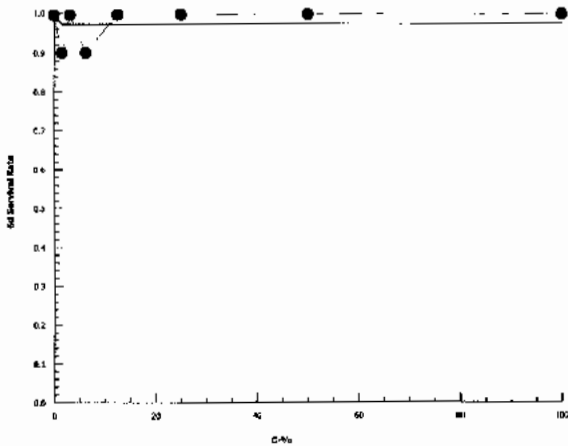
Endpoint: 6d Survival Rate
 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



QA: *JOB*
Jan-7/15

CETIS Analytical Report

Report Date: 16 Dec-14 09:42 (p 1 of 2)
 Test Code: 14927a | 10-0637-9544

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 16-3330-1880	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 16 Dec-14 9:42	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 13-2948-1504	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Percy
Start Date: 26 Nov-14 13:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 02 Dec-14 14:45	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 2h	Source: In-House Culture	Age: <24h
Sample ID: 12-8259-5703	Code: 4C72DB77	Client: Mount Polley
Sample Date: 25 Nov-14 12:45	Material: Water Sample	Project:
Receive Date: 26 Nov-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h	Station: QUL-66-45m-141125	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1911528	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	2.468	0.5325	3.998	40.51	25.01	187.8
IC10	3.705	1.349	11.5	26.99	8.694	74.15
IC15	5.393	2.68	16.39	18.54	6.1	37.32
IC20	15.48	3.937	31.55	6.458	3.17	25.4
IC25	22.13	5.397	57.68	4.519	1.734	18.53
IC40	73.57	46.29	N/A	1.359	NA	2.16
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

C-%	Control Type	Count	Mean	Calculated Variate					
				Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	21.6	19	24	0.4522	1.43	6.62%	0.0%
1.56		10	21.8	10	27	1.467	4.638	21.28%	-0.93%
3.12		10	20	14	25	1.211	3.83	19.15%	7.41%
6.25		10	16.8	2	25	2.245	7.099	42.26%	22.22%
12.5		10	19.2	14	23	0.8138	2.573	13.4%	11.11%
25		10	15.9	9	22	1.337	4.228	26.59%	26.39%
50		10	15.3	8	21	1.633	5.165	33.76%	29.17%
100		10	11.2	5	19	1.59	5.029	44.9%	48.15%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	22	21	19	20	24	22	23	22	21	22
1.56		22	24	25	27	23	22	10	23	23	19
3.12		16	21	18	23	25	20	14	24	16	23
6.25		20	18	19	6	19	2	20	25	18	21
12.5		21	19	19	22	20	14	17	18	23	19
25		19	19	18	12	19	22	11	16	14	9
50		19	21	17	9	20	10	18	8	20	11
100		11	19	6	8	5	8	8	17	17	13

QA: *Jbu*
Tan-7/15

CETIS Analytical Report

Report Date: 16 Dec-14 09:42 (p 2 of 2)

Test Code: 14927a | 10-0637-9544

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 16-3330-1880

Endpoint: Reproduction

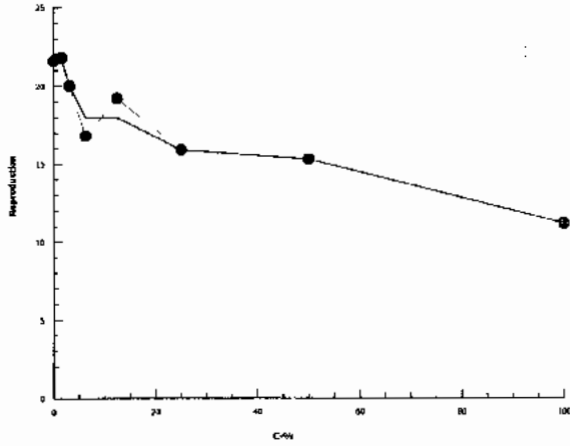
CETIS Version: CETISv1.8.7

Analyzed: 16 Dec-14 9:42

Analysis: Linear Interpolation (ICPIN)

Official Results: Yes

Graphics



Ceriodaphnia dubia Summary Sheet

Client: Mount Polley
 Work Order No.: 14927

Start Date/Time: Nov 26/14 @ 1300h
 Set up by: EMM

Sample Information:

Sample ID: QUL-66-45m-141125 (Filtered)
 Sample Date: Nov 25/14
 Date Received: Nov 26/14
 Sample Volume: 1x20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 111214A
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 35
 Mortality (%) in previous 7 d: EMM
 Individual female # used ≥ 8 young on test day: 1-8, 10, 11, 13-17, 20

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd120
 Stock Solution ID: 14NaO2
 Date initiated: Nov 19/14

7-d LC50 (95% CL): 1.8 (1.6-2.2) g/L NaCl
 7-d IC50 (95% CL): 1.2 (0.9-1.5) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.9 (1.5-2.4) g/L NaCl CV (%): 12
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-2.0) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		92.5 (43.4 - N/A)
IC50 % (v/v) (95% CL)		7100

Reviewed by: JGU

Date reviewed: Jan 7/15

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Polley
 Sample ID: QUL-66-45m-141125 Filtered
 Work Order #: 14927

Start Date & Time: NOV 26/14 @ 1300
 Stop Date & Time: Dec 2/14 @ 1445
 Test Species: Ceriodaphnia dubia

Concentration	Days						Final	7
	0	1	2	3	4	5	6	
<i>control</i>								
Temperature (°C)	24.0	24.0	24.0	25.0	24.0	25.0	24.0	24.0
DO (mg/L)	8.1	7.4	8.1	7.4	8.2	7.6	8.1	7.7
pH	8.1	7.6	7.8	7.5	8.0	7.7	7.8	7.7
Cond. (µS/cm)	219	220	221	219	220	219	223	
Initials	EMM	EMM/EC	JW	VML	EMM	EC	EC	

Concentration	Days						Final	7
	0	1	2	3	4	5	6	
<i>1.56% (V/V)</i>								
Temperature (°C)	24.0	24.0	24.0	25.0	24.0	25.0	24.0	24.0
DO (mg/L)	7.7	7.4	7.9	7.4	8.2	7.6	8.0	7.3
pH	7.9	7.6	7.9	7.4	8.0	7.8	7.8	7.7
Cond. (µS/cm)	217	219	227	219	220	217	217	
Initials	SSD	EMM/EC	JW	VML	EMM	EC	EC	

Concentration	Days						Final	7
	0	1	2	3	4	5	6	
<i>12.5% (V/V)</i>								
Temperature (°C)	24.0	24.0	24.0	25.0	24.0	25.0	24.0	24.0
DO (mg/L)	7.7	7.4	7.9	7.4	8.2	7.6	8.1	7.3
pH	7.8	7.6	7.9	7.4	8.0	7.7	7.8	7.7
Cond. (µS/cm)	207	211	216	207	210	202	202	
Initials	SSD	EMM/EC	JW	VML	EMM	EC	EC	

Concentration	Days						Final	7
	0	1	2	3	4	5	6	
<i>(Filtered) 100% (V/V)</i>								
Temperature (°C)	24.0	24.0	24.0	25.0	25.0	25.0	24.0	24.0
DO (mg/L)	7.8	7.4	7.9	7.4	8.4	7.6	8.2	7.3
pH	7.4	7.4	7.4	7.3	7.6	7.4	7.6	7.5
Cond. (µS/cm)	118	120	124	123	122	124.0	127	
Initials	EMM	EMM/EC	JW	VML	EMM	EC	EC	

	Control	<i>(Filtered) 100% (V/V)</i>
Hardness*	100	62
Alkalinity*	86	44

Analysts: EMM, EC, AND JW, VML
 Reviewed by: JR
 Date reviewed: Jan. 7/15

* mg/L as CaCO₃
 WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5
 Sample Description: clear, sample filtered through 0.45µm filter paper
 Comments: Broodboard Used: 111214A (1, 8, 10, 11, 13, 17, 20)

EC
EC
EC
EC

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt. Palley
 Sample ID: QUL-66-45M-121125-filtered
 Work Order: 14927

Start Date & Time: NOV 26/14 @ 1300
 Stop Date & Time: DEC 2/14 @ 1445
 Set up by: EMM

% (v/v)

Days	Concentration: <u>control</u>											Concentration: <u>1.56</u>											Concentration: <u>3.12</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
3	4	3	4	✓	3	4	4	4	✓	4	WML	4	4	✓	4	4	4	X	4	✓	3	WML	✓	✓	4	4	4	4	4	2	3	✓	WML
4	✓	✓	✓	3	✓	✓	✓	✓	3	✓	EMM	✓	✓	4	✓	✓	✓	✓	✓	5	✓	EMM	2	3	✓	✓	✓	✓	✓	✓	✓	3	EMM
5	7	9	8	7	7	8	5	5	7	6	JW	8	8	9	7	8	8	✓	8	6	6	JW	✓	9	6	8	6	8	8	8	8	3	JW
6	10	9	9	8	10	11	9	4	8	17	EC	10	10	10	10	11	12	✓	12	✓	10	EC	✓	9	8	12	9	9	11	10	11	5	EC
7																																	
8																																	
Total	21	21	21	18	21	23	18	13	18	27	JW	22	22	23	21	23	24	0X	24	11	19	JW	2	21	18	24	19	21	23	20	22	11	JW

Days	Concentration: <u>6.25</u>											Concentration: <u>12.5</u>											Concentration: <u>25</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
3	✓	✓	4	3	4	✓	4	4	3	4	WML	4	✓	4	4	4	4	4	4	4	4	WML	4	✓	4	4	3	✓	3	3	4	✓	WML
4	4	5	✓	✓	5	✓	✓	✓	✓	✓	EMM	✓	5	4	✓	✓	✓	✓	✓	✓	✓	EMM	✓	6	4	✓	✓	✓	3	✓	5	✓	EMM
5	8	10	9	9	7	8	7	8	9	9	JW	8	7	7	7	8	9	7	9	7	8	JW	8	9	8	10	11	8	4	9	7	8	JW
6	7	8	11	12	9	✓	11	14	12	12	EC	9	✓	9	8	11	10	11	11	10	✓	EC	11	12	✓	11	13	11	✓	10	✓	12	EC
7																																	
8																																	
Total	19	23	24	24	20	13	22	26	24	25	JW	21	12	20	19	23	23	22	24	21	12	JW	23	27	12	25	28	22	7	22	15	24	JW

Days	Concentration: <u>50</u>											Concentration: <u>100</u>											Concentration:										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
3	4	4	3	4	3	3	3	4	3	3	WML	3	3	3	✓	X	3	✓	4	✓	✓	WML											
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	X	✓	✓	4	✓	5	4	✓	4	✓	EMM											
5	8	9	7	11	5X	8	9	8	9	9	JW	✓	8	10	7	✓	8	10	7	7	✓	JW											
6	10	10	✓	11	✓	10	10	✓	10	10	EC	✓	12	13	✓	✓	12	2	✓	9	8	EC											
7																																	
8																																	
Total	22	23	10	26	8X	21	22	12	22	22	JW	31	23	26	11	0X	23	17	11	20	12	JW											

Notes: X = mortality.

Sample Description: clear, filtered sample through 0.45 um
 Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JGW

Date reviewed: Jan. 7/15

CETIS Analytical Report

Report Date: 16 Dec-14 09:49 (p 1 of 2)
 Test Code: 14927b | 13-5354-8819

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 13-0920-9743	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 16 Dec-14 9:49	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 19-7472-1199	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 26 Nov-14 13:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 02 Dec-14 14:45	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 2h	Source: In-House Culture	Age: <24h
Sample ID: 10-7207-0561	Code: 3FE67FA1	Client: Mount Polley
Sample Date: 25 Nov-14 12:45	Material: Water Sample	Project:
Receive Date: 26 Nov-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h	Station: QUL-66-45m-141125 (filtered)	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	786906	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	32.47	1.189	100	3.079	1	84.12
EC10	50	31.55	N/A	2	NA	3.17
EC15	70.77	37.95	N/A	1.413	NA	2.635
EC20	100	50	N/A	1	NA	2
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
100		10	0.8	0	1	0.1333	0.4216	52.7%	20.0%	8	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	0	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	0	1	1	1	1	1
100		0	1	1	1	0	1	1	1	1	1

QA: *Joh*
 Jan 7/15

CETIS Analytical Report

Report Date: 16 Dec-14 09:49 (p 2 of 2)
 Test Code: 14927b | 13-5354-8819

Ceriodaphnia 7-d Survival and Reproduction Test

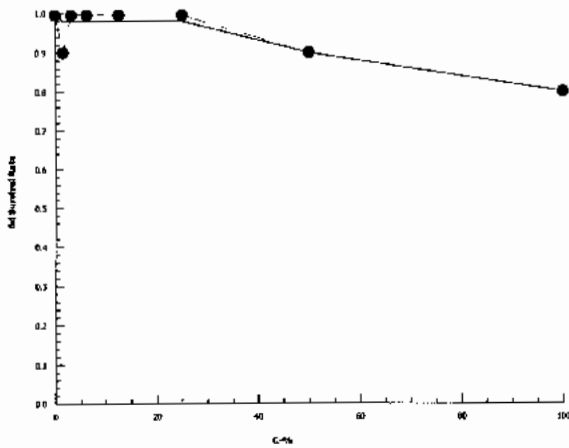
Nautilus Environmental

Analysis ID: 13-0920-9743 Endpoint: 6d Survival Rate CETIS Version: CETISv1.8.7
 Analyzed: 16 Dec-14 9:49 Analysis: Linear Interpolation (ICPIN) Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1
100		0/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 16 Dec-14 09:49 (p 1 of 2)
 Test Code: 14927b | 13-5354-8819

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 12-9172-9807	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 16 Dec-14 9:49	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 19-7472-1199	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 26 Nov-14 13:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 02 Dec-14 14:45	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 2h	Source: in-House Culture	Age: <24h
Sample ID: 10-7207-0561	Code: 3FE67FA1	Client: Mount Polley
Sample Date: 25 Nov-14 12:45	Material: Water Sample	Project:
Receive Date: 26 Nov-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h	Station: QUL-66-45m-141125 (filtered)	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1829520	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	41.13	0.48	80.68	2.431	1.239	208.3
IC10	56.24	1.19	N/A	1.778	NA	84
IC15	66.41	12.14	N/A	1.506	NA	8.239
IC20	78.39	25.88	N/A	1.276	NA	3.864
IC25	92.49	43.42	N/A	1.081	NA	2.303
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	20.1	13	27	1.169	3.695	18.38%	0.0%
1.56		10	18.9	0	24	2.424	7.666	40.56%	5.97%
3.12		10	18.1	2	24	2.121	6.707	37.06%	9.95%
6.25		10	22	13	26	1.211	3.83	17.41%	-9.45%
12.5		10	19.7	12	24	1.367	4.322	21.94%	1.99%
25		10	20.5	7	28	2.177	6.884	33.58%	-1.99%
50		10	18.8	8	26	1.988	6.286	33.44%	6.47%
100		10	14.6	0	26	2.762	8.733	59.82%	27.36%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	21	21	21	18	21	23	18	13	18	27
1.56		22	22	23	21	23	24	0	24	11	19
3.12		2	21	18	24	19	21	23	20	22	11
6.25		19	23	24	24	20	13	22	26	24	25
12.5		21	12	20	19	23	23	22	24	21	12
25		23	27	12	25	28	22	7	22	15	24
50		22	23	10	26	8	21	22	12	22	22
100		3	23	26	11	0	23	17	11	20	12

QA: JGU
 -Jan-7/14

CETIS Analytical Report

Report Date: 16 Dec-14 09:49 (p 2 of 2)
Test Code: 14927b | 13-5354-8819

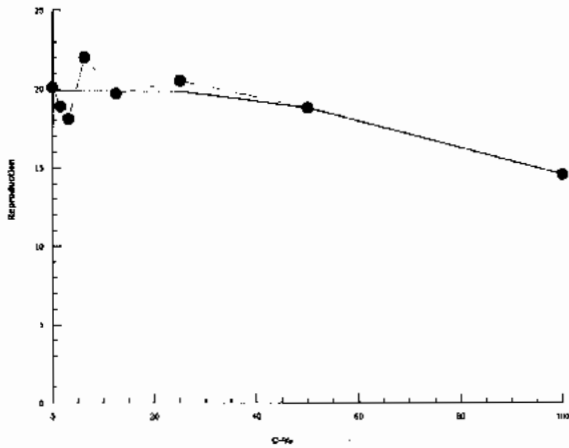
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 12-9172-9807 Endpoint: Reproduction
Analyzed: 16 Dec-14 9:49 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Client: Mt. Polley

W.O.#: 14927

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/LCaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
1 QUL-66-20 (filtered)	NOV 26/14	50	2.3	2.4	44	50	3.0	60	EC
2 QUL-66-20	↓	↓	2.3	2.4	44	↓	3.0	60	EC
3 QUL-66-45 (filtered)	↓	↓	2.3	2.4	44	↓	3.1	62	EC
4 QUL-66-45	↓	↓	2.3	2.4	44	↓	3.1	62	EC
5 QUL-66-0 (filtered)	↓	↓	2.4	2.5	44 46	↓	2.9	58	EC
6 QUL-66-0	↓	↓	2.4	2.5	46	↓	2.9	58	EC
7 QUR-1	↓	↓	2.3	2.4	44	↓	3.1	62	EC
20% perner ctrl	↓	↓	4.5	4.7	86	↓	5.0	100	EC

Notes:

Reviewed by: CJB

Date Reviewed: Jan. 7/15

APPENDIX B - Chain of Custody Form

Nautilus Environmental

Chain of Custody (electronic)

British Columbia: 8664 Commerce Court, Burnaby, BC. V5A 4N7

wo #
14928
14928

Sample Collection By: McLean Donohoe			ANALYSES REQUIRED											
Report to:			Invoice to:			7 Day Ceriodaphnia - Filtered		7 Day Ceriodaphnia - Unfiltered		RBT embryo/levin EA Test				Receipt Temperature (°C)
Company: Mount Polley Mining Corporation			Mount Polley Mining Corporation											
Address: Box 12			Box 12											
City/Prov/Postal Code: Likely BC V0L 1N0			Likely BC V0L 1N0											
Contact: Colleen Hughes			Colleen Hughes/											
Phone: (250) 790-2617			(250) 790-2617											
Email: chughes@mountpolley.com			chughes@mountpolley.com											

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS										
45 QUL-66-40m-141125	25/11/2014	12:45	water	20L	1		X	X								3.5
QUL-66-20m-141125	25/11/2014	12:10	water	20L	1		X	X								3.3
QUL-66-0m-141125	25/11/2014	11:40	water	1L	15		X	X								3.7
QUR-1-141125	25/11/2014	10:30	water	20L	6			X		X						4.5

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)		RELIQUISHED BY (COURIER)	
Client: Mount Polley Mining Corporation		Total # Containers:	23	Signature:		Signature:	
P.O. No.:		Good Condition?	Y	Print: Katie McMahan		Print:	
Shipped Via: Greyhound		Matches Schedule?	Y	Company: MPMC		Company:	
				Time/Date: 25/11/2014 15:30:00		Time/Date:	
SPECIAL INSTRUCTIONS/COMMENTS:				RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)	
				Signature:		Signature: NY	
				Print:		Print: NAIR YAMAMOTO	
				Company:		Company: NAUTILUS	
				Time/Date:		Time/Date: Nov 26/14 @ 09:05	

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 2

Toxicity testing of a sample identified as QUR-1 for the rainbow trout (*Oncorhynchus mykiss*) embryo-alevin test: Samples collected November 25 to December 22, 2014, Work Order #14928



Nautilus Environmental

Toxicity Testing of Sample QUR-1

Collected November 25 – December 22, 2014

Report date:

January 29, 2015

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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Table 2.	Results: rainbow trout embryo-alevin test.....	3
Table 3.	Reference toxicant result.	4

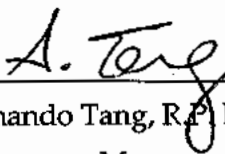
LIST OF APPENDICES

- APPENDIX A - Embryo-alevin (*Oncorhynchus mykiss*) test data
- APPENDIX B - Chain of Custody Forms

SIGNATURE PAGE



Yvonne Lam, B. Sc.
Laboratory Biologist



Armando Tang, R.F. Bio.
Laboratory Manager

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental conducted a rainbow trout (*Oncorhynchus mykiss*) embryo-alevin toxicity test for Mount Polley Mining on a sample identified as QUR-1. The initial and refresh samples were collected between November 25 to December 22, 2014 and delivered on a weekly basis to the Nautilus Environmental laboratory in Burnaby, BC. The samples were collected in 20-L plastic containers. The samples were received at temperatures ranging from 3.0 to 6.9°C and were stored at $4 \pm 2^\circ\text{C}$ in the dark prior to and during testing.

This report describes the results of the toxicity test. Copies of laboratory data sheets and printouts of statistical analyses are provided in Appendix A. The chain-of-custody forms are provided in Appendix B.

2.0 METHODS

The methodology for the early life stage embryo-alevin test is summarized in Table 1. Testing was conducted according to procedures described by Environment Canada (1998) and Canaria et al. (1999). Statistical analyses were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: rainbow trout embryo-alevin test.

Test organism	<i>Oncorhynchus mykiss</i>
Test organism source	Vancouver Island Trout Hatchery, Duncan, BC
Test organism age	<30 min post fertilization, <24 h old gametes
Test type	Static-renewal
Test duration	30 days
Test vessel	2-L plastic containers
Test solution volume	2L
Test treatments	Laboratory control, 6.25, 12.5, 25, 50, and 100% sample
Test replicates	4 test replicates per treatment
No. of organisms	30 eggs per container
Control water	Dechlorinated water (hardness 9-12 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	14 ± 1°C
Feeding	None
Light intensity	Dark (low light during solution renewals)
Photoperiod	24-h dark
Aeration	6.5 ± 1 mL/min/L
Test protocol	Environment Canada (1998), EPS 1/RM/28; Canaria et al. (1999)
Statistical software	CETIS (2013)
Test endpoint	Survival, normal alevins
Test acceptability criteria for controls	≥65% normal alevins
Reference toxicant	Sodium Dodecyl Sulphate (SDS)

3.0 RESULTS

Results of the embryo-alevin test with sample QUR-1 are provided below in Table 2. There were no adverse effects exhibited for either test endpoint, with embryo survival and normal hatched alevins in all the test treatments at >87% and >85%, respectively. Consequently, the EC25 and EC50 values for both survival and normality were >100% (v/v).

Table 2. Results: rainbow trout embryo-alevin test.

Concentration (% v/v)	Survival (%) [Mean ± SD]	Normal Alevins (%) [Mean ± SD]
Control	87.5 ± 16.2	85.0 ± 19.2
6.25	92.5 ± 7.4	92.5 ± 7.4
12.5	92.5 ± 6.9	88.3 ± 4.3
25	90.8 ± 5.7	87.5 ± 5.0
50	94.8 ± 4.6	93.2 ± 4.1
100	92.5 ± 6.3	92.5 ± 6.3
Test Endpoint	Survival (%)	Normal Alevins (%)
EC25	>100	>100
EC50	>100	>100

v/v = volume per volume, SD = Standard Deviation, EC = Effective Concentration.

4.0 QA/QC

The tests met control passing criterion of $\geq 65\%$ normal hatched alevins specified in the Environment Canada protocol (1998). Water quality parameters remained within ranges specified in the protocol and there were no deviations from the test methodology. Uncertainty associated with these tests is best described by the standard deviation around the mean and/or where applicable, the confidence interval for point estimates.

Results of the reference toxicant test conducted during the testing program are summarized in Table 3. Results for this test fell within the range for organism performance of mean and range, based on historical results obtained by the laboratory with this test. Thus, the sensitivity of the embryos used in the toxicity test and evaluated with the concurrent SDS reference toxicant test was appropriate.

Table 3. Reference toxicant result.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>O.mykiss</i> (embryo)	Viability (EC50): 2.7 mg/L SDS	3.9 (2.0 – 7.3)	37	November 26, 2014

SD = Standard Deviation, CV = Coefficient of Variation, EC = Effective Concentration.

5.0 REFERENCES

- Canaria, E.C., J.R. Elphick and H.C. Bailey. 1999. A simplified procedure for conducting small-scale short-term embryo toxicity tests with salmonids. *Environ. Toxicol.* 14:301-307.
- Environment Canada. 1998. Biological test method: toxicity tests using early life stages of salmonid fish (rainbow trout). Environmental Protection Series EPS 1/RM/28. Second Edition, July 1998. Environment Canada, Method Development and Application Section, Environmental Technology Centre, Ottawa, ON. 102 pp.
- Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.7.16 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - Embryo-alevin (*Oncorhynchus mykiss*) Test Data

Rainbow Trout Embryo Summary Sheet

Client: Mount Polley

Start Date/Time: November 26, 2014 @ 1600

Work Order No.: 14928

Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: OUR-1
 Sample Date: Nov. 25, Dec. 2, Dec. 9, Dec. 10, Dec. 16/14, Dec. 22/14
 Date Received: Nov. 26, Dec. 3, Dec. 10, Dec. 11, Dec. 17/14, Dec. 23/14
 Sample Volume: 6, 5, 6, 6, 15 x 20L, 6 x 20L
l, 5, 6, 6, 15, 6

Dilution Water:

Type: Dechlorinated Tap Water
 Hardness (mg/L CaCO₃): 9-12
 Alkalinity (mg/L CaCO₃): 7-10

Test Organism Information:

Batch No.: 112614
 Source: Vancouver Island Trout Hatchery, Duncan BC
 Loading Density: 1.04 g/L

SDS Reference Toxicant Results:

Reference Toxicant ID: RTE66
 Stock Solution ID: 14503
 Date Initiated: November 26, 2014
 7-d EC50 (95% CL): 2.7 (2.6 - 2.8 mg/L SDS)

Reference Toxicant Mean and Range: 3.9 (2.0-7.3) mg/L SDS
 Reference Toxicant CV (%): 37

Test Results:

	Sample ID - <u>OUR-1</u>	
	Survival	Normal
EC25 % (v/v) (95% CL)	>100	>100
EC50 % (v/v) (95% CL)	>100	>100

Reviewed by: JGh

Date reviewed: Jan. 27/15

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Polley
 Sample ID: QUR-1
 Work Order #: 14928

Start Date & Time: November 26, 2014 @ 16:00
 Stop Date & Time: December 26, 2014 @ 11:00
 Test Species: Oncorhynchus mykiss

Concentration Control	Days														
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6
Temperature (°C)	13.5	13.5	14.5	14.0	14.5	14.0	15.0	14.0	15.0	14.0	14.5	14.5	14.0	14.5	14.0
DO (mg/L)	10.0	9.9	9.8	9.9	9.9	9.8	9.9	9.8	9.8	9.7	9.8	9.9	9.8	9.9	9.9
pH	6.7	6.8	6.8	6.8	6.8	6.8	7.0	6.8	7.0	6.8	6.8	6.8	6.8	6.8	6.8
Cond. (µS/cm)	28	28	29			29		29		29		30			29
Initials	UWL	SSD	SSD			A		A		SSD		SSD			SSD

Concentration 6.25	Days														
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6
Temperature (°C)	13.5	13.5	14.5	14.0	14.5	14.0	15.0	14.0	15.0	14.5	14.5	14.0	14.5	14.5	
DO (mg/L)	10.1	10.0	9.8	10.0	10.1	9.8	9.8	9.8	9.8	9.9	9.8	9.8	9.9	9.9	9.9
pH	6.8	6.8	6.8	6.8	6.9	7.0	7.1	7.0	7.1	6.8	7.0	7.2	7.1	6.9	
Cond. (µS/cm)	35	35	35			34		35		36		37			36
Initials	UWL	SSD	SSD			A		A		SSD		SSD			SSD

Concentration 25	Days														
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6
Temperature (°C)	13.5	13.5	14.5	14.0	14.5	14.0	15.0	14.0	15.0	14.5	14.5	14.0	14.5	14.5	
DO (mg/L)	10.1	10.0	9.9	10.0	10.1	9.8	9.9	9.8	9.9	9.9	9.8	9.9	9.9	9.8	
pH	7.1	6.8	6.9	6.8	6.9	7.1	7.1	7.1	7.2	6.8	7.0	7.2	7.1	7.0	
Cond. (µS/cm)	52	56	51			50		51		51		51			50
Initials	UWL	SSD	SSD			A		A		SSD		SSD			SSD

Concentration 100	Days														
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6
Temperature (°C)	13.0	13.5	14.5	14.0	14.5	14.0	15.0	14.0	15.0	14.0	14.5	14.0	14.5	14.5	
DO (mg/L)	10.3	10.1	9.9	10.0	10.1	9.8	9.9	9.9	9.8	9.9	9.8	9.9	9.9	9.9	
pH	7.7	7.5	7.5	7.4	7.5	7.5	7.6	7.4	7.6	7.3	7.5	7.4	7.4	7.4	
Cond. (µS/cm)	117	117	120			118		119		126		119			118
Initials	UWL	SSD	SSD			A		A		SSD		SSD			SSD

DO meter: DO-1/3 pH meter: pH-1/3 Conductivity meter: C-1/3

	Control	100%	
Hardness*	12	66	
Alkalinity*	10	44	

Analysts: AWD, SSD, YL
 Reviewed by: JGU
 Date reviewed: Jan. 26/15

* mg/L as CaCO3

Sample Description: clear, light yellow colour no colour

Comments: _____

Chronic Freshwater Toxicity Test Water Quality Measurements

Client: Mouf Polley
 Sample ID: QUR-1
 Work Order #: 14928

Start Date & Time: November 26, 2014 @ 16:00
 Stop Date & Time: December 26, 2014 @ 11:00
 Test Species: Oncorhynchus mykiss

Concentration (4.0 v/v) Control	Days															
	7	8	9	10	11	12	13	14	7	8	9	10	11	12	13	14
Temperature (°C)	14.5	14.5	15.0	13.5	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0
DO (mg/L)	9.8	9.8	9.9	6.0	9.9	9.9	9.9	9.9	9.8	9.8	9.8	9.8	9.9	9.8	9.9	9.8
pH	6.8	6.7	6.8	6.7	6.8	6.8	7.1	6.8	7.0	6.7	6.8	6.8	6.9	6.8	6.9	6.8
Cond. (µS/cm)	✓	30		27		28		28		28		27		27		27
Initials	SSD	SSD		WML		M		M		SSD		SSD		SSD		SSD

Concentration (0.25)	Days															
	7	8	9	10	11	12	13	14	7	8	9	10	11	12	13	14
Temperature (°C)	14.5	14.5	15.0	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0
DO (mg/L)	9.9	9.8	9.9	9.3	9.8	9.9	9.7	9.7	9.9	9.9	9.8	9.9	9.9	9.8	9.9	9.8
pH	7.0	6.8	7.1	6.8	6.8	7.1	7.1	7.1	7.1	7.0	7.0	7.0	7.1	7.0	7.1	7.0
Cond. (µS/cm)	✓	36		35		35		35		33		33		32		32
Initials	SSD	SSD		WML		M		M		SSD		SSD		SSD		SSD

Concentration 25	Days															
	7	8	9	10	11	12	13	14	7	8	9	10	11	12	13	14
Temperature (°C)	14.5	14.5	15.0	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0
DO (mg/L)	9.8	9.9	9.9	9.9	9.9	9.9	9.8	9.9	9.8	9.9	9.8	9.9	9.8	9.9	9.9	9.9
pH	7.1	7.0	7.1	7.1	7.1	7.2	7.2	7.1	7.2	7.0	7.1	7.1	7.1	7.1	7.1	7.0
Cond. (µS/cm)	✓	52		54		54		55		54		53		50		50
Initials	SSD	SSD		WML		M		M		SSD		SSD		SSD		SSD

Concentration 100	Days															
	7	8	9	10	11	12	13	14	7	8	9	10	11	12	13	14
Temperature (°C)	14.5	14.5	15.0	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0
DO (mg/L)	9.9	10.0	9.9	9.6	9.8	9.8	9.8	9.9	9.9	9.8	9.9	9.8	9.9	9.8	9.9	9.9
pH	7.5	7.6	7.5	7.5	7.4	7.7	7.5	7.3	7.5	7.4	7.4	7.5	7.4	7.5	7.4	7.3
Cond. (µS/cm)	✓	119		125		126		125		126		124		124		124
Initials	SSD	SSD		WML		M		M		SSD		SSD		SSD		SSD

DO meter: 1/3 pH meter: 1/3 Conductivity meter: 1/3

	Control	100%		
Hardness*	10	62		
Alkalinity*	8	46		

Analysts: AWD, SSD, YRL

Reviewed by: JGU

Date reviewed: Jan. 26/15

Sample Description: clear, no colour

Comments: _____

Chronic Freshwater Toxicity Test Water Quality Measurements

Client: Mant Polley
 Sample ID: QUR-1
 Work Order #: 14928

Start Date & Time: November 26, 2014 @ 16:00
 Stop Date & Time: December 26, 2014 @ 11:00
 Test Species: Oncorhynchus mykiss

Concentration (% v/v) Control	Days														
	14		15		16		17		18		19		20		21
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.5	14.5	14.0	14.5	14.0	
DO (mg/L)	9.8	9.8	9.9	9.8	9.9	9.8	9.8	9.9	9.8	9.8	9.8	9.8	9.8	9.7	9.8
pH	6.9	6.7	6.8	6.7	6.8	6.8	7.0	6.9	7.0	6.7	6.8	6.7	6.8	6.8	
Cond. (µS/cm)	-	27		27		27		27		27		26		25	
Initials	SSD	SSD		SSD		m		m		SSD		SSD		SSD	

Concentration 6.25	Days														
	14		15		16		17		18		19		20		21
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	
DO (mg/L)	9.9	9.8	9.9	10.0	9.8	9.8	9.9	9.8	9.9	9.8	9.9	9.8	9.9	9.8	9.9
pH	7.1	6.8	7.0	6.7	6.8	7.0	7.0	7.0	7.1	6.9	7.0	6.8	6.9	6.8	
Cond. (µS/cm)	-	33		32		35		36		30		34		30	
Initials	SSD	SSD		SSD		m		m		SSD		SSD		SSD	

Concentration 25	Days														
	14		15		16		17		18		19		20		21
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	
DO (mg/L)	9.9	9.9	9.8	9.9	9.9	9.8	9.8	9.9	9.8	9.8	9.8	9.9	9.8	9.9	
pH	7.1	6.9	7.1	6.9	7.0	7.0	7.1	7.1	7.1	7.0	7.1	6.9	7.0	6.9	
Cond. (µS/cm)	-	51		54		55		56		52		52		52	
Initials	SSD	SSD		SSD		m		m		SSD		SSD		SSD	

Concentration 100	Days														
	14		15		16		17		18		19		20		21
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	
DO (mg/L)	9.9	9.9	9.9	10.0	9.9	9.9	9.9	9.8	9.8	9.8	9.9	9.8	9.8	9.9	
pH	7.5	7.5	7.4	7.4	7.5	7.4	7.5	7.5	7.4	7.4	7.4	7.5	7.4	7.5	
Cond. (µS/cm)	-	126		129		126		127		127		127		126	
Initials	SSD	SSD		SSD		m		m		SSD		SSD		SSD	

DO meter: 1/3 pH meter: 1/3 Conductivity meter: 1/3

	Control	100%		
Hardness*	11	60		
Alkalinity*	9	44		

Analysts: AWD, SSD
 Reviewed by: JAU
 Date reviewed: Jan. 26/15

* mg/L as CaCO₃

Sample Description: clear, no colour

Comments: _____

Chronic Freshwater Toxicity Test Water Quality Measurements

Client: Mt. Polley
 Sample ID: DUR-1
 Work Order #: 14928

Start Date & Time: November 26, 2014 @ 16:00
 Stop Date & Time: December 26, 2014 @ 11:00
 Test Species: Oncorhynchus mykiss

Concentration (% v/v) Control	Days														
	21		22		23		24		25		26		27		28
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	
Temperature (°C)	14.5	14.0	14.5	13.5	14.5	14.0	14.0	14.0	14.0	14.5	14.5	14.0	14.5	14.5	
DO (mg/L)	9.8	9.9	9.8	9.9	9.9	10.1	9.8	10.1	9.7	9.9	9.8	9.9	9.7	9.9	
pH	6.7	6.8	6.7	6.8	6.8	6.8	7.0	6.8	7.0	6.8	6.0	6.8	6.7	6.7	
Cond. (µS/cm)	/	26		25		26		26		25		25		25	
Initials	SSD	SSD		SSD		A		A		SSD		SSD		UML	

Concentration 6-25	Days														
	21		22		23		24		25		26		27		28
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	
Temperature (°C)	14.5	14.0	14.5	14.0	14.5	14.0	14.0	14.0	14.0	14.5	14.5	14.0	14.5	14.0	
DO (mg/L)	9.9	9.9	9.8	9.9	9.8	10.1	9.9	10.1	9.8	9.9	9.9	9.9	9.8	10.0	
pH	7.1	6.8	6.9	6.8	6.8	6.8	7.0	6.8	7.0	6.8	6.8	6.8	6.7	6.8	
Cond. (µS/cm)	/	31		30		26.9		26.9		30		31		32	
Initials	SSD	SSD		SSD		A		A		SSD		SSD		UML	

Concentration 25	Days														
	21		22		23		24		25		26		27		28
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	
Temperature (°C)	14.5	14.0	14.5	14.0	14.5	14.0	14.0	14.0	14.0	14.5	14.5	14.0	14.5	14.0	
DO (mg/L)	9.9	9.8	9.8	9.9	9.7	10.1	9.8	10.1	9.8	10.0	9.9	9.9	9.8	10.0	
pH	7.2	6.9	7.0	7.0	6.9	6.9	7.0	6.8	7.0	7.0	6.9	6.9	6.9	7.1	
Cond. (µS/cm)	/	52		51		55		52		52		51		52	
Initials	SSD	SSD		SSD		A		A		SSD		SSD		UML	

Concentration 100	Days														
	21		22		23		24		25		26		27		28
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	
Temperature (°C)	14.5	14.0	14.5	14.5	14.5	14.0	14.0	14.0	14.0	14.5	14.5	14.0	14.5	14.0	
DO (mg/L)	9.8	9.8	9.8	9.9	9.7	10.1	10.1	10.1	9.9	10.0	9.9	10.0	9.9	10.0	
pH	7.4	7.5	7.4	7.3	7.3	7.2	7.4	7.4	7.3	7.2	7.3	7.4	7.3	7.5	
Cond. (µS/cm)	/	126		126		127		127		127		120		126	
Initials	SSD	SSD		SSD		A		A		SSD		SSD		UML	

DO meter: 113 pH meter: 113 Conductivity meter: 413

	Control	100%		
Hardness*	9	58		
Alkalinity*	7	44		

Analysts: AWD, SSD, YYL

Reviewed by: Jbb

Date reviewed: Jan. 26/15

Sample Description: clear, no colour

Comments: _____

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mr. Polley
 Sample ID: QUR-1
 Work Order #: 14928

Start Date & Time: November 26, 2014 @ 16:00
 Stop Date & Time: December 26, 2014 @ 11:00
 Test Species: Oncorhynchus mykiss

(%v/v) Concentration Control	Days							
	28	29	30	31	32	33	34	35
Temperature (°C)	14.5	14.5	14.0	14.0				
DO (mg/L)	9.9	9.8	8.7	9.1				
pH	6.7	6.6	6.7	6.7				
Cond. (µS/cm)	-	26	31					
Initials	YML	JW	JAB					

Concentration 6.25	Days							
	28	29	30	31	32	33	34	35
Temperature (°C)	14.5	14.5	14.0	14.0				
DO (mg/L)	9.8	9.9	9.0	9.2				
pH	6.8	6.8	6.7	6.8				
Cond. (µS/cm)	-	32	39					
Initials	YML	JW	JAB					

Concentration 25	Days							
	28	29	30	31	32	33	34	35
Temperature (°C)	14.5	14.5	14.5	14.0				
DO (mg/L)	9.9	9.8	9.2	8.8				
pH	6.9	6.9	6.9	7.1				
Cond. (µS/cm)	-	50	45	56				
Initials	YML	JW	JAB					

Concentration 100	Days							
	28	29	30	31	32	33	34	35
Temperature (°C)	14.5	14.5	14.5	14.0				
DO (mg/L)	9.9	9.4	9.2	9.3				
pH	7.3	7.2	7.2	7.5				
Cond. (µS/cm)	-	121	132					
Initials	YML	JW	JAB					

DO meter: DO-113 pH meter: pH-113 Conductivity meter: C-113

	Control	100%
Hardness*	9	60
Alkalinity*	7	50

Analysts: JAB, JW, YML

Reviewed by: JAB

Date reviewed: Jan-26/15

* mg/L as CaCO₃

Sample Description: clear, no colour

Comments: _____

Embryo-Alevin Toxicity Test Daily Mortality

Client: Mt. Polley
 Sample ID: QUR-1
 Work Order #: 14928

Start Date & Time: November 26, 2014 @ 1600
 Stop Date: December 26, 2014 @ 1100
 Test Species: Oncorhynchus mykiss

Concentration (% v/v)	Rep	Day of Test - No. of Mortalities							Total Dead Eggs	Total Undeveloped	Total No. Embryo	Total Exposed
		1	2	3	4	5	6	7				
Control	1	0	0	0	0	0	0	0	0			
	2								0			
	3								0			
	4						↓		0			
6.25	1							↓	1			
	2							0	0			
	3								0			
	4		↓						0			
12.5	1		↓						1			
	2		0					↓	0			
	3							↓	1			
	4							0	0			
25	1								0			
	2								0			
	3								0			
	4								0			
50	1								0			
	2								0			
	3							↓	0			
	4							↓	1			
100	1							↓	0			
	2							↓	0			
	3							↓	0			
	4	↓	↓	↓	↓	↓	↓	↓	0			
	1											
	2											
	3											
	4											
	1											
	2											
	3											
	4											
Tech Initials		SSD	SSD	A	n	SSD	SSD	SSD	WML			

Comments: _____

Reviewed by: JOU Date reviewed: Jan. 26/15

Embryo-Alevin Toxicity Test Daily Mortality

Client: Mount Polley
 Sample ID: QR-1
 Work Order #: 14928

Start Date & Time: November 26, 2014 @ 16:00
 Stop Date: December 26, 2014 @ 11:00
 Test Species: Oncorhynchus mykiss

Concentration (% v/v)	Rep	Day of Test - No. of Mortalities							Total Dead Eggs	Total Undeveloped	Total No. Embryo	Total Exposed
		8	9	10	11	12	13	14				
Control	1	0	0	0	0	0	0	0	0			
	2		1						1			
	3		0						0			
	4								0			
6.25	1				1				0			
	2				1				1			
	3				0				0			
	4								0			
12.5	1								0			
	2		1						0			
	3		2						2			
	4		0						0			
25	1		0		1				0			
	2		1		1				2			
	3		0		0				0			
	4				0				0			
50	1								0			
	2								0			
	3								0			
	4								0			
100	1								0			
	2								0			
	3								0			
	4	1	1	1	1	1	1	1	6			
	1											
	2											
	3											
	4											
Tech Initials		SSD	WML			SSD	SSD	SSD	WML			

Comments: _____

Reviewed by: Jon

Date reviewed: Jan. 26/15

Chronic Toxicity Test Daily Mortality

Client: Mt. Palmy
 Sample ID: QUR-1
 Work Order #: 14928

Start Date & Time: November 26, 2014 @ 16:00
 Stop Date: December 26, 2014 @ 11:00
 Test Species: Oncorhynchus mykiss

Treatments (% v/v)	Rep	Day of Test - No. of Mortalities							Total Dead Eggs/ Embryos Alevins	Total Undeveloped/ Unhatched Embryos	Total No. Alevins	Total Exposed
		15	16	17	18	19	20	21				
Control	1	0	0	0	0	0	0	0	0			
	2								0			
	3								0			
	4								0			
6.25	1								0			
	2								0			
	3								0			
	4								0			
12.5	1								0			
	2								0			
	3								1			
	4								0			
25	1								0			
	2								1			
	3								0			
	4								0			
50	1								0			
	2								0			
	3								0			
	4								0			
100	1								0			
	2								0			
	3								0			
	4								0			
Tech Initials	1											
	2											
	3											
	4											
Tech Initials		SSD	SSD	A	~	SSD	SSD	SSD	SSD			

Comments: _____

Reviewed by: JGU

Date reviewed: Jan. 26/15

Chronic Toxicity Test Daily Mortality

Client: Mt. Polley
 Sample ID: QUR-1
 Work Order #: 14928

Start Date & Time: November 26, 2014 16:00
 Stop Date: December 26, 2014 11:00
 Test Species: Oncorhynchus mykiss

Concentration (% v/v)	Rep	Day of Test - No. of Mortalities							Total Dead Eggs/ Embryos Alevins	Total Undeveloped/ Unhatched Embryos	Total No. Alevins	Total Exposed
		22	23	24	25	26	27	28				
Control	1	0	0	0	0	1	0	0	1			
	2					1	↓	↓	1			
	3					1	↓	↓	1			
	4					8	1	2	11			
0.25	1					0	0	0	0			
	2					1	↓	↓	1			
	3					0	↓	↓	0			
	4					5	↓	↓	5			
12.5	1					2	↓	↓	3			
	2					1	↓	↓	1			
	3					0	↓	↓	0			
	4					0	↓	↓	0			
25	1					0	↓	↓	0			
	2					0	↓	↓	2			
	3					1	0	1	2			
	4					2	↓	↓	2			
50	1					0	↓	↓	0			
	2					↓	↓	↓	2			
	3					↓	↓	↓	0			
	4					↓	↓	↓	0			
100	1		4			1	↓	↓	5			
	2		↓			0	↓	↓	1			
	3		0			0	↓	↓	1			
	4		↓			1	↓	↓	2			
	1											
	2											
	3											
	4											
	1											
	2											
	3											
	4											
Tech Initials		SSD	SSD	A	~	SSD	SSD	mm	SSD			

Comments: _____

Reviewed by: JGU

Date reviewed: Jan. 26/15

Chronic Toxicity Test Daily Mortality

Client: Mt polley
 Sample ID: OUR-1
 Work Order #: 14928

Start Date & Time: November 26, 2014 @ 16:00
 Stop Date: December 26, 2014 @ 11:00
 Test Species: Oncorhynchus mykiss

Concentration (%v/v)	Rep	Day of Test - No. of Mortalities								Total Dead Eggs/Alevins	Total Abnormal Alevins	Total Normal Alevins	Total Exposed
		29	30	31	32	33	34	35					
Control	1	0	0						0	0	29	30	
	2								0	1 ^①	28	31	
	3								0	0	28	29	
	4								0	2 ^②	17	30	
6.25	1		↓						0	0	29	30	
	2		1						1	0	27	30	
	3		0						0	0	30	30	
	4								0	0	25	30	
12.5	1								0	1 ^①	25	30	
	2								0	1 ^①	28	30	
	3								0	0	26	30	
	4		↓						0	3 ^③	27	30	
25	1		1						1	2 ^②	27	30	
	2		0						0	0	25	30	
	3	↓	↓						0	0	28	30	
	4	1	↓						1	2 ^②	25	30	
50	1	1	1						2	1 ^①	27	30	
	2	1	0						1	0	25	28	
	3	0							0	1 ^①	29	30	
	4								0	0	29	30	
100	1								0	0	25	30	
	2								0	0	29	30	
	3								0	0	29	30	
	4	↓	↓						0	0	28	30	
	1												
	2												
	3												
	4												
	1												
	2												
	3												
	4												
Tech Initials		JW	JAB						mm	JAB	JAB	mm	

Comments: ^① skeletal ^② finfold, skeletal ^③ finfold ^④ 1: skeletal 2: finfold 3: finfold + skeletal

Reviewed by: JGW

Date reviewed: Jan. 26/15

CETIS Analytical Report

Report Date: 30 Dec-14 15:52 (p 1 of 2)
 Test Code: 14928 | 20-1308-3890

Salmonid Embryo-Alevin Survival and Development Test

Nautilus Environmental

Analysis ID: 04-8978-2240	Endpoint: Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 30 Dec-14 15:51	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 17-9788-0111	Test Type: Survival-Development	Analyst: Yvonne Lam
Start Date: 26 Nov-14 16:00	Protocol: EC/EPS 1/RM/28	Diluent: Dechlorinated Tap Water
Ending Date: 26 Dec-14 11:00	Species: Oncorhynchus mykiss	Brine:
Duration: 29d 19h	Source: Vancouver Island Trout Hatchery	Age:
Sample ID: 12-7843-5699	Code: 4C336173	Client: Mount Polley
Sample Date: 25 Nov-14 10:30	Material: Effluent	Project:
Receive Date: 26 Nov-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 29h	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1186027	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	4	0.8753	0.6333	0.9667	0.08096	0.1619	18.5%	0.0%	105	120
6.25		4	0.925	0.8333	1	0.03696	0.07391	7.99%	-5.68%	111	120
12.5		4	0.925	0.8667	1	0.03436	0.06872	7.43%	-5.68%	111	120
25		4	0.9083	0.8333	0.9667	0.02846	0.05693	6.27%	-3.78%	109	120
50		4	0.9482	0.8929	1	0.02293	0.04586	4.84%	-8.34%	112	118
100		4	0.925	0.8333	0.9667	0.03155	0.0631	6.82%	-5.68%	111	120

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.9667	0.9355	0.9655	0.6333
6.25		0.9667	0.9	1	0.8333
12.5		0.8667	0.9667	0.8667	1
25		0.9667	0.8333	0.9333	0.9
50		0.9333	0.8929	1	0.9667
100		0.8333	0.9667	0.9667	0.9333

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	29/30	29/31	28/29	19/30
6.25		29/30	27/30	30/30	25/30
12.5		26/30	29/30	26/30	30/30
25		29/30	25/30	28/30	27/30
50		28/30	25/28	30/30	29/30
100		25/30	29/30	29/30	28/30

CETIS Analytical Report

Report Date: 30 Dec-14 15:52 (p 2 of 2)
Test Code: 14928 | 20-1308-3890

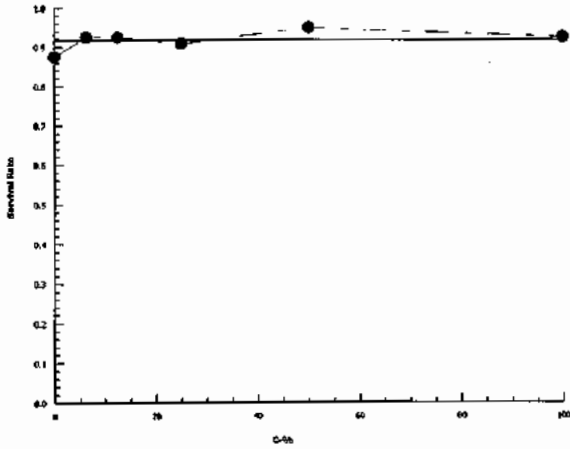
Salmonid Embryo-Alevin Survival and Development Test

Nautilus Environmental

Analysis ID: 04-8978-2240 Endpoint: Survival Rate
Analyzed: 30 Dec-14 15:51 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 30 Dec-14 15:52 (p 1 of 2)
 Test Code: 14928 | 20-1308-3890

Salmonid Embryo-Alevin Survival and Development Test

Nautilus Environmental

Analysis ID: 20-6708-2793	Endpoint: Proportion Normal	CETIS Version: CETISv1.8.7
Analyzed: 30 Dec-14 15:52	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 17-9788-0111	Test Type: Survival-Development	Analyst: Yvonne Lam
Start Date: 26 Nov-14 16:00	Protocol: EC/EPS 1/RM/28	Diluent: Dechlorinated Tap Water
Ending Date: 26 Dec-14 11:00	Species: Oncorhynchus mykiss	Brine:
Duration: 29d 19h	Source: Vancouver Island Trout Hatchery	Age:
Sample ID: 12-7843-5699	Code: 4C336173	Client: Mount Polley
Sample Date: 25 Nov-14 10:30	Material: Effluent	Project:
Receive Date: 26 Nov-14 09:05	Source: Mount Polley (MT POLLEY)	
Sample Age: 29h	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	356308	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Proportion Normal Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	4	0.8505	0.5667	0.9667	0.09577	0.1915	22.52%	0.0%	102	120
6.25		4	0.925	0.8333	1	0.03696	0.07391	7.99%	-8.76%	111	120
12.5		4	0.8833	0.8333	0.9333	0.02152	0.04303	4.87%	-3.86%	106	120
25		4	0.875	0.8333	0.9333	0.025	0.05	5.71%	-2.88%	105	120
50		4	0.9315	0.8929	0.9667	0.02033	0.04066	4.36%	-9.53%	110	118
100		4	0.925	0.8333	0.9667	0.03155	0.0631	6.82%	-8.76%	111	120

Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.9667	0.9032	0.9655	0.5667
6.25		0.9667	0.9	1	0.8333
12.5		0.8333	0.9333	0.8667	0.9
25		0.9	0.8333	0.9333	0.8333
50		0.9	0.8929	0.9667	0.9667
100		0.8333	0.9667	0.9667	0.9333

Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	29/30	28/31	28/29	17/30
6.25		29/30	27/30	30/30	25/30
12.5		25/30	28/30	26/30	27/30
25		27/30	25/30	28/30	25/30
50		27/30	25/28	29/30	29/30
100		25/30	29/30	29/30	28/30

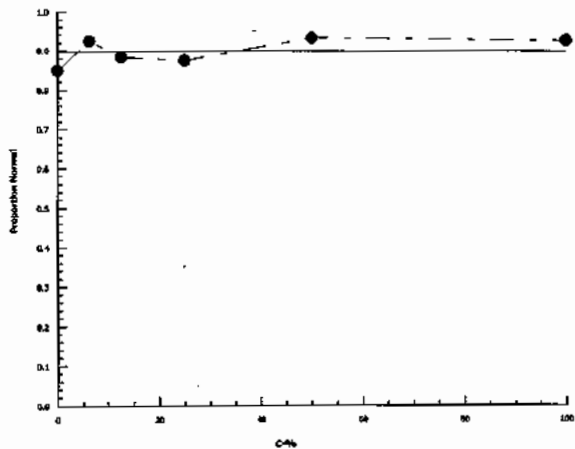
Salmonid Embryo-Alevin Survival and Development Test

Nautilus Environmental

Analysis ID: 20-6708-2793 Endpoint: Proportion Normal
Analyzed: 30 Dec-14 15:52 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Client: Mounf Polley

W.O.#: 14928

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/LCaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
QUR-1	Nov 26/14	50	2.3	2.4	44	50	3.3	66	SSD
QUR-21	Dec 3/14	50	2.4	2.5	46	50	3.1	62	SSD
QUR-31	Dec 10/14	50	2.3	2.4	44	50	3.0	60	SSD
QUR-1	Dec 17/14	50	2.3	2.4	44	50	2.9	58	SSD
QUR-1	Dec 24/14	50	2.6	2.7	50	50	3.0	60	SSD
Rechlor	Nov 26/14	100	1.1	1.2	10	100	1.2	12	YML
↓	Dec 3/14	100	0.9	1.0	8	100	1.0	10	SSD
↓	Dec 10/14	100	1.0	1.1	9	100	1.1	11	YML
↓	Dec 17/14	↓	0.8	0.9	7	↓	0.9	9	YML
↓	Dec 24/14	↓	0.8	0.9	7	↓	0.9	9	YML

Notes: _____

Reviewed by: _____

Joh

Date Reviewed: _____

Jan. 26/15

APPENDIX B - Chain of Custody Forms

Nautilus Environmental

Chain of Custody (electronic)

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

25/11/2014 Page 1 of 1

wo #
14927
14928

Sample Collection By:	McLean Donohoe	ANALYSES REQUIRED	
Report to:		7 Day Ceriodaphnia - Filtered	7 Day Ceriodaphnia - Unfiltered
Invoice to:		RBT embryo/alevin EA Test	
Company	Mount Polley Mining Corporation		
Address	Box 12		
City/Prov/Postal Code	Likely BC V0L 1N0		
Contact	Colleen Hughes		
Phone	(250) 790-2617		
Email	chughes@mountpolley.com		

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	7 Day Ceriodaphnia - Filtered	7 Day Ceriodaphnia - Unfiltered	RBT embryo/alevin EA Test	Receipt Temperature (°C)
45 QUL-66-40m-141125	25/11/2014	12:45	water	20L	1		X	X		35
QUL-66-20m-141125	25/11/2014	12:10	water	20L	1		X	X		33
QUL-66-0m-141125	25/11/2014	11:40	water	1L	15		X	X		37
QUR-1-141125	25/11/2014	10:30	water	20L	6			X	X	48

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)		RELIQUISHED BY (COURIER)	
Client: Mount Polley Mining Corporation	Total # Containers:	23	Signature:	Signature:			
P.O. No.:	Good Condition?	Y	Print: Katie McMahan	Print:			
Shipped Via: Greyhound	Matches Schedule?	Y	Company: MPMC	Company:			
SPECIAL INSTRUCTIONS/COMMENTS:			Time/Date: 25/11/2014 15:30:00	Time/Date:			
			RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)		
			Signature:	Signature: NY			
			Print:	Print: NAIR YAMAMOTO			
			Company:	Company: NAUTILUS			
			Time/Date:	Time/Date: Nov 26/14 @ 09:05			

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

WO # 14928

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

Sample Collection By: Gabriel Holmes, Fernando John							ANALYSES REQUIRED							Receipt Temperature (°C)
Report to:			Invoice to:				7 Day Ceriodaphnia - Filtered	7 Day Ceriodaphnia - Unfiltered	RBT embryo/alevin EA Test					
Company: Mount Polley Mining Corporation			Mount Polley Mining Corporation											
Address: Box 12			Box 12											
City/Prov/Postal Code: Likely BC V0L 1N0			Likely BC V0L 1N0											
Contact: Colleen Hughes			Colleen Hughes/											
Phone: (250) 790-2617			(250) 790-2617											
Email: chughes@mountpolley.com			chughes@mountpolley.com											
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS								
1 QUR-1	02/12/2014	9:51	water	20L	5	100L total			X				30	
2														
3														
4														
5														
6														
7														
8														
9														
10														
PROJECT INFORMATION			SAMPLE RECEIPT		RELIQUINSHED BY (CLIENT)			RELIQUINSHED BY (COURIER)						
Client: Mount Polley Mining Corporation			Total # Containers:	5	Signature:			Signature:						
P.O. No.:			Good Condition?	Y	Print: Gabriel Holmes			Print:						
Shipped Via: Greyhound			Matches Schedule?	Y	Company: MPMC			Company:						
					Time/Date: 02/12/2014 15:30:00			Time/Date:						
SPECIAL INSTRUCTIONS/COMMENTS:						RECEIVED BY (COURIER)			RECEIVED BY (LABORATORY)					
= refresh sample =						Signature:			Signature: NY					
						Print:			Print: NAIR YAMAMOTO					
						Company:			Company: NAUTILUS					
						Time/Date:			Time/Date: DEC 03/14 @ 09:30					

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

(09:30) NY

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

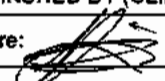
WO: 14928
#14972

Sample Collection By: Mclean Donohoe, Ira Pierce							ANALYSES REQUIRED										Receipt Temperature (°C)							
Report to:		Invoice to:					7 Day Ceriodaphnia - Filtered	7 Day Ceriodaphnia - Unfiltered	RBT embryo/alevin EA Test															
Company		Mount Polley Mining Corporation																						
Address		Box 12																						
City/Prov/Postal Code		Likely BC VOL 1N0																						
Contact		Colleen Hughes																						
Phone		(250) 790-2617																						
Email		chughes@mountpolley.com																						
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS																		
1	QUR-1	09/12/2014	9:30	water	20L	6	120L total																	6.9
2																								
3																								
4																								
5																								
6																								
7																								
8																								
9																								
10																								
PROJECT INFORMATION			SAMPLE RECEIPT			RELIQUISHED BY (CLIENT)			RELIQUISHED BY (COURIER)															
Client: Mount Polley Mining Corporation			Total # Containers:			Signature: <i>Mclean Donohoe</i>			Signature:															
P.O. No.:			Good Condition?			Print: Mclean Donohoe			Print:															
Shipped Via: Greyhound			Matches Schedule?			Company: MPMC			Company:															
						Time/Date: 09/12/2014 15:30:00			Time/Date:															
SPECIAL INSTRUCTIONS/COMMENTS:						RECEIVED BY (COURIER)			RECEIVED BY (LABORATORY)															
① save sample for both tests						Signature:			Signature: <i>Jacob Frank</i>															
						Print:			Print: Jacob Frank															
						Company:			Company: Nautilus															
						Time/Date:			Time/Date: Dec 10/14 @ 0845															

14928
 WO # 14972 ②

Sample Collection By: Shauna Litke, Fernando John			ANALYSES REQUIRED						Receipt Temperature (°C)
Report to:	Invoice to:		7 Day Ceriodaphnia - Filtered	7 Day Ceriodaphnia - Unfiltered	RBT embry/alevin EA Test				
Company: Mount Polley Mining Corporation	Mount Polley Mining Corporation								
Address: Box 12	Box 12								
City/Prov/Postal Code: Likely BC V0L 1N0	Likely BC V0L 1N0								
Contact: Colleen Hughes	Colleen Hughes/								
Phone: (250) 790-2617	(250) 790-2617								
Email: chughes@mountpolley.com	chughes@mountpolley.com								

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	7 Day Ceriodaphnia - Filtered	7 Day Ceriodaphnia - Unfiltered	RBT embry/alevin EA Test	Receipt Temperature (°C)
① QUR-1-141210	10/12/2014	12:00	water	20L	6	120L total			X	6.9

PROJECT INFORMATION	SAMPLE RECEIPT	RELIQUISHED BY (CLIENT)	RELIQUISHED BY (COURIER)
Client: Mount Polley Mining Corporation	Total # Containers: 6	Signature: 	Signature:
P.O. No.:	Good Condition? Y	Print: Shauna Litke	Print:
Shipped Via: Greyhound	Matches Schedule? Y	Company: MPMC Time/Date: 10/12/2014 15:30:00	Company: Time/Date:
SPECIAL INSTRUCTIONS/COMMENTS: 2nd EA Test ② same sample for both tests. ① Refresh of sample "QUR-1" - same station, confirmed w/ client. VMC		RECEIVED BY (COURIER)	RECEIVED BY (LABORATORY)
		Signature:	Signature: NY
		Print:	Print: NAIR YAMAMOTO
		Company:	Company: NAUTILUS
		Time/Date:	Time/Date: Dec 11/14 @ 09:15

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

Nautilus Environmental

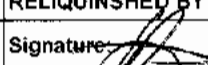
British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7


wo #
14928
14972 (2nd ext)
14983
14985
14984

Chain of Custody (electronic)

Sample Collection By: Shauna Litke, Ira Pierce			ANALYSES REQUIRED												
Report to:		Invoice to:		Refill for "November" RBT EA tes		Refill for "December" RBT EA tes		Fathead minnow survival and growth		Rainbow trout survival and growth		C. dubia survival and reproduction		Receipt Temperature (°C)	
Company	Mount Polley Mining Corporation	Mount Polley Mining Corporation													
Address	Box 12	Box 12													
City/Prov/Postal Code	Likely BC V0L 1N0	Likely BC V0L 1N0													
Contact	Colleen Hughes	Colleen Hughes/													
Phone	(250) 790-2617	(250) 790-2617													
Email	chughes@mountpolley.com	chughes@mountpolley.com													

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	Refill for "November" RBT EA tes	Refill for "December" RBT EA tes	Fathead minnow survival and growth	Rainbow trout survival and growth	C. dubia survival and reproduction							Receipt Temperature (°C)	
1 QUR-1	16/12/2014	9:15	water	20L	15	300L total	X	X	X	X	X							4.5	
2 ③ POL-4	16/12/2014	9:45	water	20L	3	60L total			X	X	X							3.9	
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)		RELIQUISHED BY (COURIER)	
Client: Mount Polley Mining Corporation		Total # Containers:	18	Signature: 		Signature:	
P.O. No.:		Good Condition?	Y	Print: Shauna Litke		Print:	
Shipped Via: Greyhound		Matches Schedule?	Y	Company: MPMC Time/Date: 16/12/2014 15:30:00		Company: Time/Date:	

SPECIAL INSTRUCTIONS/COMMENTS: ① One 20L carboy unlabelled ② QUR-1 - refresh water for NOV-EATest and DEC-EATest ③ POL-4 is replacing POL-2 - NY	RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)		
	Signature:		Signature: 		
	Print:		Print: Josh Baker		
	Company:		Company: Nautilus Env		
		Time/Date:		Time/Date: Dec 17/14 @ 0830h	

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

Sample Collection By: Gabriel Holmes, Mclean Donohoe			ANALYSES REQUIRED																	
Report to:			RBT embry/alevin EA Test (Dec)																	
Invoice to:			Receipt Temperature (°C)																	
Company	Mount Polley Mining Corporation	Mount Polley Mining Corporation																		
Address	Box 12	Box 12																		
City/Prov/Postal Code	Likely BC V0L 1N0	Likely BC V0L 1N0																		
Contact	Colleen Hughes	Colleen Hughes/																		
Phone	(250) 790-2617	(250) 790-2617																		
Email	chughes@mountpolley.com	chughes@mountpolley.com																		

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS															
1 ① QUR-1	22/12/2014	9:45	water	20L	6	100L total															3.6
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					

14928
 14972
 W04-14928
 14928

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)		RELIQUISHED BY (COURIER)	
Client: Mount Polley Mining Corporation	Total # Containers: 6	Signature: <i>Katie McMahon</i>	Signature: <i>[Signature]</i>	Signature: <i>[Signature]</i>	Signature: <i>[Signature]</i>	Signature: <i>[Signature]</i>	Signature: <i>[Signature]</i>
P.O. No.:	Good Condition? <i>yes</i>	Print: Katie McMahon	Print: <i>[Signature]</i>	Print: <i>[Signature]</i>	Print: <i>[Signature]</i>	Print: <i>[Signature]</i>	Print: <i>[Signature]</i>
Shipped Via: Greyhound	Matches Schedule? <i>yes.</i>	Company: MPMC	Company: <i>[Signature]</i>	Company: <i>[Signature]</i>	Company: <i>[Signature]</i>	Company: <i>[Signature]</i>	Company: <i>[Signature]</i>
SPECIAL INSTRUCTIONS/COMMENTS: For the December test that is currently running. <i>(2nd test) joy</i>		RECEIVED BY (CLIENT)		RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)	
① refresh sample <i>for both tests</i> - with 14928 14972 (2 EA tests).		Signature:		Signature: <i>[Signature]</i>		Signature: <i>[Signature]</i>	
		Print:		Print: <i>[Signature]</i>		Print: <i>Emma Mann</i>	
		Company:		Company: <i>[Signature]</i>		Company: <i>Nautilus Environmental</i>	
		Time/Date:		Time/Date: <i>[Signature]</i>		Time/Date: <i>Dec 23/14 @ 840h</i>	

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 3

Toxicity testing of a sample identified as QUR-1 for the rainbow trout (*Oncorhynchus mykiss*) embryo-alevin test: Samples collected December 10, 2014 to January 7, 2015, Work Order #14972



Nautilus Environmental

Toxicity testing of sample QUR-1

**Rainbow trout (*Oncorhynchus mykiss*) embryo-alevin
test**

Collected December 10, 2014 – January 7, 2015

Report date:
February 5, 2015

Submitted to:

Mount Polley Mining Corporation
Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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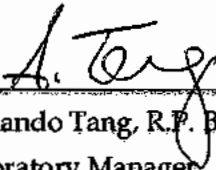
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- APPENDIX A – Embryo-alevin (*Oncorhynchus mykiss*) Test Data
- APPENDIX B – Chain of Custody Forms

SIGNATURE PAGE



Yvonne Lam, B. Sc.
Laboratory Biologist



Armando Tang, R.P. Bio.
Laboratory Manager

This report has been prepared by Nautilus Environmental Company Inc, based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental conducted a rainbow trout (*Oncorhynchus mykiss*) embryo-alevin toxicity test for Mount Polley Mining on a sample identified as QUR-1. The initial and refresh samples were collected between December 10, 2014 to January 7, 2015 and delivered on a weekly basis to the Nautilus Environmental laboratory in Burnaby, BC. The samples were collected in 20-L plastic containers. The samples were received at temperatures ranging from 2.0 to 6.9°C and were stored at $4 \pm 2^\circ\text{C}$ in the dark prior to testing.

This report describes the results of the toxicity test. Copies of laboratory data sheets and printouts of statistical analyses are provided in Appendix A. The chain-of-custody forms are provided in Appendix B.

2.0 METHODS

The methodology for the early life stage embryo-alevin test is summarized in Table 1. Testing was conducted according to procedures described by Environment Canada (1998) and Canaria et al. (1999). Statistical analyses were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: rainbow trout embryo-alevin test.

Test organism	<i>Oncorhynchus mykiss</i>
Test organism source	Vancouver Island Trout Hatchery, Duncan, BC
Test organism age	<30 min post fertilization, <24 h old gametes
Test type	Static-renewal
Test duration	30 days
Test vessel	2-L plastic containers
Test solution volume	2-L
Test treatments	Laboratory control, 6.25, 12.5, 25, 50, and 100% sample
Test replicates	4 test replicates per treatment
No. of organisms	30 eggs per container
Control water	Dechlorinated water (hardness 9-11 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	14 ± 1°C
Feeding	None
Light intensity	Dark (low light during solution renewals)
Photoperiod	24-h dark
Aeration	6.5 ± 1 mL/min/L
Test protocol	Environment Canada (1998), EPS 1/RM/28; Canaria et al. (1999)
Statistical software	CETIS (2013)
Test endpoint	Survival, normal alevins
Test acceptability criteria for controls	≥65% normal live alevins
Reference toxicant	Sodium Dodecyl Sulphate (SDS)

3.0 RESULTS

Results of the embryo-alevin test with sample QUR-1 are provided below in Table 2. There were no adverse effects exhibited for either test endpoint, with survival and normal hatched alevins in all the test treatments at $\geq 80\%$ and $>61\%$, respectively. Consequently, the EC25 and EC50 values for both survival and normal hatched alevins were $>100\%$ (v/v).

Table 2. Results: rainbow trout embryo-alevin test.

Concentration (% v/v)	Survival (%) [Mean \pm SD]	Normal Alevins (%) [Mean \pm SD]
Control	89.2 \pm 9.2	75.0 \pm 11.1
6.25	86.7 \pm 2.7	71.7 \pm 5.8
12.5	80.0 \pm 8.2	61.7 \pm 7.9
25	84.2 \pm 15.0	71.7 \pm 15.5
50	87.5 \pm 8.3	66.7 \pm 9.4
100	80.8 \pm 18.1	62.5 \pm 16.4
Test endpoint	Survival (%)	Normal (%)
EC25	>100	>100
EC50	>100	>100

v/v = volume per volume, SD = Standard Deviation, EC = Effective Concentration.

4.0 QA/QC

The tests met control passing criterion of $\geq 65\%$ normal hatched alevins specified in the Environment Canada protocol (1998). Water quality parameters remained within ranges specified in the protocol and there were no deviations from the test methodology. Uncertainty associated with these tests is best described by the standard deviation around the mean and/or where applicable, the confidence interval for point estimates.

Results of the reference toxicant test conducted during the testing program are summarized in Table 3. Results for this test fell within the range for organism performance of mean and range, based on historical results obtained by the laboratory with this test. Thus, the sensitivity of the embryos used in the toxicity tests and evaluated with the concurrent SDS reference toxicant test was appropriate.

Table 3. Reference toxicant result.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>O.mykiss</i> (embryo)	Viability (EC50): 5.6 mg/L SDS	3.9 (2.1 - 7.1)	35	December 11, 2014

SD = Standard Deviation, CV = Coefficient of Variation, EC = Effective Concentration.

5.0 REFERENCES

- Canaria, E.C., J.R. Elphick and H.C. Bailey. 1999. A simplified procedure for conducting small-scale short-term embryo toxicity tests with salmonids. *Environ. Toxicol.* 14:301-307.
- Environment Canada. 1998. Biological test method: toxicity tests using early life stages of salmonid fish (rainbow trout). Environmental Protection Series EPS 1/RM/28. Second Edition, July 1998. Environment Canada, Method Development and Application Section, Environmental Technology Centre, Ottawa, ON. 102 pp.
- Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.7.16 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - Embryo-alevin (*Oncorhynchus mykiss*) Test Data

Rainbow Trout Embryo Summary Sheet

Client: Mount Polley Start Date/Time: December 11, 2014 @ 1500
 Work Order No.: 14972 Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: QUR-1
 Sample Date: Dec. 10, Dec. 16, Dec. 22, Dec. 30, 2014; Jan. 7, 2015
 Date Received: Dec. 11, Dec. 17, Dec. 23, Dec. 31, 2014; Jan. 8, 2015
 Sample Volume: (6, 15, 6, 6, 7) x 20 L

Dilution Water:

Type: Dechlorinated Tap Water
 Hardness (mg/L CaCO₃): 9-11
 Alkalinity (mg/L CaCO₃): 6-9

Test Organism Information:

Batch No.: 121114
 Source: Vancouver Island Trout Hatchery, Duncan, B.C.
 Loading Density: 1.03 g/L

SDS Reference Toxicant Results:

Reference Toxicant ID: RTE67
 Stock Solution ID: 14503
 Date Initiated: December 11, 2014
 7-d EC50 (95% CL): 5.6 (5.3 - 6.0) mg/L SDS

Reference Toxicant Mean and Range: 3.9 (2.1 - 7.1) mg/L SDS
 Reference Toxicant CV (%): 35

Test Results:

	Sample ID - QUR-1	
	Survival	Normal
EC25 % (v/v) (95% CL)	>100	>100
EC50 % (v/v) (95% CL)	>100	>100

Reviewed by: JGH Date reviewed: Jan-30/15

Embryo-Alevin Freshwater Toxicity Test Water Quality Measurements

1/5

Client: Mount Polley
 Sample ID: QR-1
 Work Order #: 14972

Start Date & Time: December 11 2014 @ 15:00
 Stop Date & Time: January 12 2015 @ 1100
 Test Species: Oncorhynchus mykiss

Concentration <i>(% v/v)</i> Control	Days													
	0	1		2		3		4		5		6		7
	init	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	13.5	14.0	14.5	14.0	14.5	14.0	14.5	14.5	14.5	14.0	14.5	14.0	14.5	14.0
DO (mg/L)	10.0	9.8	9.9	9.8	9.8	9.9	9.8	9.8	9.8	9.8	9.8	9.7	9.8	9.9
pH	6.8	6.7	6.8	6.8	7.0	6.9	6.9	6.7	6.8	6.7	6.8	6.8	6.8	6.8
Cond. (µS/cm)	27	27		27		27		27		26		25		26
Initials	mm	SSD		m		m		SSD		SSD		SSD		SSD

Concentration <i>6.25</i>	Days													
	0	1		2		3		4		5		6		7
	init	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	13.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0
DO (mg/L)	10.0	10.0	9.8	9.8	9.8	9.9	9.9	9.9	9.8	9.9	9.8	9.9	9.9	9.9
pH	6.8	6.7	6.8	7.0	7.1	7.0	7.0	6.9	7.0	6.8	6.9	6.8	7.0	6.8
Cond. (µS/cm)	34	32		35		36		30		34		30		31
Initials	mm	SSD		m		m		SSD		SSD		SSD		SSD

Concentration <i>25</i>	Days													
	0	1		2		3		4		5		6		7
	init	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	13.0	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0
DO (mg/L)	10.1	9.9	9.9	9.8	9.9	9.9	9.8	9.8	9.8	9.9	9.9	9.9	9.9	9.8
pH	7.1	6.9	7.0	7.0	7.1	7.1	7.2	7.0	7.1	6.9	7.0	6.9	7.1	6.9
Cond. (µS/cm)	54	54		55		56		52		52		52		52
Initials	mm	SSD		m		m		SSD		SSD		SSD		SSD

Concentration <i>100</i>	Days													
	0	1		2		3		4		5		6		7
	init	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	13.0	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0	14.5	14.0
DO (mg/L)	10.3	10.0	9.9	9.9	9.8	9.8	9.8	9.8	9.9	9.8	9.8	9.9	9.9	9.8
pH	7.3	7.4	7.5	7.4	7.5	7.5	7.4	7.4	7.4	7.5	7.4	7.5	7.4	7.5
Cond. (µS/cm)	130	129		126		127		129		127		126		126
Initials	mm	SSD		m		m		SSD		SSD		SSD		SSD

DO meter: 1/3 pH meter: 1/3 Conductivity meter: 1/3

	Control	100%		
Hardness*	11 <i>mm</i>	60 <i>mm</i>		
Alkalinity*	9 <i>mm</i>	49		

Analysts: AWD, SSD, YYL

Reviewed by: JGL

Date reviewed: Jan 30/15

* mg/L as CaCO3

Sample Description: clear no colour

Comments: _____

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: MT. Polley
 Sample ID: OUR-1
 Work Order #: 14972

Start Date & Time: December 11, 2014 @ 15:00
 Stop Date & Time: January 12, 2015 @ 11:00
 Test Species: Oncorhynchus mykiss

(% v/v) Concentration Control	Days														
	7		8		9		10		11		12		13		14
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.5	13.5	14.5	14.0	14.0	14.0	14.0	14.5	14.5	14.0	14.5	13.5	14.5	14.0	
DO (mg/L)	9.8	9.9	9.8	10.1	9.9	10.1	10.1	9.9	9.8	9.9	9.7	9.9	9.8	9.8	
pH	6.7	6.8	6.8	6.8	7.0	6.8	6.8	6.8	6.8	6.8	6.7	6.8	6.7	6.6	
Cond. (µS/cm)	✓	25		26		26		25		25		25		26	
Initials	SSD	SSD		A		A		SSD		SSD		JWL		JW	

Concentration 6.25	Days														
	7		8		9		10		11		12		13		14
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	
Temperature (°C)	14.5	14.0	14.5	14.0	14.0	14.0	14.0	14.5	14.5	14.0	14.5	14.0	14.5	14.0	
DO (mg/L)	9.9	9.9	9.7	9.8	9.8	10.1	9.8	9.9	9.9	9.9	9.9	10.0	9.9	9.9	
pH	6.9	6.8	6.8	6.8	7.0	6.8	7.0	6.8	6.9	6.8	6.8	6.8	6.8	6.8	
Cond. (µS/cm)	✓	30		29		29		30		31		32		32	
Initials	SSD	SSD		A		A		SSD		SSD		JWL			

Concentration 25	Days														
	7		8		9		10		11		12		13		14
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	
Temperature (°C)	14.5	14.0	14.5	14.0	14.0	14.0	14.0	14.5	14.5	14.0	14.5	14.0	14.5	14.0	
DO (mg/L)	9.8	9.9	9.8	10.0	9.9	10.1	10.0	10.0	9.8	9.9	9.9	10.0	9.9	9.8	
pH	6.7	7.0	6.9	6.8	7.0	6.8	7.1	7.0	6.9	6.9	6.9	7.1	7.1	6.9	
Cond. (µS/cm)	✓	51		55		56		52		51		52		50	
Initials	SSD	SSD		A		A		SSD		SSD		JWL		JW	

Concentration 100	Days														
	7		8		9		10		11		12		13		14
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	
Temperature (°C)	14.5	14.5	14.5	14.0	14.0	14.0	14.0	14.5	14.5	14.0	14.5	14.0	14.5	14.0	
DO (mg/L)	9.8	9.9	9.8	10.1	9.9	10.1	9.8	10.0	9.8	10.0	9.9	10.0	9.9	9.4	
pH	7.4	7.3	7.4	7.4	7.3	7.4	7.4	7.2	7.4	7.4	7.3	7.5	7.3	7.2	
Cond. (µS/cm)	✓	126		126		127		127		120		126		121	
Initials	SSD	SSD		A		A		SSD		SSD		JWL		JW	

DO meter: DO-1/3 pH meter: pH-1/3 Conductivity meter: C-1/3

	Control	100%		
Hardness*	9	58		
Alkalinity*	7	44		

* mg/L as CaCO₃

Analysts: AWD, JW, SSD, YTL

Reviewed by: JWL

Date reviewed: Jan-30/15

Sample Description: clear, no colour

Comments: _____

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Polley
 Sample ID: QUR-1
 Work Order #: 14972

Start Date & Time: December 11, 2014 @ 15:00
 Stop Date & Time: January 12, 2015 @ 11:00
 Test Species: Oncorhynchus mykiss

Concentration Control	Days													
	14		15		16		17		18		19		20	
	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	14.5	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5	14.0	14.5	14.0	14.5	14.0
DO (mg/L)	9.8	9.9	9.8	9.9	10.0	10.0	9.9	9.9	9.8	9.9	9.9	9.9	9.8	10.2
pH	6.5	6.9	6.8	6.6	6.6	6.7	6.8	6.8	6.8	6.8	6.7	6.7	6.8	7.0
Cond. (µS/cm)	-	27		26		27		26		26		28		27
Initials	JW	KLP		JW		WML		SSD		SSD		SSD		KLP

Concentration 6-25	Days													
	14		15		16		17		18		19		20	
	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	14.5	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5	14.0	14.5	14.0	14.5	14.0
DO (mg/L)	9.9	9.9	9.9	10.0	10.0	10.1	10.0	9.9	9.8	10.0	9.9	9.9	9.8	10.2
pH	6.6	7.0	6.9	6.9	6.7	6.8	6.8	6.9	6.8	6.9	6.8	6.8	6.8	7.2
Cond. (µS/cm)	-	34		32		32		32		32		33		34
Initials	JW	KLP		JW		WML		SSD		SSD		SSD		KLP

Concentration 25	Days													
	14		15		16		17		18		19		20	
	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	14.5	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5	14.0	14.5	14.0	14.5	14.0
DO (mg/L)	9.9	9.9	9.9	10.1	10.1	10.1	9.9	10.0	9.9	10.0	10.0	9.9	9.9	10.2
pH	6.8	7.0	7.2	7.0	7.0	6.9	7.0	7.0	6.9	6.9	6.9	7.0	6.9	7.3
Cond. (µS/cm)	-	53		51		52		53		54		54		53
Initials	JW	KLP		JW		WML		SSD		SSD		SSD		KLP

Concentration 100	Days													
	14		15		16		17		18		19		20	
	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	14.5	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5	14.0	14.5	14.0	14.5	14.0
DO (mg/L)	9.9	9.9	9.9	10.1	10.1	10.0	9.9	10.0	9.9	10.1	10.0	10.0	9.9	10.2
pH	7.3	7.7	7.7	7.5	7.5	7.5	7.4	7.5	7.4	7.5	7.4	7.5	7.5	7.6
Cond. (µS/cm)	-	126		127		126		125		126		128		124
Initials	JW	KLP		JW		WML		SSD		SSD		SSD		KLP

DO meter: DO-1/3 pH meter: pH-1/3 Conductivity meter: C-1/3

	Control	100%		
Hardness*	9	60		
Alkalinity*	7	50		

Analysts: KLP, JW, SSD, TYL
 Reviewed by: JBL
 Date reviewed: Jan-30/15

* mg/L as CaCO₃

Sample Description: clear, no colour

Comments: _____

Chronic Freshwater Toxicity Test Water Quality Measurements

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Client: Mount polley
 Sample ID: OUR-1
 Work Order #: 14972

Start Date & Time: December 11, 2014 @ 15:00
 Stop Date & Time: January 12, 2015 @ 11:00
 Test Species: Oncorhynchus mykiss

Concentration (% v/v) Control	Days														
	21		22		23		24		25		26		27		28
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	
Temperature (°C)	14.5	14.0	14.5	14.0	14.0	15.0	14.5	14.0	14.0	13.5	14.0	14.0	14.0	14.0	
DO (mg/L)	10.1	10.1	9.9	10.0	10.2	10.1	10.0	10.0	9.9	10.0	9.9	10.0	10.1	10.0	
pH	6.8	7.0	6.9	7.0	7.1	7.0	7.0	6.7	6.9	6.8	6.9	6.8	6.9	7.0	
Cond. (µS/cm)	-	27		27		28		28		27		27		28	
Initials	KLP	EMM		KSL		EMM		WML		SSD		WML		WML	

Concentration 6.25	Days														
	21		22		23		24		25		26		27		28
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	
Temperature (°C)	14.0	14.0	14.5	14.0	14.0	15.0	14.5	14.0	14.0	13.5	14.0	14.0	14.0	14.0	
DO (mg/L)	10.0	10.1	10.0	10.0	10.2	10.1	10.0	10.1	10.0	10.1	9.9	10.0	10.1	10.0	
pH	7.0	7.0	6.9	7.0	7.0	7.1	7.0	6.8	6.9	6.9	6.9	6.9	6.9	7.1	
Cond. (µS/cm)	-	33		33		34		34		33		34		34	
Initials	KLP	EMM		KSL		EMM		WML		SSD		WML		WML	

Concentration 4% 125 25	Days														
	21		22		23		24		25		26		27		28
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	
Temperature (°C)	14.0	14.0	14.5	14.0	14.0	15.0	14.5	14.0	14.0	13.5	14.0	14.0	14.0	14.0	
DO (mg/L)	10.1	10.1	10.0	10.0	10.1	10.1	10.0	10.1	10.0	10.1	10.0	10.1	10.1	10.0	
pH	7.3	7.1	7.0	7.1	7.0	7.3	7.0	7.1	7.0	7.1	7.0	7.2	7.0	7.1	
Cond. (µS/cm)	-	52		52		52		54		54		54		52	
Initials	KLP	EMM		KSL		EMM		WML		SSD		WML		WML	

Concentration 100	Days														
	21		22		23		24		25		26		27		28
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	
Temperature (°C)	14.0	14.0	14.5	14.0	14.0	15.0	14.5	14.0	14.0	13.5	14.0	14.0	14.0	14.5	
DO (mg/L)	10.1	10.1	10.0	10.0	10.2	10.1	10.0	10.1	10.0	10.1	10.0	10.0	10.1	10.1	
pH	7.7	7.6	7.6	7.5	7.5	7.6	7.6	7.4	7.3	7.5	7.4	7.3	7.2	7.4	
Cond. (µS/cm)	-	124		126		124		124		124		124		125	
Initials	KLP	EMM		KSL		EMM		WML		SSD		WML		WML	

DO meter: 1/3 pH meter: 1/3 Conductivity meter: 1/3

	Control	100%		
Hardness*	10	58		
Alkalinity*	7	46		

Analysts: EMM, KSL, SSD, KLP, WML

Reviewed by: John

Date reviewed: Jan. 30/15

Sample Description: clear, no colour

Comments: _____

Chronic Freshwater Toxicity Test Water Quality Measurements

Client: Mocht Polley
 Sample ID: QUR-1
 Work Order #: 14972

Start Date & Time: December 11, 2014 @ 15:00
 Stop Date & Time: January 12, 2015 @ 11:00
 Test Species: Oncorhynchus mykiss

(90 v/v) Concentration <u>Control</u>	Days														
	28		29		30		31		32 <u>Final</u>		33		34		35
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	new
Temperature (°C)	14.0	14.5	14.0	14.0	14.0	14.0	14.0	14.0	14.5						
DO (mg/L)	9.7	10.1	10.0	9.8	9.7	9.8	9.8	9.8	9.7						
pH	7.0	6.9	6.9	6.9	7.1	6.9	7.1	7.0	7.0						
Cond. (µS/cm)	-	29		29		29		32							
Initials	YML	YML		M		M		YML							

Concentration <u>6-25</u>	Days														
	28		29		30		31		32 <u>Final</u>		33		34		35
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	new
Temperature (°C)	14.0	14.5	14.0	14.0	14.0	14.0	14.0	14.0	14.5						
DO (mg/L)	9.8	10.1	10.0	9.8	9.6	9.8	9.9	9.9	9.7						
pH	7.0	7.0	7.0	7.0	7.1	7.0	7.1	7.0	7.0						
Cond. (µS/cm)	-	34		35		36		38							
Initials	YML	YML		M		M		YML							

Concentration <u>25</u>	Days														
	28		29		30		31		32 <u>Final</u>		33		34		35
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	new
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5						
DO (mg/L)	9.8	10.1	10.0	9.8	9.8	9.7	9.6	9.6	9.8						
pH	7.0	7.3	7.1	7.2	7.3	7.1	7.3	7.2	7.2						
Cond. (µS/cm)	-	53		52		53		57							
Initials	YML	YML		M		M		YML							

Concentration <u>100</u>	Days														
	28		29		30		31		32 <u>Final</u>		33		34		35
	old	new	old	new	old	new	old	new	old	new	old	new	old	new	new
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5						
DO (mg/L)	9.8	10.2	10.1	9.8	9.6	9.8	9.7	9.7	9.7						
pH	7.2	7.5	7.4	7.5	7.5	7.4	7.5	7.5	7.5						
Cond. (µS/cm)	-	122		122		123		125							
Initials	YML	YML		M		M		YML							

DO meter: 3 pH meter: 3 Conductivity meter: 3

	Control	100%		
Hardness*	10	62		
Alkalinity*	6	44		

* mg/L as CaCO3

Analysts: AWB, YML
 Reviewed by: JGH
 Date reviewed: Jan. 30/15

Sample Description: clear, no colour.

Comments: _____

Chronic Toxicity Test Daily Mortality

Client: Mount Polley
Sample ID: QUR-1
Work Order #: 14972

Start Date & Time: December 11th, 2014 @ 15:00
Stop Date: January 12, 2015 @ 11:00
Test Species: Oncorhynchus mykiss

Concentration (% v/v)	Rep	Day of Test - No. of Mortalities							Total Dead Eggs/ Embryos Alevins	Total Undeveloped/ Unhatched Embryos	Total No. Alevins	Total Exposed
		1	2	3	4	5	6	7				
Control	1	0	0	0	0	0	0	0	0			
	2								0			
	3								0			
	4								0			
10-25	1								0			
	2								0			
	3								0			
	4								0			
12-5	1								0			
	2								0			
	3								0			
	4								0			
25	1								0			
	2								0			
	3								0			
	4								0			
50	1								0			
	2								0			
	3								0			
	4								0			
100	1								0			
	2								0			
	3								0			
	4								0			
	1											
	2											
	3											
	4											
Tech Initials		SSD	~	~	SSD	SSD	SSD	SSD	SSD	SSD		

Comments: _____

Reviewed by: JGR

Date reviewed: Jan. 30/15

Embryo-Alevin Toxicity Test Daily Mortality

Client: Mt. Adley
 Sample ID: QUR-1
 Work Order #: 14972

Start Date & Time: December 11, 2014 @ 15:00
 Stop Date: January 12, 2015 @ 11:00
 Test Species: Oncorhynchus mykiss

Concentration (% v/v)	Rep	Day of Test - No. of Mortalities							Total Dead Eggs	Total Undeveloped	Total No. Embryo	Total Exposed
		8	9	10	11	12	13	14				
Control	1	0	0	0	0	0	0	0	0			
	2				↓				0			
	3								0			
	4				1				1			
6.25	1				0				0			
	2								0			
	3								0			
	4								0			
12.5	1								0			
	2								0			
	3								0			
	4								0			
25	1								0			
	2								0			
	3								0			
	4								0			
50	1								0			
	2								0			
	3								0			
	4								0			
100	1								0			
	2								0			
	3								0			
	4	↓	↓	↓	↓	↓	↓	↓	0			
	1											
	2											
	3											
	4											
	1											
	2											
	3											
	4											
Tech Initials		SSD	A	M	SSD	SSD	JW	JW	UML			

Comments: _____

Reviewed by: Joh

Date reviewed: Jan-30/15

Embryo-Alevin Toxicity Test

Daily Mortality

Client: MT Polley
 Sample ID: QUR-1
 Work Order #: 14972

Start Date & Time: December 11, 2014 @ 15:00
 Stop Date: January 12, 2015 @ 11:00
 Test Species: Oncorhynchus mykiss

Concentration (%v/v)	Rep	Day of Test - No. of Mortalities							Total Dead Eggs	Total Undeveloped	Total No. Embryo	Total Exposed
		15	16	17	18	19	20	21				
Control	1	0	0	0	0	0	0	0	0			
	2								0			
	3								0			
	4								0			
6.25	1								0			
	2								0			
	3								0			
	4								0			
12.5	1								0			
	2								0			
	3		↓						0			
	4		1						1			
25	1		0						0			
	2								0			
	3								0			
	4							↓	0			
50	1								1			
	2								0			
	3			↓					0			
	4			0					1			
100	1			0					0			
	2								0			
	3								0			
	4	↓	↓	↓	↓	↓	↓	↓	0			
	1											
	2											
	3											
	4											
Tech Initials		MT	JW	MM	SSD	SSD	SSD	YLP	MM			

Comments: _____

Reviewed by: JOU Date reviewed: Jan-30/15

Chronic Toxicity Test Daily Mortality

Client: Mount Polley
 Sample ID: QR-1
 Work Order #: 14972

Start Date & Time: December 11, 2014 @ 15:00
 Stop Date: January 17, 2015 @ 11:00
 Test Species: Oncorhynchus mykiss

Concentration (% v/v)	Rep	Day of Test - No. of Mortalities							Total Dead Eggs/ Embryos Alevins	Total Undeveloped/ Unhatched Embryos	Total No. Alevins	Total Exposed
		22	23	24	25	26	27	28				
Control	1	0	0	0	0	0	0	0	0			
	2	0	0	1	1	0	1	1	4			
	3	0	0	0	0	0	0	0	0			
	4	0	0	0	1	0	0	0	2			
0.25	1	0	0	1	1	0	0	0	2			
	2	0	0	0	0	0	0	0	3			
	3	0	0	0	0	1	1	1	3			
	4	0	0	0	0	0	0	0	0			
12.5	1	0	0	1	0	0	0	2	3			
	2	0	0	1	0	0	0	1	2			
	3	0	0	0	0	0	0	0	5			
	4	0	0	0	0	0	0	1	1			
25	1	0	0	0	0	0	0	1	1			
	2	0	0	0	2	0	0	0	2			
	3	0	0	0	0	1	3	0	4			
	4	0	0	0	0	0	3	3	6			
50	1	0	0	0	0	0	1	3	4			
	2	0	0	0	0	0	0	0	0			
	3	0	0	0	3	0	0	0	4			
	4	0	0	0	0	0	0	0	1			
100	1	0	0	1	1	0	1	0	4			
	2	0	0	0	1	0	0	1	3			
	3	0	0	1	3	1	0	0	5			
	4	0	0	0	0	0	0	0	0			
	1											
	2											
	3											
	4											
	1											
	2											
	3											
	4											
Tech Initials		EMM	KOR	EMM	MM	SSD	MM	MM	MM			

Comments: ① 50% hatched ② 50% of all controls hatched

Reviewed by: JGh Date reviewed: Jan 30/15

Chronic Toxicity Test Daily Mortality

Client: Mount Polley
Sample ID: QR-1
Work Order #: 14972

Star Date & Time: December 11, 2014 @ 1500
Stop Date: January 12, 2015 @ 1100
Test Species: Oncorhynchus mykiss

Concentration (% v/v)	Rep	Day of Test - No. of Mortality								Total Dead Eggs/Alevins	Total Abnormal Alevins	Total Normal Alevins	Total Exposed
		29	30	31	32	33	34	35					
Control	1	1	0	1	0				2	6	22	30	
	2	2		0					2	2	22	30	
	3	0		0					0	3	27	30	
	4	2		0					2	6	19	30	
6.25	1	2		0					2	6	20	30	
	2	2		0					2	4	21	30	
	3	0		0					0	3	24	30	
	4	2	✓	2					4	5	21	30	
12.5	1	1	0	0					1	6	20	30	
	2	1	10	0					2	5	21	30	
	3	4	0	0	↓				4	5	16	30	
	4	3	0	0	2				5	6	17	30	
25	1	0	0	0	0				0	3	26	30	
	2	0	0	0					0	5	23	30	
	3	1	0	0					1	3	22	30	
	4	3	10	1					5	4	15	30	
50	1	1	10	0					2	7	16	30	
	2	1	0	0					1	9	20	30	
	3	0	0	0					0	4	22	30	
	4	0	10	0					1	5	22	30	
100	1	0	0	0					0	8	18	30	
	2	0	0	3					3	5	17	30	
	3	2	20	4					8	4	13	30	
	4	0	0	0	↓				0	5	25	30	
	1												
	2												
	3												
	4												
	1												
	2												
	3												
	4												
Tech Initials		mm	m	~ mm					mm	mm/ECC	mm/fg mm		

Comments: ① white decayed eggs present, removed & cleaned
② 2-headed alevins joined at tail sharing one yolk sac. ③ scoliosis / tail missing
④ 2-headed sharing yolk sac; scoliosis ⑤ 3 two-headed alevins sharing one yolk sac
2 alevins w/ a smaller attached part of previous dead alevin on same yolk sac.

Reviewed by: JG Date reviewed: Jan 30/15

⑥ 2 headed alevins joined at yolk sac, joined at tail region; scoliosis

Rainbow Trout Embryo-Alevin Toxicity Test

Client: Mount Polley

WO#: 14972

December 11
Test Initiation Date: ~~November 20, 2014~~

Test Termination Date: ~~December 20, 2014~~
January 12, 2015

Test Conc. (% v/v)	Rep	Weekly Mortality Counts					Total	Abnormal	Normal	Total No. Alevins	Total No. Exposed	Survival	Normal Alevins					
		1	2	3	4	5	Dead	Alevins	Alevins				Mean	SD	Mean	SD		
Control	1	0	0	0	0	2	2	6	27	28	30	93.3			73.3			
	2	0	0	0	4	2	6	2	22	24	30	80.0			73.3			
	3	0	0	0	0	0	0	3	27	30	30	100.0	Mean	SD	90.0	Mean	SD	
	4	0	1	0	2	2	5	6	19	25	30	83.3	89.2	9.2	63.3	75.0	11.1	
6.25	1	0	0	0	2	2	4	6	20	26	30	86.7			66.7			
	2	0	0	0	3	2	5	4	21	25	30	83.3			70.0			
	3	0	0	0	3	0	3	3	24	27	30	90.0	Mean	SD	80.0	Mean	SD	
	4	0	0	0	0	4	4	5	21	26	30	86.7	86.7	2.7	70.0	71.7	5.8	
12.5	1	0	0	0	3	1	4	6	20	26	30	86.7			66.7			
	2	0	0	0	2	2	4	5	21	26	30	86.7			70.0			
	3	0	0	0	5	4	9	5	16	21	30	70.0	Mean	SD	53.3	Mean	SD	
	4	0	0	1	1	5	7	6	17	23	30	76.7	80.0	8.2	56.7	61.7	7.9	
25	1	0	0	0	1	0	1	3	26	29	30	96.7			86.7			
	2	0	0	0	2	0	2	5	23	28	30	93.3			76.7			
	3	0	0	0	4	1	5	3	22	25	30	83.3	Mean	SD	73.3	Mean	SD	
	4	0	0	0	6	5	11	4	15	19	30	63.3	84.2	15.0	50.0	71.7	15.5	
50	1	0	0	1	4	2	7	7	16	23	30	76.7			53.3			
	2	0	0	0	0	1	1	9	20	29	30	96.7			66.7			
	3	0	0	0	4	0	4	4	22	26	30	86.7	Mean	SD	73.3	Mean	SD	
	4	0	0	1	1	1	3	5	22	27	30	90.0	87.5	8.3	73.3	66.7	9.4	
100	1	0	0	0	4	0	4	8	18	26	30	86.7			60.0			
	2	0	0	0	3	3	6	5	19	24	30	80.0			63.3			
	3	0	0	0	5	8	13	4	13	17	30	56.7	Mean	SD	43.3	Mean	SD	
	4	0	0	0	0	0	0	5	25	30	30	100.0	80.8	18.1	83.3	62.5	16.4	

JBL
Jan. 30 / 15

CETIS Analytical Report

Report Date: 13 Jan-15 12:18 (p 1 of 2)
 Test Code: 14972 | 09-5966-3910

Salmonid Embryo-Alevin Survival and Development Test

Nautilus Environmental

Analysis ID: 11-1402-1953	Endpoint: Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 13 Jan-15 12:17	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 07-1982-3091	Test Type: Survival-Development	Analyst: Yvonne Lam
Start Date: 11 Dec-14 15:00	Protocol: EC/EPS 1/RM/28	Diluent: Dechlorinated Tap Water
Ending Date: 12 Jan-15 11:00	Species: Oncorhynchus mykiss	Brine:
Duration: 31d 20h	Source: Vancouver Island Trout Hatchery	Age:
Sample ID: 13-9873-2906	Code: 535EF86A	Client: Mount Polley
Sample Date: 10 Dec-14 12:00	Material: Effluent	Project:
Receive Date: 11 Dec-14 09:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 27h (6.9 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	279892	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	10.24	N/A	N/A	9.768	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	4	0.8917	0.8	1	0.0459	0.09179	10.29%	0.0%	107	120
6.25		4	0.8667	0.8333	0.9	0.01361	0.02722	3.14%	2.8%	104	120
12.5		4	0.8	0.7	0.8667	0.04082	0.08165	10.21%	10.28%	96	120
25		4	0.8417	0.6333	0.9667	0.075	0.15	17.82%	5.61%	101	120
50		4	0.875	0.7667	0.9667	0.04167	0.08333	9.52%	1.87%	105	120
100		4	0.8083	0.5667	1	0.09065	0.1813	22.43%	9.35%	97	120

Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.9333	0.8	1	0.8333
6.25		0.8667	0.8333	0.9	0.8667
12.5		0.8667	0.8667	0.7	0.7667
25		0.9667	0.9333	0.8333	0.6333
50		0.7667	0.9667	0.8667	0.9
100		0.8667	0.8	0.5667	1

Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	28/30	24/30	30/30	25/30
6.25		26/30	25/30	27/30	26/30
12.5		26/30	26/30	21/30	23/30
25		29/30	28/30	25/30	19/30
50		23/30	29/30	26/30	27/30
100		26/30	24/30	17/30	30/30

CETIS Analytical Report

Report Date: 13 Jan-15 12:18 (p 2 of 2)
Test Code: 14972 | 09-5966-3910

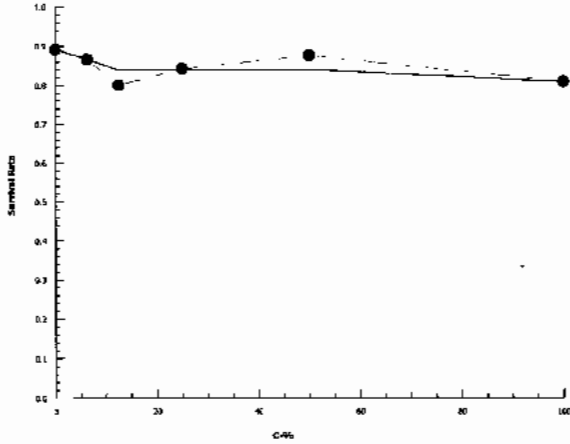
Salmonid Embryo-Alevin Survival and Development Test

Nautilus Environmental

Analysis ID: 11-1402-1953 Endpoint: Survival Rate
Analyzed: 13 Jan-15 12:17 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 13 Jan-15 12:18 (p 1 of 2)
 Test Code: 14972 | 09-5966-3910

Salmonid Embryo-Alevin Survival and Development Test

Nautilus Environmental

Analysis ID: 19-2493-6599	Endpoint: Proportion Normal	CETIS Version: CETISv1.8.7
Analyzed: 13 Jan-15 12:18	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 07-1982-3091	Test Type: Survival-Development	Analyst: Yvonne Lam
Start Date: 11 Dec-14 15:00	Protocol: EC/EPS 1/RM/28	Diluent: Dechlorinated Tap Water
Ending Date: 12 Jan-15 11:00	Species: Oncorhynchus mykiss	Brine:
Duration: 31d 20h	Source: Vancouver Island Trout Hatchery	Age:
Sample ID: 13-9873-2906	Code: 535EF86A	Client: Mount Polley
Sample Date: 10 Dec-14 12:00	Material: Effluent	Project:
Receive Date: 11 Dec-14 09:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 27h (6.9 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	279667	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	6.636	N/A	N/A	15.07	NA	NA
EC10	11.17	N/A	N/A	8.952	NA	NA
EC15	81.28	N/A	N/A	1.23	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

Proportion Normal Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	4	0.75	0.6333	0.9	0.05528	0.1106	14.74%	0.0%	90	120
6.25		4	0.7167	0.6667	0.8	0.02887	0.05774	8.06%	4.44%	86	120
12.5		4	0.6167	0.5333	0.7	0.03967	0.07935	12.87%	17.78%	74	120
25		4	0.7167	0.5	0.8667	0.07758	0.1552	21.65%	4.44%	86	120
50		4	0.6667	0.5333	0.7333	0.04714	0.09428	14.14%	11.11%	80	120
100		4	0.625	0.4333	0.8333	0.08207	0.1641	26.26%	16.67%	75	120

Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.7333	0.7333	0.9	0.6333
6.25		0.6667	0.7	0.8	0.7
12.5		0.6667	0.7	0.5333	0.5667
25		0.8667	0.7667	0.7333	0.5
50		0.5333	0.6667	0.7333	0.7333
100		0.6	0.6333	0.4333	0.8333

Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	22/30	22/30	27/30	19/30
6.25		20/30	21/30	24/30	21/30
12.5		20/30	21/30	16/30	17/30
25		26/30	23/30	22/30	15/30
50		16/30	20/30	22/30	22/30
100		18/30	19/30	13/30	25/30

CETIS Analytical Report

Report Date: 13 Jan-15 12:18 (p 2 of 2)

Test Code: 14972 | 09-5966-3910

Salmonid Embryo-Alevin Survival and Development Test

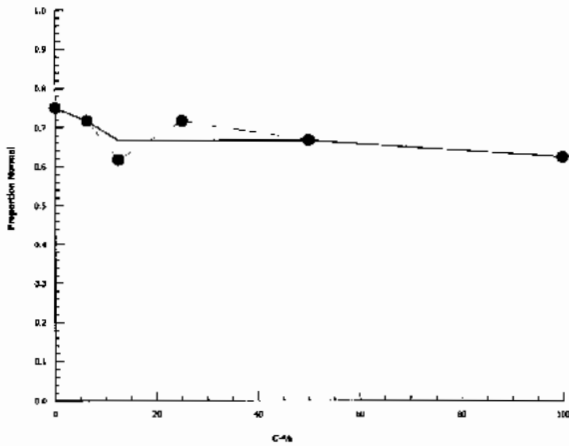
Nautilus Environmental

Analysis ID: 19-2493-6599
Analyzed: 13 Jan-15 12:18

Endpoint: Proportion Normal
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



APPENDIX B - Chain of Custody Forms

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

14928
WO # 14972 (2)

9/2/12/2014 Page 1 of 1

Sample Collection By: Shauna Litke, Fernando John							ANALYSES REQUIRED										Receipt Temperature (°C)
Report to:	Invoice to:			7 Day Ceriodaphnia - Filtered		7 Day Ceriodaphnia - Unfiltered		RBT embryo/alevin EA Test									
Company	Mount Polley Mining Corporation			Mount Polley Mining Corporation													
Address	Box 12			Box 12													
City/Prov/Postal Code	Likely BC V0L 1N0			Likely BC V0L 1N0													
Contact	Colleen Hughes			Colleen Hughes/													
Phone	(250) 790-2617			(250) 790-2617													
Email	chughes@mountpolley.com			chughes@mountpolley.com													
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS											
1 (1) QUR-1-141210	10/12/2014	12:00	water	20L	6	120L total							X			6.9	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
PROJECT INFORMATION			SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)			RELIQUISHED BY (COURIER)									
Client: Mount Polley Mining Corporation			Total # Containers:	6	Signature:			Signature:									
P.O. No.:			Good Condition?	Y	Print: Shauna Litke			Print:									
Shipped Via: Greyhound			Matches Schedule?	Y	Company: MPMC			Company:									
					Time/Date: 10/12/2014 15:30:00			Time/Date:									
SPECIAL INSTRUCTIONS/COMMENTS:					RECEIVED BY (COURIER)			RECEIVED BY (LABORATORY)									
2nd EA Test (2) same sample for both tests. (1) Refresh of sample "QUR-1" - same station, confirmed w/ client. MLC					Signature:			Signature: NY									
					Print:			Print: NAIR YAMAMOTO									
					Company:			Company: NAUTILUS									
					Time/Date:			Time/Date: Dec 11/14 @ 09:15									

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

Nautilus Environmental

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

wo #
 14928
 14972 (2nd EA)
 14983
 14985
 14984
 Chain of Custody (electronic)

Sample Collection By: Shauna Litke, Ira Pierce							ANALYSES REQUIRED										Receipt Temperature (°C)			
Report to:		Invoice to:					Refill for "November" RBT EA tes	Refill for "December" RBT EA tes	Fathead minnow survival and growth	Rainbow trout survival and growth	C. dubia survival and reproduction									
Company	Mount Polley Mining Corporation	Mount Polley Mining Corporation																		
Address	Box 12	Box 12																		
City/Prov/Postal Code	Likely BC V0L 1N0	Likely BC V0L 1N0																		
Contact	Colleen Hughes	Colleen Hughes/																		
Phone	(250) 790-2617	(250) 790-2617																		
Email	chughes@mountpolley.com	chughes@mountpolley.com																		
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS														
1 QUR-1	16/12/2014	9:15	water	20L	15	300L total	X	X	X	X	X									4.5
2 ③ POL-4	16/12/2014	9:45	water	20L	3	60L total			X	X	X								3.9	
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
PROJECT INFORMATION			SAMPLE RECEIPT			RELIQUISHED BY (CLIENT)				RELIQUISHED BY (COURIER)										
Client: Mount Polley Mining Corporation			Total # Containers: 18			Signature:				Signature:										
P.O. No.:			Good Condition? Y			Print: Shauna Litke				Print:										
Shipped Via: Greyhound			Matches Schedule? Y			Company: MPMC				Company:										
						Time/Date: 16/12/2014 15:30:00				Time/Date:										
SPECIAL INSTRUCTIONS/COMMENTS: ① One 20L carboy unlabelled ② QUR-1 - refresh water for NOV-EATest and DEC-EATest ③ POL-4 is replacing POL-2 - NY						RECEIVED BY (COURIER)				RECEIVED BY (LABORATORY)										
						Signature:				Signature:										
						Print:				Print: Josh Baker										
						Company:				Company: Nautilus Env										
				Time/Date:				Time/Date: Dec 17/14 @ 0830h												

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

22/12/2014 Page 1 of 1

Sample Collection By: Gabriel Holmes, Mclean Donohoe							ANALYSES REQUIRED							Receipt Temperature (°C)			
Report to:			Invoice to:														
Company: Mount Polley Mining Corporation			Mount Polley Mining Corporation														
Address: Box 12			Box 12														
City/Prov/Postal Code: Likely BC V0L 1N0			Likely BC V0L 1N0														
Contact: Colleen Hughes			Colleen Hughes/														
Phone: (250) 790-2617			(250) 790-2617														
Email: chughes@mountpolley.com			chughes@mountpolley.com														
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS											
① QUR-1	22/12/2014	9:45	water	20L	6	100L total						X				362	
PROJECT INFORMATION			SAMPLE RECEIPT			RELIQUINSHED BY (CLIENT)			RELIQUINSHED BY (COURIER)								
Client: Mount Polley Mining Corporation			Total # Containers:	6		Signature: <i>Katie McMahan</i>			Signature: <i>[Signature]</i>								
P.O. No.:			Good Condition?	yes		Print: Katie McMahan			Print: <i>[Signature]</i>								
Shipped Via: Greyhound			Matches Schedule?	yes.		Company: MPMC Time/Date: 22/12/2014 15:30:00			Company: Time/Date:								
SPECIAL INSTRUCTIONS/COMMENTS: For the December test that is currently running. <i>(2nd test) 104</i>						RECEIVED BY (COURIER)			RECEIVED BY (LABORATORY)								
① refresh sample for both tests - with 14928, 14972 (2 EA tests).						Signature:			Signature: <i>[Signature]</i>								
						Print:			Print: Emma Mann								
						Company:			Company: Nautilus Environmental								
						Time/Date:			Time/Date: Dec 23/14 @ 8:40h								

14928
 14972
 WDH 14928
 14928

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

British Columbia: 8864 Commerce Court, Burnaby, BC, V5A 4N7

WO # 14972

30/12/2014 Page 1 of 1

Sample Collection By: Gabriel Holmes, Shauna Litke							ANALYSES REQUIRED										Receipt Temperature (°C)					
Report to:		Invoice to:																				
Company		Mount Polley Mining Corporation																				
Address		Box 12																				
City/Prov/Postal Code		Likely BC VOL 1N0																				
Contact		Colleen Hughes																				
Email		chughes@mountpolley.com																				
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS																
1 QUR-1	30/12/2014	10:45	water	20L	6	120L total														2.0		
2																						
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						
PROJECT INFORMATION			SAMPLE RECEIPT			RELIQUISHED BY (CLIENT)				RELIQUISHED BY (COURIER)												
Client: Mount Polley Mining Corporation			Total # Containers: 6			Signature:				Signature:												
P.O. No.:			Good Condition? Y			Print: Shauna Litke				Print:												
Shipped Via: Greyhound			Matches Schedule? Y			Company: MPMC				Company:												
						Time/Date: 30/12/2014 15:30:00				Time/Date:												
SPECIAL INSTRUCTIONS/COMMENTS: For the December test that is currently running. = refresh sample =						RECEIVED BY (COURIER)				RECEIVED BY (LABORATORY)												
						Signature:				Signature: NY												
						Print:				Print: NAIR YAMAMOTO												
						Company:				Company: NAUTILUS												
				Time/Date:				Time/Date: Dec 31/14 @ 09:20														

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

Nautilus Environmental

British Columbia: 8884 Commerce Court, Burnaby, BC, V5A 4N7

Chain of Custody (electronic)

wo #
15023
15024
15025
15024
14972

Sample Collection By: Mclean Donohoe, Gabriel Holmes			ANALYSES REQUIRED																								
Report to:			<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%; text-align: center;">Fathead minnow survival and growth</td> <td style="width: 10%; text-align: center;">C. Dubia S&R - filtered</td> <td style="width: 10%; text-align: center;">Rainbow trout survival and growth</td> <td style="width: 10%; text-align: center;">C. Dubia S&R - unfiltered</td> <td style="width: 10%; text-align: center;">RBT EA test - refill (80L)</td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> </tr> </table>					Fathead minnow survival and growth	C. Dubia S&R - filtered	Rainbow trout survival and growth	C. Dubia S&R - unfiltered	RBT EA test - refill (80L)															
Fathead minnow survival and growth	C. Dubia S&R - filtered	Rainbow trout survival and growth						C. Dubia S&R - unfiltered	RBT EA test - refill (80L)																		
Invoice to:																											
Company: Mount Polley Mining Corporation																											
Address: Box 12																											
City/Prov/Postal Code: Likely BC V0L 1N0																											
Contact: Colleen Hughes																											
Phone: (250) 790-2617																											
Email: chughes@mountpolley.com																											

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS														Receipt Temperature (°C)	
1	QUR-1	07/01/2015	12:20	water	20L	7	140L total	X	X	X	X	X									40
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)		RELIQUISHED BY (COURIER)	
Client: Mount Polley Mining Corporation		Total # Containers:		Signature: <i>Mclean Donohoe</i>		Signature:	
P.O. No.:		Good Condition?		Print: Mclean Donohoe		Print:	
Shipped Via: Greyhound		Matches Schedule?		Company: MPMC		Company:	
				Time/Date: 07/01/2015 15:30:00		Time/Date:	
SPECIAL INSTRUCTIONS/COMMENTS: <i>wo # 14972 - refresh sample - NY</i>				RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)	
				Signature:		Signature: <i>J Baker</i>	
				Print:		Print: <i>Josh Baker</i>	
				Company:		Company: <i>Nautilus</i>	
				Time/Date:		Time/Date: <i>In 8/15 @ 0825h</i>	

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 4

Toxicity testing of samples identified as QUR-1 and POL-4 on *Ceriodaphnia dubia*: Samples collected December 16, 2014, Work Order #14984



Nautilus Environmental

**Toxicity testing on samples identified as QUR-1 and
POL-4 on *Ceriodaphnia dubia***

Samples collected December 16, 2014

Final Report

Report date: February 27, 2015

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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Table 2.	Results: <i>Ceriodaphnia dubia</i> survival and reproduction test.	3
Table 3.	Reference toxicant test results.	4

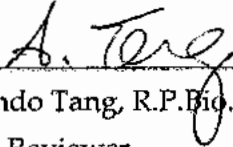
LIST OF APPENDICES

- APPENDIX A - Toxicity Test Data
- APPENDIX B - Chain of Custody Form

SIGNATURE PAGE



Emma Marus, B.Sc.
Testing Manager



Armando Tang, R.P.Bio.
Senior Reviewer

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted toxicity tests for Mount Polley Mining Corporation on samples identified as QUR-1 and POL-4. The samples were collected on December 16, 2014 and delivered to the laboratory in Burnaby, BC on December 17, 2014. Samples QUR-1 and POL-4 were transported in 20-L plastic carboys and were received at temperatures of 4.5 and 3.9°C, respectively. Samples were stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing.

This report describes the results of the toxicity tests conducted on samples QUR-1 and POL-4 using *Ceriodaphnia dubia*. Tests with fathead minnow and rainbow trout were invalid and therefore, excluded from this report. Samples were re-collected for testing at a later date and a separate report will be prepared for these two species. Copies of laboratory data sheets and printouts of statistical analyses for the test are provided in Appendix A. The chain of custody form is provided in Appendix B.

2.0 METHODS

Methods for the toxicity tests using *C. dubia* are summarized in Table 1. Testing was conducted according to procedures described by Environment Canada (2007). Statistical analyses for the test were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house culture
Test organism age	<24 h old neonates produced within 12 h
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20 mL test tube
Test volume	15 mL
Test replicates	10 test replicates per treatment
Number of organisms	1 per replicate
Control water	20% Perrier water
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	<i>Pseudokirchneriella subcapitata</i> and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada, (2007) EPS 1/RM/21
Statistical software	CETIS (2013)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods
Reference toxicant	Sodium chloride

3.0 RESULTS

Results of the toxicity tests conducted on samples QUR-1 and POL-4 using *C. dubia* are provided in Table 2. There were no adverse effects on survival for either sample, resulting in LC50 values of >100%. There were also no adverse effects on reproduction for sample POL-4. However, reproduction was adversely affected for sample QUR-1, resulting in an IC25 value of 50.6%.

Table 2. Results: *Ceriodaphnia dubia* survival and reproduction test.

Concentration (% v/v)	QUR-1		POL-4	
	Survival (%)	Reproduction (Mean ± SD)	Survival (%)	Reproduction (Mean ± SD)
Control	100	20.3 ± 3.3	90	18.8 ± 5.4
1.56	100	22.0 ± 2.7	100	22.0 ± 1.9
3.12	100	23.0 ± 2.5	90	21.6 ± 4.9
6.25	100	21.2 ± 3.2	90	20.9 ± 7.8
12.5	100	21.0 ± 2.4	90	21.0 ± 6.9
25	100	20.0 ± 4.1	90	20.4 ± 6.6
50	100	15.3 ± 3.3	80	18.1 ± 8.7
100	100	10.5 ± 3.1	100	20.8 ± 4.2
Test endpoint				
(% v/v)				
LC50	>100	--	>100	--
IC25 (95% CL)	--	50.6 (37.6 - 60.4)	--	>100
IC50	--	>100	--	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits.

4.0 QA/QC

The health history of the test organisms used in the exposure was acceptable and met the requirements of the Environment Canada protocol. The test met all control acceptability criteria and water quality parameters remained within ranges specified in the protocol throughout the test. There were no deviations from the test methodology. Uncertainty associated with this test is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

Results of the reference toxicant test conducted during the testing program are summarized in Table 3. Results for this test fell within the range for organism performance of mean and two standard deviation range, based on historical results obtained by the laboratory with this test. Thus, the sensitivity of the organisms used in this test was appropriate.

Table 3. Reference toxicant test results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>C. dubia</i>	Survival (LC50): 2.1 g/L NaCl	1.9 (1.5 - 2.4) g/L NaCl	12	December 17, 2014
	Reproduction (IC25): 1.5 g/L NaCl	1.4 (1.0 - 2.0) g/L NaCl	19	

SD = Standard Deviation, CV = Coefficient of Variation, LC = Lethal Concentration, IC = Inhibition Concentration.

5.0 REFERENCES

Environment Canada. 2007. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. EPS 1/RM/21, February 2007.

Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.7.16 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: MT Pollock
 Work Order No.: 14984

Start Date/Time: Dec 17/14 @ 1130h
 Set up by: EMM

Sample Information:

Sample ID: QUR-1
 Sample Date: Dec 16/14
 Date Received: Dec 17/14
 Sample Volume: 15x20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 120314A
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 45
 Mortality (%) in previous 7 d: 10
 Individual female # used ≥ 8 young on test day: 17, 13, 15, 16, 17, 19

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd121
 Stock Solution ID: 14Na02
 Date Initiated: Dec 17/14

7-d LC50 (95% CL): 2.1 (1.5-3.0) g/L NaCl
 7-d IC50 (95% CL): 1.5 (1.3-1.8) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.9 (1.5-2.4) g/L NaCl CV (%): 12
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-2.0) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		7100 56.6 (37.6-60.4) <small>emm</small>
IC50 % (v/v) (95% CL)		56.6 (37.6-60.4) >100 <small>emm</small>

Reviewed by: Joe

Date reviewed: Jan-27/15

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Polley
 Sample ID: GR-1
 Work Order #: 14984

Start Date & Time: Dec 17/14 @ 1130h
 Stop Date & Time: Dec 23/14 @ 1130h
 Test Species: Ceriodaphnia dubia

Concentration	Days							Final	6	7
	0	1	2	3	4	5				
control										
Temperature (°C)	24.0	25.0	24.0	24.5	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.1	7.4	8.1	7.8	8.1	7.6	8.1	7.5	8.3	7.4
pH	7.9	7.7	7.9	7.6	8.0	7.6	7.9	7.8	7.9	7.8
Cond. (µS/cm)	215	220	218	218	217	217	217	217	217	217
Initials	EMM	EMM	EMM	EMM	JW	EMM	EMM	EMM	EMM	EMM

Concentration	Days							Final	6	7
	0	1	2	3	4	5				
1.56% (v/v)										
Temperature (°C)	24.0	25.0	24.0	24.5	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.2	7.6	8.1	7.8	8.2	7.5	7.9	7.7	8.1	7.9
pH	7.9	7.8	7.9	7.8	7.9	7.8	8.0	7.9	8.1	7.8
Cond. (µS/cm)	216	218	218	218	214	216	216	216	216	221
Initials	EMM	EMM	EMM	EMM	JW	EMM	EMM	EMM	EMM	EMM

① 7.4 emm

Concentration	Days							Final	6	7
	0	1	2	3	4	5				
12.5% (v/v)										
Temperature (°C)	24.0	25.0	24.5	24.5	24.5	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.1	7.6	8.1	7.8	8.0	7.5	7.8	7.6	8.3	7.5
pH	7.8	7.8	7.7	7.6	7.9	7.7	7.9	7.9	8.1	7.8
Cond. (µS/cm)	205	209	209	210	210	206	206	209	209	210
Initials	EMM	EMM	EMM	EMM	JW	EMM	EMM	EMM	EMM	EMM

Concentration	Days							Final	6	7
	0	1	2	3	4	5				
100% (v/v)										
Temperature (°C)	24.0	25.0	25.0	24.5	25.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.1	7.6	8.0	7.9	7.9	7.6	7.9	7.6	8.4	7.5
pH	7.5	7.6	7.5	7.2	7.5	7.4	7.6	7.8	7.8	7.7
Cond. (µS/cm)	131	132	134	132	132	130	130	132	132	135
Initials	EMM	EMM	EMM	EMM	JW	EMM	EMM	EMM	EMM	EMM

	Control	100% (v/v)
Hardness*	100	64
Alkalinity*	84	58

Analysts: EMM, EC, ALUD
JW, KIP
 Reviewed by: JG
 Date reviewed: Jan. 27/15

* mg/L as CaCO₃
 WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5
 Sample Description: clear

Comments: Broodboard Used: 120314A

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt. Polley
 Sample ID: -Pot = 6 emm (UR-1)
 Work Order: 14984

Start Date & Time: Dec 17/14 12:00 ^{EMM}
 Stop Date & Time: Dec 23/14 11:30
 Set up by: EMM

% (VIV)

Days	Concentration: <u>control</u>											Concentration: <u>1.56</u>											Concentration: <u>3.12</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	
3	3	4	4	4	4	4	✓	3	✓	3	EMM	✓	✓	4	4	4	2	3	✓	✓	✓	EMM	3	✓	4	4	4	4	3	4	3	✓	EMM	
4	✓	✓	✓	✓	✓	✓	4	✓	4	✓	JW	3	6	✓	✓	✓	✓	✓	7	4	3	JW	✓	4	✓	✓	✓	✓	✓	✓	✓	✓	3	JW
5	8	6	8	6	9	8	8	8	7	9	EMM	6	7	7	6	7	7	7	8	8	8	EMM	9	8	9	9	9	8	7	8	7	9	EMM	
6	10	9	10	9	8	11	✓	10	10	12	EMM	11	12	10	12	11	10	11	13	10	9	EMM	10	13	13	11	13	12	12	10	8	9	EMM	
7																																		
8																																		
Total	21	19	22	19	21	23	12	21	21	24	EMM	20	25	21	22	22	19	21	28	22	20	EMM	22	25	26	24	26	24	22	22	18	21	EMM	

Days	Concentration: <u>6.25</u>											Concentration: <u>12.5</u>											Concentration: <u>25</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
3	4	✓	4	4	✓	3	✓	4	✓	✓	EMM	✓	✓	3	4	✓	✓	✓	4	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	4	✓	✓	EMM
4	✓	4	✓	✓	4	✓	5	✓	3	5	JW	3	2	✓	✓	4	4	6	✓	3	5	JW	4	2	3	4	3	4	✓	3	3	3	JW
5	7	6	6	7	8	8	9	8	8	8	EMM	7	6	6	7	8	6	✓	8	7	6	EMM	6	6	7	7	6	7	8	6	7	7	EMM
6	10	9	12	12	10	12	10	11	11	✓	EMM	10	14	12	8	10	10	10	12	13	12	EMM	12	9	11	11	10	12	12	10	✓	13	EMM
7																																	
8																																	
Total	21	19	22	23	22	23	24	23	22	13	EMM	20	22	21	19	22	20	16	24	23	23	EMM	22	17	21	22	19	23	24	19	10	23	EMM

Days	Concentration: <u>50</u>											Concentration: <u>100</u>											Concentration:										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
4	4	3	3	3	2	3	2	3	4	3	JW	3	4	2	1	✓	4	4	✓	2	4	JW											
5	3	7	7	4	4	5	7	3	5	5	EMM	7	6	6	5	6	✓	✓	5	4	✓	EMM											
6	6	8	11	7	7	9	✓	9	8	8	EMM	✓	6	5	✓	7	7	5	6	✓	6	EMM											
7																																	
8																																	
Total	13	18	21	14	13	17	9	15	17	16	EMM	10	16	13	6	13	11	9	11	7	10	EMM											

Notes: X = mortality.

Sample Description: clear

Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JOK

Date reviewed: Jan. 27/15

CETIS Analytical Report

Report Date: 23 Dec-14 15:04 (p 1 of 2)
 Test Code: 14984b | 18-1223-6202

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 10-1847-4421	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 23 Dec-14 15:02	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 21-3827-0486	Test Type: Reproduction-Survival (7d)	Analyst: Emma Marus
Start Date: 17 Dec-14 11:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 23 Dec-14 11:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 0h	Source: In-House Culture	Age: <24h
Sample ID: 16-2158-3823	Code: 60A767CF	Client: Mount Polley
Sample Date: 16 Dec-14 09:15	Material: Water Sample	Project:
Receive Date: 17 Dec-14 08:30	Source: Mount Polley (MT POLLEY)	
Sample Age: 26h (4.5 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	96667	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 23 Dec-14 15:04 (p 2 of 2)
Test Code: 14984b | 18-1223-6202

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

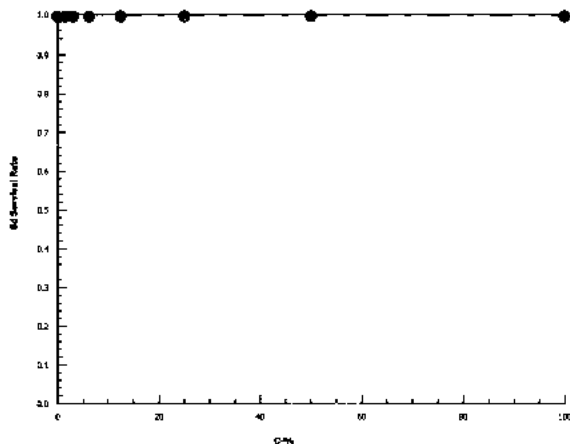
Analysis ID: 10-1847-4421 Endpoint: 6d Survival Rate
Analyzed: 23 Dec-14 15:02 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 23 Dec-14 15:03 (p 1 of 2)
 Test Code: 14984b | 18-1223-6202

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 20-6587-6494	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 23 Dec-14 15:03	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 21-3827-0486	Test Type: Reproduction-Survival (7d)	Analyst: Emma Marus
Start Date: 17 Dec-14 11:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 23 Dec-14 11:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 0h	Source: In-House Culture	Age: <24h
Sample ID: 16-2158-3823	Code: 60A767CF	Client: Mount Polley
Sample Date: 16 Dec-14 09:15	Material: Water Sample	Project:
Receive Date: 17 Dec-14 08:30	Source: Mount Polley (MT POLLEY)	
Sample Age: 26h (4.5 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	2131124	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	15.67	4.852	28.08	6.382	3.561	20.61
IC10	26.57	13.74	32.26	3.763	3.1	7.276
IC15	31.23	17.43	39.86	3.202	2.509	5.738
IC20	36.67	23.1	50.67	2.727	1.974	4.329
IC25	43.03	35.21	56.97	2.324	1.755	2.84
IC40	69.15	53.1	92.51	1.446	1.081	1.883
IC50	94.64	78.73	N/A	1.057	NA	1.27

Reproduction Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	20.3	12	24	1.044	3.302	16.26%	0.0%
1.56		10	22	19	28	0.8433	2.667	12.12%	-8.37%
3.12		10	23	18	26	0.7888	2.494	10.85%	-13.3%
6.25		10	21.2	13	24	1.009	3.19	15.05%	-4.43%
12.5		10	21	16	24	0.7454	2.357	11.22%	-3.45%
25		10	20	10	24	1.308	4.137	20.68%	1.48%
50		10	15.3	9	21	1.044	3.302	21.58%	24.63%
100		10	10.5	6	16	0.9804	3.1	29.53%	48.28%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	21	19	22	19	21	23	12	21	21	24
1.56		20	25	21	22	22	19	21	28	22	20
3.12		22	25	26	24	26	24	22	22	18	21
6.25		21	19	22	23	22	23	24	23	22	13
12.5		20	22	21	19	22	20	16	24	23	23
25		22	17	21	22	19	23	24	19	10	23
50		13	18	21	14	13	17	9	15	17	16
100		10	16	13	6	13	11	9	11	6	10

QA: *Joh*
 17 Jan-27/14

CETIS Analytical Report

Report Date: 23 Dec-14 15:03 (p 2 of 2)
Test Code: 14984b | 18-1223-6202

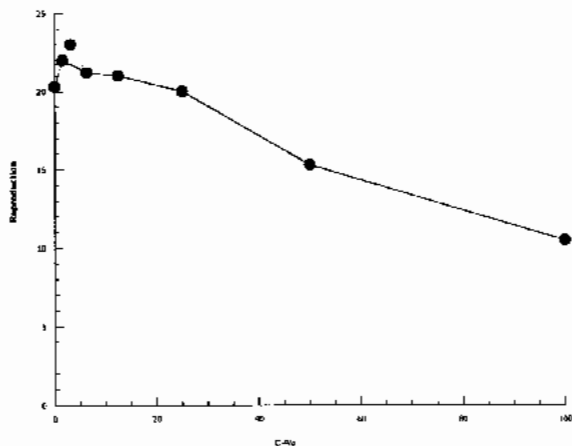
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 20-6587-6494 Endpoint: Reproduction
Analyzed: 23 Dec-14 15:03 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 23 Dec-14 15:08 (p 1 of 2)
 Test Code: 14984b(adj) | 14-6886-7968

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 09-6560-4607	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 23 Dec-14 15:07	Analysis: Linear interpolation (ICPIN)	Official Results: Yes
Batch ID: 18-7852-7859	Test Type: Reproduction-Survival (7d)	Analyst: Emma Marus
Start Date: 17 Dec-14 11:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 23 Dec-14 11:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 0h	Source: In-House Culture	Age: <24h
Sample ID: 16-2158-3823	Code: 60A767CF	Client: Mount Polley
Sample Date: 16 Dec-14 09:15	Material: Water Sample	Project:
Receive Date: 17 Dec-14 08:30	Source: Mount Polley (MT POLLEY)	
Sample Age: 26h (4.5 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1118137	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	27.81	1.073	29.9	3.596	3.345	93.22
IC10	32.32	5.87	35.96	3.094	2.781	17.04
IC15	37.54	20.59	45.85	2.664	2.181	4.857
IC20	43.57	26.78	53.69	2.295	1.862	3.734
IC25	50.55	37.57	60.35	1.978	1.557	2.662
IC40	78.52	62.15	N/A	1.274	NA	1.609
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	20.3	12	24	1.044	3.302	16.26%	0.0%
1.56		10	20.3	12	24	1.044	3.302	16.26%	0.0%
3.12		10	20.3	12	24	1.044	3.302	16.26%	0.0%
6.25		10	20.3	12	24	1.044	3.302	16.26%	0.0%
12.5		10	20.3	12	24	1.044	3.302	16.26%	0.0%
25		10	20	10	24	1.308	4.137	20.68%	1.48%
50		10	15.3	9	21	1.044	3.302	21.58%	24.63%
100		10	10.5	6	16	0.9804	3.1	29.53%	48.28%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	21	19	22	19	21	23	12	21	21	24
1.56		21	19	22	19	21	23	12	21	21	24
3.12		21	19	22	19	21	23	12	21	21	24
6.25		21	19	22	19	21	23	12	21	21	24
12.5		21	19	22	19	21	23	12	21	21	24
25		22	17	21	22	19	23	24	19	10	23
50		13	18	21	14	13	17	9	15	17	16
100		10	16	13	6	13	11	9	11	6	10

CETIS Analytical Report

Report Date: 23 Dec-14 15:08 (p 2 of 2)
Test Code: 14984b(adj) | 14-6886-7968

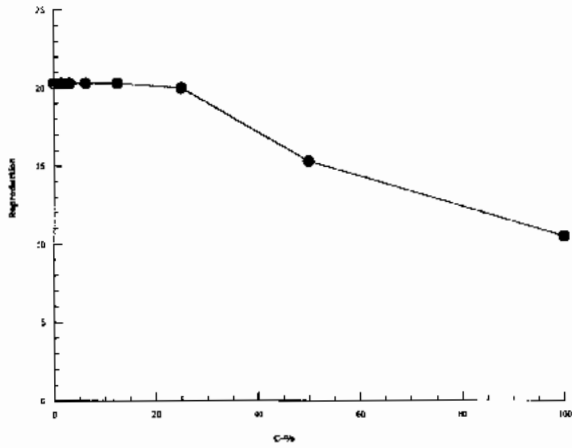
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 09-6560-4607 Endpoint: Reproduction
Analyzed: 23 Dec-14 15:07 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Ceriodaphnia dubia Summary Sheet

Client: Mount Polley
 Work Order No.: 14984

Start Date/Time: Dec 17/14 @ 12:00h
 Set up by: EMM

Sample Information:

Sample ID: POL-4
 Sample Date: Dec 16/14
 Date Received: Dec 17/14
 Sample Volume: 3 x 20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 120314A
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 42
 Mortality (%) in previous 7 d: 10
 Individual female # used ≥ 8 young on test day: 1, 2, 5, 8, 9, 10, 11

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd121
 Stock Solution ID: 14N902
 Date Initiated: Dec 17/14

7-d LC50 (95% CL): 2.1 (1.5-3.0) ^{g/L emm} g/L NaCl
 7-d IC50 (95% CL): 1.5 (1.3-1.8) ^{g/L emm} g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.9 (1.5-2.4) g/L NaCl CV (%): 12
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-2.0) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		7100
IC50 % (v/v) (95% CL)		7100

Reviewed by: Joh

Date reviewed: Jan-28/15

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Polley
 Sample ID: POL-4
 Work Order #: 1484

Start Date & Time: POL Nov 17/14 @ 1200h
 Stop Date & Time: POL 23/14 @ 1330h
 Test Species: Ceriodaphnia dubia

Concentration	Days							
	0	1	2	3	4	5	Final 6	7
<i>control</i>								
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.1	7.7	8.1	7.7	8.1	7.5	8.1	7.6
pH	8.1	7.6	7.9	7.7	8.0	7.7	7.9	7.7
Cond. (µS/cm)	215	220	218	218	217	217	217	217
Initials	EMM	EMM	EMM	EMM	JW	EMM	EMM	

Concentration	Days							
	0	1	2	3	4	5	Final 6	7
<i>1.56% (V/V)</i>								
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.2	7.8	8.3	7.7	8.1	7.5	8.2	7.4
pH	7.9	7.6	7.9	7.8	7.9	7.8	8.0	7.8
Cond. (µS/cm)	220	221	219	218	218	219	221	221
Initials	EMM	EMM	EMM	EMM	JW	EMM	EMM	

Concentration	Days							
	0	1	2	3	4	5	Final 6	7
<i>12.5% (V/V)</i>								
Temperature (°C)	24.0	25.0	24.5	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.2	7.8	8.1	7.7	8.0	7.4	8.1	7.3
pH	7.7	7.7	7.9	7.9	7.6	8.0	7.8	8.1
Cond. (µS/cm)	227	230	229	228	226	229	231	231
Initials	EMM	EMM	EMM	EMM	JW	EMM	EMM	

Concentration	Days							
	0	1	2	3	4	5	Final 6	7
<i>100% (V/V)</i>								
Temperature (°C)	24.0	25.0	25.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.2	7.8	8.0	7.7	8.0	7.6	8.1	7.3
pH	7.7	7.4	7.7	7.6	7.6	7.5	7.7	7.4
Cond. (µS/cm)	288	295	291	292	299	292	281	281
Initials	EMM	EMM	EMM	EMM	JW	EMM	EMM	

	Control	100% (V/V)
Hardness*	100	104
Alkalinity*	84	88

Analysts: EMM, EC, AUD
JW, KIP
 Reviewed by: JW
 Date reviewed: Jan. 26/15

* mg/L as CaCO₃

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5

Sample Description: clear, organisms present; filtered sample through 60µm Nitex mesh

Comments: Broodboard Used: 120314A

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt. Polley
 Sample ID: POL-9
 Work Order: 14984

Start Date & Time: Dec 17/14 07:20h
 Stop Date & Time: Dec 23/14 13:50h
 Set up by: EMM

‰ (VIV)

Days	Concentration: <u>control</u>											Concentration: <u>1.56</u>											Concentration: <u>3.12</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
3	✓	3	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	4	✓	4	4	4	4	4	5	3	4	JW	3	4	4	4	4	4	8	4	4	3	JW	4	4	4	4	4	4	4	2	5	4	JW
5	6	8	6	7	6	7	X	8	7	8	EMM	7	8	6	7	7	6	8	7	8	9	EMM	8	9	8	7	7	9	7	6	9	9	EMM
6	8	9	9	9	10	10		9	11	11	EMM	9	12	11	13	10	11	12	9	11	10	EMM	12	10	12	12	10	10	13	X	9	10	EMM
7																																	
8																																	
Total	18	20	19	20	20	21	4x	22	21	23	EMM	19	24	21	24	21	21	25	20	23	22	EMM	24	23	24	23	21	23	24	8x	23	23	EMM

Days	Concentration: <u>6.25</u>											Concentration: <u>12.5</u>											Concentration: <u>25</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
4	2	4	4	4	4	4	4	3	2	✓	JW	2	4	6	3	3	3	4	3	4	6	JW	2	2	4	2	5	3	1	4	5	4	JW
5	X	9	8	8	6	7	8	8	7	4	EMM	8	6	6	7	X	7	8	6	8	9	EMM	7	8	X	8	9	7	5	9	6	7	EMM
6		13	14	16	10	13	14	11	12	10	EMM	7	12	14	13		12	12	12	13	12	EMM	12	11		13	6	15	9	14	13	13	EMM
7																																	
8																																	
Total	2x	26	26	28	20	24	26	22	21	14	EMM	17	22	26	23	3x	22	24	21	25	27	EMM	21	21	4x	23	20	25	15	27	24	24	EMM

Days	Concentration: <u>50</u>											Concentration: <u>100</u>											Concentration:										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
4	1	3	2	3	3	2	2	1	2	3	JW	2	2	4	4	✓	2	4	2	3	3	JW											
5	7	X	8	8	9	X	9	7	7	8	EMM	8	7	7	9	4	9	9	8	7	7	EMM											
6	11		12	12	13		12	10	10	16	EMM	11	11	8	12	6	10	10	13	14	12	EMM											
7																																	
8																																	
Total	19	3x	22	23	25	2x	23	18	19	27	EMM	21	20	19	25	10	21	23	23	24	22	EMM											

Notes: X = mortality.

Sample Description: clear, organisms present; filtered sample through 60µm Nitex Mesh.
 Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JG

Date reviewed: Jan. 26/15

CETIS Analytical Report

Report Date: 28 Jan-15 15:18 (p 1 of 2)
 Test Code: 14984a | 21-4244-7392

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 15-2209-3543	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 23 Dec-14 14:43	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 11-6398-3957	Test Type: Reproduction-Survival (7d)	Analyst: Emma Marus
Start Date: 17 Dec-14 12:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 23 Dec-14 13:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 2h	Source: In-House Culture	Age: <24h
Sample ID: 20-7290-9415	Code: 7B8E1667	Client: Mount Polley
Sample Date: 16 Dec-14 09:45	Material: Water Sample	Project:
Receive Date: 17 Dec-14 08:30	Source: Mount Polley (MT POLLEY)	
Sample Age: 28h (3.9 °C)	Station: POL-4	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	463050	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	3.023	2.06	N/A	33.08	NA	48.54
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	0.9	0	1	0.1	0.3162	35.14%	0.0%	9	10
1.56		10	1	1	1	0	0	0.0%	-11.11%	10	10
3.12		10	0.9	0	1	0.1	0.3162	35.14%	0.0%	9	10
6.25		10	0.9	0	1	0.1	0.3162	35.14%	0.0%	9	10
12.5		10	0.9	0	1	0.1	0.3162	35.14%	0.0%	9	10
25		10	0.9	0	1	0.1	0.3162	35.14%	0.0%	9	10
50		10	0.8	0	1	0.1333	0.4216	52.7%	11.11%	8	10
100		10	1	1	1	0	0	0.0%	-11.11%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	0	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	0	1	1
6.25		0	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	0	1	1	1	1	1
25		1	1	0	1	1	1	1	1	1	1
50		1	0	1	1	1	0	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 28 Jan-15 15:18 (p 2 of 2)
 Test Code: 14984a | 21-4244-7392

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

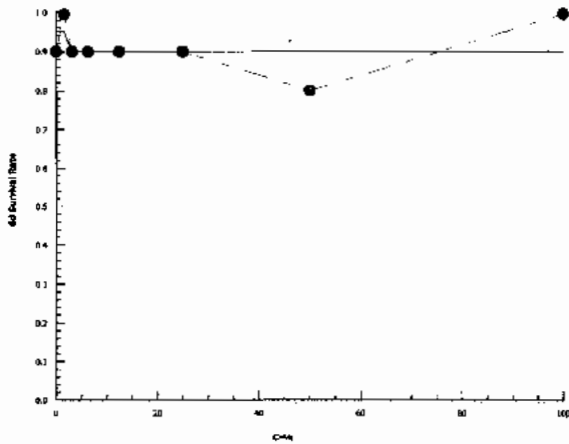
Analysis ID: 15-2209-3543 Endpoint: 6d Survival Rate
 Analyzed: 23 Dec-14 14:43 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1
6.25		0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	0/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 28 Jan-15 15:19 (p 1 of 2)
 Test Code: 14984a | 21-4244-7392

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 04-5849-5777	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 23 Dec-14 14:44	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 11-6398-3957	Test Type: Reproduction-Survival (7d)	Analyst: Emma Marus
Start Date: 17 Dec-14 12:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 23 Dec-14 13:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 2h	Source: In-House Culture	Age: <24h
Sample ID: 20-7290-9415	Code: 7B8E1667	Client: Mount Polley
Sample Date: 16 Dec-14 09:45	Material: Water Sample	Project:
Receive Date: 17 Dec-14 08:30	Source: Mount Polley (MT POLLEY)	
Sample Age: 26h (3.9 °C)	Station: POL-4	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	950514	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	38.31	3.09	N/A	2.61	NA	32.36
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

C-%	Control Type	Count	Mean	Min	Max	Calculated Variate			
						Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	18.8	4	23	1.705	5.391	28.68%	0.0%
1.56		10	22	19	25	0.6146	1.944	8.84%	-17.02%
3.12		10	21.6	8	24	1.536	4.858	22.49%	-14.89%
6.25		10	20.9	2	28	2.461	7.781	37.23%	-11.17%
12.5		10	21	3	27	2.191	6.928	32.99%	-11.7%
25		10	20.4	4	27	2.099	6.637	32.53%	-8.51%
50		10	18.1	2	27	2.747	8.685	47.98%	3.72%
100		10	20.8	10	25	1.332	4.211	20.25%	-10.64%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	18	20	19	20	20	21	4	22	21	23
1.56		19	24	21	24	21	21	25	20	23	22
3.12		24	23	24	23	21	23	24	8	23	23
6.25		2	26	26	28	20	24	26	22	21	14
12.5		17	22	26	23	3	22	24	21	25	27
25		21	21	4	23	20	25	15	27	24	24
50		19	3	22	23	25	2	23	18	19	27
100		21	20	19	25	10	21	23	23	24	22

CETIS Analytical Report

Report Date: 28 Jan-15 15:19 (p 2 of 2)
Test Code: 14984a | 21-4244-7392

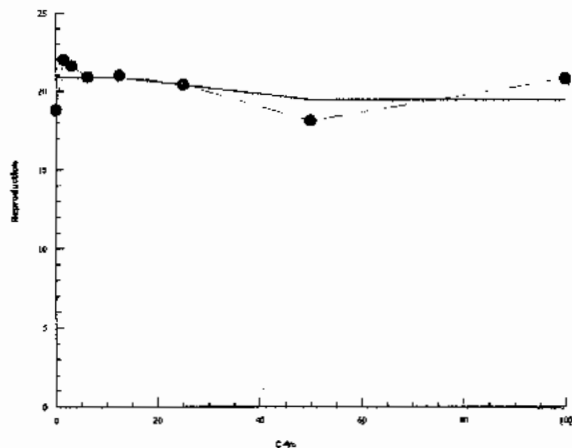
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 04-5849-5777 Endpoint: Reproduction
Analyzed: 23 Dec-14 14:44 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 28 Jan-15 15:22 (p 1 of 2)
 Test Code: 14984a | 21-4244-7392

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 03-1170-7000	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 28 Jan-15 15:21	Analysis: Nonparametric-Control vs Ord. Treatments	Official Results: Yes
Batch ID: 11-6398-3957	Test Type: Reproduction-Survival (7d)	Analyst: Emma Marus
Start Date: 17 Dec-14 12:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 23 Dec-14 13:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 2h	Source: In-House Culture	Age: <24h
Sample ID: 20-7290-9415	Code: 7B8E1667	Client: Mount Polley
Sample Date: 16 Dec-14 09:45	Material: Water Sample	Project:
Receive Date: 17 Dec-14 08:30	Source: Mount Polley (MT POLLEY)	
Sample Age: 26h (3.9 °C)	Station: POL-4	

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU
Untransformed	NA	C < T	NA	NA	100	>100	NA	1

Shirley Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		1.56	0.8812	1.645		18	>0.05	Asymp	Non-Significant Effect
		3.12	1.052	1.716		18	>0.05	Asymp	Non-Significant Effect
		6.25	0.9439	1.739		18	>0.05	Asymp	Non-Significant Effect
		12.5	0.9202	1.75		18	>0.05	Asymp	Non-Significant Effect
		25	0.7524	1.756		18	>0.05	Asymp	Non-Significant Effect
		50	0.3598	1.76		18	>0.05	Asymp	Non-Significant Effect
		100	0.4641	1.763		18	>0.05	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	126	18	7	0.4765	0.8486	Non-Significant Effect
Error	2719.8	37.775	72			
Total	2845.8		79			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	19.31	18.48	0.0073	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.7749	0.9579	<0.0001	Non-normal Distribution

Reproduction Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	10	18.8	14.94	22.66	20	4	23	1.705	28.68%	0.0%
1.56		10	22	20.61	23.39	21.5	19	25	0.6146	8.84%	-17.02%
3.12		10	21.6	18.12	25.08	23	8	24	1.536	22.49%	-14.89%
6.25		10	20.9	15.33	26.47	23	2	28	2.461	37.23%	-11.17%
12.5		10	21	16.04	25.96	22.5	3	27	2.191	32.99%	-11.7%
25		10	20.4	15.65	25.15	22	4	27	2.099	32.53%	-8.51%
50		10	18.1	11.89	24.31	20.5	2	27	2.747	47.98%	3.72%
100		10	20.8	17.79	23.81	21.5	10	25	1.332	20.25%	-10.64%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	18	20	19	20	20	21	4	22	21	23
1.56		19	24	21	24	21	21	25	20	23	22
3.12		24	23	24	23	21	23	24	8	23	23
6.25		2	26	26	28	20	24	26	22	21	14
12.5		17	22	26	23	3	22	24	21	25	27
25		21	21	4	23	20	25	15	27	24	24
50		19	3	22	23	25	2	23	18	19	27
100		21	20	19	25	10	21	23	23	24	22

CETIS Analytical Report

Report Date: 28 Jan-15 15:22 (p 2 of 2)
Test Code: 14984a | 21-4244-7392

Ceriodaphnia 7-d Survival and Reproduction Test

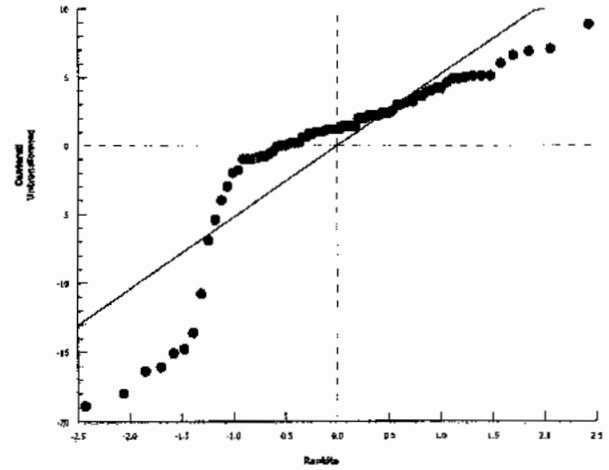
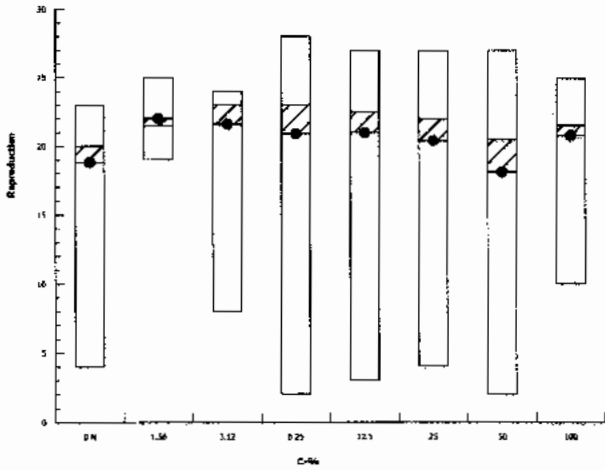
Nautilus Environmental

Analysis ID: 03-1170-7000
Analyzed: 28 Jan-15 15:21

Endpoint: Reproduction
Analysis: Nonparametric-Control vs Ord. Treatments

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



APPENDIX B - Chain of Custody Form

Nautilus Environmental

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

Chain of Custody (electronic)
 wo # 14928
 14972 (2nd CAT)
 14983
 14985
 14984

Sample Collection By: Shauna Litke, Ira Pierce			ANALYSES REQUIRED																	
Report to:	Invoice to:				Refill for "November" RBT EA tes	Refill for "December" RBT EA tes	Fathead minnow survival and growth	Rainbow trout survival and growth	C. dubia survival and reproduction											Receipt Temperature (°C)
Company	Mount Polley Mining Corporation																			
Address	Box 12																			
City/Prov/Postal Code	Likely BC V0L 1N0																			
Contact	Colleen Hughes																			
Phone	(250) 790-2617																			
Email	chughes@mountpolley.com																			

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	Refill for "November" RBT EA tes	Refill for "December" RBT EA tes	Fathead minnow survival and growth	Rainbow trout survival and growth	C. dubia survival and reproduction										Receipt Temperature (°C)	
1 QUR-1	16/12/2014	9:15	water	20L	15	300L total	X	X	X	X	X										4.5	
2 ③ POL-4	16/12/2014	9:45	water	20L	3	60L total			X	X	X										3.9	
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)		RELIQUISHED BY (COURIER)	
Client: Mount Polley Mining Corporation		Total # Containers:	18	Signature:		Signature:	
P.O. No.:		Good Condition?	Y	Print: Shauna Litke		Print:	
Shipped Via: Greyhound		Matches Schedule?	Y	Company: MPMC		Company:	
				Time/Date: 16/12/2014 15:30:00		Time/Date:	
SPECIAL INSTRUCTIONS/COMMENTS: ① One 20L carboy unlabelled ② QUR-1 - refresh water for NOV-EATest and DEC-EATest ③ POL-4 is replacing POL-2 - NY				RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)	
				Signature:		Signature:	
				Print:		Print: Josh Baker	
				Company:		Company: Nautilus Env	
				Time/Date:		Time/Date: Dec 17/14 @ 0830h	

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 5

Toxicity testing of samples identified as P2-S and QUR-1 on *Ceriodaphnia dubia*, rainbow trout (swim up) and fathead minnows: Samples collected January 6 and 7, 2015, Work Order #15019-15021 and #15023-15025



Nautilus Environmental

Toxicity testing on samples identified as P2-S and QUR-1 on *Ceriodaphnia dubia*, rainbow trout (swim up) and fathead minnows

Samples collected January 6 and 7, 2015

Final Report

Report date: March 11, 2015

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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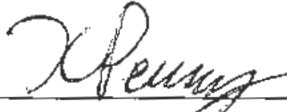
APPENDIX A – *Ceriodaphnia dubia* Toxicity Test Data

APPENDIX B – Rainbow Trout (*Oncorhynchus mykiss*) Toxicity Test Data

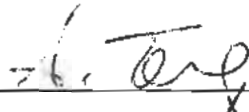
APPENDIX C – Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

APPENDIX D – Chain of Custody Form

SIGNATURE PAGE



Krysta Pearcy, B.Sc.
Laboratory Biologist



Armando Tang, R.F. Bio.
Laboratory Manager

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted toxicity tests for Mount Polley Mining Corporation on samples identified as P2-S and QUR-1. The samples were collected on January 6 and 7, 2015 and delivered to the laboratory in Burnaby, BC on January 7 and 8, 2015. P2-S was transported in three, and QUR-1 in seven 20-L plastic carboys and coolers. The samples were received at temperatures of 2.6 and 4.0°C, and were stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing. The following sub-lethal toxicity tests were performed on the samples:

- *Ceriodaphnia dubia* survival and reproduction
- 7-d rainbow trout (*Oncorhynchus mykiss*) survival and growth
- 7-d fathead minnow (*Pimephales promelas*) survival and growth

Sample QUR-1 was vacuum filtered through 0.45 µm filter paper and tested in addition to the unfiltered sample only for the *C. dubia* toxicity test.

This report describes the results of these toxicity tests. Copies of laboratory data sheets and printouts of statistical analyses for each test are provided in Appendices A to C. The chain-of-custody form is provided in Appendix D.

2.0 METHODS

Methods for the toxicity tests are summarized in Tables 1 to 3. Testing was conducted according to procedures described by the Environment Canada protocols (2007 and 2011) and methods described by Lazorchak and Smith (2007). Statistical analyses for all tests were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house culture
Test organism age	<24 h old neonates produced within 12 h
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20 mL test tube
Test volume	15 mL
Test replicates	10 test replicates per treatment
Number of organisms	1 per replicate
Control water	20% Perrier water
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	<i>Pseudokirchneriella subcapitata</i> and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada, (2007) EPS 1/RM/21
Statistical software	CETIS (2013)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods
Reference toxicant	Sodium chloride

Table 2. Summary of test conditions: rainbow trout (*Oncorhynchus mykiss*) survival and growth test.

Test organism	<i>Oncorhynchus mykiss</i>
Test organism source	Vancouver Island Trout Hatchery, Duncan, BC
Test organism age	3 to 6 days post swim up
Test type	Static renewal
Test duration	7 days
Test vessel	1-L glass containers
Test volume	500 mL
Test replicates	4 per treatment
Number of organisms	5 per replicate
Control water	Moderately-hard water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	15 ± 1°C
Feeding	Twice a day with newly hatched brine shrimp (<i>Artemia nauplii</i>)
Light intensity	100 – 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test protocol	Lazorchak and Smith (2007)
Statistical software	CETIS (2013)
Test endpoint	Survival and biomass
Test acceptability criteria for controls	≥90% survival, ≥1.5 times test initiation dry weight
Reference toxicant	Copper chloride

Table 3. Summary of test conditions: fathead minnow (*Pimephales promelas*) survival and growth test.

Test organism	<i>Pimephales promelas</i>
Test organism source	Aquatic BioSystems, Fort Collins, CO
Test organism age	<24 hours
Test type	Static renewal
Test duration	7 days
Test vessel	375-mL glass containers
Test volume	250 mL
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control water	Moderately-hard water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	Twice a day with newly hatched brine shrimp (<i>Artemia nauplii</i>)
Light intensity	100 – 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test protocol	Environment Canada (2011), EPS 1/RM/22
Statistical software	CETIS (2013)
Test endpoint	Survival and biomass
Test acceptability criteria for controls	≥80% survival, ≥250 µg mean dry weight
Reference toxicant	Sodium chloride

3.0 RESULTS

There were no adverse effects observed on survival and reproduction of *C. dubia* (Table 4), survival and growth of rainbow trout (Table 5) or survival and growth of fathead minnow (Table 6). The LC and IC values were therefore greater than 100% for each of these endpoints in the toxicity tests.

Table 4. Results: *Ceriodaphnia dubia* survival and reproduction test.

Concentration (% v/v)	P2-S		QUR-1 (Unfiltered)		QUR-1 (Filtered)	
	Survival (%)	Reproduction (mean ± SD)	Survival (%)	Reproduction (mean ± SD)	Survival (%)	Reproduction (mean ± SD)
Control	100	25.7 ± 1.8	100	26.3 ± 2.3	100	25.4 ± 2.1
1.56	100	25.9 ± 2.1	100	26.4 ± 2.4	100	26.4 ± 2.3
3.12	100	25.2 ± 5.5	100	25.7 ± 1.6	100	26.0 ± 1.5
6.25	100	26.3 ± 1.9	100	27.1 ± 3.3	100	24.1 ± 3.8
12.5	100	28.4 ± 1.8	100	24.7 ± 2.7	100	26.6 ± 2.9
25	100	28.1 ± 3.0	100	26.5 ± 2.3	100	27.1 ± 3.0
50	100	27.6 ± 2.2	100	25.2 ± 3.6	100	26.2 ± 3.8
100	100	28.8 ± 1.8	100	24.0 ± 2.9	100	26.8 ± 2.2
Test Endpoint						
(% v/v)						
LC50	>100	--	>100	--	>100	--
IC25	--	>100	--	>100	--	>100
IC50	--	>100	--	>100	--	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

Table 5. Results: rainbow trout (*Oncorhynchus mykiss*) survival and growth test.

Concentration (% v/v)	Mean ± SD					
	P2-S			QUR-1		
	Survival (%)	Biomass (mg)	Dry Weight (mg)	Survival (%)	Biomass (mg)	Dry Weight (mg)
Control	100.0 ± 0.0	29.9 ± 1.5	29.9 ± 1.5	100.0 ± 0.0	31.3 ± 2.9	31.3 ± 2.9
6.25	100.0 ± 0.0	30.0 ± 0.5	30.0 ± 0.5	100.0 ± 0.0	31.5 ± 1.7	31.5 ± 1.7
12.5	100.0 ± 0.0	30.3 ± 1.5	30.3 ± 1.5	100.0 ± 0.0	28.1 ± 1.8	28.1 ± 1.8
25	100.0 ± 0.0	28.7 ± 1.3	28.7 ± 1.3	95.0 ± 10.0	25.8 ± 2.8	27.1 ± 0.1
50	100.0 ± 0.0	28.5 ± 2.0	28.5 ± 2.0	100.0 ± 0.0	30.5 ± 0.8	30.5 ± 0.8
100	100.0 ± 0.0	28.9 ± 2.2	28.9 ± 2.2	95.0 ± 10.0	28.9 ± 4.5	30.3 ± 2.2
Test endpoint						
(% v/v)						
LC50	>100	--	--	>100	--	--
IC25	--	>100	>100	--	>100	>100
IC50	--	>100	>100	--	>100	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

Table 6. Results: fathead minnow (*Pimephales promelas*) survival and growth test.

Concentration (% v/v)	Mean ± SD					
	P2-S			QR-1		
	Survival (%)	Biomass (µg)	Dry Weight (µg)	Survival (%)	Biomass (µg)	Dry Weight (µg)
Control	96.7 ± 5.8	578.3 ± 32.6	599.7 ± 47.7	96.7 ± 5.8	521.7 ± 20.2	541.7 ± 52.0
1.56	90.0 ± 17.3	493.3 ± 89.4	549.3 ± 19.4	80.0 ± 0.0	446.7 ± 35.6	558.3 ± 44.5
3.1	100.0 ± 0.0	552.0 ± 75.0	552.0 ± 75.0	93.3 ± 5.8	516.0 ± 49.1	552.3 ± 27.0
6.25	96.7 ± 5.8	543.0 ± 32.4	561.8 ± 11.7	100.0 ± 0.0	558.3 ± 38.8	558.3 ± 38.8
12.5	100.0 ± 0.0	531.7 ± 31.3	531.7 ± 31.3	96.7 ± 5.8	512.3 ± 9.0	531.0 ± 24.5
25	100.0 ± 0.0	603.7 ± 61.9	603.7 ± 61.9	100.0 ± 0.0	480.7 ± 9.1	480.7 ± 9.1
50	100.0 ± 0.0	587.3 ± 27.7	587.3 ± 27.7	96.7 ± 5.8	491.3 ± 33.6	526.8 ± 30.4
100	86.7 ± 11.6	499.3 ± 59.5	578.0 ± 49.6	83.3 ± 5.8	457.3 ± 46.8	548.5 ± 35.1
Test endpoint						
(% v/v)						
LC50	>100	--	--	>100	--	--
IC25	--	>100	>100	--	>100	>100
IC50	--	>100	>100	--	>100	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

4.0 QA/QC

The health history of the test organisms used in the exposures was acceptable and met the requirements of the protocols. The tests met all control acceptability criteria and water quality parameters remained within ranges specified in the protocols throughout the tests. There were no deviations from the test methodologies. Uncertainty associated with these tests is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

Results of the reference toxicant tests conducted during the testing program are summarized in Table 7. Results of the *C. dubia* and *P. promelas* tests fell within range for organism performance of mean and range, based on historical results obtained by the laboratory with this test. Thus, the sensitivity of the organisms used in these tests was appropriate. Results of the *O. mykiss* reference toxicant test fell outside two standard deviations of the historical results obtained by the laboratory. Approximately one in twenty reference toxicant results would be expected to fall outside of the two standard deviation range. Survival in the control and sample concentrations was high (>95%) and the organisms appeared healthy; therefore, the test results were not affected.

Table 7. Reference toxicant results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>C. dubia</i>	Survival (LC50): 2.0 g/L NaCl	1.9 (1.5 - 2.4)	12	January 21, 2015
	Reproduction (IC50): 1.4 g/L NaCl	1.4 (1.0 - 2.0)	19	
<i>O. mykiss</i>	Survival (LC50): 37.5 mg/L Cu	77.6 (49.5-121.7)	25	January 8, 2015
<i>P. promelas</i>	Survival (LC50): 4.6 g/L NaCl	4.4 (3.4 - 5.5)	13	January 8, 2015
	Biomass (IC50): 4.1 g/L NaCl	3.8 (2.8 - 5.3)	18	

SD = Standard Deviation, CV = Coefficient of Variation, IC = Inhibition Concentration, LC = Lethal Concentration.

5.0 REFERENCES

- Environment Canada. 2007. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. Report EPS 1/RM/21, Second Edition, February 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 74 pp.
- Environment Canada. 2011. Biological test method: test of larval growth and survival using fathead minnows. Environmental Protection Series, Report EPS 1/RM/22. February 2011,. Environment Canada, Environmental Protection, Conservation and Protection, Ottawa, ON. 73 pp.
- Lazorchak, J.M. and Smith, M.E. 2007. Rainbow trout (*Oncorhynchus mykiss*) and brook trout (*Salvelinus fontinalis*) 7-day survival and growth test method. Arch. Environ. Contam. Toxicol. 53:397-405.
- Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.4.29 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: Mount Palley
 Work Order No.: 15020

Start Date/Time: Jan 7 14^{15mm} @ 1030h
 Set up by: EMM

Sample Information:

Sample ID: P2-S
 Sample Date: Jan 6/15
 Date Received: Jan 7/15
 Sample Volume: 3x20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is >80 %
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 1224^{14mm}
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 42
 Mortality (%) in previous 7 d: 5
 Individual female # used ≥8 young on test day: 13,14,15,16,17,18

NaCl Reference Toxicant Results:

Reference Toxicant ID: Ca122
 Stock Solution ID: 15NaCl
 Date Initiated: Jan 21/15

7-d LC50 (95% CL): 2.0 (1.7-2.3) g/L NaCl
 7-d IC50 (95% CL): 1.4 (1.2-1.5) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.9 (1.5-3.4) g/L NaCl CV (%): 12
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-2.0) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	7100
IC25 % (v/v) (95% CL)	7100	7100
IC50 % (v/v) (95% CL)	7100	7100

Reviewed by: [Signature]

Date reviewed: Feb 26, 2015

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: MT Palley
 Sample ID: P2-3
 Work Order #: 15020

Start Date & Time: Jan 7/15 1030h
 Stop Date & Time: Jan 13/15 1130h
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		Final	6	7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
<i>Control</i>														
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	8.1	8.0	8.1	7.8	8.0	7.8	8.2	7.7	8.1	7.7	8.0	7.5		
pH	8.1	7.8	8.0	7.7	7.9	7.7	8.1	7.7	8.0	7.7	7.9	7.8		
Cond. (µS/cm)	217	217		218		222		219		218		218		
Initials	EMM	EMM		EMM		m		m		uml		EMM		

Concentration (V/V) 1.56%	Days													
	0	1		2		3		4		5		Final	6	7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	8.1	8.0	8.2	7.8	8.2	7.8	8.2	7.6	8.2	7.7	8.0	7.6		
pH	7.8	7.8	7.8	7.7	7.9	7.7	8.1	7.6	8.0	7.8	7.9	7.8		
Cond. (µS/cm)	220	221		220		220		220		220		216		
Initials	EMM	EMM		EMM		m		m		uml		EMM		

Concentration (V/V) 12.5%	Days													
	0	1		2		3		4		5		Final	6	7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	8.2	8.0	8.2	7.8	8.2	7.8	8.2	7.6	8.2	7.8	8.2	7.5		
pH	7.7	7.7	7.6	7.6	7.9	7.6	8.0	7.6	7.8	7.7	7.8	7.6		
Cond. (µS/cm)	231	232		232		229		231		230		228		
Initials	EMM	EMM		EMM		m		m		uml		EMM		

Concentration (V/V) 100%	Days													
	0	1		2		3		4		5		Final	6	7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.5	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	8.2	8.0	8.1	7.9	8.2	7.7	8.2	7.5	8.2	7.8	8.2	7.5		
pH	7.6	7.5	7.5	7.5	7.7	7.6	7.6	7.7	7.6	7.6	7.5	7.3		
Cond. (µS/cm)	307	305		301		313		305		309		310		
Initials	EMM	EMM		EMM		m		m		uml		EMM		

	Control	100% (V/V)		
Hardness*	100	120		
Alkalinity*	82	84		

Analysts: AUD, EMM

Reviewed by: YML

Date reviewed: Feb 24, 2015

* mg/L as CaCO₃

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5

Sample Description: clear

Comments:

Broodboard Used: 12241314^{EMM}

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt. Pailey
 Sample ID: P2-S
 Work Order: 15020

Start Date & Time: Jan 7/15 @ 1030h
 Stop Date & Time: Jan 13/15 @ 1130h
 Set up by: EMM

‰ (v/v)

Days	Concentration: <u>Control</u>												Concentration: <u>1.56</u>												Concentration: <u>3.12</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	
4	4	3	3	~	4	4	~	4	~	4	~	4	4	5	4	3	4	4	4	5	4	~	2	5	4	4	4	~	3	4	4	4	~			
5	8	9	8	10	9	10	9	9	9	8	EMM	10	9	10	11	9	9	10	9	10	9	EMM	7	11	9	12	14	11	~	8	10	9	EMM			
6	12	14	12	14	14	11	13	12	14	12	EMM	12	12	14	12	14	10	12	12	14	10	EMM	13	10	14	13	13	12	8	14	13	13	EMM			
7																																				
8																																				
Total	24	26	23	28	27	25	27	25	28	24	EMM	26	25	29	27	26	23	26	25	29	23	EMM	22	26	27	29	31	27	11	26	27	26	EMM			

Days	Concentration: <u>6.25</u>												Concentration: <u>12.5</u>												Concentration: <u>25</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
4	4	3	3	5	4	4	3	4	2	3	~	4	4	5	3	5	3	4	5	4	4	~	4	4	5	4	4	3	4	4	4	5	~			
5	10	9	10	10	9	8	9	9	9	8	EMM	9	12	9	9	11	14	8	10	9	9	EMM	9	9	10	11	10	8	8	8	9	7	EMM			
6	13	14	14	15	12	14	16	13	12	14	EMM	15	16	15	15	13	12	14	14	16	13	EMM	15	18	16	17	16	13	17	13	14	13	EMM			
7																																				
8																																				
Total	27	26	27	30	25	26	28	26	23	25	EMM	28	32	29	27	29	29	26	29	29	26	EMM	28	31	31	32	30	23	29	25	27	25	EMM			

Days	Concentration: <u>50</u>												Concentration: <u>100</u>												Concentration:											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM														
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM														
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM														
4	4	4	5	4	4	3	4	2	4	4	~	5	4	4	4	4	3	5	3	5	5	~														
5	8	10	10	9	10	9	9	12	9	10	EMM	11	9	10	8	8	11	9	10	10	9	EMM														
6	12	14	17	13	15	15	14	14	13	15	EMM	16	15	16	15	16	17	15	14	14	13	EMM														
7																																				
8																																				
Total	24	28	32	26	29	27	27	28	26	29	EMM	32	28	30	27	28	31	29	27	29	27	EMM														

Notes: X = mortality.

Sample Description: clear

Comments: Total # Young only based on the first 3 broods. Fourth and subsequent broods not included in total count.

Reviewed by: EMM

Date reviewed: Feb 24, 2015

CETIS Analytical Report

Report Date: 20 Jan-15 12:56 (p 1 of 2)
 Test Code: 15020 | 05-7452-3394

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 04-5348-3411	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 20 Jan-15 12:55	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 01-4993-0032	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 07 Jan-15 10:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 13 Jan-15 11:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 1h	Source: In-House Culture	Age: <24h
Sample ID: 04-9502-4959	Code: 1D817B3F	Client: Mount Polley
Sample Date: 06 Jan-15 11:03	Material: Water Sample	Project:
Receive Date: 07 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 23h (2.6 °C)	Station: P2-S	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	531609	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

EW
 Feb 24, 2015

CETIS Analytical Report

Report Date: 20 Jan-15 12:56 (p 2 of 2)
 Test Code: 15020 | 05-7452-3394

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 04-5348-3411
 Analyzed: 20 Jan-15 12:55

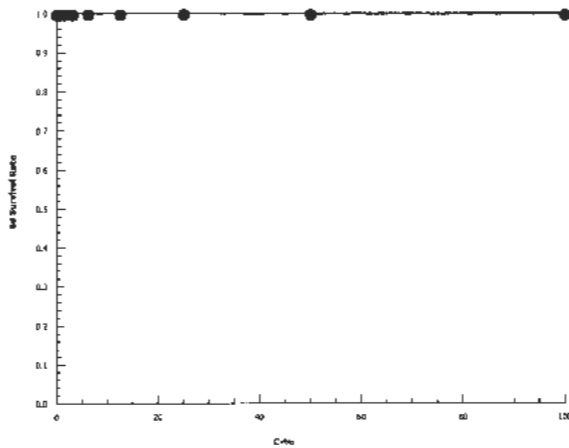
Endpoint: 6d Survival Rate
 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



EC
 Feb 24, 2015

CETIS Analytical Report

Report Date: 20 Jan-15 12:56 (p 1 of 2)
 Test Code: 15020 | 05-7452-3394

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 14-2749-3889	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 20 Jan-15 12:55	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 01-4993-0032	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Percy
Start Date: 07 Jan-15 10:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 13 Jan-15 11:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 1h	Source: In-House Culture	Age: <24h
Sample ID: 04-9502-4959	Code: 1D817B3F	Client: Mount Polley
Sample Date: 06 Jan-15 11:03	Material: Water Sample	Project:
Receive Date: 07 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 23h (2.6 °C)	Station: P2-S	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	773729	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	25.7	23	28	0.5588	1.767	6.88%	0.0%
1.56		10	25.9	23	29	0.6574	2.079	8.03%	-0.78%
3.12		10	25.2	11	31	1.737	5.493	21.8%	1.95%
6.25		10	26.3	23	30	0.5972	1.889	7.18%	-2.34%
12.5		10	28.4	26	32	0.5617	1.776	6.26%	-10.51%
25		10	28.1	23	32	0.9597	3.035	10.8%	-9.34%
50		10	27.6	24	32	0.6864	2.171	7.86%	-7.39%
100		10	28.8	27	32	0.5538	1.751	6.08%	-12.06%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	24	26	23	28	27	25	27	25	28	24
1.56		26	25	29	27	26	23	26	25	29	23
3.12		22	26	27	29	31	27	11	26	27	26
6.25		27	26	27	30	25	26	28	26	23	25
12.5		28	32	29	27	29	29	26	29	29	26
25		28	31	31	32	30	23	29	25	27	25
50		24	28	32	26	29	27	27	28	26	29
100		32	28	30	27	28	31	29	27	29	27

EC
 Feb. 24, 2015

CETIS Analytical Report

Report Date: 20 Jan-15 12:56 (p 2 of 2)

Test Code: 15020 | 05-7452-3394

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 14-2749-3889

Endpoint: Reproduction

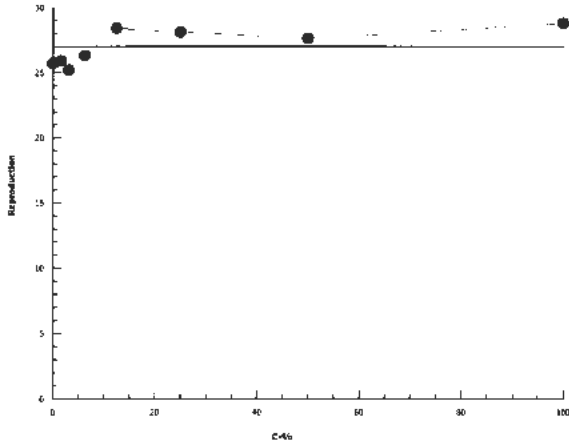
CETIS Version: CETISv1.8.7

Analyzed: 20 Jan-15 12:55

Analysis: Linear Interpolation (ICPIN)

Official Results: Yes

Graphics



EW
Feb 24, 2015

CETIS Analytical Report

Report Date: 20 Jan-15 12:56 (p 1 of 2)
 Test Code: 15020 | 05-7452-3394

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 17-4624-5999	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 20 Jan-15 12:55	Analysis: Nonparametric-Control vs Treatments	Official Results: Yes
Batch ID: 01-4993-0032	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 07 Jan-15 10:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 13 Jan-15 11:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 1h	Source: In-House Culture	Age: <24h
Sample ID: 04-9502-4959	Code: 1D817B3F	Client: Mount Polley
Sample Date: 06 Jan-15 11:03	Material: Water Sample	Project:
Receive Date: 07 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 23h (2.6 °C)	Station: P2-S	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	11.5%	100	>100	NA	1

Steel Many-One Rank Sum Test

Control	vs C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	1.56	107.5	74	4	18	0.9165	Asymp	Non-Significant Effect
	3.12	112.5	74	2	18	0.9676	Asymp	Non-Significant Effect
	6.25	113	74	6	18	0.9708	Asymp	Non-Significant Effect
	12.5	142	74	4	18	1.0000	Asymp	Non-Significant Effect
	25	129.5	74	5	18	0.9997	Asymp	Non-Significant Effect
	50	130	74	5	18	0.9998	Asymp	Non-Significant Effect
	100	144	74	3	18	1.0000	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	134	19.14286	7	2.497	0.0236	Significant Effect
Error	552	7.666667	72			
Total	686		79			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	25.69	18.48	0.0006	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8772	0.9579	<0.0001	Non-normal Distribution

Reproduction Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	10	25.7	24.44	26.96	25.5	23	28	0.5588	6.88%	0.0%
1.56		10	25.9	24.41	27.39	26	23	29	0.6574	8.03%	-0.78%
3.12		10	25.2	21.27	29.13	26.5	11	31	1.737	21.8%	1.95%
6.25		10	26.3	24.95	27.65	26	23	30	0.5972	7.18%	-2.34%
12.5		10	28.4	27.13	29.67	29	26	32	0.5617	6.26%	-10.51%
25		10	28.1	25.93	30.27	28.5	23	32	0.9597	10.8%	-9.34%
50		10	27.6	26.05	29.15	27.5	24	32	0.6864	7.86%	-7.39%
100		10	28.8	27.55	30.05	28.5	27	32	0.5538	6.08%	-12.06%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	24	26	23	28	27	25	27	25	28	24
1.56		26	25	29	27	26	23	26	25	29	23
3.12		22	26	27	29	31	27	11	26	27	26
6.25		27	26	27	30	25	26	28	26	23	25
12.5		28	32	29	27	29	29	26	29	29	26
25		28	31	31	32	30	23	29	25	27	25
50		24	28	32	26	29	27	27	28	26	29
100		32	28	30	27	28	31	29	27	29	27

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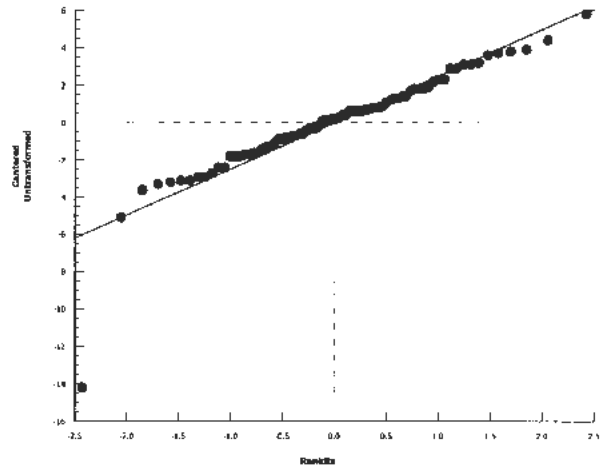
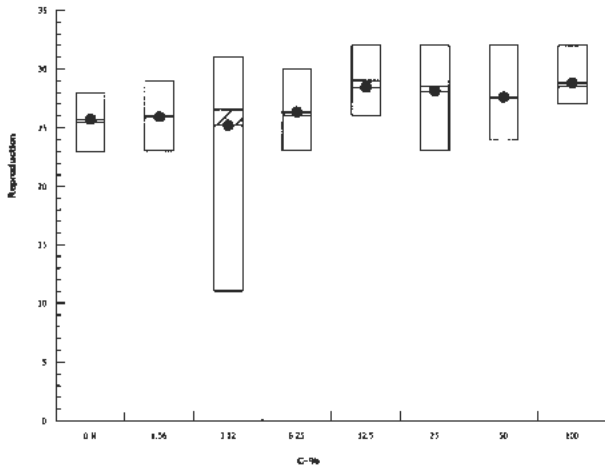
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 17-4624-5999 Endpoint: Reproduction
Analyzed: 20 Jan-15 12:55 Analysis: Nonparametric-Control vs Treatments

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



ea
Feb 24, 2015

Client: Mt. Palley

W.O.#: 15020

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	Technician
P2-S	Jan 7/15	50	4.4	4.6	84	50	6.0	120	EMM
20% Perrier	Jan 7/15	50	4.3	4.5	82	50	5.0	100	EMM

Notes: _____

Reviewed by: EMM

Date Reviewed: Feb 24, 2015

Ceriodaphnia dubia Summary Sheet

Client: Mount Palley
 Work Order No.: 15024

Start Date/Time: Jan 8/15 @ 1130h
 Set up by: EMM

Sample Information:

Sample ID: QUR-1
 Sample Date: Jan 7/15
 Date Received: Jan 8/15
 Sample Volume: 7X 20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 123014
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 20
 Mortality (%) in previous 7 d: 5
 Individual female # used ≥ 8 young on test day: 2,3,4,5,6,7,8,9,15,16,17,18,19,20

NaCl Reference Toxicant Results:

Reference Toxicant ID: CD122
 Stock Solution ID: 15NaCl
 Date Initiated: Jan 21/15

7-d LC50 (95% CL): 2.0 (1.7 - 2.3) g/L NaCl
 7-d IC50 (95% CL): 1.4 (1.2 - 1.5) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.9 (1.5 - 2.4) g/L NaCl CV (%): 12
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0 - 2.0) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		7100
IC50 % (v/v) (95% CL)		7100

Reviewed by: EMM

Date reviewed: Feb-26, 2015

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt Palley
 Sample ID: QUR-1
 Work Order #: 15024

Start Date & Time: Jan 8/15 @ 1130h
 Stop Date & Time: Jan 15/15 @ 1130h
 Test Species: Ceriodaphnia dubia

Concentration	Days															
	0		1		2		3		4		5		6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
<i>Control</i>																
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.1	7.7	8.0	7.8	8.2	7.7	8.1	8.0	7.9	7.7	8.0	7.5	8.0	7.4	7.7	7.4
pH	8.0	7.7	7.9	7.7	8.1	7.7	8.0	7.7	7.9	7.7	7.9	7.7	7.9	7.7	7.7	7.7
Cond. (µS/cm)	217	218		220		219		218		219		220		225		225
Initials	EMM	EMM										EMM	EMM	EMM	EMM	EMM

Concentration (V/V) 1.56%	Days															
	0		1		2		3		4		5		6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.1	7.7	8.1	7.8	8.1	7.6	8.2	8.1	8.0	7.6	8.2	7.6	8.2	7.4	7.7	7.4
pH	7.9	7.7	7.9	7.7	8.1	7.7	7.9	7.7	7.9	7.7	7.9	7.7	7.9	7.7	7.7	7.7
Cond. (µS/cm)	215	218		222		219		220		220		217		218		218
Initials	EMM	EMM										EMM	EMM	EMM	EMM	EMM

Concentration (V/V) 12.5%	Days															
	0		1		2		3		4		5		6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.0	7.8	8.2	7.8	8.1	7.7	8.2	8.1	8.0	7.7	8.2	7.6	8.2	7.5	7.7	7.5
pH	7.8	7.7	7.9	7.7	8.1	7.8	8.0	7.7	7.8	7.7	7.8	7.7	7.8	7.7	7.7	7.7
Cond. (µS/cm)	207	209		210		210		210		212		211		212		212
Initials	EMM	EMM										EMM	EMM	EMM	EMM	EMM

Concentration (V/V) 100%	Days															
	0		1		2		3		4		5		6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.0	7.8	8.2	7.7	8.2	7.6	8.2	8.1	8.1	7.7	8.2	7.8	8.2	7.4	7.7	7.4
pH	7.4	7.6	7.8	7.7	8.0	7.8	7.7	7.7	7.6	7.6	7.5	7.6	7.6	7.6	7.6	7.6
Cond. (µS/cm)	127	126		125		128		127		127		127		129		129
Initials	EMM	EMM										EMM	EMM	EMM	EMM	EMM

	Control	100% (V/V)
Hardness*	100	66
Alkalinity*	82	46

Analysts: AWB, EMM

Reviewed by: EMM

Date reviewed: Feb. 24, 2015

* mg/L as CaCO₃

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5

Sample Description: clear

Comments: Broodboard Used: 123014

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt. Palley
 Sample ID: OPD-1
 Work Order: 15324

Start Date & Time: Jan 8/15 @ 1130h
 Stop Date & Time: Jan 15/15 @ 1130h
 Set up by: EMM

96 CVL (V)

Days	Concentration: <u>Control</u>												Concentration: <u>1.56</u>												Concentration: <u>3.12</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
3											EMM											EMM											EMM			
4	4	4	5	4	4	4	3	4	4	4	EMM	2	4	4	4	3	3	4	4	5	4	EMM	4	4	3	4	5	4	5	4	3	3	EMM			
5	✓	6	8	✓	9	8	✓	✓	✓	✓	EMM	8	✓	9	9	10	✓	7	✓	7	✓	EMM	✓	8	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
6	9	✓	✓	7	13	15	9	10	8	8	EMM	✓	✓	14	15	12	8	✓	✓	✓	9	EMM	9	✓	9	10	9	8	9	✓	8	10	EMM			
7	15	16	14	11	13	15	16	12	13	EMM	12	14	14	15	✓	17	12	13	14	15	EMM	12	13	14	14	13	12	13	12	12	14	EMM				
8											EMM											EMM											EMM			
Total	28	26	27	22	26	27	28	30	24	25	EMM	22	27	27	28	27	30	23	26	26	28	EMM	25	25	26	28	27	24	27	25	23	27	EMM			

Days	Concentration: <u>6.25</u>												Concentration: <u>12.5</u>												Concentration: <u>25</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
3											EMM											EMM											EMM			
4	5	4	4	3	4	3	5	4	2	✓	EMM	3	4	2	3	4	3	4	3	4	5	EMM	5	4	3	2	3	4	5	4	3	4	EMM			
5	✓	10	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	7	7	✓	✓	✓	8	✓	✓	✓	EMM			
6	8	✓	9	10	9	11	12	10	8	9	EMM	8	7	8	9	✓	10	✓	9	9	9	EMM	9	✓	✓	10	8	9	✓	10	10	9	EMM			
7	14	12	7	12	16	15	15	14	10	10	EMM	12	12	14	12	15	10	15	11	13	13	EMM	15	16	13	13	13	16	12	16	13	14	EMM			
8											EMM											EMM											EMM			
Total	27	26	30	25	29	29	32	28	20	21	EMM	23	23	24	24	28	22	29	21	26	27	EMM	29	27	23	25	24	29	25	30	26	27	EMM			

Days	Concentration: <u>50</u>												Concentration: <u>100</u>												Concentration: <u>250</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM														
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM														
3											EMM											EMM														
4	3	3	4	4	3	2	4	3	4	4	EMM	2	4	3	4	3	3	4	2	4	3	EMM														
5	✓	7	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM														
6	9	✓	10	11	9	9	10	8	9	13	EMM	8	9	10	9	9	7	7	8	12	9	EMM														
7	12	10	14	10	14	12	11	11	13	16	EMM	14	12	12	13	11	14	10	9	14	11	EMM														
8											EMM											EMM														
Total	24	20	28	25	26	23	25	22	26	33	EMM	24	25	25	26	23	24	21	19	30	23	EMM														

Notes: X = mortality.

Sample Description: crab

Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: [Signature]

Date reviewed: Feb. 24, 2015

CETIS Analytical Report

Report Date: 20 Jan-15 13:14 (p 1 of 2)
 Test Code: 15024a | 21-4531-3418

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 06-6197-7644	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 20 Jan-15 13:05	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 13-4080-8695	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 08 Jan-15 11:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 15 Jan-15 11:30	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 0h	Source: In-House Culture	Age: <24h
Sample ID: 07-8293-4425	Code: 2EAAA199	Client: Mount Polley
Sample Date: 07 Jan-15 12:20	Material: Water Sample	Project:
Receive Date: 08 Jan-15 08:25	Source: Mount Polley (MT POLLEY)	
Sample Age: 23h (4 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	495230	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

ECU
Feb 24, 2015

CETIS Analytical Report

Report Date: 20 Jan-15 13:14 (p 2 of 2)
 Test Code: 15024a | 21-4531-3418

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

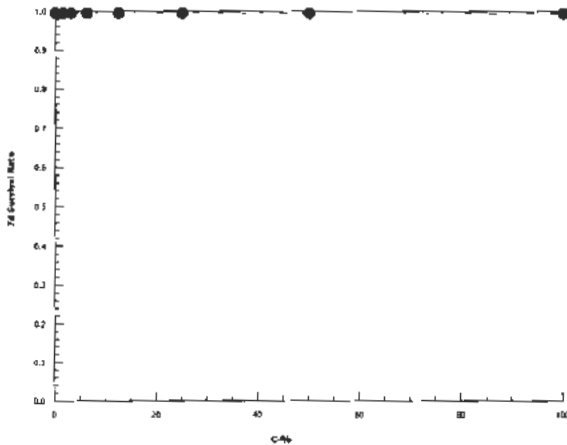
Analysis ID: 06-6197-7644 Endpoint: 7d Survival Rate
 Analyzed: 20 Jan-15 13:05 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



EC
 Feb 24, 2015

CETIS Analytical Report

Report Date: 20 Jan-15 13:14 (p 1 of 2)
 Test Code: 15024a | 21-4531-3418

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 18-9325-6483	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 20 Jan-15 13:06	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 13-4080-8695	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Percy
Start Date: 08 Jan-15 11:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 15 Jan-15 11:30	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 0h	Source: In-House Culture	Age: <24h
Sample ID: 07-8293-4425	Code: 2EAAA199	Client: Mount Polley
Sample Date: 07 Jan-15 12:20	Material: Water Sample	Project:
Receive Date: 08 Jan-15 08:25	Source: Mount Polley (MT POLLEY)	
Sample Age: 23h (4 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1200865	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	54.35	2.809	N/A	1.84	NA	35.6
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	26.3	22	30	0.7157	2.263	8.61%	0.0%
1.56		10	26.4	22	30	0.7483	2.366	8.96%	-0.38%
3.12		10	25.7	23	28	0.4955	1.567	6.1%	2.28%
6.25		10	27.1	20	32	1.059	3.348	12.36%	-3.04%
12.5		10	24.7	21	29	0.8439	2.669	10.8%	6.08%
25		10	26.5	23	30	0.7341	2.321	8.76%	-0.76%
50		10	25.2	20	33	1.123	3.553	14.1%	4.18%
100		10	24	19	30	0.9309	2.944	12.27%	8.75%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	28	26	27	22	26	27	28	30	24	25
1.56		22	27	27	28	27	30	23	26	26	28
3.12		25	25	26	28	27	24	27	25	23	27
6.25		27	26	30	25	29	29	32	28	20	25
12.5		23	23	24	24	28	22	29	21	26	27
25		29	27	23	25	24	29	25	30	26	27
50		24	20	28	25	26	23	25	22	26	33
100		24	25	25	26	23	24	21	19	30	23

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 Feb 24, 2015

CETIS Analytical Report

Report Date: 20 Jan-15 13:14 (p 2 of 2)
Test Code: 15024a | 21-4531-3418

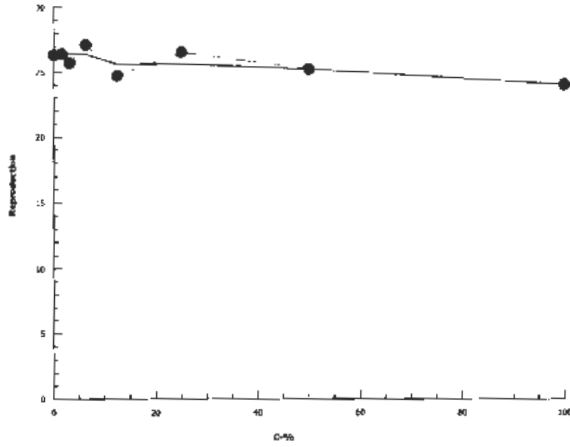
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 18-9325-6483 Endpoint: Reproduction
Analyzed: 20 Jan-15 13:06 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Ceriodaphnia dubia Summary Sheet

Client: Mount Polley
 Work Order No.: 15024

Start Date/Time: Jan 8/15 @ 1200h
 Set up by: EM/M

Sample Information:

Sample ID: QUR-1 (Filtered)
 Sample Date: Jan 7/15
 Date Received: Jan 8/15
 Sample Volume: 7x20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 123014
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 20
 Mortality (%) in previous 7 d: 5
 Individual female # used ≥ 8 young on test day: 2,3,4,5,6,7,8,9,15,16,17,18,19,20

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd122
 Stock Solution ID: 15NaCl
 Date Initiated: Jan 2/15

7-d LC50 (95% CL): 2.0 (1.7 - 2.3) g/L NaCl
 7-d IC50 (95% CL): 1.4 (1.2 - 1.5) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.9 (1.5 - 2.4) g/L NaCl CV (%): 12
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0 - 2.0) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		7100
IC50 % (v/v) (95% CL)		7100

Reviewed by: [Signature]

Date reviewed: Feb 25 2015

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt Palley
 Sample ID: QUD-1 (filtered)
 Work Order #: 15024

Start Date & Time: Jan 8/15 @ 12:00h
 Stop Date & Time: Jan 15/15 @ 12:00h
 Test Species: Ceriodaphnia dubia

Concentration	Days															
	0		1		2		3		4		5		6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Control																
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.1	7.8	8.0	7.8	8.2	7.7	8.1	8.0	7.9	7.5	8.0	7.6	8.0	7.3	7.8	7.3
pH	7.9	7.7	7.9	7.7	8.1	7.7	8.0	7.7	7.9	7.7	7.9	7.6	7.9	7.7	7.7	7.7
Cond. (µS/cm)	217	218		222		219		218		219		220		221		221
Initials	EMM	EMM						MM		EMM		EMM		EMM		EMM

Concentration (V/V) 1.56%	Days															
	0		1		2		3		4		5		6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.0	7.8	8.1	7.8	8.2	7.6	8.2	8.0	8.0	7.6	8.2	7.4	8.2	7.2	7.2	7.2
pH	7.9	7.7	7.9	7.9	8.1	7.8	8.0	7.7	7.9	7.7	7.9	7.6	7.9	7.8	7.8	7.8
Cond. (µS/cm)	214	217		219		218		218		219		215		214		214
Initials	EMM	EMM						MM		EMM		EMM		EMM		EMM

Concentration (V/V) 12.5%	Days															
	0		1		2		3		4		5		6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	7.9	7.8	8.1	7.7	8.2	7.7	8.2	8.0	8.1	7.6	8.2	7.4	8.2	7.2	7.2	7.2
pH	7.8	7.7	8.0	7.8	8.1	7.8	8.0	7.6	7.8	7.6	7.8	7.7	7.8	7.5	7.5	7.5
Cond. (µS/cm)	206	209		210		207		209		208		207		209		209
Initials	EMM	EMM						MM		EMM		EMM		EMM		EMM

Concentration (V/V) 100%	Days															
	0		1		2		3		4		5		6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	7.9	7.9	8.2	7.8	8.2	7.7	8.2	8.0	8.1	7.7	8.2	7.4	8.2	7.4	7.4	7.4
pH	7.5	7.3	7.7	7.5	7.8	7.6	7.7	7.4	7.7	7.5	7.6	7.5	7.6	7.5	7.5	7.5
Cond. (µS/cm)	126	126		128		129		128		127		127		129		129
Initials	EMM	EMM						MM		EMM		EMM		EMM		EMM

	Control	100% (V/V)
Hardness*	100	66
Alkalinity*	82	46

Analysts: AWB, EMM
 Reviewed by: EMM
 Date reviewed: Feb. 24, 2015

* mg/L as CaCO₃

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5

Sample Description: clear; sample filtered through 0.45 µm filter

Comments: Broodboard Used: 12304

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt. Palley
 Sample ID: 002-1 (Filtered)
 Work Order: 15024

Start Date & Time: Jan 8/15 @ 1200h
 Stop Date & Time: Jan 15/15 @ 1200h
 Set up by: Emm

90 CVLV)

Days	Concentration: <u>control</u>											Concentration: <u>1.56</u>											Concentration: <u>3.12</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A
4	5	4	5	5	4	4	4	4	4	5	Emm	6	5	5	4	5	4	4	3	4	4	Emm	4	5	4	4	4	4	4	6	4	5	Emm
5	8	9	10	8	7	7	9	9	✓	8	Emm	9	✓	8	10	9	8	✓	11	9	Emm	10	9	11	8	9	✓	7	✓	✓	9	Emm	
6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm
7	14	14	12	13	12	10	12	11	15	14	Emm	15	13	12	13	13	10	12	14	14	15	Emm	13	10	9	14	14	12	16	13	15	10	Emm
8											Emm											Emm											Emm
Total	27	27	27	26	23	21	25	24	27	27	Emm	30	26	25	27	27	25	25	29	28	Emm	27	24	24	26	27	26	27	27	27	28	Emm	

Days	Concentration: <u>6.75</u>											Concentration: <u>12.5</u>											Concentration: <u>25</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A
4	4	5	4	3	5	4	5	4	4	5	Emm	5	4	4	5	3	2	4	3	4	4	Emm	3	4	4	5	3	4	4	4	3	4	Emm
5	7	9	10	7	10	8	5	8	✓	10	Emm	9	10	11	✓	✓	10	9	✓	11	10	Emm	9	8	7	10	9	11	12	✓	9	10	Emm
6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm
7	7	12	12	14	15	✓	✓	15	13	8	Emm	17	15	14	10	12	13	9	13	12	12	Emm	14	11	14	15	16	14	17	14	14	10	Emm
8											Emm											Emm											Emm
Total	18	26	26	24	30	22	19	27	27	27	Emm	31	29	29	24	24	25	22	29	27	26	Emm	26	23	25	30	28	29	33	27	26	24	Emm

Days	Concentration: <u>50</u>											Concentration: <u>100</u>											Concentration: <u></u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm											
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A											
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A											
4	3	3	4	3	4	4	4	5	4	✓	Emm	3	5	4	3	4	4	5	5	5	✓	Emm											
5	9	8	✓	10	9	✓	✓	✓	✓	6	Emm	7	10	9	9	8	9	✓	✓	10	6	Emm											
6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Emm											
7	16	14	15	13	13	13	16	14	15	✓	Emm	13	14	13	16	14	11	12	16	13	14	Emm											
8											Emm											Emm											
Total	28	25	27	26	26	28	24	28	29	16	Emm	23	29	26	28	26	24	26	30	28	28	Emm											

Notes: X = mortality.

Sample Description: clear; sample filtered through 0.45µm filter

Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: [Signature]

Date reviewed: Feb. 24, 2015

CETIS Analytical Report

Report Date: 20 Jan-15 13:14 (p 1 of 2)
 Test Code: 15024b | 17-5884-5607

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 08-5169-7236	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 20 Jan-15 13:14	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 13-0862-5001	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 08 Jan-15 12:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 15 Jan-15 12:00	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 0h	Source: In-House Culture	Age: <24h
Sample ID: 12-7793-9082	Code: 4C2BCD8A	Client: Mount Polley
Sample Date: 07 Jan-15 12:20	Material: Water Sample	Project:
Receive Date: 08 Jan-15 08:25	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h (4 °C)	Station: QUR-1 (Filtered)	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	2038222	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

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Feb 24, 2015

CETIS Analytical Report

Report Date: 20 Jan-15 13:14 (p 2 of 2)
 Test Code: 15024b | 17-5884-5607

Ceriodaphnia 7-d Survival and Reproduction Test

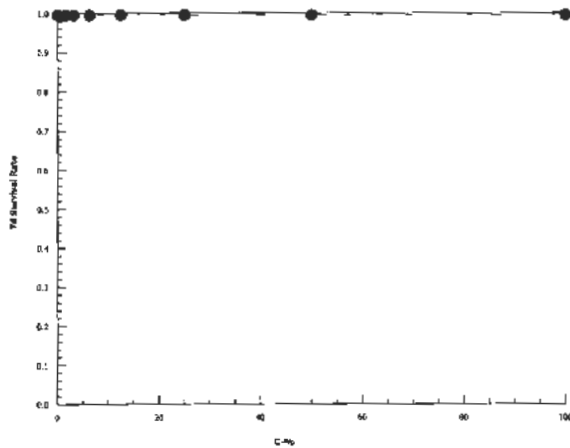
Nautilus Environmental

Analysis ID: 08-5169-7236 Endpoint: 7d Survival Rate CETIS Version: CETISv1.8.7
 Analyzed: 20 Jan-15 13:14 Analysis: Linear Interpolation (ICPIN) Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



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 Feb-24, 2015

CETIS Analytical Report

Report Date: 20 Jan-15 13:14 (p 1 of 2)
 Test Code: 15024b | 17-5884-5607

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 21-4006-0197	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 20 Jan-15 13:14	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 13-0862-5001	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 08 Jan-15 12:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 15 Jan-15 12:00	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 0h	Source: In-House Culture	Age: <24h
Sample ID: 12-7793-9082	Code: 4C2BCD8A	Client: Mount Polley
Sample Date: 07 Jan-15 12:20	Material: Water Sample	Project:
Receive Date: 08 Jan-15 08:25	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h (4 °C)	Station: QUR-1 (Filtered)	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1813697	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

C-%	Control Type	Count	Mean	Min	Max	Calculated Variate			
						Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	25.4	21	27	0.67	2.119	8.34%	0.0%
1.56		10	26.4	22	30	0.7333	2.319	8.78%	-3.94%
3.12		10	26	24	28	0.4714	1.491	5.73%	-2.36%
6.25		10	24.1	18	30	1.206	3.814	15.82%	5.12%
12.5		10	26.6	22	31	0.9092	2.875	10.81%	-4.72%
25		10	27.1	23	33	0.9481	2.998	11.06%	-6.69%
50		10	26.2	16	29	1.209	3.824	14.6%	-3.15%
100		10	26.8	23	30	0.696	2.201	8.21%	-5.51%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	27	27	27	26	23	21	25	24	27	27
1.56		30	26	25	27	27	22	25	25	29	28
3.12		27	24	24	26	27	26	27	27	28	24
6.25		18	26	26	24	30	22	19	27	27	22
12.5		31	29	29	24	24	25	22	29	27	26
25		26	23	25	30	28	29	33	27	26	24
50		28	25	27	26	26	28	29	28	29	16
100		23	29	26	28	26	24	26	30	28	28

EC
 FEB 24, 2015

CETIS Analytical Report

Report Date: 20 Jan-15 13:14 (p 2 of 2)
Test Code: 15024b | 17-5884-5607

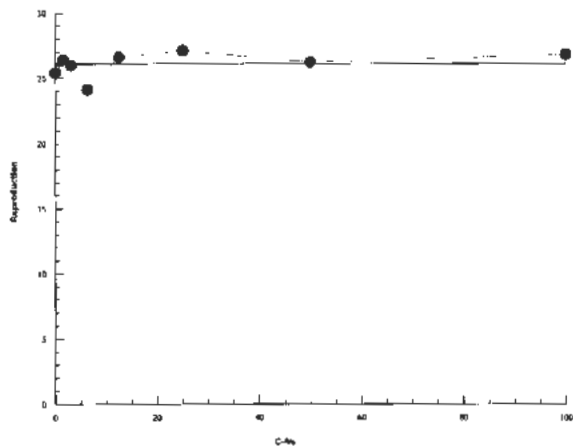
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 21-4006-0197 Endpoint: Reproduction
Analyzed: 20 Jan-15 13:14 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



EC
Feb
24, 2015

CETIS Analytical Report

Report Date: 20 Jan-15 13:14 (p 1 of 2)
 Test Code: 15024b | 17-5884-5607

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 19-0588-4677	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 20 Jan-15 13:14	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 13-0862-5001	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 08 Jan-15 12:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 15 Jan-15 12:00	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 0h	Source: In-House Culture	Age: <24h
Sample ID: 12-7793-9082	Code: 4C2BCD8A	Client: Mount Polley
Sample Date: 07 Jan-15 12:20	Material: Water Sample	Project:
Receive Date: 08 Jan-15 08:25	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h (4 °C)	Station: QUR-1 (Filtered)	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	11.8%	100	>100	NA	1

Dunnnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		1.56	-0.7946	2.386	3.003	18	0.9829	CDF	Non-Significant Effect
		3.12	-0.4767	2.386	3.003	18	0.9583	CDF	Non-Significant Effect
		6.25	1.033	2.386	3.003	18	0.4617	CDF	Non-Significant Effect
		12.5	-0.9535	2.386	3.003	18	0.9895	CDF	Non-Significant Effect
		25	-1.351	2.386	3.003	18	0.9973	CDF	Non-Significant Effect
		50	-0.6357	2.386	3.003	18	0.9728	CDF	Non-Significant Effect
		100	-1.112	2.386	3.003	18	0.9938	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	63.35	9.05	7	1.143	0.3466	Non-Significant Effect
Error	570.2	7.919445	72			
Total	633.55		79			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	11.46	18.48	0.1198	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.961	0.9579	0.0154	Normal Distribution

Reproduction Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	10	25.4	23.88	26.92	26.5	21	27	0.67	8.34%	0.0%
1.56		10	26.4	24.74	28.06	26.5	22	30	0.7333	8.78%	-3.94%
3.12		10	26	24.93	27.07	26.5	24	28	0.4714	5.73%	-2.36%
6.25		10	24.1	21.37	26.83	25	18	30	1.206	15.82%	5.12%
12.5		10	26.6	24.54	28.66	26.5	22	31	0.9092	10.81%	-4.72%
25		10	27.1	24.96	29.24	26.5	23	33	0.9481	11.06%	-6.69%
50		10	26.2	23.46	28.94	27.5	16	29	1.209	14.6%	-3.15%
100		10	26.8	25.23	28.37	27	23	30	0.696	8.21%	-5.51%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	27	27	27	26	23	21	25	24	27	27
1.56		30	26	25	27	27	22	25	25	29	28
3.12		27	24	24	26	27	26	27	27	28	24
6.25		18	26	26	24	30	22	19	27	27	22
12.5		31	29	29	24	24	25	22	29	27	26
25		26	23	25	30	28	29	33	27	26	24
50		28	25	27	26	26	28	29	28	29	16
100		23	29	26	28	26	24	26	30	28	28

EC
 FEB 24, 2015

CETIS Analytical Report

Report Date: 20 Jan-15 13:14 (p 2 of 2)

Test Code: 15024b | 17-5884-5607

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 19-0588-4677

Endpoint: Reproduction

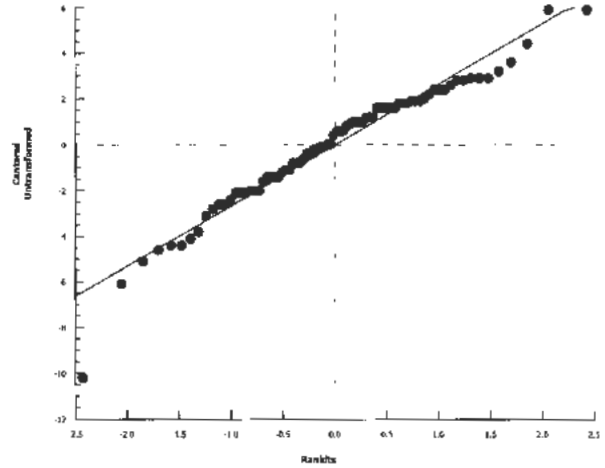
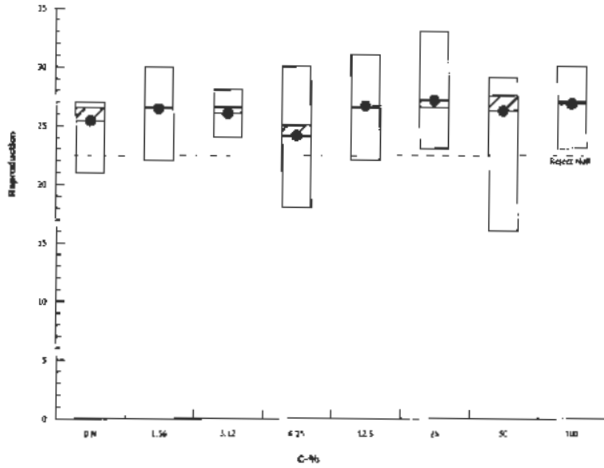
CETIS Version: CETISv1.8.7

Analyzed: 20 Jan-15 13:14

Analysis: Parametric-Control vs Treatments

Official Results: Yes

Graphics



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Feb 24, 2015

APPENDIX B - Rainbow Trout (*Oncorhynchus mykiss*) Toxicity Test Data

Rainbow Trout Swimup Test Summary Sheet

Client: Mt Polley

Start Date/Time: JAN 8 / 2015 @ 1400h

Work Order No.: 15021

Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: P2-S

Sample Date: JAN 6 / 15

Date Received: JAN 7 / 15

Sample Volume: 3 x 20L

Dilution Water:

Type: Moderately Hard Water
 Hardness (mg/L CaCO₃): EC 128 98
 Alkalinity (mg/L CaCO₃): EC 86 62
 Batch: 010615 | 010915 EC

Test Organism Information:

Batch No.: 010715
 Source: Vancouver Island Trout Hatchery
 Loading Density: N/A

Copper Reference Toxicant Results:

Reference Toxicant ID: ATCLII
 Stock Solution ID: 15Cu01
 Date Initiated: JAN 8 / 15
 7-d EC50 (95% CL): 37.5 (32.12 - 43.79) mg/L Cu
 Reference Toxicant Mean ± 2 SD: 77.63 (49.54 - 121.7) mg/L Cu
 Reference Toxicant CV (%): 25.20

Test Results:

	Sample ID	
	Swimup Survival	Swimup Dry Weight
EC25 % (v/v) (95% CL)	>100%	
EC50 % (v/v) (95% CL)	>100%	
IC25 % (v/v) (95% CL)		>100%
IC50 % (v/v) (95% CL)		>100%

Reviewed by: [Signature]

Date reviewed: Feb. 26, 2015

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Polley
 Sample ID: PN-POL-2 P2S
 Work Order #: 15021

Start Date & Time: Jan 8, 2015 @ 1400h
 Stop Date & Time: Jan 15, 2015 @ 1400h
 Test Species: Oncorhynchus mykiss

Control Concentration % (V/V)	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
DO (mg/L)	10.0	7.2	9.8	9.8	9.8	9.8	9.9	9.9	9.0	10.0	9.5	10.0	9.9	10.3	9.5
pH	7.8	7.3	7.9	7.8	7.8	7.7	7.8	7.7	7.9	7.7	7.8	7.7	7.8	7.7	7.7
Cond. (µS/cm)	345	360		358		360		359		365		307		329	
Initials	EC	EC		A		A		EC		EC		EC		EC	

Concentration 6.25	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
DO (mg/L)	10.0	7.2	9.7	9.8	9.8	9.8	9.9	6.5	9.6	9.6	10.0	9.4	10.0	9.6	
pH	7.7	7.4	7.7	7.8	7.7	7.8	7.7	7.2	7.8	7.7	7.6	7.8	7.6	7.7	
Cond. (µS/cm)	344	354		352		355		355		353		307		323	
Initials	EC	EC		A		A		EC		EC		EC		EC	

Concentration 12.5	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	
DO (mg/L)	10.1	7.4	9.8	9.8	9.8	9.8	9.9	9.2	9.8	9.6	10.0	9.4	10.1	9.7	
pH	7.7	7.4	7.7	7.7	7.7	7.8	7.7	7.9	7.7	7.7	7.6	7.8	7.6	7.7	
Cond. (µS/cm)	341	350		350		352		351		357		307		324	
Initials	EC	EC		A		A		EC		EC		EC		EC	

Concentration 25	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	
DO (mg/L)	10.0	7.6	9.8	9.8	9.9	9.9	9.8	9.3	10.0	9.6	10.0	9.4	10.2	9.6	
pH	7.7	7.5	7.7	7.7	7.7	7.8	7.7	7.9	7.7	7.7	7.6	7.7	7.6	7.7	
Cond. (µS/cm)	335	342		347		345		343		344		306		318	
Initials	EC	EC		A		A		EC		EC		EC		EC	

DO meter: DO-1/2 pH meter: pH-1/2 Conductivity meter: C-1/2

	Control	100%		
Hardness*	98	128		
Alkalinity*	62	86		

* mg/L as CaCO₃

Analysts: JAB, AWD, EC

Reviewed by: EC

Date reviewed: Feb-25/15

Sample Description: Clear, Colorless

Comments: ① aeration is, started @ 1700h, 0.0 mg/L in Control Rep A, 6.7 mg/L
② Aeration Stopped, but resumed immediately.

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Polley
 Sample ID: W P01-2 P33
 Work Order #: 15021

Start Date & Time: Jan 2, 2015 @ 1400h
 Stop Date & Time: Jan 15, 2015 @ 1400h
 Test Species: Oncorhynchus mykiss

% (V/V) Concentration 50	Days													
	0	1		2		3		4		5		6		7
	Init.	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
DO (mg/L)	10.0	7.7	9.9	7.8	9.8	9.8	9.7	9.4	10.0	9.6	10.0	9.4	10.3	9.7
pH	7.7	7.5	7.7	7.7	7.7	7.8	7.7	7.8	7.7	7.7	7.6	7.8	7.6	7.7
Cond. (µS/cm)	324	331		328		330		330		334		304		319
Initials	EC	EC						EC		EC		EC		EC

Concentration 100	Days													
	0	1		2		3		4		5		6		7
	Init.	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
DO (mg/L)	10.3	7.6	9.9	9.8	9.8	9.7	9.7	9.4	10.0	9.6	10.0	9.4	10.2	9.7
pH	7.7	7.5	7.7	7.7	7.7	7.8	7.7	8.0	7.7	7.8	7.6	7.8	7.6	7.8
Cond. (µS/cm)	301	301		300		301		302		300		301		307
Initials	EC	EC						EC		EC		EC		EC

Concentration	Days													
	0	1		2		3		4		5		6		7
	Init.	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)														
DO (mg/L)														
pH														
Cond. (µS/cm)														
Initials														

Concentration	Days													
	0	1		2		3		4		5		6		7
	Init.	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)														
DO (mg/L)														
pH														
Cond. (µS/cm)														
Initials														

DO meter: DO-1/2 pH meter: pH-1/2 Conductivity meter: C-1/2

	Control	100%		
Hardness*	98	128		
Alkalinity*	62	86		

Analysts: JAB, A.W.D., EC

Reviewed by: [Signature]

Date reviewed: Feb-25/15

* mg/L as CaCO₃

Sample Description: _____

Comments: _____

7-d Chronic Freshwater Toxicity Test Daily Mortality

Client: Mt. Polley
 Sample ID: 20 PGL-2 P25
 Work Order #: 15021

Start Date & Time: JAN 8, 2015 @ 1400h
 Stop Date & Time: JAN 15, 2015 @ 1400h
 Test Species: Oncorhynchus mykiss

Concentration % (V/V)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	5	5	5	5	5	5	5	
	B								
	C								
	D								
6.25	A								
	B								
	C								
	D								
12.5	A								
	B								
	C								
	D								
25	A								
	B								
	C								
	D								
50	A								
	B								
	C								
	D								
100	A								
	B								
	C	↓	↓	↓	↓	↓	↓	↓	
	D	↓	↓	↓	↓	↓	↓	↓	
	A								
	B								
	C								
	D								
Tech Initials	A								
	B								
	C								
	D								

Comments: _____

Reviewed by: 

Date reviewed: FEB. 25/15

7-d Chronic Freshwater Toxicity Test Data Sheet
Swim-up Survival and Dry Weight

Client: Mt. Poileg
 Sample ID: TW POL-2 P25
 Work Order #: 16021

Start Date: JAN 8, 2015 *214 ooh*
 Termination Date: JAN 15, 2015 *214 ooh*
 Species: O. mykiss

Concentration % (V/V)	Rep	POL-2 Pan No. Blue	No. Alive	Initials	Pan weight w/ (g) mg	Pan + organism (g)	No. weighed	Initials
control	A	1	5	EC	943.03	1.09609	5	EC
	B	2			978.26	1.11650		EC
	C	3			972.43	1.12706		EC
	D	4			973.27	1.12517		EC
6.25	A	5			979.01	1.12673		EC
	B	6			999.98	1.15200		EC
	C	7			999.33	1.14741		EC
	D	8			996.82	1.14888		EC
12.5	A	9			989.17	1.13880		EC
	B	10			1002.20	1.15703		EC
	C	11			994.33	1.15365		EC
	D	12			990.33	1.13210		EC
25	A	13			1000.57	1.15409		EC
	B	14			1007.66	1.14769		EC
	C	15			1006.06	1.14731		EC
	D	16			1001.56	1.14131		EC
50	A	17			1002.28	1.13694		EC
	B	18			994.92	1.12896		EC
	C	19			985.86	1.13985		EC
	D	20			987.63	1.13477		EC
100	A	21			991.66	1.14444		EC
	B	22			985.08	1.14042		EC
	C	23			1002.28	1.13585		EC
	D	24		✓	995.49	1.13198	✓	EC

Thermometer: Calibrated Thermometer DO meter: DO-1/2 pH meter: pH-1/2

Comments: Reweighed: Pan#1 = 1098.05mg Pan#10 = 1160.72mg Pan#24 = 1134.36mg

Reviewed by: _____ Date Reviewed: _____

7d Chronic Freshwater Toxicity Test Data Sheet
Swim-up Survival and Dry Weight

Client: Mt. Polley
 Work Order No.: 15021

Start Date: JAN 8/15
 Termination Date: JAN 15/15

Sample ID	Rep	Pan No.	No. Alive	Initials	Pan weight EC to mg	Pan + organism (g)	No. weighed	Initials
P25	A	A	5	EC	999.40	1.07018	5	EC
(To)	B	B	5		965.97	1.04538		
	C	C	5		973.58	1.04388		
	D	D	5	↓	971.86	1.05667	↓	↓
	A				EC			
	B							
	C							
	D							
	A							
	B							
	C							
	D							
	A							
	B							
	C							
	D							
	A							
	B							
	C							
	D							

Thermometer: Calibrated Thermometer DO meter: D.O.-1/2 pH meter: pH-1/2

Comments: Reweighed Pan#B: 1.04718 g

Reviewed by: [Signature] Date Reviewed: Feb. 25, 2015

CETIS Analytical Report

Report Date: 21 Jan-15 16:41 (p 1 of 2)
 Test Code: 15021 | 11-4307-1481

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 15-5589-9660	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 21 Jan-15 16:32	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 14-8960-3798	Test Type: Growth-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 08 Jan-15 14:00	Protocol: Washington DOE (2008)	Diluent: Mod-Hard Synthetic Water
Ending Date: 15 Jan-15 14:00	Species: Oncorhynchus mykiss	Brine:
Duration: 7d 0h	Source: Vancouver Island Trout Hatchery	Age:
Sample ID: 04-9502-4959	Code: 1D817B3F	Client: Mount Polley
Sample Date: 06 Jan-15 11:03	Material: Water Sample	Project:
Receive Date: 07 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 51h (2.6 °C)	Station: P2-S	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1607060	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	4	1	1	1	0	0	0.0%	0.0%	20	20
6.25		4	1	1	1	0	0	0.0%	0.0%	20	20
12.5		4	1	1	1	0	0	0.0%	0.0%	20	20
25		4	1	1	1	0	0	0.0%	0.0%	20	20
50		4	1	1	1	0	0	0.0%	0.0%	20	20
100		4	1	1	1	0	0	0.0%	0.0%	20	20

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1	1	1	1
6.25		1	1	1	1
12.5		1	1	1	1
25		1	1	1	1
50		1	1	1	1
100		1	1	1	1

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	5/5	5/5	5/5	5/5
6.25		5/5	5/5	5/5	5/5
12.5		5/5	5/5	5/5	5/5
25		5/5	5/5	5/5	5/5
50		5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5

KW
 Feb 25/15

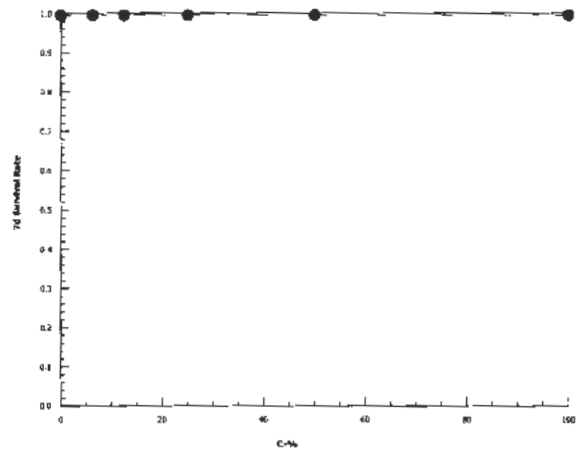
CETIS Analytical Report

Report Date: 21 Jan-15 16:41 (p 2 of 2)
Test Code: 15021 | 11-4307-1481

Fish Survival Development Growth (w/Length) Nautilus Environmental

Analysis ID: 15-5589-9660	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 21 Jan-15 16:32	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes

Graphics



CA
Feb-25/15

CETIS Analytical Report

Report Date: 30 Jan-15 11:13 (p 1 of 2)

Test Code: 15021 | 11-4307-1481

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 18-3259-2491	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 21 Jan-15 16:32	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 14-8960-3798	Test Type: Growth-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 08 Jan-15 14:00	Protocol: Washington DOE (2008)	Diluent: Mod-Hard Synthetic Water
Ending Date: 15 Jan-15 14:00	Species: Oncorhynchus mykiss	Brine:
Duration: 7d 0h	Source: Vancouver Island Trout Hatchery	Age:
Sample ID: 04-9502-4959	Code: 1D817B3F	Client: Mount Polley
Sample Date: 06 Jan-15 11:03	Material: Water Sample	Project:
Receive Date: 07 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 51h (2.6 °C)	Station: P2-S	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1755846	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	29.89	27.65	30.93	0.7562	1.512	5.06%	0.0%
6.25		4	29.99	29.54	30.41	0.2395	0.479	1.6%	-0.34%
12.5		4	30.28	28.35	31.86	0.7551	1.51	4.99%	-1.31%
25		4	28.73	27.95	30.7	0.662	1.324	4.61%	3.89%
50		4	28.49	26.81	30.8	0.9774	1.955	6.86%	4.68%
100		4	28.91	26.71	31.07	1.11	2.22	7.68%	3.29%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	30.61	27.65	30.93	30.38
6.25		29.54	30.4	29.62	30.41
12.5		29.93	30.99	31.86	28.35
25		30.7	28.01	28.25	27.95
50		26.93	26.81	30.8	29.43
100		30.56	31.07	26.71	27.3

Feb. 25/15

CETIS Analytical Report

Report Date: 30 Jan-15 11:13 (p 2 of 2)
Test Code: 15021 | 11-4307-1481

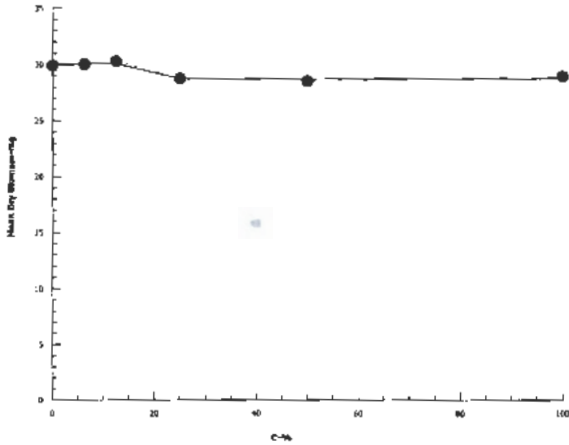
Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 18-3259-2491 Endpoint: Mean Dry Biomass-mg
Analyzed: 21 Jan-15 16:32 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



EC
FEB-25/15

CETIS Analytical Report

Report Date: 21 Jan-15 16:41 (p 1 of 2)
 Test Code: 15021 | 11-4307-1481

Fish Survival Development Growth (w/Length)			Nautilus Environmental
Analysis ID: 00-3407-2749	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7	
Analyzed: 21 Jan-15 16:32	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes	
Batch ID: 14-8960-3798	Test Type: Growth-Survival (7d)	Analyst: Krysta Pearcy	
Start Date: 08 Jan-15 14:00	Protocol: Washington DOE (2008)	Diluent: Mod-Hard Synthetic Water	
Ending Date: 15 Jan-15 14:00	Species: Oncorhynchus mykiss	Brine:	
Duration: 7d 0h	Source: Vancouver Island Trout Hatchery	Age:	
Sample ID: 04-9502-4959	Code: 1D817B3F	Client: Mount Polley	
Sample Date: 06 Jan-15 11:03	Material: Water Sample	Project:	
Receive Date: 07 Jan-15 08:45	Source: Mount Polley (MT POLLEY)		
Sample Age: 51h (2.6 °C)	Station: P2-S		

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1014742	200	Yes	Two-Point Interpolation

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	29.89	27.65	30.93	0.7562	1.512	5.06%	0.0%
6.25		4	29.99	29.54	30.41	0.2395	0.479	1.6%	-0.34%
12.5		4	30.28	28.35	31.86	0.7551	1.51	4.99%	-1.31%
25		4	28.73	27.95	30.7	0.662	1.324	4.61%	3.89%
50		4	28.49	26.81	30.8	0.9774	1.955	6.86%	4.68%
100		4	28.91	26.71	31.07	1.11	2.22	7.68%	3.29%

Mean Dry Weight-mg Detail					
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	30.61	27.65	30.93	30.38
6.25		29.54	30.4	29.62	30.41
12.5		29.93	30.99	31.86	28.35
25		30.7	28.01	28.25	27.95
50		26.93	26.81	30.8	29.43
100		30.56	31.07	26.71	27.3

MSC
 Feb. 25/15

CETIS Analytical Report

Report Date: 21 Jan-15 16:41 (p 2 of 2)
Test Code: 15021 | 11-4307-1481

Fish Survival Development Growth (w/Length)

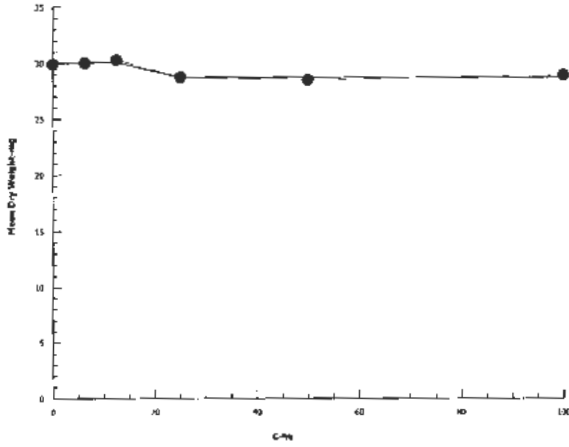
Nautilus Environmental

Analysis ID: 00-3407-2749
Analyzed: 21 Jan-15 16:32

Endpoint: Mean Dry Weight-mg
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



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Feb. 25/15

CETIS Analytical Report

Report Date: 30 Jan-15 10:43 (p 1 of 1)
 Test Code: 15021 | 11-4307-1481

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 08-5850-3736	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 30 Jan-15 10:42	Analysis: Parametric-Two Sample	Official Results: Yes
Batch ID: 14-8960-3798	Test Type: Growth-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 08 Jan-15 14:00	Protocol: Washington DOE (2008)	Diluent: Mod-Hard Synthetic Water
Ending Date: 15 Jan-15 14:00	Species: Oncorhynchus mykiss	Brine:
Duration: 7d 0h	Source: Vancouver Island Trout Hatchery	Age:
Sample ID: 04-9502-4959	Code: 1D817B3F	Client: Mount Polley
Sample Date: 06 Jan-15 11:03	Material: Water Sample	Project:
Receive Date: 07 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 51h (2.6 °C)	Station: P2-S	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	6.71%	Fails mean dry weight-mg

Equal Variance t Two-Sample Test

Control	vs Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	Time Zero	14.16	1.943	2.007	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	427.8688	427.8688	1	200.5	<0.0001	Significant Effect
Error	12.8037	2.13395	6			
Total	440.6725		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.155	47.47	0.9087	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9136	0.6451	0.3804	Normal Distribution

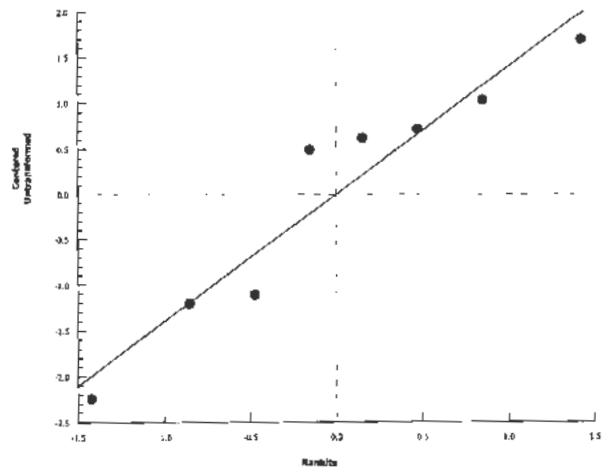
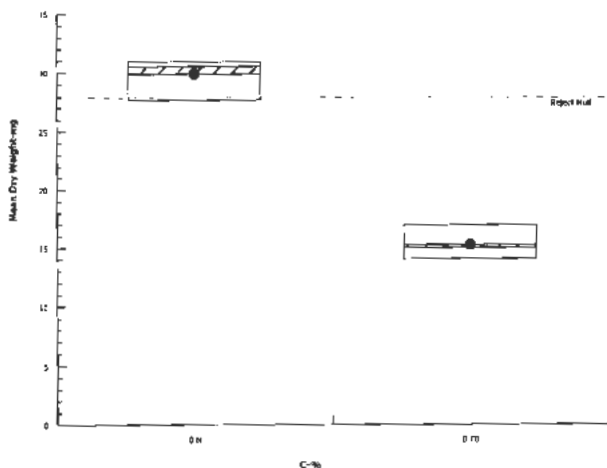
Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Time Zero	4	15.27	13.03	17.5	15.02	14.06	16.96	0.7037	9.22%	0.0%
0	Negative Control	4	29.89	27.49	32.3	30.5	27.65	30.93	0.7562	5.06%	-95.82%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	30.61	27.65	30.93	30.38
0	Time Zero	14.16	15.88	14.06	16.96

Graphics



Handwritten signature and date: RB 25/15

Client: Mt. Polley

W.O.#: 15021

Hardness and Alkalinity Datasheet

Alkalinity						Hardness			
Sample ID	Sample Date	Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/LCaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	Technician
Control	JAN 8/15	50	3.2	3.3	62	50	4.9	98	SSD
P2-S	JAN 8/15	50	4.4	4.5	86	50	6.4	128	SSD

Notes: _____

Reviewed by: 

Date Reviewed: FEB. 25, 2015

Rainbow Trout Swimup Test Summary Sheet

Client: Mt. Polley

Start Date/Time: JAN 8, 2015 @ 1400h

Work Order No.: 15025

Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: QUR-1

Sample Date: JAN 7/15

Date Received: JAN 8/15

Sample Volume: 73x20L

Dilution Water:

Type: moderately Hard Water

Hardness (mg/L CaCO₃): 98

Alkalinity (mg/L CaCO₃): 62

~~batch: 010615, 010915 EC~~

Test Organism Information:

Batch No.: 010715

Source: Vancouver Island Trout Hatchery

Loading Density: N/A

Copper Reference Toxicant Results:

Reference Toxicant ID: RTCL11

Stock Solution ID: 15Cu01

Date Initiated: JAN 8/15

7-d EC50 (95% CL): 37.5 (32.12 - 43.79) mg/L Cu

Reference Toxicant Mean ± 2 SD: 77.63 (49.54 - 121.7) mg/L Cu

Reference Toxicant CV (%): 25.20

Test Results:	Sample ID	
	Swimup Survival	Swimup Dry Weight
EC25 % (v/v) (95% CL)	>100%	
EC50 % (v/v) (95% CL)	>100%	
IC25 % (v/v) (95% CL)		>100%
IC50 % (v/v) (95% CL)		>100%

Reviewed by: 

Date reviewed: Feb. 26, 2015

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Polley
 Sample ID: GUR - 1
 Work Order #: 15025

Start Date & Time: Jan 8, 2015 @ 1400h
 Stop Date & Time: Jan 15, 2015 @ 1400h
 Test Species: Oncorhynchus mykiss

Control Concentration % (V/V)	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
DO (mg/L)	10.2	7.1	9.8	9.7	9.8	9.7	9.8	9.9	9.4	10.0	9.5	10.0	9.3	10.0	9.6
pH	7.8	7.3	7.7	7.8	7.8	7.8	7.9	7.8	7.8	7.9	7.7	7.8	7.7	7.7	7.6
Cond. (µS/cm)	345	34	360		358		360		359		365		307		326
Initials	EC	EC			A				EC		EC		EC		EC

Concentration 6.25	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
DO (mg/L)	10.0	7.2	9.9	9.8	9.9	9.8	9.9	9.4	9.6	9.5	10.0	9.4	10.0	9.6	
pH	7.8	7.3	7.7	7.8	7.8	7.9	7.7	7.8	7.7	7.7	7.6	7.7	7.5	7.7	
Cond. (µS/cm)	332	342			335		340		341		342		295		312
Initials	EC	EC			M		M		EC		EC		EC		EC

Concentration 12.5	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
DO (mg/L)	10.0	7.2	9.8	9.9	9.9	9.8	9.9	9.5	9.8	9.6	10.0	9.4	10.0	9.7	
pH	7.8	7.3	7.7	7.8	7.7	7.9	7.7	7.8	7.7	7.6	7.6	7.6	7.6	7.6	
Cond. (µS/cm)	320	321			321		326		327		330		284		303
Initials	EC	EC			M		M		EC		EC		EC		EC

Concentration 25	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
DO (mg/L)	10.0	7.2	9.8	9.9	9.8	9.9	9.8	9.5	9.9	9.5	10.0	9.3	10.0	9.7	
pH	7.7	7.3	7.7	7.8	7.9	7.8	7.9	7.8	7.7	7.7	7.6	7.7	7.6	7.7	
Cond. (µS/cm)	288	302			298		296		305		298		261		283
Initials	EC	EC			M		M		EC		EC		EC		EC

DO meter: DO-1/2 pH meter: pH-1/2 Conductivity meter: C-1/2

	Control	100%		
Hardness*	98	66		
Alkalinity*	62	46		

* mg/L as CaCO₃

Analysts: JAB, PWD, EC

Reviewed by: [Signature]

Date reviewed: Feb. 25/15

Sample Description: Clear, Colorless

Comments: ① reaction initiated @ 1700h, DO (mg/L) in control Rep A, 6.7 mg/L

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Polley
 Sample ID: QR - 1
 Work Order #: 15025

Start Date & Time: Jan 8, 2015 @ 1400h
 Stop Date & Time: Jan 15, 2015 @ 1400h
 Test Species: Oncorhynchus mykiss

% (V/V) Concentration 50	Days													
	0	1		2		3		4		5		6		7
	Init.	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
DO (mg/L)	10.0	7.6	9.9	9.9	9.8	9.9	9.9	9.5	10.0	9.5	10.0	9.3	10.2	9.6
pH	7.7	7.4	7.7	7.8	7.7	7.9	7.9	7.8	7.7	7.7	7.6	7.7	7.6	7.7
Cond. (µS/cm)	234	243		242		245		247		253		223		237
Initials	EC	EC		m		m		EC		EC		EC		EC

Concentration 100	Days													
	0	1		2		3		4		5		6		7
	Init.	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
DO (mg/L)	10.3	7.6	10.3	9.8	9.5	9.8	9.9	9.5	10.0	9.6	10.0	9.5	10.1	9.6
pH	7.7	7.3	7.6	7.6	7.6	7.7	7.7	7.7	7.6	7.7	7.5	7.7	7.6	7.7
Cond. (µS/cm)	121	123		123		124		123		EL 123		123		131
Initials	EC	EC		m		m		EC		EC		EC		EC

Concentration	Days													
	0	1		2		3		4		5		6		7
	Init.	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)														
DO (mg/L)														
pH														
Cond. (µS/cm)														
Initials														

Concentration	Days													
	0	1		2		3		4		5		6		7
	Init.	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)														
DO (mg/L)														
pH														
Cond. (µS/cm)														
Initials														

DO meter: DO-1/2 pH meter: pH-1/2 Conductivity meter: C-1/2

	Control	100%		
Hardness*	98	66		
Alkalinity*	64	46		

* mg/L as CaCO₃

Analysts: JAB, AWD, EC

Reviewed by: EC

Date reviewed: Feb. 25/15

Sample Description: _____

Comments: _____

7-d Chronic Freshwater Toxicity Test Daily Mortality

Client: Mt. Polley
 Sample ID: QUR - L
 Work Order #: 15025

Start Date & Time: JAN 8, 2015 @ 1400h
 Stop Date & Time: JAN 15, 2015 @ 1400h
 Test Species: Oncorhynchus mykiss

Concentration % (V/V)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
CONTROL	A	5	5	5	5	5	5	5	
	B								
	C								
	D								
6.25	A								
	B								
	C								
	D								
12.5	A								
	B								
	C								
	D						↓	↓	
25	A						4	4	
	B						5	5	
	C								
	D								
50	A								
	B								
	C								
	D								
100	A								
	B								
	C								
	D	↓	↓	↓	↓	↓	↓	↓	
	A			4	7	4	4	4	
	B								
	C								
	D								
	A								
	B								
	C								
	D								
Tech Initials					EC	EC	EC	EC	

Comments: _____

Reviewed by: 

Date reviewed: FEB. 28/15

7-d Chronic Freshwater Toxicity Test Data Sheet

Swim-up Survival and Dry Weight

Client: Mt. Policy
 Sample ID: OUR - 1
 Work Order #: 15025

Start Date: Jan 8, 2015 @ 14:00h
 Termination Date: Jan 15, 2015 @ 14:00h
 Species: O. mykiss

Concentration % (V/V)	Rep	OUR - 1 Pan No. Green	No. Alive	Initials	Pan weight (g)	Pan + organism (g)	No. weighed	Initials
control	A	1	5	EC	985.64	1.14738	5	EC
	B	2	↓	EC	997.96	1.17002	↓	EC
	C	3	↓	EC	980.75	1.13593	↓	EC
	D	4	↓	EC	990.80	1.12869	↓	EC
6.25	A	5	↓	EC	989.38	1.15419	↓	EC
	B	6	↓	EC	998.52	1.15490	↓	EC
	C	7	↓	EC	988.88	1.15150	↓	EC
	D	8	↓	EC	989.88	1.13535	↓	EC
12.5	A	9	↓	EC	983.70	1.12059	↓	EC
	B	10	↓	EC	948.81	1.08994	↓	EC
	C	11	↓	EC	961.61	1.11429	↓	EC
	D	12	↓	EC	972.11	1.10411	↓	EC
25	A	13	4	EC	952.80	1.06087	4	EC
	B	14	5	EC	952.69	1.08768	5	EC
	C	15	↓	EC	977.53	1.11387	↓	EC
	D	16	↓	EC	997.64	1.13345	↓	EC
50	A	17	↓	EC	971.83	1.11880	↓	EC
	B	18	↓	EC	1007.11	1.15989	↓	EC
	C	19	↓	EC	1001.01	1.15771	↓	EC
	D	20	↓	EC	1009.00	1.16299	↓	EC
100	A	21	↓	EC	1005.04	1.17012	↓	EC
	B	22	↓	EC	989.02	1.13158	↓	EC
	C	23	↓	EC	982.05	1.13792	↓	EC
	D	24	4	EC	994.79	1.10877	4	EC

Thermometer: Calibrated Thermometer DO meter: DO-1/2 pH meter: pH-1/2

Comments: Reweighed: Pan # 8 = 1138.69 mg Pan # 10 = 970.81 mg Pan # 11 = 1150.25 mg

Reviewed by: [Signature] Date Reviewed: Feb. 25, 2015

7d Chronic Freshwater Toxicity Test Data Sheet
Swim-up Survival and Dry Weight

Client: Mt. Polley
 Work Order No.: 15025

Start Date: JAN 8/15
 Termination Date: JAN 15/15
 Species: O. mykiss

Sample ID	Rep	Pan No.	No. Alive	Initials	Pan weight EC for mg	Pan + organism (g)	No. weighed	Initials
QUR-1	A	A	5	EC	1007.91	1.10152	5	EC
(To)	B	B	5	EC	987.24	1.08335	5	EC
	C	C	5	EC	983.52	1.07256	5	EC
	D	D	5	EC	996.43	1.06482	5	EC
	A							
	B							
	C							
	D							
	A							
	B							
	C							
	D							
	A							
	B							
	C							
	D							
	A							
	B							
	C							
	D							

Thermometer: Calibrated Thermometer DO meter: DO-1/2 pH meter: pH-1/2

Comments: Rewighed Pan # D : 1.06657g

Reviewed by: EW Date Reviewed: Feb. 25 2015

CETIS Analytical Report

Report Date: 21 Jan-15 16:19 (p 1 of 2)
 Test Code: 15025 | 06-0462-2809

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 10-9500-7093	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 21 Jan-15 16:04	Analysis: Linear Regression (MLE)	Official Results: Yes
Batch ID: 15-1836-7257	Test Type: Growth-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 08 Jan-15 14:00	Protocol: Washington DOE (2008)	Diluent: Mod-Hard Synthetic Water
Ending Date: 15 Jan-15 14:00	Species: Oncorhynchus mykiss	Brine:
Duration: 7d 0h	Source: Vancouver Island Trout Hatchery	Age:
Sample ID: 07-8293-4425	Code: 2EAAA199	Client: Mount Polley
Sample Date: 07 Jan-15 12:20	Material: Water Sample	Project:
Receive Date: 08 Jan-15 08:25	Source: Mount Polley (MT POLLEY)	
Sample Age: 26h (4 °C)	Station: QUR-1	

Linear Regression Options

Model Function	Threshold Option	Threshold	Optimized	Pooled	Het Corr	Weighted
Log-Normal [NED=A+B*log(X)]	Control Threshold	1E-07	Yes	No	No	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
23	-9.246	25.69	28.03	4.109	1.251	0.2197	9.143	3.16	0.0007	Significant Lack of Fit

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	112.5	N/A	N/A	0.8889	NA	NA
EC10	320.3	N/A	N/A	0.3122	NA	NA
EC15	648.9	N/A	N/A	0.1541	NA	NA
EC20	1137	N/A	N/A	0.08792	NA	NA
EC25	1841	N/A	N/A	0.05433	NA	NA
EC40	6191	N/A	N/A	0.01615	NA	NA
EC50	12840	N/A	N/A	0.007786	NA	NA

Handwritten note: A EC 25 and 50 > 100%

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Threshold	6.24E-08	5.58E-05	-0.00011	0.00011	0.001117	0.9991	Non-Significant Parameter
Slope	0.7994	0.8063	-0.7809	2.38	0.9915	0.3327	Non-Significant Parameter
Intercept	-3.285	1.354	-5.938	-0.6312	-2.426	0.0243	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	6.432512	6.432512	1	8.474	0.0084	Significant
Lack of Fit	9.624579	3.208193	3	9.143	0.0007	Significant
Pure Error	6.31579	0.350877	18			
Residual	15.94037	0.759065	21			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	15.94	32.67	0.7730	Non-Significant Heterogeneity
	Likelihood Ratio GOF	8.483	32.67	0.9927	Non-Significant Heterogeneity
Variances	Mod Levene Equality of Variance	0.826	2.773	0.5475	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.4891	0.9169	<0.0001	Non-normal Distribution
	Anderson-Darling A2 Normality	5.326	2.492	<0.0001	Non-normal Distribution

7d Survival Rate Summary

C-%	Control Type	Count	Calculated Variate(A/B)								
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	4	1	1	1	0	0	0.0%	0.0%	20	20
6.25		4	1	1	1	0	0	0.0%	0.0%	20	20
12.5		4	1	1	1	0	0	0.0%	0.0%	20	20
25		4	0.95	0.8	1	0.05	0.1	10.53%	5.0%	19	20
50		4	1	1	1	0	0	0.0%	0.0%	20	20
100		4	0.95	0.8	1	0.05	0.1	10.53%	5.0%	19	20

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 10-9500-7093 Endpoint: 7d Survival Rate
 Analyzed: 21 Jan-15 16:04 Analysis: Linear Regression (MLE)

CETIS Version: CETISv1.8.7
 Official Results: Yes

7d Survival Rate Detail

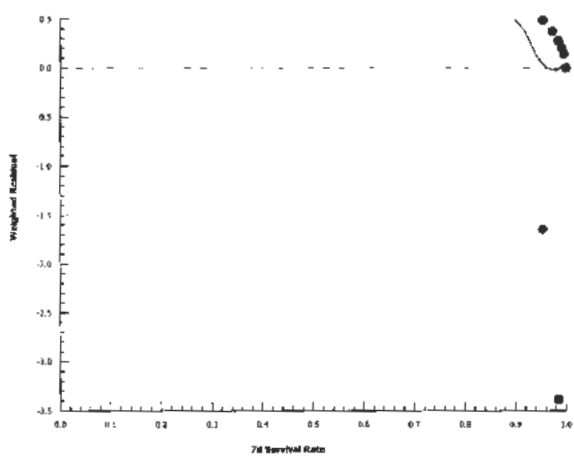
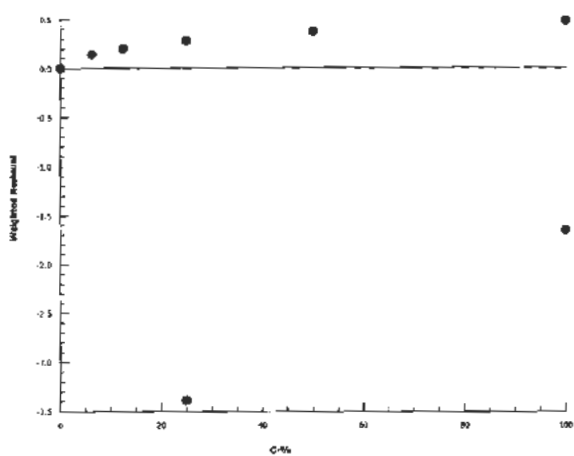
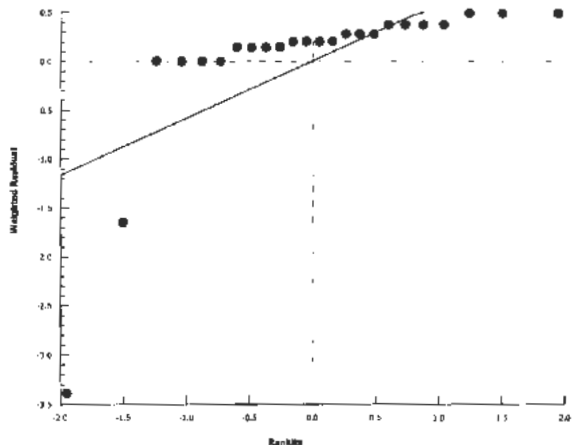
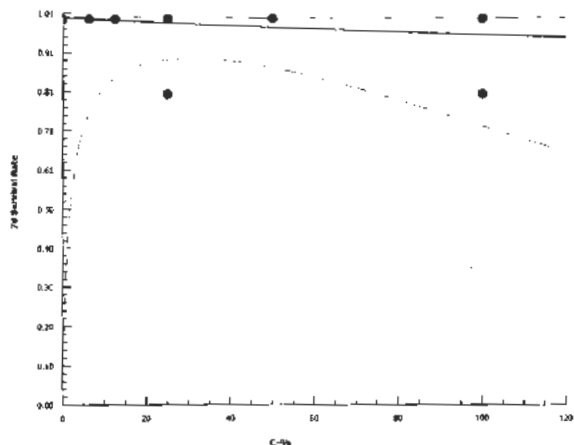
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1	1	1	1
6.25		1	1	1	1
12.5		1	1	1	1
25		0.8	1	1	1
50		1	1	1	1
100		1	1	1	0.8

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	5/5	5/5	5/5	5/5
6.25		5/5	5/5	5/5	5/5
12.5		5/5	5/5	5/5	5/5
25		4/5	5/5	5/5	5/5
50		5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	4/5

Graphics

Log-Normal [NED=A+B*log(X)]



Feb 25/15
 QA: *[Signature]*

CETIS Analytical Report

Report Date: 30 Jan-15 11:13 (p 1 of 2)
 Test Code: 15025 | 06-0462-2809

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 06-1887-4881	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 21 Jan-15 16:16	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 15-1836-7257	Test Type: Growth-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 08 Jan-15 14:00	Protocol: Washington DOE (2008)	Diluent: Mod-Hard Synthetic Water
Ending Date: 15 Jan-15 14:00	Species: Oncorhynchus mykiss	Brine:
Duration: 7d 0h	Source: Vancouver Island Trout Hatchery	Age:
Sample ID: 07-8293-4425	Code: 2EAAA199	Client: Mount Polley
Sample Date: 07 Jan-15 12:20	Material: Water Sample	Project:
Receive Date: 08 Jan-15 08:25	Source: Mount Polley (MT POLLEY)	
Sample Age: 26h (4 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	559999	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	8.953	N/A	N/A	11.17	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	31.34	27.58	34.41	1.435	2.869	9.15%	0.0%
6.25		4	31.46	29.09	32.96	0.867	1.734	5.51%	-0.38%
12.5		4	28.13	26.4	30.54	0.883	1.766	6.28%	10.24%
25		4	25.76	21.61	27.27	1.383	2.767	10.74%	17.81%
50		4	30.52	29.39	31.34	0.4102	0.8203	2.69%	2.62%
100		4	28.87	22.8	33.02	2.227	4.454	15.43%	7.88%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	32.35	34.41	31.04	27.58
6.25		32.96	31.28	32.52	29.09
12.5		27.38	28.23	30.54	26.4
25		21.61	27	27.27	27.16
50		29.39	30.56	31.34	30.8
100		33.02	28.51	31.17	22.8

EU
Feb-25/15

CETIS Analytical Report

Report Date: 30 Jan-15 11:13 (p 2 of 2)

Test Code: 15025 | 06-0462-2809

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 06-1887-4881

Endpoint: Mean Dry Biomass-mg

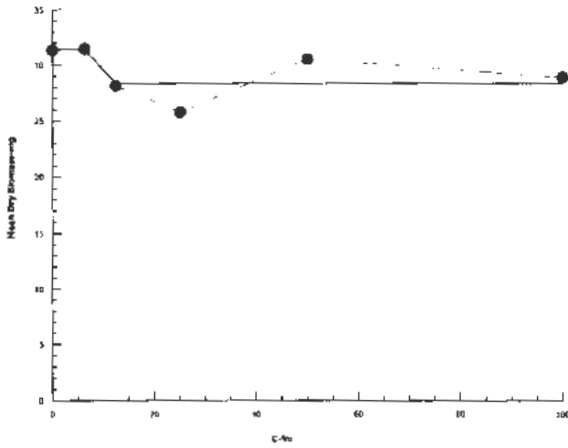
CETIS Version: CETISv1.8.7

Analyzed: 21 Jan-15 16:16

Analysis: Linear Interpolation (ICPIN)

Official Results: Yes

Graphics



EC
Feb 26/15

CETIS Analytical Report

Report Date: 21 Jan-15 16:19 (p 1 of 2)
 Test Code: 15025 | 06-0462-2809

Fish Survival Development Growth (w/L Length)

Nautilus Environmental

Analysis ID: 12-2360-8958	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 21 Jan-15 16:16	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 15-1836-7257	Test Type: Growth-Survival (7d)	Analyst: Krysta Percy
Start Date: 08 Jan-15 14:00	Protocol: Washington DOE (2006)	Diluent: Mod-Hard Synthetic Water
Ending Date: 15 Jan-15 14:00	Species: Oncorhynchus mykiss	Brine:
Duration: 7d 0h	Source: Vancouver Island Trout Hatchery	Age:
Sample ID: 07-8293-4425	Code: 2EAAA199	Client: Mount Polley
Sample Date: 07 Jan-15 12:20	Material: Water Sample	Project:
Receive Date: 08 Jan-15 08:25	Source: Mount Polley (MT POLLEY)	
Sample Age: 26h (4 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1171390	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	9.913	N/A	N/A	10.09	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	31.34	27.58	34.41	1.435	2.869	9.15%	0.0%
6.25		4	31.46	29.09	32.96	0.867	1.734	5.51%	-0.38%
12.5		4	28.13	26.4	30.54	0.883	1.766	6.28%	10.24%
25		4	27.11	27	27.27	0.06378	0.1276	0.47%	13.5%
50		4	30.52	29.39	31.34	0.4102	0.8203	2.69%	2.62%
100		4	30.3	28.5	33.02	1.103	2.206	7.28%	3.33%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	32.35	34.41	31.04	27.58
6.25		32.96	31.28	32.52	29.09
12.5		27.38	28.23	30.54	26.4
25		27.02	27	27.27	27.16
50		29.39	30.56	31.34	30.8
100		33.02	28.51	31.17	28.5

ECC
Feb 25/15

CETIS Analytical Report

Report Date: 21 Jan-15 16:19 (p 2 of 2)
Test Code: 15025 | 06-0462-2809

Fish Survival Development Growth (w/Length)

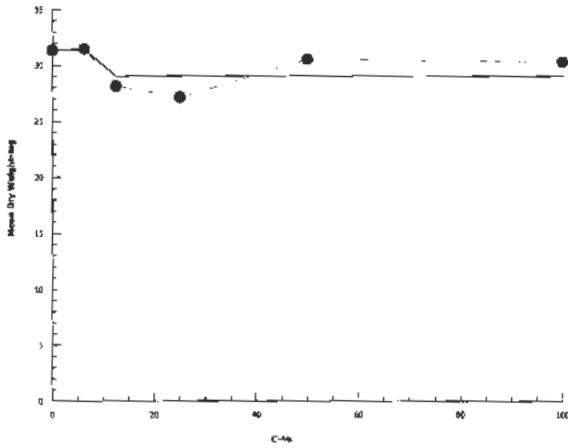
Nautilus Environmental

Analysis ID: 12-2360-8958
Analyzed: 21 Jan-15 16:16

Endpoint: Mean Dry Weight-mg
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



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Feb 20/15

CETIS Analytical Report

Report Date: 30 Jan-15 10:43 (p 1 of 1)
 Test Code: 15025 | 06-0462-2809

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 09-5001-8787	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 30 Jan-15 10:41	Analysis: Parametric-Two Sample	Official Results: Yes
Batch ID: 15-1836-7257	Test Type: Growth-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 08 Jan-15 14:00	Protocol: Washington DOE (2008)	Diluent: Mod-Hard Synthetic Water
Ending Date: 15 Jan-15 14:00	Species: Oncorhynchus mykiss	Brine:
Duration: 7d 0h	Source: Vancouver Island Trout Hatchery	Age:
Sample ID: 07-8293-4425	Code: 2EAAA199	Client: Mount Polley
Sample Date: 07 Jan-15 12:20	Material: Water Sample	Project:
Receive Date: 08 Jan-15 08:25	Source: Mount Polley (MT POLLEY)	
Sample Age: 26h (4 °C)	Station: QUR-1	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	11.8%	Fails mean dry weight-mg

Equal Variance t Two-Sample Test

Control	vs Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	Time Zero	7.322	1.943	3.712	6	0.0002	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	391.2163	391.2163	1	53.62	0.0003	Significant Effect
Error	43.77829	7.296381	6			
Total	434.9946		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.294	47.47	0.8370	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8816	0.6451	0.1953	Normal Distribution

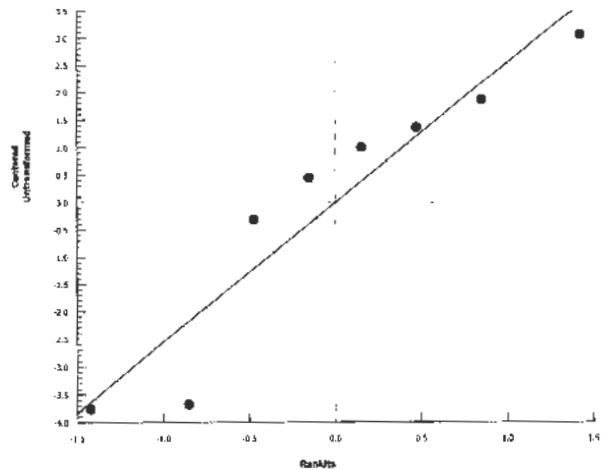
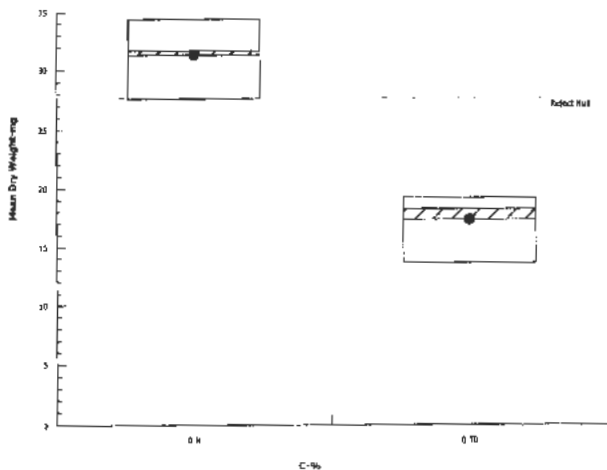
Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Time Zero	4	17.36	13.34	21.37	18.27	13.68	19.22	1.261	14.53%	0.0%
0	Negative Control	4	31.34	26.78	35.91	31.69	27.58	34.41	1.435	9.15%	-80.58%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	32.35	34.41	31.04	27.58
0	Time Zero	18.72	19.22	17.81	13.68

Graphics



Feb. 25/15

Client: Mt. Polley

W.O.#: 15025

Hardness and Alkalinity Datasheet

Alkalinity						Hardness			
Sample ID	Sample Date	Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	Technician
Control	JAN 8/15	50	3.2	3.3	62	50	4.9	98	SSD
QUR-1	JAN 8/15	50	2.4	2.5	46	50	3.3	66	SSD

Notes: _____

Reviewed by: _____ SSD

Date Reviewed: Feb. 25/15

APPENDIX C - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

Fathead Minnow Test Summary Sheet
(7-d *Pimephales promelas* Survival and Growth Test)

Client: Mount Polley
Work Order No.: 15019

Start Date/Time: JAN 8/15 @ 1500h
Test Species: P. promelas

Sample Information:

Sample ID: P2-S
Sample Date: JAN 6/15
Date Received: JAN 7/15
Sample Volume: 3x 20L

Dilution Water (initial water quality):

Type: Moderately Hard Water
Temperature (°C): 24.5
pH: 7.6
Dissolved Oxygen (mg/L): 8.0
Hardness (mg/L CaCO₃): 82
Alkalinity (mg/L CaCO₃): 52

Test Validity Criteria:

The test is invalid if:

- 1) for the control solutions, the combined and cumulative incidence of any mortalities, or fish showing loss of equilibrium or other signs of atypical swimming behavior, is >20%
- 2) the average dry weight of the surviving control fish does not attain 250 ug when the fish are dried and weighed.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4; pH = 6.5 to 8.5

Test Organism Information:

Batch No.: 010815
Source: Aquatic Biosystems, CO
Age: 224 hrs

NaCl Reference Toxicant Results:

Reference Toxicant ID: PP10?
Stock Solution ID: n/a
Date Initiated: JAN 8/15
7-d EC50 (95% CL): 4.6 (3.7 - 5.7) g/L NaCl
7-d IC50 (95% CL): 4.1 (3.4 - 5.1) g/L NaCl

Survival:

Reference Toxicant Mean and Historical Range: 4.4 (3.4 - 5.5) CV (%) 13

Biomass:

Reference Toxicant Mean and Historical Range: 3.8 (2.8 - 5.3) CV (%) 18

Test Results:

	Survival	Biomass
LC25 % (v/v) (95% CL)	>100	
LC50 % (v/v) (95% CL)	>100	
IC25 % (v/v) (95% CL)		>100
IC50 % (v/v) (95% CL)		>100

Reviewed by: [Signature]

Date reviewed: FEB. 26, 2015

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: 92-5 red
 Work Order #: 15019

Start Date & Time: Jan 8/15 @ 1500h
 Stop Date & Time: Jan 15/15 @ 1400h
 Test Species: Pimephales promelas

%. (V/V) Concentration (Control)	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.5	24.0	26.0	24.0	26.0	24.0	26.0	24.0	26.0	24.0	26.0	24.0	26.0	24.0
DO (mg/L)	8.0	7.4	8.2	5.4	8.0	5.4	7.4	6.2	7.9	5.7	7.6	6.2	7.8	5.1
pH	7.6	7.9	7.8	7.6	7.7	7.2	8.0	7.7	8.1	7.6	8.0	7.8	7.9	7.4
Cond. (µS/cm)	320	323		327		322		330		329		333		337
Initials	KJL	KJL		KJL		EMM		KJL		KJL		KJL		KJL

Concentration 1.56	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.5	24.0	26.0	24.0	26.0	24.0	26.0	24.0	26.0	24.0	26.0	24.0	26.0	24.0
DO (mg/L)	8.1	7.5	7.8	5.5	7.9	5.3	7.7	6.3	7.6	5.6	7.9	6.2	7.9	5.2
pH	7.9	7.8	7.8	7.4	8.0	7.2	8.0	7.7	8.1	7.6	7.9	7.7	8.1	7.3
Cond. (µS/cm)	318	321		323		327		324		328		329		340
Initials	KJL	KJL		KJL		EMM		KJL		KJL		KJL		KJL

Concentration 12.5	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.5	24.0	26.0	24.0	26.0	24.0	26.0	24.0	26.0	24.0	26.0	24.0	26.0	24.0
DO (mg/L)	8.1	7.6	7.6	5.7	8.0	5.3	7.7	6.0	7.6	5.6	8.0	6.3	8.1	5.3
pH	7.9	7.8	7.9	7.5	8.0	7.4	7.9	7.7	8.1	7.6	7.9	7.7	8.0	7.3
Cond. (µS/cm)	318	320		320		321		322		325		327		336
Initials	KJL	KJL		KJL		EMM		KJL		KJL		KJL		KJL

Concentration 100	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	26.0	24.0	25.5	24.0	24.0	24.0	26.0	24.0	26.0	24.0	26.0	24.0	26.0	24.0
DO (mg/L)	8.2	7.5	8.0	5.6	8.0	5.4	7.7	6.2	8.0	5.5	7.9	6.4	8.1	5.0
pH	7.8	7.8	7.8	7.5	7.8	7.3	7.8	7.8	7.9	7.5	7.7	7.7	7.7	7.4
Cond. (µS/cm)	309	305		306		304		305		305		307		314
Initials	KJL	KJL		KJL		EMM		KJL		KJL		KJL		KJL

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6.5 to 8.5

DO meter: 3 pH meter: 3 Conductivity meter: 3

	Control	100% (V/V)		
Hardness*	82	120		
Alkalinity*	52	84		

* mg/L as CaCO3

Analysts: KJL EMM

Reviewed by: [Signature]

Date reviewed: Feb 24, 2015

Sample Description: clear, pale yellow

Comments: _____

7-d Fathead Minnow Toxicity Test Daily Survival

Client: Mount Pooley
 Sample ID: P2-5 red
 Work Order #: 15019

Start Date & Time: Jan 8/15 @ 1500h
 Stop Date & Time: Jan 15/15 @ 1400h
 Test Species: Pimephales promelas

Concentration (% LVIV)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	10	10	10	10	9	9	9	
	B	10	10		10	10	10	10	
	C	10	10		10	10	10	10	
1.56	A	10	10		7	7	7	7	
	B	10	10		10	10	10	10	
	C	10	10		10	10	10	10	
3.1	A	10	10		10	10	10	10	
	B	10	10		10	10	10	10	
	C	10	10		10	10	10	10	
6.25	A	10	10		10	10	10	10	
	B	10	10		10	10	9	9	
	C	10	10		10	10	10	10	
12.5	A	10	10		10	10	10	10	
	B	10	10		10	10	10	10	
	C	10	10		10	10	10	10	
25	A	10	10		10	10	10	10	
	B	10	10		10	10	10	10	
	C	10	10		10	10	10	10	
50	A	10	10		10	10	10	10	
	B	10	10		10	10	10	10	
	C	10	10		10	10	10	10	
100	A	10	10		10	10	10	8	
	B	10	10		10	10	10	10	
	C	10	10		9	9	9	8	
	A								
	B								
	C								
	A								
	B								
	C								
Tech Initials		KJL	KJL	EMM	KJL	KJL	KJL	KJL	

Comments: All surviving fish appear normal.

Reviewed by:

Date reviewed: Feb. 24, 2015

Fathead Minnow Toxicity Test Data Sheet

Dry Weight Data

Client: Mount Peleey

Start Date & Time: Jan 8/15 @ 1500h

Sample ID: Pol-2 P2-5 red

Termination Date & Time: Jan 15/15 @ 1400h

Work Order No.: 15019

Concentration % (V/V)	Rep	Pol-2 Pan No. Red	No. alive	Initials	Pan weight EC (mg) g	Pan + organism N ^o (mg) g	No. weighed	Initials
Control	A	1	9	KSL	1.01432	1.02008	9	EC NY
	B	2	10		0.99875	1.00487	10	EC
	C	3	10		0.99394	0.99941	10	EC
1.56	A	4	7		0.97578	0.97970	7	EC
	B	5	10		0.98649	0.99210	10	EC
	C	6	10		0.99095	0.99622	10	EC
3.1	A	7	10		0.98493	0.99119	10	EC
	B	8	10		1.008206	1.00760	10	EC
	C	9	10		1.00865	1.01341	10	EC
6.25	A	10	10		0.98964	0.99536	10	EC
	B	11	9		0.99230	0.99738	9	EC
	C	12	10		0.97111	0.97660	10	EC
12.5	A	13	10		0.97604	0.98169	10	EC
	B	14	10		0.97768	0.98271	10	EC
	C	15	10		0.97400	0.97927	10	EC
25	A	16	10		0.97278	0.97862	10	EC
	B	17	10		0.99064	0.99737	10	EC
	C	18	10		0.99270	0.99824	10	EC
50	A	19	10		1.00984	1.01597	10	EC
	B	20	10		1.01011	1.01569	10	EC
	C	21	10		1.00761	1.01352	10	EC
100	A	22	8		1.01954	1.02462	8	EC
	B	23	10		1.01656	1.02210	10	EC
	C	24	8		1.01110	1.01546	8	EC

Comments: Reweighed pan: 1-1020.13mg 9-1013.51mg

Reviewed by: EC

Date Reviewed: Feb. 24, 2015

CETIS Analytical Report

Report Date: 20 Jan-15 17:21 (p 1 of 2)
 Test Code: 15019 | 12-4726-5325

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 14-7312-9512	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 20 Jan-15 17:21	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 08-7554-5965	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 08 Jan-15 15:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 15 Jan-15 14:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 08-6678-5809	Code: 33AA1A11	Client: Mount Polley
Sample Date: 06 Jan-15 11:03	Material: Water Sample	Project:
Receive Date: 07 Feb-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 52h (2.6 °C)	Station: P2-S	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1291447	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	68.15	30.03	N/A	1.467	NA	3.33
EC10	92.77	40.27	N/A	1.078	NA	2.483
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	3	0.9667	0.9	1	0.03333	0.05773	5.97%	0.0%	29	30
1.56		3	0.9	0.7	1	0.1	0.1732	19.25%	6.9%	27	30
3.1		3	1	1	1	0	0	0.0%	-3.45%	30	30
6.25		3	0.9667	0.9	1	0.03333	0.05773	5.97%	0.0%	29	30
12.5		3	1	1	1	0	0	0.0%	-3.45%	30	30
25		3	1	1	1	0	0	0.0%	-3.45%	30	30
50		3	1	1	1	0	0	0.0%	-3.45%	30	30
100		3	0.8667	0.8	1	0.06667	0.1155	13.32%	10.34%	26	30

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.9	1	1
1.56		0.7	1	1
3.1		1	1	1
6.25		1	0.9	1
12.5		1	1	1
25		1	1	1
50		1	1	1
100		0.8	1	0.8

GR
 FEB 24, 2015

CETIS Analytical Report

Report Date: 20 Jan-15 17:21 (p 2 of 2)

Test Code: 15019 | 12-4726-5325

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 14-7312-9512
Analyzed: 20 Jan-15 17:21

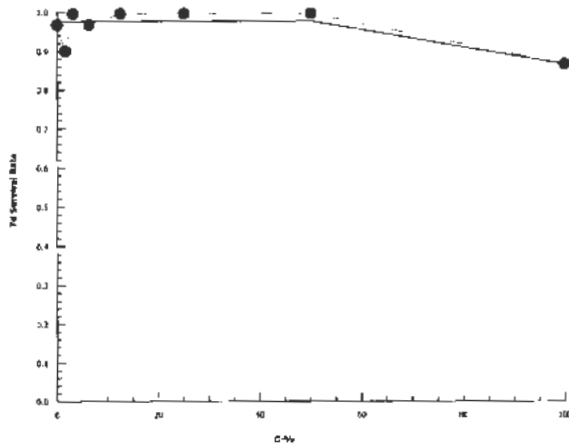
Endpoint: 7d Survival Rate
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	9/10	10/10	10/10
1.56		7/10	10/10	10/10
3.1		10/10	10/10	10/10
6.25		10/10	9/10	10/10
12.5		10/10	10/10	10/10
25		10/10	10/10	10/10
50		10/10	10/10	10/10
100		8/10	10/10	8/10

Graphics



CR
Feb-24, 2015

CETIS Analytical Report

Report Date: 22 Jan-15 16:41 (p 1 of 2)
 Test Code: 15019 | 12-4726-5325

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 11-2613-6420	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 22 Jan-15 16:41	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 08-7554-5965	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 08 Jan-15 15:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 15 Jan-15 14:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 08-6678-5809	Code: 33AA1A11	Client: Mount Polley
Sample Date: 06 Jan-15 11:03	Material: Water Sample	Project:
Receive Date: 07 Feb-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 52h (2.6 °C)	Station: P2-S	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	397266	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	51.63	N/A	N/A	1.937	NA	NA
IC10	75.68	N/A	N/A	1.321	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.5783	0.547	0.612	0.0188	0.03256	5.63%	0.0%
1.56		3	0.4933	0.392	0.561	0.05161	0.08939	18.12%	14.7%
3.1		3	0.552	0.476	0.626	0.04331	0.07502	13.59%	4.55%
6.25		3	0.543	0.508	0.572	0.01872	0.03242	5.97%	6.11%
12.5		3	0.5317	0.503	0.565	0.01805	0.03126	5.88%	8.07%
25		3	0.6037	0.554	0.673	0.03573	0.06189	10.25%	-4.38%
50		3	0.5873	0.558	0.613	0.01598	0.02768	4.71%	-1.56%
100		3	0.4993	0.436	0.554	0.03434	0.05947	11.91%	13.66%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.576	0.612	0.547
1.56		0.392	0.561	0.527
3.1		0.626	0.554	0.476
6.25		0.572	0.508	0.549
12.5		0.565	0.503	0.527
25		0.584	0.673	0.554
50		0.613	0.558	0.591
100		0.508	0.554	0.436

CEL
 Feb. 24, 2015

CETIS Analytical Report

Report Date: 22 Jan-15 16:41 (p 2 of 2)
Test Code: 15019 | 12-4726-5325

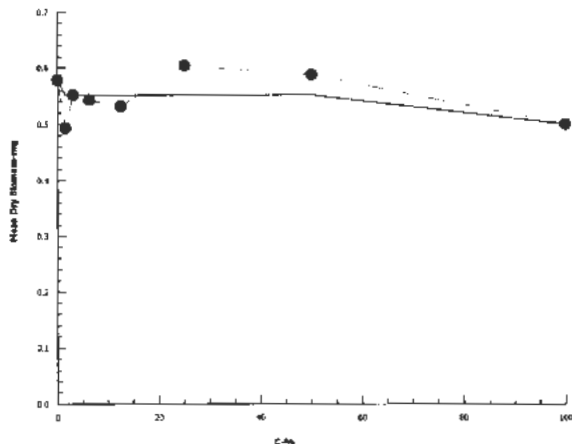
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 11-2613-6420 Endpoint: Mean Dry Biomass-mg
Analyzed: 22 Jan-15 16:41 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Ed
Feb 24, 2015

CETIS Analytical Report

Report Date: 20 Jan-15 17:21 (p 1 of 2)
 Test Code: 15019 | 12-4726-5325

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 14-8325-0190	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 20 Jan-15 17:21	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 08-7554-5965	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 08 Jan-15 15:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 15 Jan-15 14:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 08-6678-5809	Code: 33AA1A11	Client: Mount Polley
Sample Date: 06 Jan-15 11:03	Material: Water Sample	Project:
Receive Date: 07 Feb-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 52h (2.6 °C)	Station: P2-S	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	389153	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	1.325	N/A	N/A	75.48	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.5997	0.547	0.64	0.02755	0.04771	7.96%	0.0%
1.56		3	0.5493	0.527	0.561	0.01117	0.01935	3.52%	8.39%
3.1		3	0.552	0.476	0.626	0.04331	0.07502	13.59%	7.95%
6.25		3	0.5618	0.549	0.572	0.006768	0.01172	2.09%	6.31%
12.5		3	0.5317	0.503	0.565	0.01805	0.03126	5.88%	11.34%
25		3	0.6037	0.554	0.673	0.03573	0.06189	10.25%	-0.67%
50		3	0.5873	0.558	0.613	0.01598	0.02768	4.71%	2.06%
100		3	0.578	0.545	0.635	0.02862	0.04957	8.58%	3.61%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.64	0.612	0.547
1.56		0.56	0.561	0.527
3.1		0.626	0.554	0.476
6.25		0.572	0.5644	0.549
12.5		0.565	0.503	0.527
25		0.584	0.673	0.554
50		0.613	0.558	0.591
100		0.635	0.554	0.545

KCL
 Feb 24, 2015

CETIS Analytical Report

Report Date: 20 Jan-15 17:21 (p 2 of 2)

Test Code: 15019 | 12-4726-5325

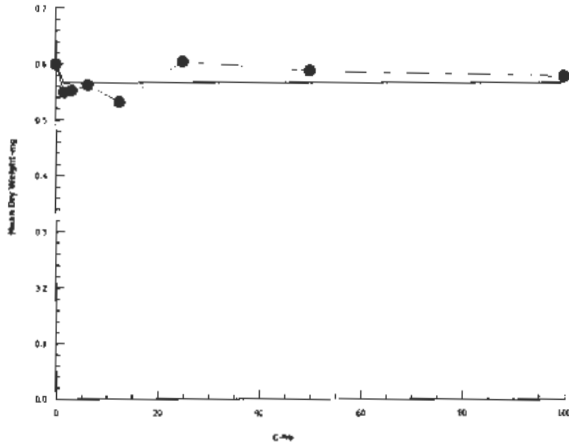
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 14-8325-0190 Endpoint: Mean Dry Weight-mg
Analyzed: 20 Jan-15 17:21 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



EC
Feb 24, 2015

Client: Mount Pelley

W.O.#: 15019

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/LCaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
FHM MHW 010715	Jan 12/15	50	2.7	2.8	52	50	4.1	82	NY
P2-S	Jan 7/15	50	4.4	4.6	84	50	6.0	120	EMM

Notes: _____

Reviewed by: 

Date Reviewed: Feb 24, 2015

Fathead Minnow Test Summary Sheet
(7-d *Pimephales promelas* Survival and Growth Test)

Client: Mount Polley
Work Order No.: 15023

Start Date/Time: Jan 8/15 @ 1500h
Test Species: P. promelas

Sample Information:

Sample ID: OUR-1
Sample Date: Jan 7/15
Date Received: Jan 8/15
Sample Volume: 7x20L

Dilution Water (initial water quality):

Type: Moderately Hard Water
Temperature (°C): 24.5
pH: 7.6
Dissolved Oxygen (mg/L): 8.0
Hardness (mg/L CaCO₃): 82
Alkalinity (mg/L CaCO₃): 52

Test Validity Criteria:

The test is invalid if:

- 1) for the control solutions, the combined and cumulative incidence of any mortalities, or fish showing loss of equilibrium or other signs of atypical swimming behavior, is >20%
- 2) the average dry weight of the surviving control fish does not attain 250 ug when the fish are dried and weighed.

WQ Ranges:
T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4; pH = 6.5 to 8.5

Test Organism Information:

Batch No.: 010815
Source: Aquatic Biosystems, CO
Age: 24 hrs

NaCl Reference Toxicant Results:

Reference Toxicant ID: PP103
Stock Solution ID: n/a
Date Initiated: Jan 8/15
7-d EC50 (95% CL): 4.6 (3.7 - 5.7) g/L NaCl
7-d IC50 (95% CL): 4.1 (3.4 - 5.1) g/L NaCl

Survival:
Reference Toxicant Mean and Historical Range: 4.4 (3.4 - 5.5) CV (%): 13

Biomass:
Reference Toxicant Mean and Historical Range: 3.8 (2.8 - 5.3) CV (%): 18

Test Results:

	Survival	Biomass
LC25 % (v/v) (95% CL)	>100	
LC50 % (v/v) (95% CL)	>100	
IC25 % (v/v) (95% CL)		>100
IC50 % (v/v) (95% CL)		>100

Reviewed by: [Signature]

Date reviewed: Feb. 26, 2015

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: QR-1 purple
 Work Order #: 15023

Start Date & Time: Jan 8/15 @ 15:00h
 Stop Date & Time: Jan 15/15 @ 14:00h
 Test Species: Pimephales promelas

7. (V/V) Concentration (Control)	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	final	
Temperature (°C)	24.5	24.0	26.0	24.0	26.0	24.0	26.0	24.0	26.0	24.0	25.5	24.0	26.0	24.0	
DO (mg/L)	8.0	7.1	8.2	5.5	8.0	5.8	7.4	6.0	7.9	5.6	7.6	6.1	7.8	5.0	
pH	7.6	7.9	7.8	7.7	7.8	7.3	8.0	7.7	8.1	7.6	8.0	7.7	7.9	7.3	
Cond. (µS/cm)	320	323	327	327	322	322	330	329	329	333	325	325	325	325	
Initials	KJL	KJL	KJL	KJL	EMM	KJL	KJL	KJL	KJL	KJL	KJL	KJL	KJL	KJL	

Concentration mg. 1.56	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	final	
Temperature (°C)	24.5	24.0	26.0	24.0	26.0	24.0	26.0	24.0	26.0	24.0	26.0	24.0	26.0	24.0	
DO (mg/L)	8.0	7.4	7.8	5.5	7.9	5.7	7.7	5.8	7.6	5.6	7.9	6.2	7.8	4.8	
pH	8.1	7.8	7.9	7.5	7.8	7.5	7.9	7.6	8.1	7.6	7.9	7.7	8.0	7.3	
Cond. (µS/cm)	315	318	319	319	321	324	325	328	328	328	328	328	328	328	
Initials	KJL	KJL	KJL	KJL	EMM	KJL	KJL	KJL	KJL	KJL	KJL	KJL	KJL	KJL	

Concentration 12.5	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	final	
Temperature (°C)	24.0	24.0	26.0	24.0	26.0	24.0	26.0	24.0	26.0	24.0	26.0	24.0	26.0	24.0	
DO (mg/L)	7.9	7.4	7.7	5.7	7.9	5.8	7.8	6.0	7.6	5.7	8.0	6.0	8.1	5.1	
pH	8.0	7.8	7.9	7.5	7.9	7.5	7.8	7.6	8.1	7.6	7.9	7.7	8.0	7.3	
Cond. (µS/cm)	294	297	298	298	299	301	301	301	301	301	301	301	301	301	
Initials	KJL	KJL	KJL	KJL	EMM	KJL	KJL	KJL	KJL	KJL	KJL	KJL	KJL	KJL	

Concentration 100	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	final	
Temperature (°C)	24.0	24.0	25.5	24.0	26.0	24.0	26.0	24.0	26.0	24.0	26.0	24.0	26.0	24.0	
DO (mg/L)	7.9	7.3	8.1	5.6	8.0	5.4	7.9	6.3	8.1	5.6	7.9	6.3	8.2	4.9	
pH	7.9	7.9	7.8	7.5	7.9	7.5	7.8	7.7	7.8	7.7	7.8	7.8	7.8	7.3	
Cond. (µS/cm)	124	123	125	124	124	125	124	125	124	124	126	126	126	126	
Initials	KJL	KJL	KJL	KJL	EMM	KJL	KJL	KJL	KJL	KJL	KJL	KJL	KJL	KJL	

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6.5 to 8.5

DO meter: 3 pH meter: 3 Conductivity meter: 3

	Control	100% (V/V)		
Hardness*	82	66		
Alkalinity*	52	46		

* mg/L as CaCO3

Analysts: KJL, EMM

Reviewed by: [Signature]
 Date reviewed: FEB 25 2015

Sample Description: Clear

Comments: _____

7-d Fathead Minnow Toxicity Test Daily Survival

Client: Mount Pooley
 Sample ID: DNR-1 purple
 Work Order #: 15023

Start Date & Time: Jan 8/15 @ 1500h
 Stop Date & Time: Jan 15/15 @ 1400h
 Test Species: Pimephales promelas

Concentration % (v/v)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	10	10	10	10	10	9	9	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
1.56	A	10	10	10	10	9	8	8	
	B	10	10	10	9	9	8	8	
	C	10	10	10	8	8	8	8	
3.1	A	10	10	10	10	9	9	9	
	B	10	10	10	9	9	9	9	
	C	10	10	10	10	10	10	10	
6.25	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
12.5	A	10	10	10	10	10	10	9	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
25	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
50	A	10	10	9	9	9	9	9	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	① 1 organism lost in transfer
100	A	10	10	9	9	9	9	9	
	B	10	9	8	8	8	8	8	
	C	10	10	9	9	8	8	8	
	A								
	B								
	C								
	A								
	B								
	C								
Tech Initials		KJL	KJL	KJL	KJL	KJL	KJL	KJL	

Comments: All surviving fish appear normal.

Reviewed by:

Date reviewed: Feb. 25, 2015

Fathead Minnow Toxicity Test Data Sheet

Dry Weight Data

Client: Mount Polley

Start Date & Time: Jan 8/15 @ 1500h

Sample ID: QUR-1 purple

Termination Date & Time: Jan 15/15 @ 1400h

Work Order No.: 15023

Concentration % (v/v)	Rep	QUR-1 Pan No. purple	No. alive	Initials	Pan weight EC (mg) g	Pan + organism wt (mg) g	No. weighed	Initials
Control	A	1	9	KJL	0.98653	0.99193	9	EC NY
	B	2	10		0.98634	0.99159	10	EC
	C	3	10		0.99483	0.99983	10	EC
1-56	A	4	8		0.98436	0.98844	8	EC
	B	5	8		0.98936	0.99390	8	EC
	C	6	8		0.99031	0.99509	8	EC
3.1	A	7	9		1.01405	1.01874	9	EC
	B	8	9		0.96535	0.97047	9	EC
	C	9	10		0.98587	0.99154	10	EC
6.25	A	10	10		1.00127	1.00644	10	EC
	B	11	10		0.99100	0.99664	10	EC
	C	12	10		0.98798	0.99392	10	EC
12.5	A	13	9		0.98713	0.99216	9	EC
	B	14	10		0.99858	1.00371	10	EC
	C	15	10		0.99413	0.99934	10	EC
25	A	16	10		0.99503	0.99980	10	EC
	B	17	10		1.00224	1.00715	10	EC
	C	18	10		1.004379	1.00913	10	EC
50	A	19	9		0.98698	0.99203	9	EC
	B	20	10		0.98615	0.99131	10	EC
	C	21	10		0.99150	0.99603	9	EC
100	A	22	9		1.00011	1.00512	9	EC
	B	23	8		0.99008	0.99471	8	EC
	C	24	8	↓	0.98974	0.99382	8	EC ↓

Comments: Reweighed: 6-995.03mg 16-999.74mg

Reviewed by: 

Date Reviewed: Feb. 25/15

CETIS Analytical Report

Report Date: 20 Jan-15 17:19 (p 1 of 2)
 Test Code: 15023 | 20-8295-5349

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 12-2460-1882	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 20 Jan-15 17:19	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 11-9664-0099	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 08 Jan-15 15:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 15 Jan-15 14:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 07-8293-4425	Code: 2EAAA199	Client: Mount Polley
Sample Date: 07 Jan-15 12:20	Material: Water Sample	Project:
Receive Date: 08 Jan-15 08:25	Source: Mount Polley (MT POLLEY)	
Sample Age: 27h (4 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	226271	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	58.88	N/A	100.9	1.698	0.9913	NA
EC10	79.61	40.01	N/A	1.256	NA	2.499
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variats(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	3	0.9667	0.9	1	0.03333	0.05773	5.97%	0.0%	29	30
1.56		3	0.8	0.8	0.8	0	0	0.0%	17.24%	24	30
3.1		3	0.9333	0.9	1	0.03333	0.05773	6.19%	3.45%	28	30
6.25		3	1	1	1	0	0	0.0%	-3.45%	30	30
12.5		3	0.9667	0.9	1	0.03333	0.05773	5.97%	0.0%	29	30
25		3	1	1	1	0	0	0.0%	-3.45%	30	30
50		3	0.9667	0.9	1	0.03333	0.05773	5.97%	0.0%	29	30
100		3	0.8333	0.8	0.9	0.03333	0.05774	6.93%	13.79%	25	30

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.9	1	1
1.56		0.8	0.8	0.8
3.1		0.9	0.9	1
6.25		1	1	1
12.5		0.9	1	1
25		1	1	1
50		0.9	1	1
100		0.9	0.8	0.8

KLU
 Feb. 25, 2015

CETIS Analytical Report

Report Date: 20 Jan-15 17:19 (p 2 of 2)

Test Code: 15023 | 20-8295-5349

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 12-2460-1882
Analyzed: 20 Jan-15 17:19

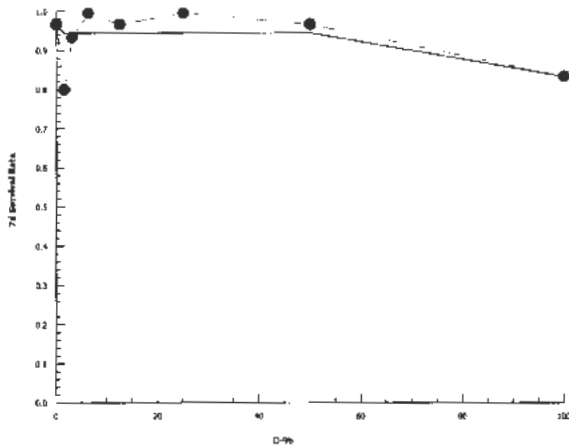
Endpoint: 7d Survival Rate
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	9/10	10/10	10/10
1.56		8/10	8/10	8/10
3.1		9/10	9/10	10/10
6.25		10/10	10/10	10/10
12.5		9/10	10/10	10/10
25		10/10	10/10	10/10
50		9/10	10/10	10/10
100		9/10	8/10	8/10

Graphics



ELL
Feb 25, 2015

CETIS Analytical Report

Report Date: 22 Jan-15 16:40 (p 1 of 2)
 Test Code: 15023 | 20-8295-5349

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 15-0136-0211	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 22 Jan-15 16:40	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 11-9664-0099	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 08 Jan-15 15:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 15 Jan-15 14:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 07-8293-4425	Code: 2EAAA199	Client: Mount Polley
Sample Date: 07 Jan-15 12:20	Material: Water Sample	Project:
Receive Date: 08 Jan-15 08:25	Source: Mount Polley (MT POLLEY)	
Sample Age: 27h (4 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	423553	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	18.63	N/A	134.9	5.389	0.7411	NA
IC10	74.58	N/A	N/A	1.341	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.5217	0.5	0.54	0.01167	0.02021	3.87%	0.0%
1.56		3	0.4467	0.408	0.478	0.02054	0.03557	7.96%	14.38%
3.1		3	0.516	0.469	0.567	0.02836	0.04912	9.52%	1.09%
6.25		3	0.5583	0.517	0.594	0.02241	0.03881	6.95%	-7.03%
12.5		3	0.5123	0.503	0.521	0.005208	0.009021	1.76%	1.79%
25		3	0.4807	0.474	0.491	0.005241	0.009077	1.89%	7.86%
50		3	0.4913	0.453	0.516	0.01943	0.03365	6.85%	5.81%
100		3	0.4573	0.408	0.501	0.027	0.04676	10.22%	12.33%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.54	0.525	0.5
1.56		0.408	0.454	0.478
3.1		0.469	0.512	0.567
6.25		0.517	0.564	0.594
12.5		0.503	0.513	0.521
25		0.477	0.491	0.474
50		0.505	0.516	0.453
100		0.501	0.463	0.408

KCU
 Feb-25, 2015

CETIS Analytical Report

Report Date: 22 Jan-15 16:40 (p 2 of 2)
Test Code: 15023 | 20-8295-5349

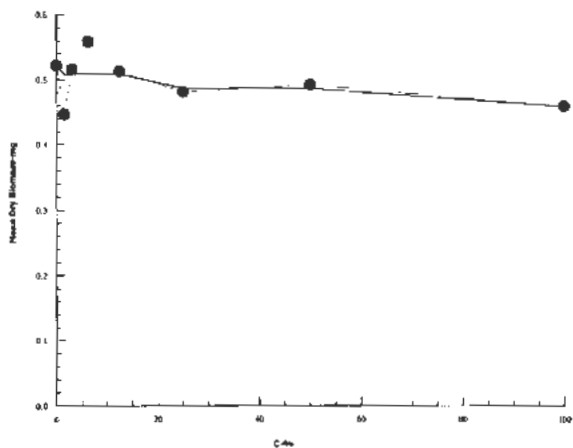
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 15-0136-0211 Endpoint: Mean Dry Biomass-mg
Analyzed: 22 Jan-15 16:40 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CEU
Feb 25, 2015

CETIS Analytical Report

Report Date: 20 Jan-15 17:19 (p 1 of 2)
 Test Code: 15023 | 20-8295-5349

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 20-3521-4669	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 20 Jan-15 17:19	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 11-9664-0099	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 08 Jan-15 15:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 15 Jan-15 14:00	Species: Pinephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 07-8293-4425	Code: 2EAAA199	Client: Mount Polley
Sample Date: 07 Jan-15 12:20	Material: Water Sample	Project:
Receive Date: 08 Jan-15 08:25	Source: Mount Polley (MT POLLEY)	
Sample Age: 27h (4 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1457142	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	17.51	N/A	N/A	5.711	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.5417	0.5	0.6	0.03004	0.05204	9.61%	0.0%
1.56		3	0.5583	0.51	0.5975	0.02567	0.04447	7.96%	-3.08%
3.1		3	0.5523	0.5211	0.5689	0.01562	0.02705	4.9%	-1.97%
6.25		3	0.5583	0.517	0.594	0.02241	0.03881	6.95%	-3.08%
12.5		3	0.531	0.513	0.5589	0.01415	0.02451	4.62%	1.98%
25		3	0.4807	0.474	0.491	0.005241	0.009077	1.89%	11.26%
50		3	0.5268	0.5033	0.5611	0.01753	0.03037	5.77%	2.74%
100		3	0.5485	0.51	0.5788	0.02026	0.0351	6.4%	-1.26%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.6	0.525	0.5
1.56		0.51	0.5675	0.5975
3.1		0.5211	0.5689	0.567
6.25		0.517	0.564	0.594
12.5		0.5589	0.513	0.521
25		0.477	0.491	0.474
50		0.5611	0.516	0.5033
100		0.5567	0.5788	0.51

EC
 Feb 25 / 15

CETIS Analytical Report

Report Date: 20 Jan-15 17:19 (p 2 of 2)

Test Code: 15023 | 20-8295-5349

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 20-3521-4669

Endpoint: Mean Dry Weight-mg

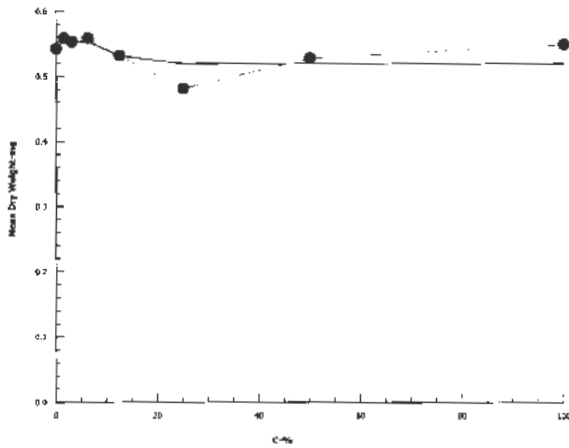
CETIS Version: CETISv1.8.7

Analyzed: 20 Jan-15 17:19

Analysis: Linear Interpolation (ICPIN)

Official Results: Yes

Graphics



ECU
Feb. 25/15

Client: Mount Polley

W.O.#: 15023

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/LCaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
FHM MHW 010715	Jan 12/15	50	2.7	2.8	52	50	4.1	82	NY
QUR-1	Jan 8/15	50	2.4	2.5	46	50	3.3	66	EMM

Notes: _____

Reviewed by: 

Date Reviewed: Feb 24, 2015

APPENDIX D - Chain of Custody Form

British Columbia, 8664 Commerce Court, Burnaby, BC, V5A 4N7

W# 15019
W# 15020
W# 15021

Sample Collection By: Shauna Litke, Katie McMahan			Report to:			Invoice to:			ANALYSES REQUIRED															
Company	Mount Polley Mining Corporation					Company	Mount Polley Mining Corporation					Fathead minnow survival and growth	C. Dubia survival and reproduction	Rainbow trout survival and growth										
Address	Box 12					Address	Box 12																	
City/Prov/Postal Code	Likely BC V0L 1N0					City/Prov/Postal Code	Likely BC V0L 1N0																	
Contact	Colleen Hughes					Contact	Colleen Hughes/																	
Phone	(250) 790-2617					Phone	(250) 790-2617																	
Email	chughes@mountpolley.com					Email	chughes@mountpolley.com																	

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS																Receipt Temperature (°C)	
P2-S	06/01/2015	11:03	water	20L	3	60L total	X	X	X													26	

PROJECT INFORMATION			SAMPLE RECEIPT			RELIQUISHED BY (CLIENT)			RELIQUISHED BY (COURIER)									
Client: Mount Polley Mining Corporation			Total # Containers:	3	Signature: <i>[Signature]</i>			Signature:										
P.O. No.:			Good Condition?	Y	Print: Katie McMahan			Print:										
Shipped Via: Greyhound			Matches Schedule?	Y	Company: MPMC			Company:										
					Time/Date: 06/01/2015 15:30:00			Time/Date:										
SPECIAL INSTRUCTIONS/COMMENTS:						RECEIVED BY (COURIER)			RECEIVED BY (LABORATORY)									
						Signature:			Signature: <i>[Signature]</i>									
						Print:			Print: <i>[Name]</i>									
						Company:			Company: <i>Nautilus Env.</i>									
						Time/Date:			Time/Date: <i>Jan. 7/15 08:15h</i>									

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

Nautilus Environmental

Chain of Custody (electronic)

British Columbia 8664 Commerce Court, Burnaby, BC, V5A 4N7

wo # 15023
15024
15025
15024
14972

Sample Collection By: Mclean Donohoe, Gabriel Holmes			ANALYSES REQUIRED															
Report to:			Invoice to:			Fathead minnow survival and growth	C Dubia S&R - filtered	Rainbow trout survival and growth	C. Dubia S&R - unfiltered	RBT EA test - refill (80L)								Receipt Temperature (°C)
Company: Mount Polley Mining Corporation			Mount Polley Mining Corporation															
Address: Box 12			Box 12															
City/Prov/Postal Code: Likely BC V0L 1N0			Likely BC V0L 1N0															
Contact: Colleen Hughes			Colleen Hughes/															
Phone: (250) 790-2617			(250) 790-2617															
Email: chughes@mountpolley.com			chughes@mountpolley.com															

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	Fathead minnow survival and growth	C Dubia S&R - filtered	Rainbow trout survival and growth	C. Dubia S&R - unfiltered	RBT EA test - refill (80L)							Receipt Temperature (°C)	
1 QUR-1	07/01/2015	12.20	water	20L	7	140L total	X	X	X	X	X							40	
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)				RELIQUISHED BY (COURIER)			
Client: Mount Polley Mining Corporation		Total # Containers:		Signature: <i>Mclean Donohoe</i>				Signature:			
P.O. No.:		Good Condition?		Print: Mclean Donohoe				Print:			
Shipped Via: Greyhound		Matches Schedule?		Company: MPMC				Company:			
				Time/Date: 07/01/2015 15:30:00				Time/Date:			
SPECIAL INSTRUCTIONS/COMMENTS: wo #14972 - refresh sample - NY				RECEIVED BY (COURIER)				RECEIVED BY (LABORATORY)			
				Signature:				Signature: <i>J Baker</i>			
				Print:				Print: Josh Baker			
				Company:				Company: Nautilus			
				Time/Date:				Time/Date: Jun 8/15 @ 0825h			

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 6

Toxicity testing of samples identified as QUL-66-0M and QUL-66-85M on *Ceriodaphnia dubia*, rainbow trout (swim up) and fathead minnows: Samples collected January 15, 2015, Work Order #15042-15044



Nautilus Environmental

**Toxicity testing on samples identified as QUL-66-0M
and QUL-66-85M on *Ceriodaphnia dubia*, rainbow
trout (swim up) and fathead minnows**

Samples collected January 15, 2015

Final Report

Report date: March 13, 2015

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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APPENDIX A – *Ceriodaphnia dubia* Toxicity Test Data

APPENDIX B – Rainbow Trout (*Oncorhynchus mykiss*) Toxicity Test Data

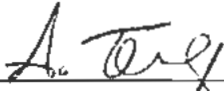
APPENDIX C – Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

APPENDIX D – Chain of Custody Form

SIGNATURE PAGE



Krysta Pearcy, B.Sc.
Laboratory Biologist



Armando Tang, R.P.Bio.
Laboratory Manager

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted toxicity tests for Mount Polley Mining Corporation on samples identified as QUL-66-0M and QUL-66-85M. The samples were collected on January 15, 2015 and delivered to the laboratory in Burnaby, BC on January 16, 2015. Each sample was transported in three 20-L plastic carboys inside coolers. The samples were received at temperatures of 4.0 and 4.4°C and were stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing. The following sub-lethal toxicity tests were performed on the samples:

- *Ceriodaphnia dubia* survival and reproduction
- 7-d rainbow trout (*Oncorhynchus mykiss*) survival and growth
- 7-d fathead minnow (*Pimephales promelas*) survival and growth

The samples were vacuum filtered through 0.45 µm filter paper and tested in addition to unfiltered sample only for the *C. dubia* toxicity test.

This report describes the results of these toxicity tests. Copies of laboratory data sheets and printouts of statistical analyses for each test are provided in Appendices A to C. The chain-of-custody form is provided in Appendix D.

2.0 METHODS

Methods for the toxicity tests are summarized in Tables 1 to 3. Testing was conducted according to procedures described by the Environment Canada protocols (2007 and 2011) and methods described by Lazorchak and Smith (2007). Statistical analyses for all tests were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house culture
Test organism age	<24 h old neonates produced within 12 h
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20 mL test tube
Test volume	15 mL
Test replicates	10 test replicates per treatment
Number of organisms	1 per replicate
Control water	20% Perrier water
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	<i>Pseudokirchneriella subcapitata</i> and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada, (2007) EPS 1/RM/21
Statistical software	CETIS (2013)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods
Reference toxicant	Sodium chloride

Table 2. Summary of test conditions: rainbow trout (*Oncorhynchus mykiss*) survival and growth test.

Test organism	<i>Oncorhynchus mykiss</i>
Test organism source	Vancouver Island Trout Hatchery, Duncan, BC
Test organism age	3 to 6 days post swim up
Test type	Static renewal
Test duration	7 days
Test vessel	1-L glass containers
Test volume	500 mL
Test replicates	4 per treatment
Number of organisms	5 per replicate
Control water	Moderately-hard water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	15 ± 1°C
Feeding	Twice a day with newly hatched brine shrimp (<i>Artemia nauplii</i>)
Light intensity	100 – 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test protocol	Lazorchak and Smith (2007)
Statistical software	CETIS (2013)
Test endpoint	Survival and biomass
Test acceptability criteria for controls	≥90% survival, ≥1.5 times test initiation dry weight
Reference toxicant	Copper chloride

Table 3. Summary of test conditions: fathead minnow (*Pimephales promelas*) survival and growth test.

Test organism	<i>Pimephales promelas</i>
Test organism source	Aquatic BioSystems, Fort Collins, CO
Test organism age	<24 hours
Test type	Static renewal
Test duration	7 days
Test vessel	375-mL glass containers
Test volume	250 mL
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control water	Moderately-hard water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	Twice a day with newly hatched brine shrimp (<i>Artemia nauplii</i>)
Light intensity	100 – 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test protocol	Environment Canada (2011), EPS 1/RM/22
Statistical software	CETIS (2013)
Test endpoint	Survival and biomass
Test acceptability criteria for controls	≥80% survival, ≥250 µg mean dry weight
Reference toxicant	Sodium chloride

3.0 RESULTS

Results of the toxicity tests conducted on samples QUL-66-0M and QUL-66-85M using *C. dubia*, rainbow trout swim up and fathead minnow are provided in Tables 4 to 6. No adverse effects on survival were observed in the samples, resulting in LC50 values of >100% for the toxicity tests.

Adverse effects on *C. dubia* reproduction were observed on the unfiltered samples; the IC25 values were 11.1 and 8.3% for QUL-66-0M and QUL-66-85M, respectively. The corresponding filtered samples exhibited no toxicity with IC25 values of >100%. There were no adverse effects on rainbow trout swim up biomass or dry weight; the IC25 values were >100%. For the fathead minnow test, there were adverse effects on biomass but not dry weight; the IC25 for biomass was 83.2% for QUL-66-0M and 95.6% for QUL-66-85M.

Table 4. Results: *Ceriodaphnia dubia* survival and reproduction test.

Concentration (% v/v)	QUL-66-0M				QUL-66-85M			
	Unfiltered		Filtered		Unfiltered		Filtered	
	Survival (%)	Reproduction (mean ± SD)	Survival (%)	Reproduction (mean ± SD)	Survival (%)	Reproduction (mean ± SD)	Survival (%)	Reproduction (mean ± SD)
Control	100	24.3 ± 5.7	100	21.7 ± 3.6	100	26.0 ± 4.9	100	29.4 ± 1.4
1.56	100	29.7 ± 6.0 †	100	25.3 ± 1.3	100	23.5 ± 6.7	100	27.2 ± 3.0
3.12	100	23.4 ± 9.1	100	23.9 ± 3.5	100	20.9 ± 6.6	100	26.7 ± 6.1
6.25	100	24.3 ± 7.5	100	24.2 ± 1.9	100	21.1 ± 5.4	100	27.0 ± 2.7
12.5	100	16.6 ± 5.7	100	26.3 ± 3.9	100	17.3 ± 4.5	100	24.7 ± 3.4
25	100	17.4 ± 6.1	100	25.3 ± 3.0	100	16.2 ± 4.9	100	25.6 ± 2.3
50	100	12.9 ± 1.9	100	24.7 ± 3.1	100	14.6 ± 2.8	100	27.4 ± 2.1
100	100	14.9 ± 5.1	100	26.0 ± 1.4	100	13.2 ± 0.9	100	28.4 ± 5.1
Test Endpoint (% v/v)								
LC50	>100	--	>100	--	>100	--	>100	--
IC25 (95% CL)	--	11.1 (7.2 - 29.1)	--	>100	--	8.3 (2.3 - 23.0)	--	>100
IC50	--	>100	--	>100	--	>100	--	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits.

† = The hormesis model was conducted but the data did not fit the model; therefore the reproduction was adjusted to that of the control value for analysis.

Table 5. Results: rainbow trout (*Oncorhynchus mykiss*) survival and growth test.

Concentration (% v/v)	Mean ± SD					
	QUL-66-0M			QUL-66-85M		
	Survival (%)	Biomass (mg)	Dry Weight (mg)	Survival (%)	Biomass (mg)	Dry Weight (mg)
Control	100.0 ± 0.0	52.1 ± 2.8	52.1 ± 2.8	100.0 ± 0.0	52.4 ± 2.8	52.4 ± 2.8
6.25	100.0 ± 0.0	51.8 ± 2.4	51.8 ± 2.4	100.0 ± 0.0	45.6 ± 2.1	45.6 ± 2.1
12.5	100.0 ± 0.0	47.3 ± 3.0	47.3 ± 3.0	100.0 ± 0.0	49.6 ± 4.2	49.6 ± 4.2
25	100.0 ± 0.0	48.9 ± 4.5	48.9 ± 4.5	100.0 ± 0.0	46.1 ± 2.6	46.1 ± 2.6
50	100.0 ± 0.0	48.0 ± 1.9	48.0 ± 1.9	100.0 ± 0.0	48.2 ± 1.2	48.2 ± 1.2
100	100.0 ± 0.0	50.1 ± 2.1	50.1 ± 2.1	100.0 ± 0.0	46.5 ± 2.0	46.5 ± 2.0
Test endpoint (% v/v)						
LC50	>100	--	--	>100	--	--
IC25	--	>100	>100	--	>100	>100
IC50	--	>100	>100	--	>100	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

Table 6. Results: fathead minnow (*Pimephales promelas*) survival and growth test.

Concentration (% v/v)	Mean ± SD					
	QUL-66-0M			QUL-66-85M		
	Survival (%)	Biomass (µg)	Dry Weight (µg)	Survival (%)	Biomass (µg)	Dry Weight (µg)
Control	100.0 ± 0.0	844.0 ± 39.3	844.0 ± 39.3	100.0 ± 0.0	856.7 ± 67.9	856.7 ± 67.9
1.56	100.0 ± 0.0	799.0 ± 39.8	799.0 ± 39.8	100.0 ± 0.0	885.7 ± 80.3	885.7 ± 80.3
3.1	100.0 ± 0.0	866.3 ± 10.0	866.3 ± 10.0	100.0 ± 0.0	848.3 ± 17.0	848.3 ± 17.0
6.25	96.7 ± 5.8	843.3 ± 60.2	872.7 ± 42.1	96.7 ± 5.8	904.0 ± 41.0	937.2 ± 65.5
12.5	100.0 ± 0.0	862.3 ± 44.4	862.3 ± 44.4	96.7 ± 5.8	814.3 ± 37.6	843.3 ± 34.8
25	100.0 ± 0.0	850.0 ± 21.3	850.0 ± 21.3	100.0 ± 0.0	845.0 ± 30.0	845.0 ± 30.0
50	100.0 ± 0.0	806.3 ± 15.0	806.3 ± 15.0	93.3 ± 11.6	872.3 ± 172.4	929.2 ± 83.4
100	76.7 ± 32.2	570.3 ± 180.2	778.8 ± 134.2	83.3 ± 28.9	642.0 ± 228.5	775.3 ± 93.5
Test endpoint (% v/v)						
LC50	>100	--	--	>100	--	--
IC25 (95% CL)	--	83.2 (46.7 - 100)	>100	--	95.6 (25.4 - 100)	>100
IC50	--	>100	>100	--	>100	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

4.0 QA/QC

The health history of the test organisms used in the exposures was acceptable and met the requirements of the protocols. The tests met all control acceptability criteria and water quality parameters remained within ranges specified in the protocols throughout the tests. There were no deviations from the test methodologies. Uncertainty associated with these tests is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

Results of the reference toxicant tests conducted during the testing program are summarized in Table 7. Results for these tests fell within the range for organism performance of mean and two standard deviation range, based on historical results obtained by the laboratory with these tests. Thus, the sensitivity of the organisms used in these tests was appropriate.

Table 7. Reference toxicant results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>C. dubia</i>	Survival (LC50): 2.0 g/L NaCl	1.9 (1.5 - 2.4)	12	January 21, 2015
	Reproduction (IC50): 1.4 g/L NaCl	1.4 (1.0 - 2.0)	19	
<i>O. mykiss</i>	Survival (LC50): 55.9 mg/L Cu	72.1 (38.6 - 134.9)	37	January 16, 2015
<i>P. promelas</i>	Survival (LC50): 4.8 g/L NaCl	4.3 (3.4 - 5.5)	13	January 16, 2015
	Biomass (IC50): 4.0 g/L NaCl	3.8 (2.8 - 5.2)	17	

SD = Standard Deviation, CV = Coefficient of Variation, IC = Inhibition Concentration, LC = Lethal Concentration.

5.0 REFERENCES

- Environment Canada. 2007. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. Report EPS 1/RM/21, Second Edition, February 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 74 pp.
- Environment Canada. 2011. Biological test method: test of larval growth and survival using fathead minnows. Environmental Protection Series, Report EPS 1/RM/22. February 2011,. Environment Canada, Environmental Protection, Conservation and Protection, Ottawa, ON. 73 pp.
- Lazorchak, J.M. and Smith, M.E. 2007. Rainbow trout (*Oncorhynchus mykiss*) and brook trout (*Salvelinus fontinalis*) 7-day survival and growth test method. Arch. Environ. Contam. Toxicol. 53:397-405.
- Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.4.29 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: Mount Pooley
 Work Order No.: 15044

Start Date/Time: Jan 16/15 @ 12:00h
 Set up by: KLP

Sample Information:

Sample ID: QUL-06-0m (unfiltered)
 Sample Date: Jan 15/15
 Date Received: Jan 16/15
 Sample Volume: 3 x 20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:
 T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: BB010715 A+B
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 27
 Mortality (%) in previous 7 d: 0
 Individual female # used ≥ 8 young on test day: 1, 7, 13, 16, 18, 20, 21, 30

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd122
 Stock Solution ID: 15 NaCl
 Date Initiated: Jan 21/15

7-d LC50 (95% CL): 2.0 (1.7-2.3) g/L NaCl
 7-d IC50 (95% CL): 1.4 (1.2-1.5) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.9 (1.5-2.4) g/L NaCl CV (%): 12
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-2.0) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		11.1 (7.2-29.1)
IC50 % (v/v) (95% CL)		7100

Reviewed by: A. Terry

Date reviewed: March 3, 2015

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Lit. Polley
 Sample ID: 01L-66-0m (unfiltered)
 Work Order #: 15044

Start Date & Time: Jan 16/15 @ 1200h^{cap} 1210h
 Stop Date & Time: Jan 23/15 @ 1500h
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		6		7
<i>control</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.5
DO (mg/L)	8.1	7.6	8.0	7.6	8.1	7.4	8.2	7.2	8.2	7.3	8.0	7.2	8.0	7.0
pH	7.8	7.7	8.1	7.7	8.1	7.7	7.9	7.6	7.9	7.6	7.9	7.5	7.8	7.4
Cond. (µS/cm)	224	222		221		225		216		219		220		233
Initials	MLT/KCP	A		M		EMM		MLT		MLT		MLT		KP

Concentration	Days													
	0	1		2		3		4		5		6		7
<i>1.56% CVIV</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.5
DO (mg/L)	7.8	7.6	8.0	7.7	8.1	7.3	8.0	7.3	8.1	7.3	8.1	7.3	8.1	7.0
pH	7.7	7.7	8.1	7.7	8.1	7.7	7.9	7.7	7.7	7.6	7.8	7.6	7.7	7.4
Cond. (µS/cm)	221	220		220		220		219		210		221		229
Initials	MLT	A		M		EMM		MLT		MLT		MLT		KP

Concentration	Days													
	0	1		2		3		4		5		6		7
<i>12.5% CVIV</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.5
DO (mg/L)	7.9	7.5	8.0	7.7	8.1	7.3	8.0	7.2	8.1	7.3	8.1	7.1	8.1	7.0
pH	7.8	7.7	7.9	7.8	8.0	7.8	7.9	7.7	7.7	7.5	7.8	7.6	7.7	7.5
Cond. (µS/cm)	210	212		211		211		208		200		212		224 ^{cap} 218
Initials	MLT	A		M		EMM		MLT		MLT		MLT		KP

Concentration	Days													
	0	1		2		3		4		5		6		7
<i>100% CVIV</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.5	25.0	24.0	25.0	24.0	24.5
DO (mg/L)	8.0	7.6	8.0	7.6	8.0	7.3	8.0	7.2	8.1	7.3	7.9	7.9	8.1	7.0
pH	7.5	7.7	7.6	7.8	7.8	7.8	7.8	7.7	7.5	7.5	7.5	7.6	7.5	7.2
Cond. (µS/cm)	119 ^{cap}	119		119		121		119		117		119		121
Initials	MLT	A		M		EMM		MLT		MLT		MLT		KP

① 119

	Control	100% CVIV		
Hardness*	100	58		
Alkalinity*	86	48		

* mg/L as CaCO₃

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5

Sample Description: clear

Analysts: EMM, AUD, KP, MLT

Reviewed by: ART

Date reviewed: Feb 25/15

Comments:

Broodboard Used: 010715A1B (tt# 17, 13, 16, 18, 20, 21, 30)

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt. Palley ^{emm}
 Sample ID: 04166-01 filtered (unfiltered)
 Work Order: 15044

Start Date & Time: Jan 16, 15 @ 12:10h
 Stop Date & Time: Jan 22, 15 @ 15:00h
 Set up by: EMM

Days	Concentration: <u>control</u>											Concentration: <u>1.56</u>											Concentration: <u>3.12</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~
2	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	~	
3	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	EMM	
4	4	3	4	5	4	4	4	3	✓	EMM	EMM	4	5	4	4	5	✓	4	4	4	EMM	EMM	4	4	4	5	4	5	✓	3	EMM		
5	4	6	6	8	10	8	6	6	8	6	EMM	4	9	4	8	8	6	4	10	9	EMM	EMM	5	4	8	9	6	✓	✓	10	4	6	EMM
6	10	/	/	/	/	/	/	/	/	9	EMM	11	✓	10	/	/	12	10	/	/	EMM	EMM	12	11	✓	13	10	12	10	✓	9	EMM	
7	✓	14	14	16	17	15	18	16	15	✓	EMM	18	16	17	18	17	19	✓	15	19	19	EMM	17	✓	17	✓	✓	14	16	16	✓	✓	EMM
8																																	
Total	14	24	23	28	32	27	28	26	26	15	EMM	33	30	31	30	30	37	14	29	32	31	EMM	34	15	29	26	16	31	30	31	13	9	EMM

Days	Concentration: <u>6.25</u>											Concentration: <u>12.5</u>											Concentration: <u>25</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	
1	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	~		
2	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	~		
3	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	EMM		
4	4	5	✓	✓	✓	✓	✓	3	3	EMM	EMM	5	5	4	4	5	3	3	4	5	5	EMM	EMM	4	4	3	3	5	3	4	4	✓	3	EMM
5	4	10	6	5	4	4	5	4	8	7	EMM	5	5	4	4	5	3	3	4	5	5	EMM	EMM	4	4	3	3	5	3	4	4	✓	3	EMM
6	4	13	10	10	9	10	8	7	✓	13	EMM	12	10	10	9	8	9	8	9	10	10	EMM	EMM	10	11	9	8	10	8	11	10	9	8	EMM
7	17	✓	✓	18	✓	✓	18	19	14	✓	EMM	✓	✓	✓	17	✓	11	✓	✓	✓	✓	EMM	✓	✓	✓	13	✓	16	✓	✓	15	✓	EMM	
8																																		
Total	30	28	16	33	13	14	31	28	25	23	EMM	17	15	14	30	13	23	11	13	15	15	EMM	14	15	12	25	15	27	15	14	27	11	EMM	

Days	Concentration: <u>50</u>											Concentration: <u>100</u>											Concentration: <u> </u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	
1	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	~		
2	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	~		
3	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	EMM		
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM		
5	3	4	3	4	4	3	3	3	5	4	EMM	4	4	3	5	4	4	4	3	5	4	EMM	4	4	3	5	4	4	4	4	4	EMM		
6	8	7	8	9	10	10	✓	8	9	✓	EMM	9	9	7	8	8	9	9	6	7	8	EMM	9	9	7	8	8	9	9	9	9	EMM		
7	✓	✓	✓	✓	✓	✓	12	✓	✓	12	EMM	✓	✓	✓	✓	✓	13	5	12	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM		
8																																		
Total	11	11	11	13	14	13	15	11	14	16	EMM	13	12	10	13	12	20	18	21	12	12	EMM												

Notes: X = mortality.

Sample Description: sample filtered through ~~EMM~~ ^{EMM} filter, clear
 Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: A. Ong

Date reviewed: February 25, 2015

CETIS Analytical Report

Report Date: 28 Jan-15 11:14 (p 1 of 2)
 Test Code: 15044a | 14-1766-5076

Ceriodaphnia 7-d Survival and Reproduction Test			Nautilus Environmental
Analysis ID: 21-2048-9266	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7	
Analyzed: 28 Jan-15 11:11	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes	
Batch ID: 21-0371-2954	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Percy	
Start Date: 16 Jan-15 12:10	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water	
Ending Date: 23 Jan-15 15:00	Species: Ceriodaphnia dubia	Brine:	
Duration: 7d 3h	Source: In-House Culture	Age: <24h	
Sample ID: 13-7511-0324	Code: 51F684B4	Client: Mount Polley	
Sample Date: 15 Jan-15 10:30	Material: Water Sample	Project:	
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)		
Sample Age: 26h (4 °C)	Station: QUL-66-0m		

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1820870	200	Yes	Two-Point Interpolation

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary			Calculated Variate(A/B)									
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B	
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10	
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10	
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10	
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10	
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10	
25		10	1	1	1	0	0	0.0%	0.0%	10	10	
50		10	1	1	1	0	0	0.0%	0.0%	10	10	
100		10	1	1	1	0	0	0.0%	0.0%	10	10	

7d Survival Rate Detail											
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

AR
 QA Feb 25/15

CETIS Analytical Report

Report Date: 28 Jan-15 11:14 (p 2 of 2)
 Test Code: 15044a | 14-1766-5076

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 21-2048-9266
 Analyzed: 28 Jan-15 11:11

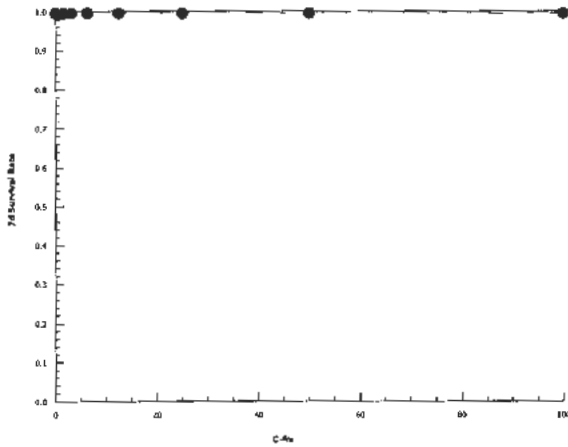
Endpoint: 7d Survival Rate
 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



EBT
 QA: Feb 25/15

CETIS Analytical Report

Report Date: 03 Mar-15 14:44 (p 1 of 2)
 Test Code: 15044a | 14-1766-5076

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 09-5226-4243	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 03 Mar-15 14:41	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 21-0371-2954	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 16 Jan-15 12:10	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 23 Jan-15 15:00	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 3h	Source: In-House Culture	Age: <24h
Sample ID: 13-7511-0324	Code: 51F684B4	Client: Mount Polley
Sample Date: 15 Jan-15 10:30	Material: Water Sample	Project:
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 26h (4 °C)	Station: QUL-66-0m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1035543	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	2.139	1.801	6.959	46.75	14.37	55.52
IC10	2.849	2.075	8.125	35.1	12.31	48.19
IC15	6.867	2.37	9.76	14.56	10.25	42.19
IC20	7.892	2.694	11.48	12.67	8.713	37.12
IC25	9.052	3.049	14.85	11.05	6.735	32.8
IC40	29.94	10.66	42.93	3.34	2.33	9.378
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

C-%	Control Type	Count	Mean	Min	Max	Calculated Variate			
						Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	24.3	14	32	1.808	5.716	23.52%	0.0%
1.56		10	29.7	14	37	1.886	5.964	20.08%	-22.22%
3.12		10	23.4	9	34	2.888	9.131	39.02%	3.7%
6.25		10	24.3	13	33	2.367	7.484	30.8%	0.0%
12.5		10	16.6	11	30	1.802	5.7	34.34%	31.69%
25		10	17.4	11	27	1.939	6.132	35.24%	28.4%
50		10	12.9	11	16	0.5859	1.853	14.36%	46.91%
100		10	14.9	10	26	1.616	5.109	34.29%	38.68%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	14	24	23	28	32	27	28	26	26	15
1.56		33	30	31	30	30	37	14	29	32	31
3.12		34	15	29	26	16	31	30	31	13	9
6.25		30	28	16	33	13	14	31	30	25	23
12.5		17	15	14	30	13	23	11	13	15	15
25		14	15	12	24	15	27	15	14	27	11
50		11	11	11	13	14	13	15	11	14	16
100		13	12	10	13	12	26	18	21	12	12

QA: *RT* 1/26/15

CETIS Analytical Report

Report Date: 03 Mar-15 14:44 (p 2 of 2)
Test Code: 15044a | 14-1766-5076

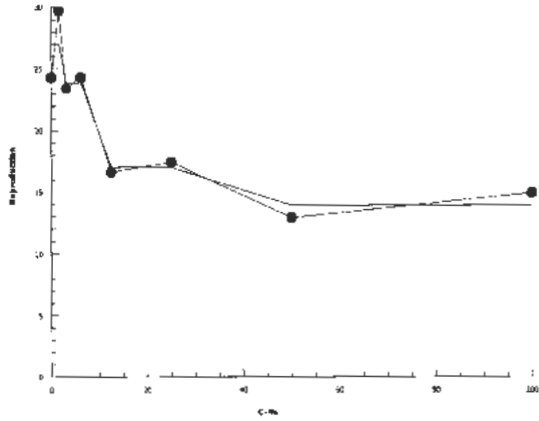
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 09-5226-4243 Endpoint: Reproduction
Analyzed: 03 Mar-15 14:41 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 04 Mar-15 08:22 (p 1 of 2)
 Test Code: 15044aa | 14-1989-9131

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 09-8646-1821	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 03 Mar-15 14:45	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 00-0619-4523	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 16 Jan-15 12:10	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 23 Jan-15 15:00	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 3h	Source: In-House Culture	Age: <24h
Sample ID: 13-7511-0324	Code: 51F684B4	Client: Mount Polley
Sample Date: 15 Jan-15 10:30	Material: Water Sample	Project:
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 26h (4 °C)	Station: QUL-66-0m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	2130831	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	6.771	0.395	7.486	14.77	13.36	253.1
IC10	7.677	0.9461	9.356	13.03	10.69	105.7
IC15	8.689	1.861	13.38	11.51	7.475	53.72
IC20	9.818	3.798	25.32	10.19	3.949	26.33
IC25	11.08	7.235	29.1	9.026	3.436	13.82
IC40	42.99	12	N/A	2.326	NA	8.332
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

C-%	Control Type	Count	Mean	Min	Max	Calculated Variate			
						Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	24.3	14	32	1.808	5.716	23.52%	0.0%
1.56		10	24.3	14	32	1.808	5.716	23.52%	0.0%
3.12		10	23.4	9	34	2.888	9.131	39.02%	3.7%
6.25		10	24.3	13	33	2.367	7.484	30.8%	0.0%
12.5		10	16.6	11	30	1.802	5.7	34.34%	31.69%
25		10	17.4	11	27	1.939	6.132	35.24%	28.4%
50		10	12.9	11	16	0.5859	1.853	14.36%	46.91%
100		10	14.9	10	26	1.616	5.109	34.29%	38.68%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	14	24	23	28	32	27	28	26	26	15
1.56		14	24	23	28	32	27	28	26	26	15
3.12		34	15	29	26	16	31	30	31	13	9
6.25		30	28	16	33	13	14	31	30	25	23
12.5		17	15	14	30	13	23	11	13	15	15
25		14	15	12	24	15	27	15	14	27	11
50		11	11	11	13	14	13	15	11	14	16
100		13	12	10	13	12	26	18	21	12	12

KRT
 QA: *MAH 5/15*

CETIS Analytical Report

Report Date: 04 Mar-15 08:22 (p 2 of 2)

Test Code: 15044aa | 14-1989-9131

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 09-8646-1821

Endpoint: Reproduction

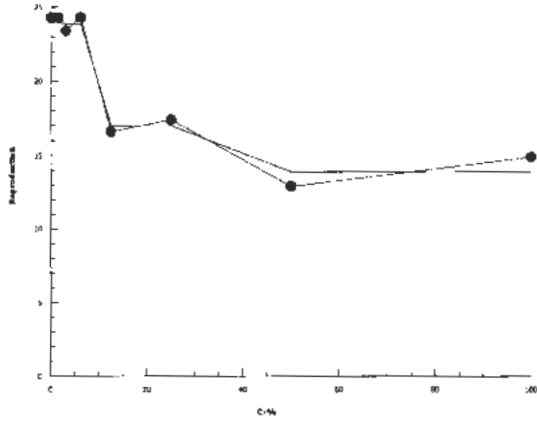
CETIS Version: CETISv1.8.7

Analyzed: 03 Mar-15 14:45

Analysis: Linear Interpolation (ICPIN)

Official Results: Yes

Graphics



Ceriodaphnia dubia Summary Sheet

Client: Mount Polley
 Work Order No.: 15044

Start Date/Time: Jan 16/15 @ 12:30h
 Set up by: KLP

Sample Information:

Sample ID: QUL-66-0m (Filtered)
 Sample Date: Jan 15/15
 Date Received: Jan 16/15
 Sample Volume: 3x20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: BB010715 A+B
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 27
 Mortality (%) in previous 7 d: 0
 Individual female # used ≥ 8 young on test day: 1-7, 13, 16, 18, 20-30

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd122
 Stock Solution ID: 15Na01
 Date Initiated: Jan 21/15

7-d LC50 (95% CL): 2.0 (1.7-2.3) g/L NaCl
 7-d IC50 (95% CL): 1.4 (1.2-1.5) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.9 (1.5-2.4) g/L NaCl CV (%): 12
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-2.0) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		7100
IC50 % (v/v) (95% CL)		7100

Reviewed by: A. Terry

Date reviewed: March 8th 2015

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: UH Pollex
 Sample ID: QUL 65-0M (filtered)
 Work Order #: 15044

Start Date & Time: Jan 16/15 @ 12:30h
 Stop Date & Time: Jan 23/15 @ 16:30h
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		6		7
<i>Control</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.1	7.6	8.0	7.6	8.1	7.5	8.0	7.4	8.2	7.2	8.0	7.3	8.0	7.3
pH	7.8	7.7	8.1	7.7	8.1	7.7	7.9	7.7	7.9	7.5	7.9	7.4	7.8	7.6
Cond. (µS/cm)	224	222		224		225		216		219		220		224
Initials	MLT/AMM	A		A		EMM		MLT/AMM		MLT/AMM		MLT/AMM		EMM

Concentration	Days													
	0	1		2		3		4		5		6		7
<i>1.56% CIVI</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.5	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	7.9	7.6	8.0	7.7	8.1	7.5	8.1	7.4	8.1	7.1	8.1	7.3	7.9	7.4
pH	7.8	7.7	8.1	7.8	8.0	7.8	7.9	7.6	7.9	7.6	7.8	7.5	7.7	7.4
Cond. (µS/cm)	220	221		220		219		218		213		224		218
Initials	MLT/AMM	A		A		EMM		MLT/AMM		MLT/AMM		MLT/AMM		EMM

Concentration	Days													
	0	1		2		3		4		5		6		7
<i>12.5% CIVI</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.5	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	7.8	7.5	8.0	7.6	8.0	7.5	8.1	7.6	8.1	7.1	8.2	7.4	7.9	7.4
pH	7.8	7.7	8.0	7.8	8.0	7.8	7.9	7.6	7.9	7.6	7.8	7.5	7.8	7.4
Cond. (µS/cm)	210	209		208		208		207		200		212		215
Initials	MLT/AMM	A		A		EMM		MLT/AMM		MLT/AMM		MLT/AMM		EMM

Concentration	Days													
	0	1		2		3		4		5		6		7
<i>100% CIVI</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	25.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	7.8	7.6	8.0	7.7	7.8	7.8	8.1	7.6	7.9	7.2	8.2	7.4	8.0	7.3
pH	7.6	7.7	7.7	7.8	7.8	7.8	7.7	7.5	7.6	7.4	7.5	7.5	7.5	7.9
Cond. (µS/cm)	118	119		120		119		117		116		119		118
Initials	MLT/AMM	A		A		EMM		MLT/AMM		MLT/AMM		MLT/AMM		EMM

	Control	<i>100% CIVI</i>
Hardness*	100	58
Alkalinity*	86	48

Analysts: EMM, AMM, MLT
 Reviewed by: ART
 Date reviewed: Feb 25/15

* mg/L as CaCO₃
 WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5
 Sample Description: clear, sample filtered through 0.45µm filter
 Comments: Broodboard Used: 010715A+B (tt # 1-7, 13, 16, 18, 20-30)

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: H.F. Pallely
 Sample ID: DULID-354 (Filtered) Om (filtered)
 Work Order: 1504

Start Date & Time: Jan 16/15 @ 1230h
 Stop Date & Time: Jan 23/15 @ 1330h
 Set up by: EMM

Days	Concentration: <u>Control</u>											Concentration: <u>1.56</u>											Concentration: <u>3.12</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~
2	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~
3	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM
4	3	3	3	3	4	3	3	4	3	EMM	4	4	5	3	4	4	5	4	4	3	EMM	3	3	3	4	4	3	5	5	6	4	EMM	
5	6	6	6	6	8	8	8	6	6	EMM	8	8	10	7	8	8	7	7	7	EMM	8	7	9	8	8	6	6	9	9	4	EMM		
6	10	9	9	9	12	13	13	13	12	EMM	14	12	12	11	14	15	14	12	10	EMM	12	14	13	12	11	12	13	14	13	EMM			
7	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	
8	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	
Total	19	22	20	25	13	24	23	24	23	24	EMM	26	24	26	24	25	27	27	26	24	24	EMM	23	24	25	24	23	27	24	29	29	17	EMM

Days	Concentration: <u>6.25</u>											Concentration: <u>12.5</u>											Concentration: <u>25</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~
2	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~
3	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	
4	3	3	4	4	5	3	4	4	5	EMM	4	3	4	4	4	5	4	4	6	3	EMM	5	4	4	5	5	3	4	4	3	4	EMM	
5	6	8	8	9	9	8	8	6	7	EMM	6	8	9	6	10	9	9	4	6	EMM	7	7	9	7	7	8	9	10	7	EMM			
6	12	3	15	12	10	11	11	7	10	EMM	12	10	11	11	12	10	11	7	EMM	10	13	9	13	11	13	11	13	EMM					
7	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	
8	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	
Total	21	24	27	25	24	24	25	23	27	EMM	22	26	21	27	26	26	24	32	22	EMM	30	24	25	28	24	23	26	29	20	24	EMM		

Days	Concentration: <u>50</u>											Concentration: <u>100</u>											Concentration: <u>29</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~
2	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~
3	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	
4	5	4	3	4	4	4	5	3	4	EMM	5	4	4	5	5	4	5	6	4	4	EMM	/	/	/	/	/	/	/	/	/	/	EMM	
5	4	4	9	4	7	9	9	8	9	EMM	10	9	7	8	8	9	10	10	10	EMM	/	/	/	/	/	/	/	/	/	/	EMM		
6	10	9	9	10	10	10	8	9	EMM	14	13	13	15	11	14	12	10	12	EMM	/	/	/	/	/	/	/	/	/	/	EMM			
7	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	
8	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	
Total	19	24	26	27	29	23	29	24	23	EMM	29	26	26	27	24	26	26	24	26	26	EMM	/	/	/	/	/	/	/	/	/	/	EMM	

Notes: X = mortality.

Sample Description: sample filtered through 0.45 um filter view
 Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: A. Tong

Date reviewed: February 25, 2015

CETIS Analytical Report

Report Date: 28 Jan-15 11:29 (p 1 of 2)

Test Code: 15044b | 17-4382-0357

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 07-4015-8380	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 28 Jan-15 11:29	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 16-3723-1095	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 16 Jan-15 12:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 23 Jan-15 16:30	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 4h	Source: In-House Culture	Age: <24h
Sample ID: 14-1191-8612	Code: 54282B14	Client: Mount Polley
Sample Date: 15 Jan-15 10:30	Material: Water Sample	Project:
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 26h (4 °C)	Station: QUL-66-0m (Filtered)	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1794718	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

APT
QA: Feb 25/15

CETIS Analytical Report

Report Date: 28 Jan-15 11:29 (p 2 of 2)
 Test Code: 15044b | 17-4382-0357

Ceriodaphnia 7-d Survival and Reproduction Test

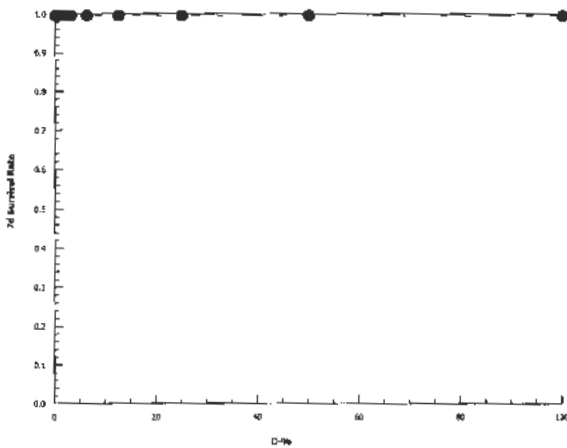
Nautilus Environmental

Analysis ID: 07-4015-8380 Endpoint: 7d Survival Rate CETIS Version: CETISv1.8.7
 Analyzed: 28 Jan-15 11:29 Analysis: Linear Interpolation (ICPIN) Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



QA: *FT* Feb 25/15

CETIS Analytical Report

Report Date: 28 Jan-15 11:29 (p 1 of 2)
 Test Code: 15044b | 17-4382-0357

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 10-7528-3860	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 28 Jan-15 11:29	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 16-3723-1095	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 16 Jan-15 12:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 23 Jan-15 16:30	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 4h	Source: In-House Culture	Age: <24h
Sample ID: 14-1191-8612	Code: 54282B14	Client: Mount Polley
Sample Date: 15 Jan-15 10:30	Material: Water Sample	Project:
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 26h (4 °C)	Station: QUL-66-0m (Filtered)	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1734881	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	21.7	13	25	1.136	3.592	16.55%	0.0%
1.56		10	25.3	24	27	0.3958	1.252	4.95%	-16.59%
3.12		10	23.9	17	29	1.11	3.51	14.69%	-10.14%
6.25		10	24.2	21	27	0.611	1.932	7.98%	-11.52%
12.5		10	26.3	21	32	1.239	3.917	14.89%	-21.2%
25		10	25.3	20	30	0.9551	3.02	11.94%	-16.59%
50		10	24.7	19	29	0.9781	3.093	12.52%	-13.82%
100		10	26	24	29	0.4472	1.414	5.44%	-19.82%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	19	22	20	25	13	24	23	24	23	24
1.56		26	24	26	24	25	27	27	26	24	24
3.12		23	24	25	24	23	21	24	29	29	17
6.25		21	24	27	25	24	24	25	23	27	22
12.5		32	22	26	21	27	26	26	29	32	22
25		30	24	25	28	24	23	26	29	20	24
50		19	24	26	27	29	23	29	24	23	23
100		29	26	26	27	24	26	26	24	26	26

ART
 QA: FEB 25/15

CETIS Analytical Report

Report Date: 28 Jan-15 11:29 (p 2 of 2)

Test Code: 15044b | 17-4382-0357

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 10-7528-3860

Endpoint: Reproduction

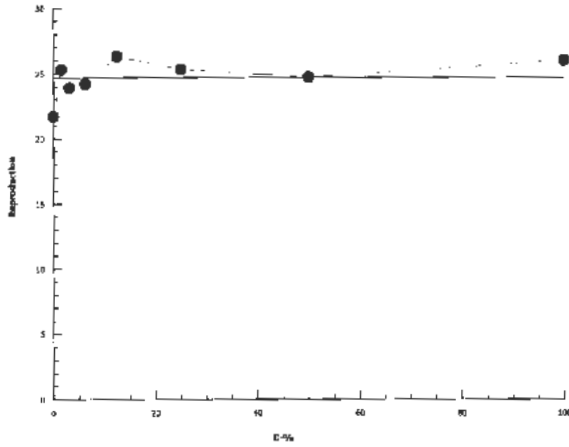
CETIS Version: CETISv1.8.7

Analyzed: 28 Jan-15 11:29

Analysis: Linear Interpolation (ICPIN)

Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 28 Jan-15 11:57 (p 1 of 2)

Test Code: 15044b | 17-4382-0357

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 06-3052-7652	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 28 Jan-15 11:56	Analysis: Nonparametric-Control vs Treatments	Official Results: Yes
Batch ID: 16-3723-1095	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 16 Jan-15 12:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 23 Jan-15 16:30	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 4h	Source: In-House Culture	Age: <24h
Sample ID: 14-1191-8612	Code: 54282B14	Client: Mount Polley
Sample Date: 15 Jan-15 10:30	Material: Water Sample	Project:
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 26h (4 °C)	Station: QUL-66-0m (Filtered)	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	14.2%	100	>100	NA	1

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		1.56	144.5	74	2	18	1.0000	Asymp	Non-Significant Effect
		3.12	121	74	3	18	0.9959	Asymp	Non-Significant Effect
		6.25	128	74	4	18	0.9995	Asymp	Non-Significant Effect
		12.5	135	74	1	18	1.0000	Asymp	Non-Significant Effect
		25	134.5	74	4	18	1.0000	Asymp	Non-Significant Effect
		50	126.5	74	3	18	0.9992	Asymp	Non-Significant Effect
		100	150	74	1	18	1.0000	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	148.55	21.22143	7	2.551	0.0210	Significant Effect
Error	599	8.319445	72			
Total	747.55		79			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	19.19	18.48	0.0076	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.9703	0.9579	0.0593	Normal Distribution

Reproduction Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	10	21.7	19.13	24.27	23	13	25	1.136	16.55%	0.0%
1.56		10	25.3	24.4	26.2	25.5	24	27	0.3958	4.95%	-16.59%
3.12		10	23.9	21.39	26.41	24	17	29	1.11	14.69%	-10.14%
6.25		10	24.2	22.82	25.58	24	21	27	0.611	7.98%	-11.52%
12.5		10	26.3	23.5	29.1	26	21	32	1.239	14.89%	-21.2%
25		10	25.3	23.14	27.46	24.5	20	30	0.9551	11.94%	-16.59%
50		10	24.7	22.49	26.91	24	19	29	0.9781	12.52%	-13.82%
100		10	26	24.99	27.01	26	24	29	0.4472	5.44%	-19.82%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	19	22	20	25	13	24	23	24	23	24
1.56		26	24	26	24	25	27	27	26	24	24
3.12		23	24	25	24	23	21	24	29	29	17
6.25		21	24	27	25	24	24	25	23	27	22
12.5		32	22	26	21	27	26	26	29	32	22
25		30	24	25	28	24	23	26	29	20	24
50		19	24	26	27	29	23	29	24	23	23
100		29	26	26	27	24	26	26	24	26	26

QA: *RT* Feb 25/15

CETIS Analytical Report

Report Date: 28 Jan-15 11:57 (p 2 of 2)

Test Code: 15044b | 17-4382-0357

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 06-3052-7652

Endpoint: Reproduction

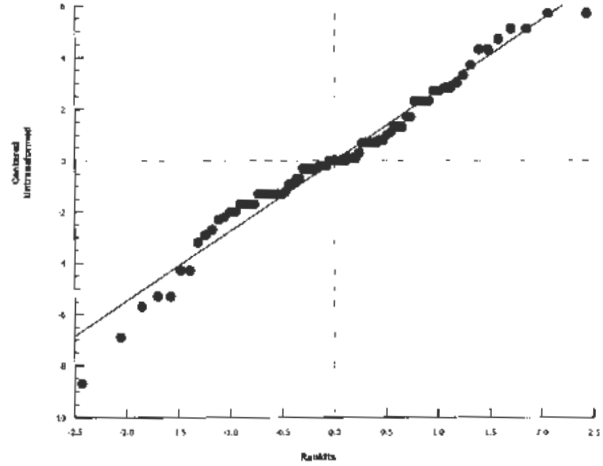
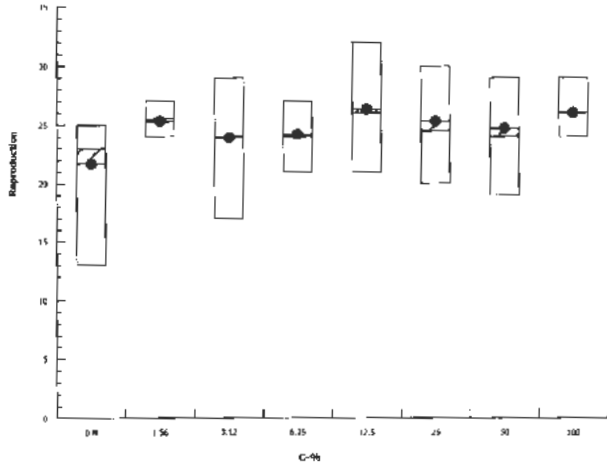
CETIS Version: CETISv1.8.7

Analyzed: 28 Jan-15 11:56

Analysis: Nonparametric-Control vs Treatments

Official Results: Yes

Graphics



Ceriodaphnia dubia Summary Sheet

Client: Mount Polley
 Work Order No.: 15044

Start Date/Time: Jan 16/15 @ 12:00h
 Set up by: KLP

Sample Information:

Sample ID: QVL-66-ESm (Unfiltered)
 Sample Date: Jan 15/15
 Date Received: Jan 16/15
 Sample Volume: 3 x 20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: BB 010715 A+B
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 27
 Mortality (%) in previous 7 d: 0
 Individual female # used ≥ 8 young on test day: 1, 7, 13, 16, 18, 20, 30

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd122
 Stock Solution ID: 15 NaCl
 Date Initiated: Jan 21/15

7-d LC50 (95% CL): 2.0 (1.7 - 2.3) g/L NaCl
 7-d IC50 (95% CL): 1.4 (1.2 - 1.5) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.9 (1.5 - 2.4) g/L NaCl CV (%): 12
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0 - 2.0) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		6.3 (2.3 - 23.0)
IC50 % (v/v) (95% CL)		7100

Reviewed by: A. Toz

Date reviewed: March 5, 2015

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: vt. Polley
 Sample ID: 01075A-25m (unfiltered)
 Work Order #: 15044

Start Date & Time: Jan 16/15 @ 12:20h
 Stop Date & Time: Jan 23/15 @ 15:50h
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		6		7
<i>Control</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.5
DO (mg/L)	8.1	7.6	8.0	7.6	8.1	7.3	8.2	7.3	8.2	7.3	8.0	7.1	8.0	7.2
pH	7.8	7.7	8.1	7.7	8.1	7.6	7.9	7.7	7.9	7.6	7.9	7.6	7.8	7.7
Cond. (µS/cm)	224	222		221		225		216		219		220		228
Initials	MLT/KCP		M		M		EMM		MLT/EMM		MLT/EMM		EMM	MLT

Concentration	Days													
	0	1		2		3		4		5		6		7
<i>1.56% CIV</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.5	25.0	24.0	25.0	24.0	24.5
DO (mg/L)	7.9	7.6	8.0	7.7	8.0	7.3	8.0	7.2	8.0	7.1	8.1	7.2	8.2	7.1
pH	7.9	7.7	8.1	7.8	8.0	7.7	7.9	7.7	7.6	7.6	7.6	7.5	7.7	7.7
Cond. (µS/cm)	220		221		220		221		219		213		223	225
Initials	MLT/KCP		M		M		EMM		MLT/EMM		MLT/EMM		EMM	MLT

Concentration	Days													
	0	1		2		3		4		5		6		7
<i>12.5% CIV</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.5	25.0	24.0	25.0	24.0	24.5
DO (mg/L)	7.9	7.6	8.0	7.7	8.0	7.5	8.0	7.2	8.0	7.1	8.1	7.2	8.2	7.1
pH	7.9	7.8	8.0	7.8	7.9	7.7	7.9	7.7	7.7	7.5	7.6	7.5	7.7	7.6
Cond. (µS/cm)	210		208		209		209		209		193		212	216
Initials	MLT/KCP		M		M		EMM		MLT/EMM		MLT/EMM		EMM	MLT

Concentration	Days													
	0	1		2		3		4		5		6		7
<i>100% CIV</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	25.0	25.0	24.0	25.0	24.0	24.5
DO (mg/L)	8.0	7.8	8.0	7.6	8.0	7.4	8.0	7.2	8.0	7.1	8.0	7.2	8.2	7.1
pH	7.5	7.8	7.7	7.9	7.6	7.8	7.3	7.5	7.5	7.5	7.5	7.6	7.6	7.4
Cond. (µS/cm)	118		119		120		119		117		116		117	128
Initials	MLT/KCP		M		M		EMM		MLT/EMM		MLT/EMM		EMM	MLT

0119

	Control	100% CIV
Hardness*	100	58
Alkalinity*	86	46

Analysts: EMM, AWD, W, MLT

Reviewed by: ART
 Date reviewed: FEB 25/15

* mg/L as CaCO₃

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5

Sample Description: clear

Comments: Broodboard Used: 01075A+B (tt # 1-7, 13, 16, 18, 20-30)

Chronic Freshwater Toxicity Test
C. dubia Reproduction Data

Client: Mt. Palley
 Sample ID: 27-504-505-506-507-508-509-510-511-512-513-514-515-516-517-518-519-520-521-522-523-524-525-526-527-528-529-530-531-532-533-534-535-536-537-538-539-540-541-542-543-544-545-546-547-548-549-550-551-552-553-554-555-556-557-558-559-560-561-562-563-564-565-566-567-568-569-570-571-572-573-574-575-576-577-578-579-580-581-582-583-584-585-586-587-588-589-590-591-592-593-594-595-596-597-598-599-600
 Work Order: 1504
 (unfiltered)
 % (v/v)

Start Date & Time: Jan 16/15 @ 1220h
 Stop Date & Time: Jan 23/15 @ 1550h
 Set up by: [Signature]

Days	Concentration: <u>Control</u>											Concentration: <u>1.56</u>											Concentration: <u>3.12</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	~	
2	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	~		
3	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	~		
4	4	4	5	2	3	3	4	✓	4	3	~	4	4	4	3	4	4	✓	4	✓	4	~	3	3	4	4	✓	✓	✓	✓	3	~	
5	8	8	✓	9	9	✓	9	6	10	✓	~	4	9	9	6	✓	✓	5	10	5	4	~	6	✓	9	10	6	4	5	4	9	~	
6	✓	✓	10	✓	✓	9	✓	7	✓	9	~	9	✓	✓	9	10	8	9	✓	10	9	~	9	11	✓	✓	11	10	10	9	11	✓	~
7	15	15	16	16	14	17	15	✓	14	12	~	14	12	15	15	14	18	✓	14	✓	✓	~	13	14	12	14	✓	✓	✓	✓	17	~	
8																																	
Total	27	27	31	27	26	24	28	13	28	24	~	27	25	28	27	28	30	14	28	15	13	~	25	28	25	28	17	14	15	13	15	26	~

Days	Concentration: <u>6.25</u>											Concentration: <u>12.5</u>											Concentration: <u>25</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	~		
2	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	~		
3	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	~		
4	3	✓	3	✓	✓	3	4	✓	✓	4	~	3	4	✓	✓	✓	✓	✓	✓	✓	✓	~	✓	✓	3	4	✓	3	✓	✓	✓	~	
5	8	4	9	6	6	10	✓	6	5	8	~	9	8	5	4	4	5	6	5	4	4	~	6	4	5	4	9	4	✓	5	4	5	~
6	✓	8	✓	11	10	✓	8	9	11	✓	~	✓	✓	9	11	10	8	11	10	10	13	~	10	9	11	9	✓	10	9	9	11	6	~
7	13	✓	13	✓	✓	11	16	11	✓	11	~	13	14	✓	✓	✓	✓	✓	2	1	✓	~	✓	✓	✓	12	✓	✓	14	✓	✓	✓	~
8																																	
Total	24	12	25	17	16	24	28	26	16	23	~	25	26	14	15	14	13	17	17	15	17	~	16	13	16	24	13	14	26	14	15	11	~

Days	Concentration: <u>50</u>											Concentration: <u>100</u>											Concentration: <u></u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	~		
2	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	~		
3	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	~		
4	✓	✓	✓	✓	8	✓	2	✓	✓	✓	~	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~	✓	✓	✓	✓	✓	✓	✓	✓	~		
5	5	5	4	4	3	5	✓	5	4	4	~	4	5	4	3	4	4	5	4	4	4	~	4	5	4	3	4	4	4	4	~		
6	14	9	8	10	7	✓	7	✓	9	✓	~	11	9	9	10	8	✓	9	9	8	8	~	11	9	10	8	✓	9	9	8	8	~	
7	✓	✓	✓	1	✓	12	11	11	1	9	~	✓	✓	✓	✓	✓	9	✓	✓	1	✓	~	✓	✓	✓	✓	✓	✓	✓	✓	✓	~	
8																																	
Total	15	14	12	15	10	17	20	16	14	13	~	15	14	13	13	12	13	14	13	13	12	~											

Notes: X = mortality.

Sample Description: clear
 Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: A. Tang Date reviewed: February 25, 2015

CETIS Analytical Report

Report Date: 28 Jan-15 11:20 (p 1 of 2)
 Test Code: 15044c | 12-2293-4828

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 05-0880-3484	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 28 Jan-15 11:19	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 09-3330-2709	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 16 Jan-15 12:20	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 23 Jan-15 15:50	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 3h	Source: In-House Culture	Age: <24h
Sample ID: 12-6648-4787	Code: 4B7D0633	Client: Mount Polley
Sample Date: 15 Jan-15 11:30	Material: Water Sample	Project:
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 25h (4.4 °C)	Station: QUL-66-85m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	916990	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 28 Jan-15 11:20 (p 2 of 2)

Test Code: 15044c | 12-2293-4828

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 05-0880-3484

Endpoint: 7d Survival Rate

CETIS Version: CETISv1.8.7

Analyzed: 28 Jan-15 11:19

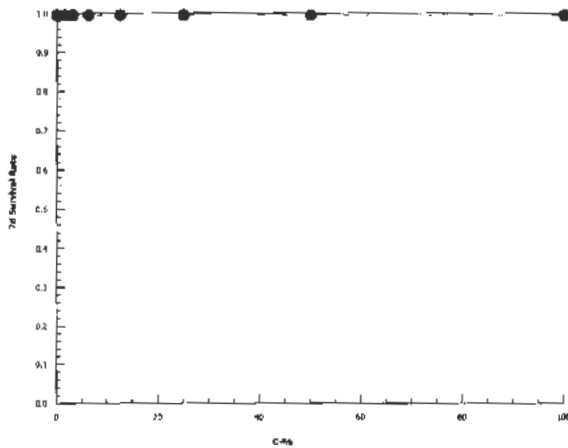
Analysis: Linear Interpolation (ICPIN)

Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 28 Jan-15 11:20 (p 1 of 2)
 Test Code: 15044c | 12-2293-4828

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 04-3032-3126	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 28 Jan-15 11:20	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 09-3330-2709	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 16 Jan-15 12:20	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 23 Jan-15 15:50	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 3h	Source: In-House Culture	Age: <24h
Sample ID: 12-6648-4787	Code: 4B7D0633	Client: Mount Polley
Sample Date: 15 Jan-15 11:30	Material: Water Sample	Project:
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 25h (4.4 °C)	Station: QUL-66-85m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	785383	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.6304	0.2267	2.712	158.6	36.87	441.1
IC10	1.609	0.5048	6.336	62.14	15.78	198.1
IC15	2.342	0.846	7.797	42.7	12.83	118.2
IC20	6.498	1.264	12.41	15.39	8.06	79.08
IC25	8.328	2.32	22.95	12.01	4.356	43.09
IC40	32.47	10.98	66.03	3.079	1.514	9.108
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

C-%	Control Type	Count	Mean	Min	Max	Calculated Variate				%Effect
						Std Err	Std Dev	CV%		
0	Negative Control	10	26	13	31	1.556	4.922	18.93%	0.0%	
1.56		10	23.5	13	30	2.115	6.687	28.46%	9.62%	
3.12		10	20.9	13	29	2.095	6.624	31.69%	19.62%	
6.25		10	21.1	12	28	1.696	5.363	25.42%	18.85%	
12.5		10	17.3	13	26	1.438	4.547	26.28%	33.46%	
25		10	16.2	11	26	1.548	4.894	30.21%	37.69%	
50		10	14.6	10	20	0.8718	2.757	18.88%	43.85%	
100		10	13.2	12	15	0.2906	0.9189	6.96%	49.23%	

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	27	27	31	27	26	29	28	13	28	24
1.56		27	25	28	27	28	30	14	28	15	13
3.12		25	28	25	28	17	14	15	13	15	29
6.25		24	12	25	17	16	24	28	26	16	23
12.5		25	26	14	15	14	13	17	17	15	17
25		16	13	16	24	13	14	26	14	15	11
50		15	14	12	15	10	17	20	16	14	13
100		15	14	13	13	12	13	14	13	13	12

CETIS Analytical Report

Report Date: 28 Jan-15 11:20 (p 2 of 2)
Test Code: 15044c | 12-2293-4828

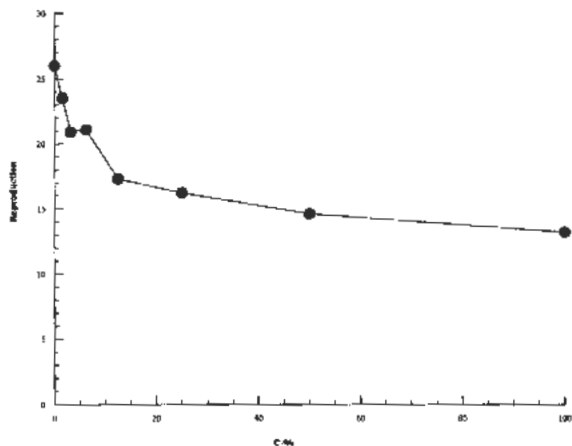
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 04-3032-3126 Endpoint: Reproduction
Analyzed: 28 Jan-15 11:20 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Ceriodaphnia dubia Summary Sheet

Client: Mount Polley
 Work Order No.: 15044

Start Date/Time: Jan 16/15 @ 1200h
 Set up by: KLP

Sample Information:

Sample ID: 09L-66-85m (Filtered)
 Sample Date: Jan 15/15
 Date Received: Jan 16/15
 Sample Volume: 3x20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:
 T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: BB 010715 A+B
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 27
 Mortality (%) in previous 7 d: 0
 Individual female # used ≥ 8 young on test day: 1-7, 13, 16, 18, 20-30

NaCl Reference Toxicant Results:

Reference Toxicant ID: Cd122
 Stock Solution ID: 15Na01
 Date Initiated: Jan 21/15

7-d LC50 (95% CL): 2.0 (1.7-2.3) g/L NaCl
 7-d IC50 (95% CL): 1.4 (1.2-1.5) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.9 (1.5-2.4) g/L NaCl CV (%): 12
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-2.0) g/L NaCl CV (%): 19

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		7100
IC50 % (v/v) (95% CL)		7100

Reviewed by: A. Terry

Date reviewed: March 3, 2015

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Ut. Pollex
 Sample ID: 0119 0.45µm (Filtered)
 Work Order #: 15044

Start Date & Time: Jan 16/15 @ 1230h ^{1200h}
 Stop Date & Time: Jan 23/15 @ 1500h ^{KAD}
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		6		7
	Init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Control														
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.1	7.6	8.0	7.6	8.1	7.4	8.2	7.4	8.2	7.2	8.0	7.2	8.0	7.4
pH	7.8	7.7	8.1	7.7	8.0	7.6	7.9	7.6	7.9	7.6	7.9	7.6	7.8	7.4
Cond. (µS/cm)	224	222		219		225		216		219		220		232
Initials	MLT/KP	m		m		EMM		MLT		MLT		EMM		EMM

Concentration	Days													
	0	1		2		3		4		5		6		7
	Init.	old	new	old	new	old	new	old	new	old	new	old	new	final
1.56% CIV														
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	7.9	7.6	8.0	7.7	8.1	7.3	8.1	7.4	8.1	7.3	8.1	7.2	8.1	7.3
pH	7.8	7.7	8.1	7.8	8.0	7.6	8.0	7.6	7.6	7.5	7.8	7.3	7.8	7.4
Cond. (µS/cm)	218	220		219		219		219		219		223		229
Initials	MLT/KP	m		m		EMM		MLT		MLT		EMM		EMM

Concentration	Days													
	0	1		2		3		4		5		6		7
	Init.	old	new	old	new	old	new	old	new	old	new	old	new	final
12.5% CIV														
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	7.9	7.7	8.0	7.7	8.0	7.3	8.1	7.4	8.1	7.3	8.1	7.2	8.1	7.2
pH	7.9	7.8	7.9	7.9	7.9	7.7	7.9	7.7	7.6	7.5	7.8	7.3	7.8	7.3
Cond. (µS/cm)	208	210		209		209		208		218		218		220
Initials	KP/MLT	m		m		EMM		MLT		MLT		EMM		EMM

Concentration	Days													
	0	1		2		3		4		5		6		7
	Init.	old	new	old	new	old	new	old	new	old	new	old	new	final
100% CIV														
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	7.9	7.6	8.0	7.6	8.0	7.3	8.1	7.5	8.1	7.1	8.0	7.2	8.1	7.4
pH	7.8	7.8	7.7	7.7	7.7	7.6	7.5	7.6	7.5	7.5	7.5	7.1	7.6	7.2
Cond. (µS/cm)	118.5	119		120		120		118		119		119		121
Initials	KP/MLT	m		m		EMM		MLT		MLT		EMM		EMM

0119

	Control	100% CIV
Hardness*	100	58
Alkalinity*	86	46

Analysts: EMM, AWD, KP, MLT
 Reviewed by: AKT
 Date reviewed: Feb 25/15

* mg/L as CaCO₃

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5

Sample Description: clear, sample filtered through 0.45µm filter.

Comments: Broodboard Used: 010715 ATB (TET 1-7, 13, 16, 18, 20-30)

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt. Palley
 Sample ID: BU 05-0m (filtered)
 Work Order: 15044

Start Date & Time: Jan 16/15 @ 1200h ^{1200h ref}
 Stop Date & Time: Jan 23/15 @ 1500h
 Set up by: EMM

Days	Concentration: <u>Control</u>												Concentration: <u>1.56</u> % (v/v)												Concentration: <u>3.12</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~			
2	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	~				
3	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	EMM				
4	5	5	4	4	4	3	4	4	4	3	EMM	4	4	4	5	4	3	5	4	4	EMM	3	4	3	4	2	4	4	5	3	4	EMM				
5	8	9	9	9	10	9	9	9	8	7	EMM	4	10	8	9	4	8	9	8	9	6	EMM	6	9	9	8	8	9	9	9	9	EMM				
6	15	15	17	16	18	18	16	16	16	17	EMM	12	10	10	10	10	10	10	10	10	EMM	11	10	9	10	8	11	10	10	10	EMM					
7	17	17	17	16	18	18	16	16	16	17	EMM	15	16	10	12	10	15	15	18	16	15	EMM	12	16	16	16	15	16	16	14	18	EMM				
8											EMM										EMM											EMM				
Total	28	29	30	29	32	29	29	31	28	27	EMM	31	30	22	26	24	28	27	31	29	25	EMM	21	31	29	29	25	30	28	30	12	32	EMM			

Days	Concentration: <u>6.25</u>												Concentration: <u>12.5</u>												Concentration: <u>25</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	~				
2	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	~				
3	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	EMM				
4	5	3	4	4	5	4	3	4	4	5	EMM	4	3	4	5	5	4	5	4	3	3	EMM	5	4	4	5	3	5	5	4	4	EMM				
5	9	8	8	9	9	9	9	9	9	8	EMM	9	9	10	9	8	9	9	9	10	EMM	9	9	9	9	8	9	9	9	9	EMM					
6	15	16	17	16	14	11	9	15	12	16	EMM	9	9	10	10	11	12	12	12	10	EMM	9	10	11	10	9	9	7	10	10	EMM					
7	15	16	17	16	14	11	9	15	12	16	EMM	13	10	9	13	12	12	13	5	13	10	EMM	12	13	12	14	13	13	12	12	11	16	EMM			
8											EMM											EMM										EMM				
Total	29	27	29	30	26	24	21	28	27	29	EMM	26	22	23	28	25	27	30	18	25	23	EMM	26	27	27	29	25	25	26	23	21	27	EMM			

Days	Concentration: <u>50</u>												Concentration: <u>100</u>												Concentration: <u> </u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	~				
2	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	/	~	/	/	/	/	/	/	/	/	/	~				
3	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	/	EMM	/	/	/	/	/	/	/	/	/	EMM				
4	6	5	5	4	4	5	5	4	3	4	EMM	5	4	4	3	4	4	4	4	4	5	EMM										EMM				
5	9	10	8	8	9	9	9	9	9	8	EMM	9	9	9	9	8	8	6	9	10	EMM											EMM				
6	15	16	16	13	13	13	15	16	16	14	EMM	9	9	11	10	8	9	10	11	EMM												EMM				
7	9	13	16	13	13	13	15	16	16	14	EMM	16	14	16	17	14	15	17	17	19	EMM											EMM				
8											EMM											EMM										EMM				
Total	24	28	29	25	26	27	30	29	30	26	EMM	30	27	29	31	28	29	29	15	33	33	EMM										EMM				

Notes: X = mortality.

Sample Description: Clear, sample filtered through 0.45um filter.
 Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: A. Terry

Date reviewed: February 25, 2015

CETIS Analytical Report

Report Date: 28 Jan-15 11:37 (p 1 of 2)
 Test Code: 15044d | 08-5741-3780

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 15-0924-1863	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 28 Jan-15 11:36	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 08-8688-2905	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 16 Jan-15 12:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 23 Jan-15 15:00	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 3h	Source: In-House Culture	Age: <24h
Sample ID: 09-5985-8531	Code: 39364763	Client: Mount Polley
Sample Date: 15 Jan-15 11:30	Material: Water Sample	Project:
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 25h (4.4 °C)	Station: QUL-66-85m (Filtered)	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1453067	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 28 Jan-15 11:37 (p 2 of 2)
 Test Code: 15044d | 08-5741-3780

Ceriodaphnia 7-d Survival and Reproduction Test

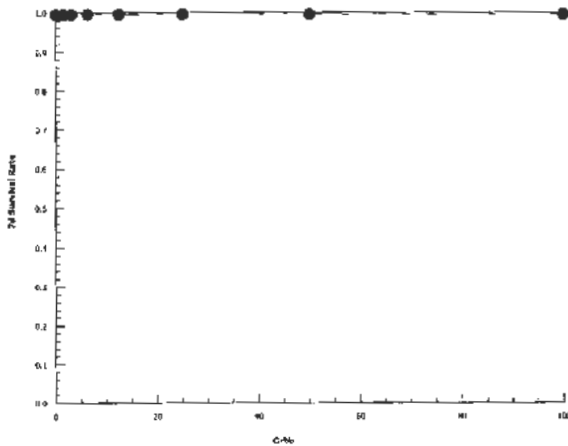
Nautilus Environmental

Analysis ID: 15-0924-1863 Endpoint: 7d Survival Rate CETIS Version: CETISv1.8.7
 Analyzed: 28 Jan-15 11:36 Analysis: Linear Interpolation (ICPIN) Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 28 Jan-15 11:37 (p 1 of 2)

Test Code: 15044d | 08-5741-3780

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 01-6447-1571	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 28 Jan-15 11:37	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 08-8688-2905	Test Type: Reproduction-Survival (7d)	Analyst: Krysta Pearcy
Start Date: 16 Jan-15 12:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 23 Jan-15 15:00	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 3h	Source: In-House Culture	Age: <24h
Sample ID: 09-5985-8531	Code: 39364763	Client: Mount Polley
Sample Date: 15 Jan-15 11:30	Material: Water Sample	Project:
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 25h (4.4 °C)	Station: QUL-66-85m (Filtered)	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	54268	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.874	0.4756	7.784	114.4	12.85	210.3
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

C-%	Control Type	Count	Mean	Min	Max	Calculated Variate			
						Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	29.4	27	32	0.4522	1.43	4.86%	0.0%
1.56		10	27.2	22	31	0.9638	3.048	11.21%	7.48%
3.12		10	26.7	12	32	1.921	6.075	22.75%	9.18%
6.25		10	27	21	30	0.8692	2.749	10.18%	8.16%
12.5		10	24.7	18	30	1.075	3.401	13.77%	15.99%
25		10	25.6	21	29	0.718	2.271	8.87%	12.93%
50		10	27.4	24	30	0.67	2.119	7.73%	6.8%
100		10	28.4	15	33	1.614	5.103	17.97%	3.4%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	30	29	30	29	32	29	29	31	28	27
1.56		31	30	22	26	24	27	27	31	29	25
3.12		21	31	29	29	25	30	28	30	12	32
6.25		29	27	29	30	26	24	21	28	27	29
12.5		26	22	23	28	25	27	30	18	25	23
25		26	27	27	29	25	25	26	23	21	27
50		24	28	29	25	26	27	30	29	30	26
100		30	27	29	31	28	29	29	15	33	33

CETIS Analytical Report

Report Date: 28 Jan-15 11:37 (p 2 of 2)
Test Code: 15044d | 08-5741-3780

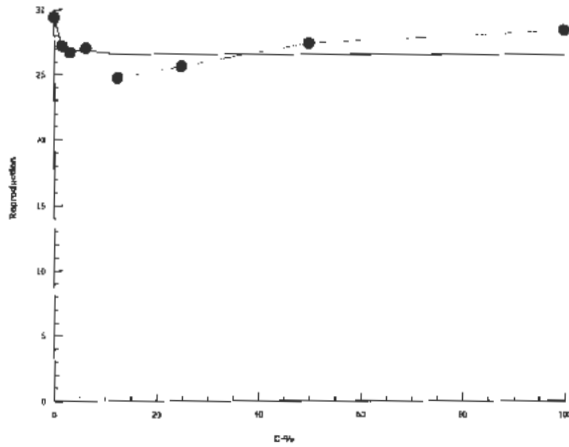
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 01-6447-1571 Endpoint: Reproduction
Analyzed: 28 Jan-15 11:37 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Client: ^{MLT} ~~Mount~~ Polley

W.O.#: 15044

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
QUL-66-0m	Jan 16/15	50	2.5	2.6	48	50	2.9	58	MLT
QUL-66-85m	↓	50	2.4	2.5	46	50	2.9	58	MLT
20% perme Ctrl	↓	50	4.4	4.5	86	50	5.0	100	MLT

Notes: _____

Reviewed by: A. Tong

Date Reviewed: February 25, 2015

APPENDIX B - Rainbow Trout (*Oncorhynchus mykiss*) Toxicity Test Data

Rainbow Trout Swimup Test Summary Sheet

Client: Mount Polley

Start Date/Time: JAN16/15 @ 1100h

Work Order No.: 15043

Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: QUL-66-0M
 Sample Date: JAN15/15
 Date Received: JAN16/15
 Sample Volume: 3x20L

Dilution Water:

Type: Moderately Hard Water
 Hardness (mg/L CaCO₃): 10
 Alkalinity (mg/L CaCO₃): 6

Test Organism Information:

Batch No.: 011415
 Source: Vancouver Island Trout Hatchery
 Loading Density: N/A

Copper Reference Toxicant Results:

Reference Toxicant ID: RTCL12
 Stock Solution ID: 13Cu05
 Date Initiated: JAN16/15
 7-d EC50 (95% CL): 55.94 (48.68-64.28) µg/L Cu

Reference Toxicant Mean ± 2 SD: 72.1 (38.61-134.9) µg/L Cu
 Reference Toxicant CV (%): 36.70%

Test Results:

	Sample ID	
	Swimup Survival	Swimup Dry Weight
EC25 % (v/v) (95% CL)	>100	
EC50 % (v/v) (95% CL)	>100	
IC25 % (v/v) (95% CL)		>100
IC50 % (v/v) (95% CL)		>100

Reviewed by: A. Toro

Date reviewed: March 3, 2015

1/2

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: QV-66-000
 Work Order #: 15043

Start Date & Time: Jan 16/14⁵ 1100h
 Stop Date & Time: Jan 23/15¹⁰ 1100h
 Test Species: Oncorhynchus mykiss

90 (V/J) Concentration Control	Days													
	0 ^(D)	1	2	3	4	5	6	7						
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0					
DO (mg/L)	10.1	9.9	9.8	9.9	9.8	10.1	9.3	10.0 ¹⁴	9.6	9.8	9.6	9.8	8.5	8.2 ⁸⁰
pH	7.9	7.8	7.9	7.7	7.9	7.8	7.7	7.8	7.8	7.8	7.7	7.8	7.3	7.6
Cond. (µS/cm)	318	321	322	334	337	341	341	341	341	341	341	341	714	
Initials	EC	A	A	EC	EC	EC	EC	EC	EC	EC	EC	EC	EC	

Concentration 6.25	Days													
	0	1	2	3	4	5	6	7						
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0					
DO (mg/L)	9.9	9.8	9.9	9.8	9.8	10.0	9.4	9.6	9.7	10.0	9.6	9.8	8.4	8.1
pH	7.8	7.8	7.9	7.7	7.8	7.7	7.8	7.7	7.8	7.5	7.7	7.5	7.5	7.4
Cond. (µS/cm)	300	304	305	321	318	326	327	327	327	327	327	327	532	
Initials	EC	A	A	EC	EC	EC	EC	EC	EC	EC	EC	EC	EC	

Concentration 12.5	Days													
	0	1	2	3	4	5	6	7						
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0					
DO (mg/L)	9.9	9.9	9.8	9.8	9.8	10.2	9.8	9.9	9.8	10.1	9.7	9.8	7.5	8.7
pH	7.8	7.7	7.8	7.7	7.8	7.8	7.7	7.7	7.7	7.5	7.7	7.5	7.3	7.4
Cond. (µS/cm)	270	295	296	306	312	313	313	313	313	313	313	312	718	
Initials	EC	A	A	EC	EC	EC	EC	EC	EC	EC	EC	EC	EC	

Concentration 25	Days													
	0	1	2	3	4	5	6	7						
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0					
DO (mg/L)	9.9	9.7	9.9	9.3	9.7	10.2	9.7	10.0	9.8	10.1	9.8	9.8	7.1	7.4
pH	7.8	7.7	7.8	7.7	7.8	7.7	7.6	7.7	7.6	7.6	7.6	7.5	7.2	7.3
Cond. (µS/cm)	266	272	270	279	284	287	287	287	287	287	287	287	686	
Initials	EC	A	A	EC	EC	EC	EC	EC	EC	EC	EC	EC	EC	

DO meter: DO-1/2 pH meter: pH 1/2 Conductivity meter: C-1/2

	Control	100	/	
Hardness*	120	80		
Alkalinity*	58	46		

Analysts: EC, AW
 Reviewed by: [Signature]
 Date reviewed: Jan 2/15

* mg/L as CaCO₃

Sample Description: Clear, Yellow^{EC} (colorless)

Comments: 1) control initiated @ 11:00h: DO (mg/L) Control Rep A: 7.0

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: QWL-66-0M J
 Work Order #: 15043

Start Date & Time: Jan 16/15 @ 1100h
 Stop Date & Time: Jan 23/15 @ 1100h
 Test Species: Oncorhynchus mykiss

Concentration 50	Days								
	0 ①	1	2	3	4	5	6	7	
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
DO (mg/L)	9.9	9.8	9.9	9.8	9.8	10.2	9.6	10.2	9.6
pH	7.8	7.7	7.8	7.7	7.8	7.7	7.7	7.5	7.7
Cond. (µS/cm)	218	223	222		228	231	230	231	592
Initials	EC	A	M		EC	EC	EC	EC	EC

Concentration 100	Days								
	0	1	2	3	4	5	6	7	
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
DO (mg/L)	10.3	9.7	9.9	9.9	9.8	10.2	9.7	10.2	9.8
pH	7.6	7.6	7.8	7.6	7.7	7.6	7.7	7.5	7.7
Cond. (µS/cm)	119	120	119		119	117	117	117	418
Initials	EC	A	A		EC	EC	EC	EC	EC

Concentration	Days								
	0	1	2	3	4	5	6	7	
Temperature (°C)									
DO (mg/L)									
pH									
Cond. (µS/cm)									
Initials									

Concentration	Days								
	0	1	2	3	4	5	6	7	
Temperature (°C)									
DO (mg/L)									
pH									
Cond. (µS/cm)									
Initials									

DO meter: DO-1/2 pH meter: pH 1/2 Conductivity meter: C-1/2

Hardness*	Control			
Alkalinity*	refer to page 1			

Analysts: EC, AM
 Reviewed by: [Signature]
 Date reviewed: Dec 2/15

* mg/L as CaCO3

Sample Description: Clear, colorless

Comments: ①: View ① in page 1

7-d Chronic Freshwater Toxicity Test Daily Mortality

Client: Mt. Peleé
 Sample ID: GUL-66-CM
 Work Order #: 15073

Start Date & Time: JAN 16 115 @ 1100h
 Stop Date & Time: JAN 23 115 @ 1100h
 Test Species: Oncorhynchus mykiss

Concentration % (V/V)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
control	A	5	5	5	5	5	5	5	
	B								
	C								
	D								
6.25	A				5	5	5	5	
	B				5	5	5	5	
	C				5	5	5	5	
	D				4	4	4	4	
12.5	A				5	5	5	5	
	B								
	C								
	D								
25	A				5	5	5	5	
	B								
	C								
	D								
50	A				5	5	5	5	
	B				3	3	3	3	
	C				4	4	4	4	
	D				5	5	5	5	
100	A				5	5	5	5	
	B								
	C								
	D								
Tech Initials		A	M	EL	EL	EC	EC	EL	

Comments: ① Fish Jumped out of the Jar.

Reviewed by: A. Long

Date reviewed: March 2, 2015

7-d Chronic Freshwater Toxicity Test Data Sheet
Swim-up Survival and Dry Weight

Client: MR. POLLEY
Sample ID: QUL-66-CM
Work Order #: 15043

Start Date: JAN 16 11:5 @ 1100h
Termination Date: JAN 23 11:5 @ 1100h
Species: O. MYKISS

Concentration % (V/V)	Rep	CM Pan No. Purple	No. Alive	Initials	Pan weight (g) mg	Pan + organism (g) mg	No. weighed	Initials
control	A	1	5	EC	1014.31	1265.69	5	EC
	B	2	↓		1001.15	1277.30		
	C	3	↓		997.37	1243.78		
	D	4	↓		1002.49	1271.22		
6.25	A	5	5		998.96	1268.52		
	B	6	5		1001.35	1269.02		
	C	7	5		996.12	1249.62	↓	
	D	8	4		993.70	1189.04	4	
12.5	A	9	5		1010.84	1258.39	5	
	B	10	↓		997.78	1222.15	↓	
	C	11	↓		1001.55	1252.89		
	D	12	↓		1006.26	1229.53		
25	A	13	↓		1001.47	1234.89		
	B	14	↓		992.25	1269.76		
	C	15	↓		1005.54	1243.13		
	D	16	↓		988.00	1217.45	↓	
50	A	17	5		980.25	1212.47	5	
	B	18	3		988.87	1127.81	3	
	C	19	4		983.27	1180.42	4	
	D	20	5		987.35	1237.54	5	
100	A	21	5		997.52	1246.24	5	
	B	22	↓		1009.30	1250.49	↓	
	C	23	↓		998.09	1244.91	↓	
	D	24	↓	✓	995.07	1260.57	↓	✓

Thermometer: Calibrated Thermometer DO meter: DO-1/2 pH meter: pH-1/2

Comments: _____

Reviewed by: L. Terry Date Reviewed: March 2, 2015

CETIS Analytical Report

Report Date: 03 Mar-15 13:44 (p 1 of 2)
 Test Code: 15043a | 05-4803-9024

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 19-2393-5213	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 27 Jan-15 16:52	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 18-4212-5856	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 16 Jan-15 11:00	Protocol: Washington DOE (2008)	Diluent: Mod-Hard Synthetic Water
Ending Date: 23 Jan-15 11:00	Species: Oncorhynchus mykiss	Brine:
Duration: 7d 0h	Source: Vancouver Island Trout Hatchery	Age:
Sample ID: 13-7511-0324	Code: 51F684B4	Client: Mount Polley
Sample Date: 15 Jan-15 10:30	Material: Water Sample	Project:
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 25h (4 °C)	Station: QUL-66-0m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1576650	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	4	1	1	1	0	0	0.0%	0.0%	20	20
6.2		4	1	1	1	0	0	0.0%	0.0%	19	19
12.5		4	1	1	1	0	0	0.0%	0.0%	20	20
25		4	1	1	1	0	0	0.0%	0.0%	20	20
50		4	1	1	1	0	0	0.0%	0.0%	17	17
100		4	1	1	1	0	0	0.0%	0.0%	20	20

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1	1	1	1
6.2		1	1	1	1
12.5		1	1	1	1
25		1	1	1	1
50		1	1	1	1
100		1	1	1	1

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	5/5	5/5	5/5	5/5
0	Time Zero	5/5	5/5	5/5	5/5
6.2		5/5	5/5	5/5	4/4
12.5		5/5	5/5	5/5	5/5
25		5/5	5/5	5/5	5/5
50		5/5	3/3	4/4	5/5
100		5/5	5/5	5/5	5/5

QA: *RET*
Mar 3/15

CETIS Analytical Report

Report Date: 03 Mar-15 13:44 (p 2 of 2)
Test Code: 15043a | 05-4803-9024

Fish Survival Development Growth (w/Length)

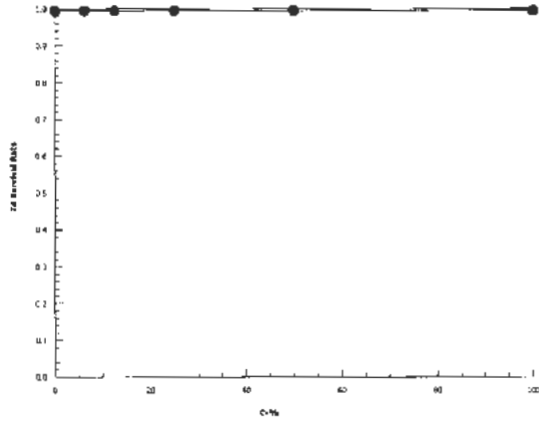
Nautilus Environmental

Analysis ID: 19-2393-5213
Analyzed: 27 Jan-15 16:52

Endpoint: 7d Survival Rate
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 03 Mar-15 13:43 (p 1 of 2)
 Test Code: 15043a | 05-4803-9024

Fish Survival Development Growth (w/Length)			Nautilus Environmental
Analysis ID: 19-4623-8545	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7	
Analyzed: 27 Jan-15 17:01	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes	
Batch ID: 18-4212-5656	Test Type: Growth-Survival (7d)	Analyst:	
Start Date: 16 Jan-15 11:00	Protocol: Washington DOE (2008)	Diluent: Mod-Hard Synthetic Water	
Ending Date: 23 Jan-15 11:00	Species: Oncorhynchus mykiss	Brine:	
Duration: 7d 0h	Source: Vancouver Island Trout Hatchery	Age:	
Sample ID: 13-7511-0324	Code: 51F684B4	Client: Mount Polley	
Sample Date: 15 Jan-15 10:30	Material: Water Sample	Project:	
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)		
Sample Age: 25h (4 °C)	Station: QUL-66-0m		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1972918	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	10.2	N/A	N/A	9.802	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	52.13	49.28	55.23	1.407	2.815	5.4%	0.0%
6.2		4	51.75	48.84	53.91	1.206	2.412	4.66%	0.74%
12.5		4	47.33	44.65	50.27	1.488	2.976	6.29%	9.22%
25		4	48.9	45.89	55.5	2.226	4.452	9.11%	6.21%
50		4	48.03	46.33	50.04	0.9577	1.915	3.99%	7.88%
100		4	50.11	48.24	53.1	1.046	2.092	4.18%	3.88%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	50.28	55.23	49.28	53.75
6.2		53.91	53.53	50.7	48.84
12.5		49.51	44.87	50.27	44.65
25		46.68	55.5	47.52	45.89
50		46.44	46.33	49.29	50.04
100		49.74	48.24	49.36	53.1

KFT
 QA: *M. Mac* 3/15

CETIS Analytical Report

Report Date: 03 Mar-15 13:43 (p 2 of 2)
Test Code: 15043a | 05-4803-9024

Fish Survival Development Growth (w/Length)

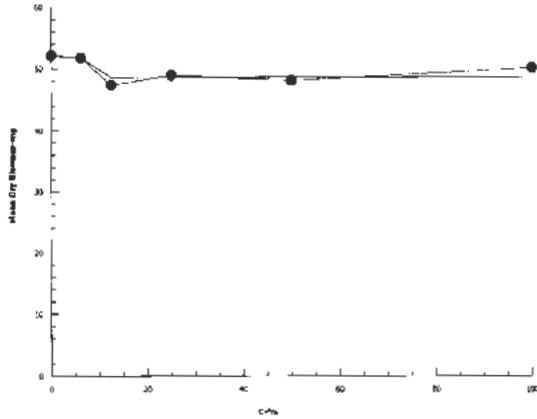
Nautilus Environmental

Analysis ID: 19-4623-8545
Analyzed: 27 Jan-15 17:01

Endpoint: Mean Dry Biomass-mg
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 03 Mar-15 13:44 (p 1 of 2)
 Test Code: 15043a | 05-4803-9024

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 06-7386-4414	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 27 Jan-15 16:53	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 18-4212-5656	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 16 Jan-15 11:00	Protocol: Washington DOE (2008)	Diluent: Mod-Hard Synthetic Water
Ending Date: 23 Jan-15 11:00	Species: Oncorhynchus mykiss	Brine:
Duration: 7d 0h	Source: Vancouver Island Trout Hatchery	Age:
Sample ID: 13-7511-0324	Code: 51F684B4	Client: Mount Polley
Sample Date: 15 Jan-15 10:30	Material: Water Sample	Project:
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 25h (4 °C)	Station: QUL-66-0m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	989232	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	10.2	N/A	N/A	9.802	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	52.13	49.28	55.23	1.407	2.815	5.4%	0.0%
6.2		4	51.75	48.84	53.91	1.206	2.412	4.66%	0.74%
12.5		4	47.33	44.65	50.27	1.488	2.976	6.29%	9.22%
25		4	48.9	45.89	55.5	2.226	4.452	9.11%	6.21%
50		4	48.03	46.33	50.04	0.9577	1.915	3.99%	7.88%
100		4	50.11	48.24	53.1	1.046	2.092	4.18%	3.88%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	50.28	55.23	49.28	53.75
6.2		53.91	53.53	50.7	48.84
12.5		49.51	44.87	50.27	44.65
25		46.68	55.5	47.52	45.89
50		46.44	46.33	49.29	50.04
100		49.74	48.24	49.36	53.1

QA: *APJ* *Mac* 3/15

CETIS Analytical Report

Report Date: 03 Mar-15 13:44 (p 2 of 2)
Test Code: 15043a | 05-4803-9024

Fish Survival Development Growth (w/Length)

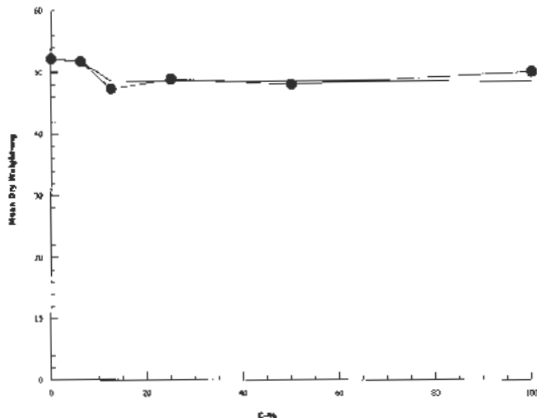
Nautilus Environmental

Analysis ID: 06-7386-4414
Analyzed: 27 Jan-15 16:53

Endpoint: Mean Dry Weight-mg
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



ART
QA: Alac 3/15

CETIS Analytical Report

Report Date: 30 Jan-15 11:02 (p 1 of 1)
 Test Code: 15043a | 05-4803-9024

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 20-1399-9787	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 30 Jan-15 11:01	Analysis: Parametric-Two Sample	Official Results: Yes
Batch ID: 18-4212-5656	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 16 Jan-15 11:00	Protocol: Washington DOE (2008)	Diluent: Mod-Hard Synthetic Water
Ending Date: 23 Jan-15 11:00	Species: Oncorhynchus mykiss	Brine:
Duration: 7d 0h	Source: Vancouver Island Trout Hatchery	Age:
Sample ID: 13-7511-0324	Code: 51F684B4	Client: Mount Polley
Sample Date: 15 Jan-15 10:30	Material: Water Sample	Project:
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 25h (4 °C)	Station: QUL-66-0m	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	5.84%	Fails mean dry weight-mg

Equal Variance t Two-Sample Test

Control	vs Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	Time Zero	14.58	1.943	3.042	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1041.824	1041.824	1	212.6	<0.0001	Significant Effect
Error	29.40918	4.901529	6			
Total	1071.233		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	4.215	47.47	0.2681	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9552	0.6451	0.7632	Normal Distribution

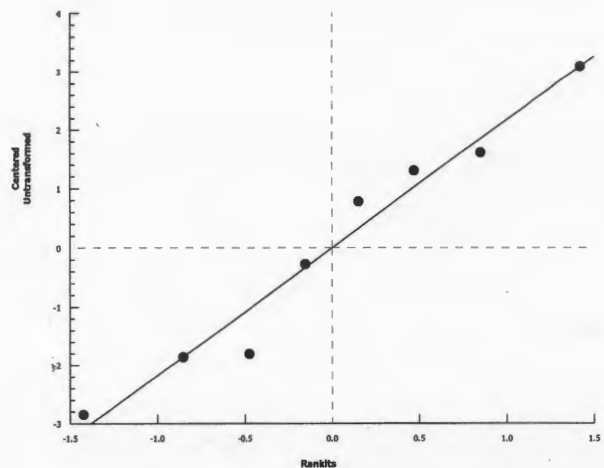
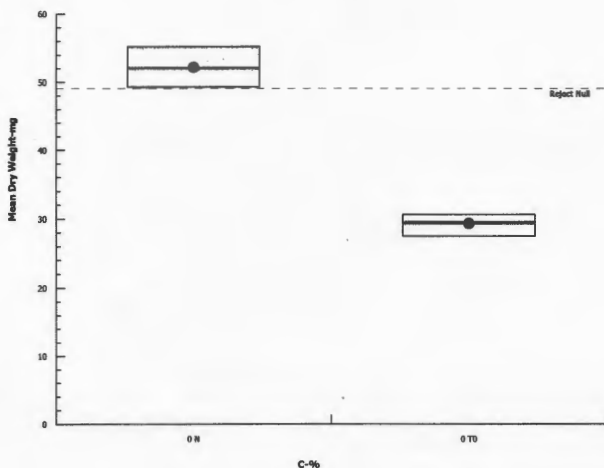
Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Time Zero	4	29.31	27.13	31.49	29.56	27.5	30.61	0.6855	4.68%	0.0%
0	Negative Control	4	52.13	47.65	56.61	52.01	49.28	55.23	1.407	5.4%	-77.87%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	50.28	55.23	49.28	53.75
0	Time Zero	29.03	30.09	27.5	30.61

Graphics



ART
 QA: Mar 2/15

Client: Mount Polley

W.O.#: 15043

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/LCaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
DUL-66-DM	JAN 7, 2015	50	2.4	2.5	46	50	4.0	80	EC
Control	JAN 19, 15	50	3.0	3.1	58	50	6.0	120	EC

Notes: _____

Reviewed by: A. Tong

Date Reviewed: March 2, 2015

Rainbow Trout Swimup Test Summary Sheet

Client: Mount Polley

Start Date/Time: JAN16/15 @ 1100h

Work Order No.: 15043

Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: QUL-66-85M
 Sample Date: JAN15/15
 Date Received: JAN16/15
 Sample Volume: 3x20L

Dilution Water:

Type: Moderately Hard Water
 Hardness (mg/L CaCO₃): 10
 Alkalinity (mg/L CaCO₃): 6

Test Organism Information:

Batch No.: 011415
 Source: Vancouver Island Trout Hatchery
 Loading Density: N/A

Copper Reference Toxicant Results:

Reference Toxicant ID: RTCL12
 Stock Solution ID: 13Cu05
 Date Initiated: JAN16/15
 7-d EC50 (95% CL): 55.94 (48.68-64.28)
 Reference Toxicant Mean ± 2 SD: 72.1 (38.61-134.9)
 Reference Toxicant CV (%): 36.70%

Test Results:

	Sample ID	
	Swimup Survival	Swimup Dry Weight
EC25 % (v/v) (95% CL)	>100	
EC50 % (v/v) (95% CL)	>100	
IC25 % (v/v) (95% CL)		>100
IC50 % (v/v) (95% CL)		>100

Reviewed by: A. Teng

Date reviewed: March 3, 2015

1/2

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: QUL-66-85M
 Work Order #: 15043

Start Date & Time: Jan 16/15⁵ 1100h
 Stop Date & Time: Jan 23/15 1100h
 Test Species: Oncorhynchus mykiss

Concentration Control	Days													
	0 ^(D)	1		2		3		4		5		6		7
	init.	new	old	new	old	new	old	new	old	new	old	new	old	final
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
DO (mg/L)	10.1	9.1	9.5	9.3	9.8	10.1	9.4	9.8	9.8	9.8	9.6	9.8	8.5	8.8
pH	7.9	7.8	7.8	7.7	7.9	7.8	7.7	7.8	7.7	7.8	7.7	7.8	7.4	7.5
Cond. (µS/cm)	318	321		322		334		337		341		341		612
Initials	EC	A		M		EC		EC		EC		EC		EC

② 10.0 EC

Concentration 6.25	Days													
	0	1		2		3		4		5		6		7
	init.	new	old	new	old	new	old	new	old	new	old	new	old	final
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
DO (mg/L)	10.1	9.9	9.9	9.9	9.8	10.2	9.6	10.0	9.8	10.2	9.7	9.7	8.5	8.9
pH	7.9	7.8	7.8	7.7	7.8	7.7	7.7	7.7	7.8	7.6	7.7	7.5	7.4	7.6
Cond. (µS/cm)	297	302		302		320		325		325		328		600
Initials	EC	M		M		EC		EC		EC		EC		EC

Concentration 12.5	Days													
	0	1		2		3		4		5		6		7
	init.	new	old	new	old	new	old	new	old	new	old	new	old	final
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
DO (mg/L)	10.1	9.8	9.9	9.8	9.8	10.3	9.8	10.3	9.8	10.2	9.8	9.8	8.9	9.0
pH	7.9	7.7	7.8	7.7	7.8	7.6	7.7	7.7	7.7	7.6	7.7	7.5	7.5	7.6
Cond. (µS/cm)	286	293		290		308		313		314		312		608
Initials	EC	M		M		EC		EC		EC		EC		EC

Concentration 25	Days													
	0	1		2		3		4		5		6		7
	init.	new	old	new	old	new	old	new	old	new	old	new	old	final
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
DO (mg/L)	10.2	9.8	9.9	9.9	9.7	10.3	9.8	10.3	9.8	10.2	9.8	9.8	9.1	9.0
pH	7.8	7.7	7.8	7.7	7.8	7.7	7.7	7.7	7.7	7.6	7.7	7.5	7.5	7.6
Cond. (µS/cm)	257	264		263		284		283		286		285		606
Initials	EC	M		M		EC		EC		EC		EC		EC

DO meter: DO-1/2 pH meter: pH 1/2 Conductivity meter: C-1/2

	Control	100		
Hardness*	120	64		
Alkalinity*	58	98		

Analysts: EC, AVO
 Reviewed by: [Signature]
 Date reviewed: March 2/15

* mg/L as CaCO3

Sample Description: Clear, Colorless

Comments: DO correction initiated @ 1400h; D.O (mg/L) Rep A Control: 6.9

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: QIA-66-85M
 Work Order #: 15043

Start Date & Time: Jan 16/15 @ 1100h
 Stop Date & Time: Jan 23/15 @ 1100h
 Test Species: Oncorhynchus mykiss

Concentration SO	Days														
	0		1		2		3		4		5		6		7
	Init.	new	old	new	old	new	old	new	old	new	old	new	old	final	
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	
DO (mg/L)	10.1	9.8	9.7	9.7	9.8	10.3	9.8	10.3	9.8	10.2	9.9	9.8	9.2	9.1	
pH	7.8	7.7	7.7	7.7	7.8	7.6	7.8	7.7	7.8	7.6	7.7	7.5	7.5	7.6	
Cond. (µS/cm)	211	218		220		241		247		230		230		482	
Initials	EC					EC		EC		EC		EC		EC	

Concentration 100	Days														
	0		1		2		3		4		5		6		7
	Init.	new	old	new	old	new	old	new	old	new	old	new	old	final	
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	
DO (mg/L)	10.2	9.8	9.7	9.7	9.8	10.3	9.8	10.3	9.8	10.3	9.9	9.9	9.1	9.2	
pH	7.7	7.6	7.8	7.6	7.8	7.5	7.7	7.7	7.7	7.6	7.7	7.5	7.5	7.5	
Cond. (µS/cm)	120	118		119		119		118		118		117		482	
Initials	EC					EC		EC		EC		EC		EC	

Concentration	Days														
	0		1		2		3		4		5		6		7
	Init.	new	old	new	old	new	old	new	old	new	old	new	old	final	
Temperature (°C)															
DO (mg/L)															
pH															
Cond. (µS/cm)															
Initials															

Concentration	Days														
	0		1		2		3		4		5		6		7
	Init.	new	old	new	old	new	old	new	old	new	old	new	old	final	
Temperature (°C)															
DO (mg/L)															
pH															
Cond. (µS/cm)															
Initials															

DO meter: DO-1/2 pH meter: pH 1/2 Conductivity meter: C-1/2

Control			
Hardness*	<u>refer to page 1</u>		
Alkalinity*			

Analysts: EC, Am
 Reviewed by: AKT
 Date reviewed: March 2/15

* mg/L as CaCO3

Sample Description: Clear, colorless

Comments: ① View page 1^{cc} ① in page 1

Embryo-Alevin-Fry Toxicity Test Daily Mortality

Client: Mt. Polley
 Sample ID: QUL-66-85M3
 Work Order #: 15943

Start Date & Time: JAN16/15 @ 1100h
 Stop Date & Time: JAN23/15 @ 1100h
 Test Species: Oncorhynchus mykiss

Concentration % (w/v)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	5	5	5	5	5	5	5	
	B								
	C								
	D								
6.25	A								
	B								
	C								
	D								
12.5	A			5	4 [⊙]	4	4	4	
	B				5	5	5	5	
	C								
	D								
25	A								
	B								
	C								
	D								
50	A								
	B								
	C								
	D								
100	A								
	B								
	C								
	D								
Tech Initials	A								
	B								
	C								
	D								

Comments: ⊙ Fish Jumped Out of the Jar

Reviewed by: A. Long

Date reviewed: March 2, 2015

7-d Chronic Freshwater Toxicity Test Data Sheet
Swim-up Survival and Dry Weight

Client: Mt. Polley
 Sample ID: QUL-66-85M
 Work Order #: 15073

Start Date: JAN 16 11:5 @ 1100h
 Termination Date: JAN 23 11:5 @ 1100h
 Species: O. MYKISS

Concentration % (V/V)	Rep	XX M Pan No. Black	No. Alive	Initials	Pan weight (g) mg	Pan + organism (g) mg	No. weighed	Initials
control	A	1	5	EC	1002.07	1277.34	5	EC
	B	2			1014.98	1288.11		
	C	3			985.67	1237.57		
	D	4			1002.39	1249.70		
6.25	A	5			1001.35	1239.00		
	B	6			970.78	1190.24		
	C	7			975.02	1193.31		
	D	8	✓		968.73	1205.26	✓	
12.5	A	9	4		977.63	1179.59	4	
	B	10	5		982.12	1237.22	5	
	C	11			1004.94	1271.65		
	D	12			994.99	1213.15		
25	A	13			987.41	1199.76		
	B	14			988.44	1220.33		
	C	15			989.98	1233.50		
	D	16			1001.51	1236.21		
50	A	17			1011.96	1246.53		
	B	18			1018.86	1267.93		
	C	19			1024.48	1263.13		
	D	20			1019.81	1262.42		
100	A	21			994.85	1231.84		
	B	22			993.94	1231.83		
	C	23			1002.12	1219.85		
	D	24	✓	✓	1005.92	1243.32	✓	✓

Thermometer: Calibrated Thermometer DO meter: DO-1/2 pH meter: pH-1/2

Comments: _____

Reviewed by: A. Tong Date Reviewed: March 2, 2015

7d Chronic Freshwater Toxicity Test Data Sheet
Swim-up Survival and Dry Weight

Client: Mt. Polley
Work Order No.: 15043

Start Date: JAN 16 / 15
Termination Date: JAN 23 / 15

Sample ID	Rep	Pan No.	No. Alive	Initials	Pan weight EC (g) mg	Pan + organism (g)	No. weighed	Initials
QUL-66-00M (To)	A	A	5	EC	981.19	1.12636	5	EC
	B	B			1011.63	1.16209		
	C	C			1011.74	1.14926		
	D	D			998.23	1.15128		
QUL-66-85M (To)	A	A			1009.79	1.13237		
	B	B			1015.53	1.15294		
	C	C			1000.20	1.15328		
	D	D	↓	↓	978.89	1.12859	↓	↓
	A							
	B							
	C							
	D							
	A							
	B							
	C							
	D							
	A							
	B							
	C							
	D							

Thermometer: Calibrated Thermometer DO meter: 0.0-1/2 pH meter: pH-1/2

Comments: Reweighed Pan # C : 1.15033g QUL-66-00M
EC QUL-66-85M
Pan # B = 1.16107g

Reviewed by: A. Terry Date Reviewed: March 2, 2015

CETIS Analytical Report

Report Date: 28 Jan-15 10:01 (p 1 of 2)
 Test Code: 15043b | 17-8238-4095

Fish Survival Development Growth (w/Length)				Nautilus Environmental	
Analysis ID:	09-7017-1954	Endpoint:	7d Survival Rate	CETIS Version:	CETISv1.8.7
Analyzed:	27 Jan-15 17:00	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes
Batch ID:	00-1625-7850	Test Type:	Growth-Survival (7d)	Analyst:	
Start Date:	16 Jan-15 11:00	Protocol:	Washington DOE (2008)	Diluent:	Mod-Hard Synthetic Water
Ending Date:	23 Jan-15 11:00	Species:	Oncorhynchus mykiss	Brine:	
Duration:	7d 0h	Source:	Vancouver Island Trout Hatchery	Age:	
Sample ID:	12-6648-4787	Code:	4B7D0633	Client:	Mount Polley
Sample Date:	15 Jan-15 11:30	Material:	Water Sample	Project:	
Receive Date:	16 Jan-15 08:45	Source:	Mount Polley (MT POLLEY)		
Sample Age:	24h (4.4 °C)	Station:	QUL-66-85m		

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	2038800	200	Yes	Two-Point Interpolation

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary			Calculated Variate(A/B)									
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B	
0	Negative Control	4	1	1	1	0	0	0.0%	0.0%	20	20	
6.25		4	1	1	1	0	0	0.0%	0.0%	20	20	
12.5		4	1	1	1	0	0	0.0%	0.0%	19	19	
25		4	1	1	1	0	0	0.0%	0.0%	20	20	
50		4	1	1	1	0	0	0.0%	0.0%	20	20	
100		4	1	1	1	0	0	0.0%	0.0%	20	20	

7d Survival Rate Detail						
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	
0	Negative Control	1	1	1	1	
6.25		1	1	1	1	
12.5		1	1	1	1	
25		1	1	1	1	
50		1	1	1	1	
100		1	1	1	1	

7d Survival Rate Binomials						
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	
0	Negative Control	5/5	5/5	5/5	5/5	
6.25		5/5	5/5	5/5	5/5	
12.5		4/4	5/5	5/5	5/5	
25		5/5	5/5	5/5	5/5	
50		5/5	5/5	5/5	5/5	
100		5/5	5/5	5/5	5/5	

CETIS Analytical Report

Report Date: 28 Jan-15 10:01 (p 2 of 2)
Test Code: 15043b | 17-8238-4095

Fish Survival Development Growth (w/Length)

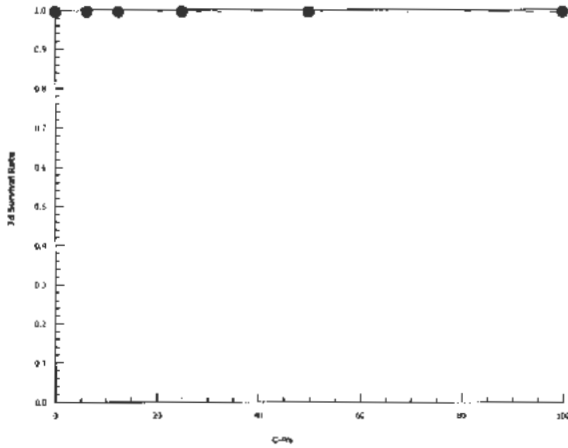
Nautilus Environmental

Analysis ID: 09-7017-1954
Analyzed: 27 Jan-15 17:00

Endpoint: 7d Survival Rate
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 30 Jan-15 11:12 (p 1 of 2)
 Test Code: 15043b | 17-8238-4095

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 00-9111-8372	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 27 Jan-15 17:01	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 00-1625-7850	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 16 Jan-15 11:00	Protocol: Washington DOE (2008)	Diluent: Mod-Hard Synthetic Water
Ending Date: 23 Jan-15 11:00	Species: Oncorhynchus mykiss	Brine:
Duration: 7d 0h	Source: Vancouver Island Trout Hatchery	Age:
Sample ID: 12-6648-4787	Code: 4B7D0633	Client: Mount Polley
Sample Date: 15 Jan-15 11:30	Material: Water Sample	Project:
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h (4.4 °C)	Station: QUL-66-85m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	618679	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	1.985	0.6195	30.67	50.38	3.281	161.4
IC10	53.62	N/A	N/A	1.865	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	52.35	49.46	54.93	1.417	2.833	5.41%	0.0%
6.25		4	45.6	43.66	47.53	1.054	2.107	4.62%	12.9%
12.5		4	49.62	43.63	53.34	2.09	4.18	8.43%	5.21%
25		4	46.12	42.47	48.7	1.315	2.629	5.7%	11.9%
50		4	48.25	46.91	49.81	0.6175	1.235	2.56%	7.84%
100		4	46.5	43.55	47.58	0.9855	1.971	4.24%	11.17%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	54.93	54.63	50.38	49.46
6.25		47.53	43.89	43.66	47.31
12.5		50.49	51.02	53.34	43.63
25		42.47	46.38	48.7	46.94
50		46.91	49.81	47.73	48.52
100		47.4	47.58	43.55	47.48

CETIS Analytical Report

Report Date: 30 Jan-15 11:12 (p 2 of 2)

Test Code: 15043b | 17-8238-4095

Fish Survival Development Growth (w/Length)

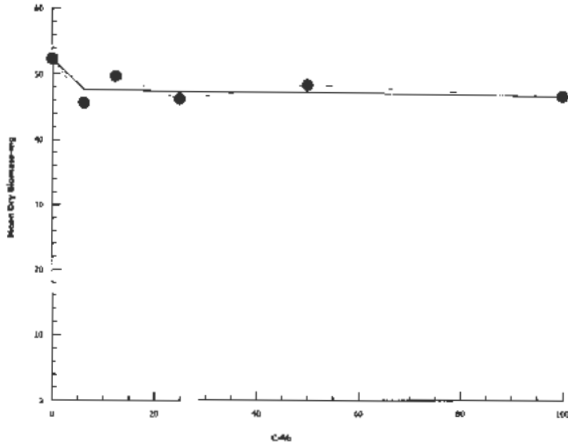
Nautilus Environmental

Analysis ID: 00-9111-8372
Analyzed: 27 Jan-15 17:01

Endpoint: Mean Dry Biomass-mg
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 28 Jan-15 10:01 (p 1 of 2)
 Test Code: 15043b | 17-8238-4095

Fish Survival Development Growth (w/Length)				Nautilus Environmental
Analysis ID: 02-7745-5752	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7		
Analyzed: 27 Jan-15 16:56	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes		
Batch ID: 00-1625-7850	Test Type: Growth-Survival (7d)	Analyst:		
Start Date: 16 Jan-15 11:00	Protocol: Washington DOE (2008)	Diluent: Mod-Hard Synthetic Water		
Ending Date: 23 Jan-15 11:00	Species: Oncorhynchus mykiss	Brine:		
Duration: 7d 0h	Source: Vancouver Island Trout Hatchery	Age:		
Sample ID: 12-6648-4787	Code: 4B7D0633	Client: Mount Polley		
Sample Date: 15 Jan-15 11:30	Material: Water Sample	Project:		
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)			
Sample Age: 24h (4.4 °C)	Station: QUL-66-85m			

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	449116	200	Yes	Two-Point Interpolation

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	1.985	0.578	32.13	50.38	3.112	173
IC10	53.62	N/A	N/A	1.865	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary				Calculated Variate					
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	52.35	49.46	54.93	1.417	2.833	5.41%	0.0%
6.25		4	45.6	43.66	47.53	1.054	2.107	4.62%	12.9%
12.5		4	49.62	43.63	53.34	2.09	4.18	8.43%	5.21%
25		4	46.12	42.47	48.7	1.315	2.629	5.7%	11.9%
50		4	48.25	46.91	49.81	0.6175	1.235	2.56%	7.84%
100		4	46.5	43.55	47.58	0.9855	1.971	4.24%	11.17%

Mean Dry Weight-mg Detail					
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	54.93	54.63	50.38	49.46
6.25		47.53	43.89	43.66	47.31
12.5		50.49	51.02	53.34	43.63
25		42.47	46.38	48.7	46.94
50		46.91	49.81	47.73	48.52
100		47.4	47.58	43.55	47.48

CETIS Analytical Report

Report Date: 28 Jan-15 10:01 (p 2 of 2)
Test Code: 15043b | 17-8238-4095

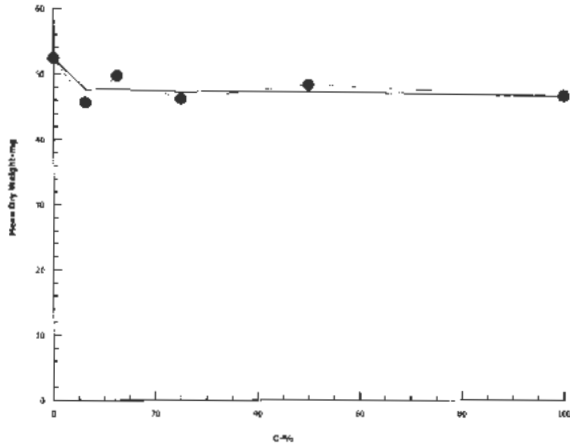
Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 02-7745-5752 Endpoint: Mean Dry Weight-mg
Analyzed: 27 Jan-15 16:56 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 30 Jan-15 11:02 (p 1 of 1)
 Test Code: 15043b | 17-8238-4095

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 00-2941-3854	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 30 Jan-15 11:00	Analysis: Parametric-Two Sample	Official Results: Yes
Batch ID: 00-1625-7850	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 16 Jan-15 11:00	Protocol: Washington DOE (2008)	Diluent: Mod-Hard Synthetic Water
Ending Date: 23 Jan-15 11:00	Species: Oncorhynchus mykiss	Brine:
Duration: 7d 0h	Source: Vancouver Island Trout Hatchery	Age:
Sample ID: 12-6648-4787	Code: 4B7D0633	Client: Mount Polley
Sample Date: 15 Jan-15 11:30	Material: Water Sample	Project:
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h (4.4 °C)	Station: QUL-66-85m	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	7.35%	Fails mean dry weight-mg

Equal Variance t Two-Sample Test

Control	vs	Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		Time Zero	12.23	1.943	3.846	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1172.442	1172.442	1	149.6	<0.0001	Significant Effect
Error	47.01566	7.835943	6			
Total	1219.457		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.05	47.47	0.9691	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8535	0.6451	0.1033	Normal Distribution

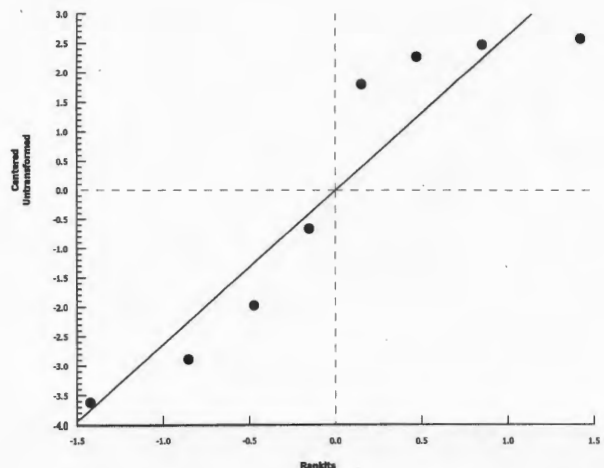
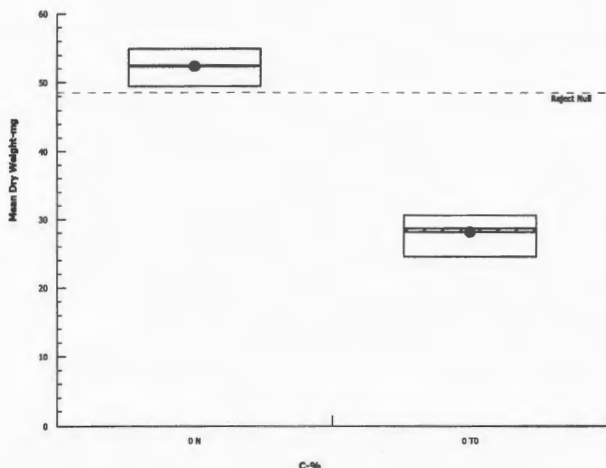
Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Time Zero	4	28.14	23.74	32.54	28.71	24.52	30.62	1.383	9.83%	0.0%
0	Negative Control	4	52.35	47.84	56.86	52.5	49.46	54.93	1.417	5.41%	-86.05%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	54.93	54.63	50.38	49.46
0	Time Zero	24.52	27.48	30.62	29.94

Graphics



Client: Mount Polley

W.O.#: 15043

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/LCaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
<u>QUL-66-85M</u>	<u>JAN 17, 15</u>	<u>50</u>	<u>2.5</u>	<u>2.6</u>	<u>48</u>	<u>50</u>	<u>3.2</u>	<u>64</u>	<u>EC</u>
<u>Control</u>	<u>JAN 19, 15</u>	<u>50</u>	<u>3.0</u>	<u>3.1</u>	<u>58</u>	<u>50</u>	<u>6.0</u>	<u>120</u>	<u>EC</u>

Notes: _____

Reviewed by: A. Tong

Date Reviewed: March 2, 2015

Client: Mount Polley

W.O.#: 15043

Hardness and Alkalinity Datasheet

Alkalinity						Hardness			Technician
Sample ID	Sample Date	Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/LCaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
011615	JAN 19.15	50	3.0	3.1	58	50	6.0	120	EC

Notes: _____

Reviewed by: A. Teng

Date Reviewed: March 2/15

APPENDIX C - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

Fathead Minnow Test Summary Sheet
(7-d *Pimephales promelas* Survival and Growth Test)

Client: Mount Polley
Work Order No.: 15042

Start Date/Time: Jan 16/15 @ 1400h
Test Species: P. promelas

Sample Information:

Sample ID: QUL-66-DM
Sample Date: Jan 15/15
Date Received: Jan 16/15
Sample Volume: 3 x 20L

Dilution Water (initial water quality):

Type: Moderately Hard Water
Temperature (°C): 26.0
pH: 8.0
Dissolved Oxygen (mg/L): 8.0
Hardness (mg/L CaCO₃): 100
Alkalinity (mg/L CaCO₃): 62

Test Validity Criteria:

The test is invalid if:

- 1) for the control solutions, the combined and cumulative incidence of any mortalities, or fish showing loss of equilibrium or other signs of atypical swimming behavior, is >20%
- 2) the average dry weight of the surviving control fish does not attain 250 ug when the fish are dried and weighed.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4; pH = 6.5 to 8.5

Test Organism Information:

Batch No.: 011615
Source: Aquatic Biosystems, CO
Age: 24 hrs

NaCl Reference Toxicant Results:

Reference Toxicant ID: PP105
Stock Solution ID: nil
Date Initiated: Jan 16/15
7-d EC50 (95% CL): 4.8 (4.1-5.7)
7-d IC50 (95% CL): 4.0 (3.6-4.5)

Survival:

Reference Toxicant Mean and Historical Range: 4.3 (3.4-5.5) CV (%): 13

Biomass:

Reference Toxicant Mean and Historical Range: 3.8 (2.8-5.2) CV (%): 17

Test Results:

	Survival	Biomass
LC25 % (v/v) (95% CL)	>100	
LC50 % (v/v) (95% CL)	>100	
IC25 % (v/v) (95% CL)		53.2 (46.7-100)
IC50 % (v/v) (95% CL)		7100

Reviewed by: A. Teng

Date reviewed: March 5, 2015

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: QUL66-0M (blue)
 Work Order #: 15042

Start Date & Time: Jan 16/15 @ 1400h
 Stop Date & Time: Jan 23/15 @ 1100h
 Test Species: Pimephales promelas

Concentration Control	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	26.0	24.0	24.0	24.0	26.0	24.0	26.0	24.0	24.0	24.0	26.0	24.0	24.0	24.0
DO (mg/L)	8.0	6.1	8.2	7.0	8.1	5.9	8.0	6.4	8.0	5.5	7.7	5.9	8.3	5.0
pH	8.0	7.9	7.6	7.9	7.5	7.9	7.5	8.1	7.7	7.7	7.9	7.4	7.9	7.4
Cond. (µS/cm)	338	350		350		346		351	351	358		355		373
Initials	KJL	KJL		EMM		KJL		KJL		KJL		KJL		KLP

Concentration 1.56	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	25.0	24.0	24.0	24.0	26.0	24.0	24.5	24.0	24.5	24.0	24.5	24.0	24.0	24.0
DO (mg/L)	7.9	6.2	8.0	6.4	8.0	5.9	8.1	6.3	8.1	5.7	7.9	6.0	8.3	4.7
pH	7.4	7.5	8.0	7.4	8.0	7.6	8.2	7.7	8.1	7.6	8.1	7.7	7.8	7.5
Cond. (µS/cm)	335	338		339		343		348		349		332		347
Initials	KJL	KJL		EMM		KJL		KJL		KJL		KJL		KLP

Concentration 2.5	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	26.0	24.0	24.0	24.0	26.0	24.0	24.5	24.0	25.0	24.0	24.5	24.0	24.0	24.0
DO (mg/L)	8.2	6.1	8.0	6.4	8.0	5.8	7.9	6.3	8.2	5.6	8.1	6.2	8.3	4.7
pH	7.5	7.5	7.9	7.4	7.8	7.6	8.2	7.7	8.1	7.5	8.1	7.4	7.8	7.4
Cond. (µS/cm)	309	316		310		319		321		320		310		323
Initials	KJL	KJL		EMM		KJL		KJL		KJL		KJL		KLP

Concentration 100	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	25.5	24.0	24.0	24.0	26.0	24.0	24.0	24.0	25.0	24.0	24.0	24.0	24.0	24.0
DO (mg/L)	8.3	6.0	8.0	6.1	8.0	6.0	8.0	6.4	8.2	5.9	8.3	6.1	8.3	4.7
pH	7.3	7.5	7.7	7.4	7.8	7.7	8.2	7.6	7.8	7.5	7.9	7.5	7.6	7.4
Cond. (µS/cm)	120	120		121		119	7.9	119		119		122		132
Initials	KJL	KJL		EMM		KJL		KJL		KJL		KJL		KLP

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6.5 to 8.5

DO meter: 3 pH meter: 3 Conductivity meter: 3

	Control	100% (v/v)		
Hardness*	100	58		
Alkalinity*	62	48		

Analysts: KJL, EMM
 Reviewed by: AKT
 Date reviewed: FEB 26/15

* mg/L as CaCO3

Sample Description: clear

Comments: _____

7-d Fathead Minnow Toxicity Test Daily Survival

Client: Mount Palley
 Sample ID: 201466-0M (blue)
 Work Order #: 15042

Start Date & Time: Jan 16/15 @ 1400 hrs
 Stop Date & Time: Jan 23/15 @ 1100 hrs
 Test Species: Pimephales promelas

Concentration % (V/V)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
1.56	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
3.1	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	9	9	① 1 org squished by siphon
	C	10	10	10	10	10	10	10	
6.25	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	9	9	
12.5	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
25	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
50	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
100	A	10	10	10	10	10	10	9	
	B	10	10	10	10	10	7	4	
	C	10	10	10	10	10	10	10	
	A								
	B								
	C								
	A								
	B								
	C								
Tech Initials		ks	ks	ks	ks	ks	ks	ks	

Comments:

Reviewed by:

A. Terry

Date reviewed:

February 26, 2015

Fathead Minnow Toxicity Test Data Sheet

Dry Weight Data

Client: Mount Polley

Start Date & Time: Jan 16/15 @ 1400h

Sample ID: QUL66-DM

Termination Date & Time: Jan 23/15 @ 1100h

Work Order No.: 15042

Concentration % (v/v)	Rep	15A Pan No. blue	No. alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control	A	1	10	KLP	983.01	991.36	10	MLT NY
	B	2	10		1000.91	1009.01	10	
	C	3	10		995.67	1004.54	10	
1.56	A	4	10		992.53	1000.30	10	
	B	5	10		979.80	988.25	10	
	C	6	10		984.91	992.66	10	
3.1	A	7	10		994.08	1002.69	10	
	B	8	9		972.91	980.81	9	
	C	9	10		985.53	994.13	10	
6.25	A	10	10		941.85	950.09	10	
	B	11	10		953.63	962.73	10	
	C	12	9		964.51	972.44	9	
12.5	A	13	10		955.30	964.29	10	
	B	14	10		952.08	960.83	10	
	C	15	10		969.98	978.11	10	
25	A	16	10		954.17	962.63	10	
	B	17	10		941.56	949.87	10	
	C	18	10		953.65	962.38	10	
50	A	19	10		950.69	958.91	10	
	B	20	10		948.98	956.90	10	
	C	21	10		953.30	961.35	10	
100	A	22	9		958.49	965.51	9	
	B	23	4		956.03	959.68	4	
	C	24	10	↓	965.21	971.65	10	MLT ↓

Comments: MLT ① Pan #1 weight = 983.01mg

NY Reweighed pans: 2-1009.10 9-994.12 17-949.85

Reviewed by: A. Long

Date Reviewed: February 26, 2015

CETIS Analytical Report

Report Date: 25 Jan-15 14:35 (p 1 of 2)
 Test Code: 15042 | 01-8901-8962

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 12-6058-5704	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 25 Jan-15 14:35	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 02-7991-6270	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 16 Jan-15 14:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 23 Jan-15 14:00	Species: Pimephales promelas	Brine:
Duration: 7d 0h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 13-7511-0324	Code: 51F684B4	Client: Mount Polley
Sample Date: 15 Jan-15 10:30	Material: Water Sample	Project:
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 28h (4 °C)	Station: QUL-66-0m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1898164	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	56.88	47.71	N/A	1.758	NA	2.096
EC10	66.37	43.95	N/A	1.507	NA	2.275
EC15	77.42	38.88	N/A	1.292	NA	2.572
EC20	90.28	32.23	N/A	1.108	NA	3.103
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	3	1	1	1	0	0	0.0%	0.0%	30	30
1.56		3	1	1	1	0	0	0.0%	0.0%	30	30
3.1		3	1	1	1	0	0	0.0%	0.0%	29	29
6.25		3	0.9667	0.9	1	0.03333	0.05773	5.97%	3.33%	29	30
12.5		3	1	1	1	0	0	0.0%	0.0%	30	30
25		3	1	1	1	0	0	0.0%	0.0%	30	30
50		3	1	1	1	0	0	0.0%	0.0%	30	30
100		3	0.7667	0.4	1	0.1856	0.3215	41.93%	23.33%	23	30

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	1	1	1
1.56		1	1	1
3.1		1	1	1
6.25		1	1	0.9
12.5		1	1	1
25		1	1	1
50		1	1	1
100		0.9	0.4	1

QA: *AT* Feb 26/15

CETIS Analytical Report

Report Date: 25 Jan-15 14:35 (p 2 of 2)
Test Code: 15042 | 01-8901-6962

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

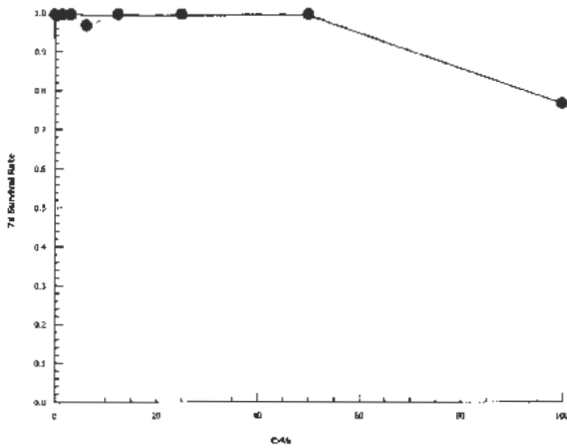
Analysis ID: 12-6058-5704 Endpoint: 7d Survival Rate
Analyzed: 25 Jan-15 14:35 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	10/10	10/10	10/10
1.56		10/10	10/10	10/10
3.1		10/10	9/9	10/10
6.25		10/10	10/10	9/10
12.5		10/10	10/10	10/10
25		10/10	10/10	10/10
50		10/10	10/10	10/10
100		9/10	4/10	10/10

Graphics



CETIS Analytical Report

Report Date: 27 Jan-15 14:15 (p 1 of 2)
 Test Code: 15042 | 01-8901-6962

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 16-3666-6257	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 27 Jan-15 14:15	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 02-7991-6270	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 16 Jan-15 14:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 23 Jan-15 14:00	Species: Pimephales promelas	Brine:
Duration: 7d 0h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 13-7511-0324	Code: 51F684B4	Client: Mount Polley
Sample Date: 15 Jan-15 10:30	Material: Water Sample	Project:
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 28h (4 °C)	Station: QUL-66-0m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	850313	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	50.65	N/A	57.03	1.974	1.753	NA
IC10	57.37	45.01	78.5	1.743	1.274	2.222
IC15	64.95	48.11	108.4	1.54	0.9222	2.078
IC20	73.53	47.44	N/A	1.36	NA	2.108
IC25	83.21	46.68	N/A	1.202	NA	2.142
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.844	0.81	0.887	0.02268	0.03928	4.65%	0.0%
1.56		3	0.799	0.775	0.845	0.02301	0.03985	4.99%	5.33%
3.1		3	0.8663	0.86	0.8778	0.005768	0.009991	1.15%	-2.64%
6.25		3	0.8433	0.793	0.91	0.03475	0.06018	7.14%	0.08%
12.5		3	0.8623	0.813	0.899	0.02562	0.04438	5.15%	-2.17%
25		3	0.85	0.831	0.873	0.01229	0.02128	2.5%	-0.71%
50		3	0.8063	0.792	0.822	0.008684	0.01504	1.87%	4.46%
100		3	0.5703	0.365	0.702	0.104	0.1802	31.59%	32.43%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.835	0.81	0.887
1.56		0.777	0.845	0.775
3.1		0.861	0.8778	0.86
6.25		0.827	0.91	0.793
12.5		0.899	0.875	0.813
25		0.846	0.831	0.873
50		0.822	0.792	0.805
100		0.702	0.365	0.644

ART
 QA: Feb 26/15

CETIS Analytical Report

Report Date: 27 Jan-15 14:15 (p 2 of 2)

Test Code: 15042 | 01-8901-8962

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 16-3666-6257

Endpoint: Mean Dry Biomass-mg

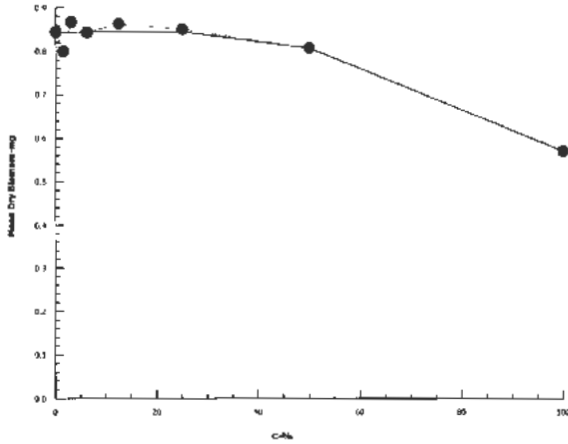
CETIS Version: CETISv1.8.7

Analyzed: 27 Jan-15 14:15

Analysis: Linear Interpolation (ICPIN)

Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 27 Jan-15 14:29 (p 1 of 2)
 Test Code: 15042 | 01-8901-6962

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 08-7756-3459	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 27 Jan-15 14:29	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 02-7991-6270	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 16 Jan-15 14:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 23 Jan-15 14:00	Species: Pimephales promelas	Brine:
Duration: 7d 0h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 13-7511-0324	Code: 51F684B4	Client: Mount Polley
Sample Date: 15 Jan-15 10:30	Material: Water Sample	Project:
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 28h (4 °C)	Station: QUL-66-0m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1391790	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	49.79	14.75	N/A	2.008	NA	6.779
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	Min	Max	Calculated Variate			
						Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.844	0.81	0.887	0.02268	0.03928	4.65%	0.0%
1.56		3	0.799	0.775	0.845	0.02301	0.03985	4.99%	5.33%
3.1		3	0.8663	0.86	0.8778	0.005768	0.009991	1.15%	-2.64%
6.25		3	0.8727	0.827	0.91	0.02432	0.04213	4.83%	-3.4%
12.5		3	0.8623	0.813	0.899	0.02562	0.04438	5.15%	-2.17%
25		3	0.85	0.831	0.873	0.01229	0.02128	2.5%	-0.71%
50		3	0.8063	0.792	0.822	0.008684	0.01504	1.87%	4.46%
100		3	0.7788	0.644	0.9125	0.07751	0.1342	17.24%	7.72%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.835	0.81	0.887
1.56		0.777	0.845	0.775
3.1		0.861	0.8778	0.86
6.25		0.827	0.91	0.8811
12.5		0.899	0.875	0.813
25		0.846	0.831	0.873
50		0.822	0.792	0.805
100		0.78	0.9125	0.644

Handwritten: 1/27/15
 QA: 1/26/15

CETIS Analytical Report

Report Date: 27 Jan-15 14:29 (p 2 of 2)
Test Code: 15042 | 01-8901-6962

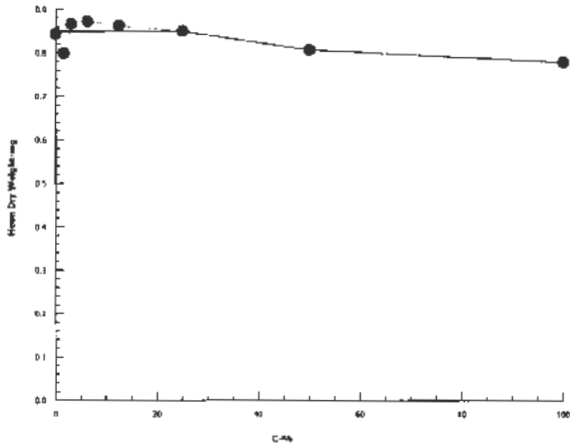
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 08-7756-3459 Endpoint: Mean Dry Weight-mg
Analyzed: 27 Jan-15 14:29 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Fathead Minnow Test Summary Sheet
(7-d *Pimephales promelas* Survival and Growth Test)

Client: Mount Polley
Work Order No.: 15042

Start Date/Time: Jan 16/15 @ 1400h
Test Species: P. promelas

Sample Information:

Sample ID: QUL66-8SM
Sample Date: Jan 15/15
Date Received: Jan 16/15
Sample Volume: 5K206

Dilution Water (initial water quality):

Type: Moderately Hard water
Temperature (°C): 26.3
pH: 8.0
Dissolved Oxygen (mg/L): 8.0
Hardness (mg/L CaCO₃): 100
Alkalinity (mg/L CaCO₃): 62

Test Validity Criteria:

The test is invalid if:

- 1) for the control solutions, the combined and cumulative incidence of any mortalities, or fish showing loss of equilibrium or other signs of atypical swimming behavior, is >20%
- 2) the average dry weight of the surviving control fish does not attain 250 ug when the fish are dried and weighed.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4; pH = 6.5 to 8.5

Test Organism Information:

Batch No.: 011615
Source: Aquatic Biosystems, CO
Age: 224 hrs

NaCl Reference Toxicant Results:

Reference Toxicant ID: PP105
Stock Solution ID: N/A
Date Initiated: Jan 16/15
7-d EC50 (95% CL): 4.8 (4.1-5.7)
7-d IC50 (95% CL): 4.0 (3.6-4.5)

Survival:

Reference Toxicant Mean and Historical Range: 4.3 (3.4-5.5) CV (%): 13

Biomass:

Reference Toxicant Mean and Historical Range: 3.8 (2.8-5.2) CV (%): 17

Test Results:

	Survival	Biomass
LC25 % (v/v) (95% CL)	<u>>100</u>	
LC50 % (v/v) (95% CL)	<u>>100</u>	
IC25 % (v/v) (95% CL)		<u>42.93-5 (29.0-100) 95.6 (25.9-100)</u>
IC50 % (v/v) (95% CL)		<u>7100</u>

Reviewed by: A. T. J.

Date reviewed: March 5, 2015

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley Start Date & Time: Jan 16/15 @ 1400h
 Sample ID: QUL66-8SM (black) Stop Date & Time: Jan 23/15 @ 1200h
 Work Order #: 15042 Test Species: Pimephales promelas

Concentration <i>Control</i>	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	26.0	24.0	24.0	24.0	26.0	24.0	24.0	24.0	24.0	24.0	26.0	24.0	24.0	24.0
DO (mg/L)	8.0	6.3	8.2	6.0	8.1	6.2	8.0	6.3	8.0	6.0	7.7	6.0	8.2	5.0
pH	8.0	7.7	7.9	7.6	7.9	7.7	8.1	7.7	8.1	7.6	8.0	7.2	7.9	7.4
Cond. (µS/cm)	338	350		350		346		351		358		333		343
Initials	KJL	KJL		EMM		KJL		KJL		KJL		KJL		KJL

Concentration <i>1-56</i>	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	24.0	24.0	24.0	26.0	24.0	24.0	24.0	25.0	24.0	24.5	24.0	24.0	24.0
DO (mg/L)	7.3	6.1	8.1	5.9	8.0	6.2	8.0	6.3	8.1	5.7	7.9	6.0	8.3	4.7
pH	7.4	7.6	7.9	7.6	8.0	7.7	8.2	7.6	8.1	7.5	8.1	7.3	7.8	7.4
Cond. (µS/cm)	350	338		339		343		346		348		334		342
Initials	KJL	KJL		EMM		KJL		KJL		KJL		KJL		KJL

Concentration <i>12-5</i>	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	24.0	24.0	24.0	26.0	24.0	25.0	24.0	25.0	24.0	24.5	24.0	24.0	24.0
DO (mg/L)	8.0	6.0	7.8	5.9	8.0	6.1	8.0	6.1	7.9	6.5	8.1	6.1	8.3	4.7
pH	7.4	7.6	7.9	7.7	7.9	7.7	8.2	7.6	8.1	7.5	8.1	7.4	7.8	7.4
Cond. (µS/cm)	346	315		318		318		321		325		310		323
Initials	KJL	KJL		EMM		KJL		KJL		KJL		KJL		KJL

Concentration <i>100</i>	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	24.0	24.0	24.0	26.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
DO (mg/L)	8.2	5.9	7.9	5.8	8.0	6.2	8.1	6.3	7.9	6.2	8.3	6.1	8.3	4.8
pH	7.3	7.7	7.9	7.7	7.7	7.9	7.9	7.7	8.0	7.5	7.8	7.5	7.8	7.4
Cond. (µS/cm)	121	120		119		119		118		120		119		128
Initials	KJL	KJL		EMM		KJL		KJL		KJL		KJL		KJL

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6.5 to 8.5

DO meter: 3 pH meter: 3 Conductivity meter: 3

	Control	100% (VIV)		
Hardness*	100	38		
Alkalinity*	62	46		

* mg/L as CaCO3

Analysts: KJL, EMM

Reviewed by: AKT

Date reviewed: Feb 26/15

Sample Description: clear

Comments: _____

7-d Fathead Minnow Toxicity Test Daily Survival

Client: Mount Polley
 Sample ID: QUL66-85M (black)
 Work Order #: 15042

Start Date & Time: Jan 16/15 @ 1400h
 Stop Date & Time: Jan 23/15 @ 1200h
 Test Species: Pimephales promelas

Concentration % (v/v)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
1.56	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
3.1	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
6.25	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
12.5	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
25	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
50	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
100	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	5	
	C	10	10	10	10	10	10	10	
	A								
	B								
	C								
	A								
	B								
	C								
Tech Initials		KJL	EMM	KJL	KJL	KJL	KJL	EMM	

Comments: _____

Reviewed by: A. Long

Date reviewed: February 26, 2015

Fathead Minnow Toxicity Test Data Sheet

Dry Weight Data

Client: Mount Polley

Start Date & Time: Jan 16/15 @ 1400h

Sample ID: QUL66-85M

Termination Date & Time: Jan 21/15 @ 1200h

Work Order No.: to 1552 15042

Concentration % (V/V)	Rep	15B Pan No. black	No. alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control	A	1	10	ML	959.56	968.00	10	MLT NY
	B	2	10		969.79	977.75	10	
	C	3	10		969.73	979.03	10	
1.56	A	4	10		969.30	977.77	10	
	B	5	10		963.85	972.17	10	
	C	6	10		958.96	968.74	10	
3.1	A	7	10		965.55	974.02	10	
	B	8	10		987.44	995.76	10	
	C	9	10		957.90	966.56	10	
6.25	A	10	9		972.56	981.53	9	
	B	11	10		968.71	977.38	10	
	C	12	10		976.82	986.30	10	
12.5	A	13	10		963.53	972.09	10	
	B	14	9		956.74	964.57	9	
	C	15	10		974.22	982.26	10	
25	A	16	6		956.08	964.51	10	
	B	17	10		959.41	967.57	10	
	C	18	10		950.21	958.97	10	
50	A	19	10		973.93	983.10	10	
	B	20	8		963.33	970.15	8	
	C	21	10		988.12	998.30	10	
100	A	22	10		968.91	975.63	10	
	B	23	5		947.99	951.99	5	↓
	C	24	10	↓	956.54	965.08	10	MLT ↓

Comments: NY Reweighed pans: 5-972.16 13-972.04 21-998.27

Reviewed by: A. Tong

Date Reviewed: February 26, 2015

CETIS Analytical Report

Report Date: 25 Jan-15 14:35 (p 1 of 2)
 Test Code: 15042b | 16-3040-5720

Fathead Minnow 7-d Larval Survival and Growth Test			Nautilus Environmental
Analysis ID: 15-4402-3189	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7	
Analyzed: 25 Jan-15 14:35	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes	
Batch ID: 15-2689-3762	Test Type: Growth-Survival (7d)	Analyst: Karen Lee	
Start Date: 16 Jan-15 14:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water	
Ending Date: 23 Jan-15 14:00	Species: Pimephales promelas	Brine:	
Duration: 7d 0h	Source: Aquatic Biosystems, CO	Age: <24h	
Sample ID: 12-6648-4787	Code: 4B7D0633	Client: Mount Polley	
Sample Date: 15 Jan-15 11:30	Material: Water Sample	Project:	
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)		
Sample Age: 27h (4.4 °C)	Station: QUL-66-85m		

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	858078	200	Yes	Two-Point Interpolation

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	38.61	12.37	N/A	2.59	NA	8.082
EC10	63.05	11.74	N/A	1.586	NA	8.519
EC15	89.13	13.23	N/A	1.122	NA	7.556
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary			Calculated Variate(A/B)									
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B	
0	Negative Control	3	1	1	1	0	0	0.0%	0.0%	30	30	
1.56		3	1	1	1	0	0	0.0%	0.0%	30	30	
3.1		3	1	1	1	0	0	0.0%	0.0%	30	30	
6.25		3	0.9667	0.9	1	0.03333	0.05773	5.97%	3.33%	29	30	
12.5		3	0.9667	0.9	1	0.03333	0.05773	5.97%	3.33%	29	30	
25		3	1	1	1	0	0	0.0%	0.0%	30	30	
50		3	0.9333	0.8	1	0.06667	0.1155	12.37%	6.67%	28	30	
100		3	0.8333	0.5	1	0.1667	0.2887	34.64%	16.67%	25	30	

7d Survival Rate Detail				
C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	1	1	1
1.56		1	1	1
3.1		1	1	1
6.25		0.9	1	1
12.5		1	0.9	1
25		1	1	1
50		1	0.8	1
100		1	0.5	1

AP
 QA: *F0626/15*

CETIS Analytical Report

Report Date: 25 Jan-15 14:35 (p 2 of 2)
Test Code: 15042b | 16-3040-5720

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

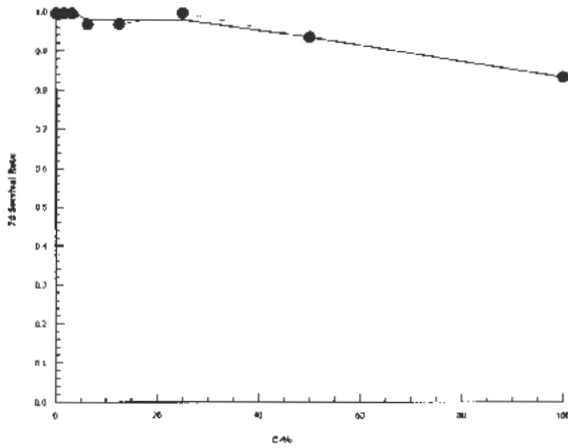
Analysis ID: 15-4402-3189 Endpoint: 7d Survival Rate
Analyzed: 25 Jan-15 14:35 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	10/10	10/10	10/10
1.56		10/10	10/10	10/10
3.1		10/10	10/10	10/10
6.25		9/10	10/10	10/10
12.5		10/10	9/10	10/10
25		10/10	10/10	10/10
50		10/10	8/10	10/10
100		10/10	5/10	10/10

Graphics



ART
QA Feb 26/15

CETIS Analytical Report

Report Date: 03 Mar-15 15:49 (p 1 of 2)
Test Code: 15042b | 16-3040-5720

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 19-8742-7390	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 03 Mar-15 15:45	Analysis: Linear Interpolation (ICP:IN)	Official Results: Yes
Batch ID: 15-2689-3762	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 16 Jan-15 14:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 23 Jan-15 14:00	Species: Pimephales promelas	Brine:
Duration: 7d 0h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 12-6648-4787	Code: 4B7D0633	Client: Mount Polley
Sample Date: 15 Jan-15 11:30	Material: Water Sample	Project:
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 27h (4.4 °C)	Station: QUL-66-85m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	760666	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	52.46	N/A	103.8	1.906	0.9631	NA
IC10	60.98	N/A	N/A	1.64	NA	NA
IC15	70.85	4.343	N/A	1.411	NA	23.02
IC20	82.3	10.26	N/A	1.215	NA	9.75
IC25	95.57	25.41	N/A	1.046	NA	3.935
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.8567	0.796	0.93	0.0392	0.06789	7.93%	0.0%
1.56		3	0.8857	0.832	0.978	0.04637	0.08031	9.07%	-3.39%
3.1		3	0.8483	0.832	0.866	0.009837	0.01704	2.01%	0.97%
6.25		3	0.904	0.867	0.948	0.02364	0.04095	4.53%	-5.53%
12.5		3	0.8143	0.783	0.856	0.0217	0.03758	4.62%	4.94%
25		3	0.845	0.816	0.876	0.01735	0.03005	3.56%	1.36%
50		3	0.8723	0.682	1.018	0.09953	0.1724	19.76%	-1.83%
100		3	0.642	0.4	0.854	0.1319	0.2285	35.59%	25.06%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.844	0.796	0.93
1.56		0.847	0.832	0.978
3.1		0.847	0.832	0.866
6.25		0.897	0.867	0.948
12.5		0.856	0.783	0.804
25		0.843	0.816	0.876
50		0.917	0.682	1.018
100		0.672	0.4	0.854

AP
QA: Mar 3/15

CETIS Analytical Report

Report Date: 03 Mar-15 15:49 (p 2 of 2)
Test Code: 15042b | 16-3040-5720

Fathead Minnow 7-d Larval Survival and Growth Test

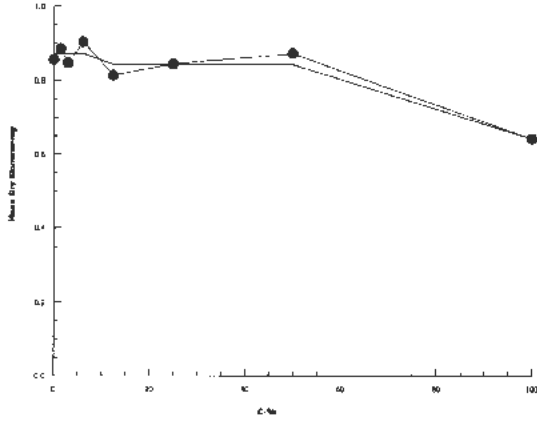
Nautilus Environmental

Analysis ID: 19-8742-7390
Analyzed: 03 Mar-15 15:45

Endpoint: Mean Dry Biomass-mg
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 03 Mar-15 15:48 (p 1 of 2)
 Test Code: 15042b | 16-3040-5720

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 12-8736-5209	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 03 Mar-15 15:45	Analysis: Linear Interpolation (CPIN)	Official Results: Yes
Batch ID: 15-2689-3762	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 16 Jan-15 14:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 23 Jan-15 14:00	Species: Pimephales promelas	Brine:
Duration: 7d 0h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 12-6648-4787	Code: 4B7D0633	Client: Mount Polley
Sample Date: 15 Jan-15 11:30	Material: Water Sample	Project:
Receive Date: 16 Jan-15 08:45	Source: Mount Polley (MT POLLEY)	
Sample Age: 27h (4.4 °C)	Station: QUL-66-85m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	176185	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	64.06	N/A	N/A	1.561	NA	NA
IC10	87.72	32.2	N/A	1.14	NA	3.106
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	Min	Max	Calculated Variate			
						Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.8567	0.796	0.93	0.0392	0.06789	7.93%	0.0%
1.56		3	0.8857	0.832	0.978	0.04637	0.08031	9.07%	-3.39%
3.1		3	0.8483	0.832	0.866	0.009837	0.01704	2.01%	0.97%
6.25		3	0.9372	0.867	0.9967	0.03782	0.0655	6.99%	-9.4%
12.5		3	0.8433	0.804	0.87	0.02008	0.03477	4.12%	1.56%
25		3	0.845	0.816	0.876	0.01735	0.03005	3.56%	1.36%
50		3	0.9292	0.8525	1.018	0.04816	0.08342	8.98%	-8.46%
100		3	0.7753	0.672	0.854	0.05397	0.09347	12.06%	9.49%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.844	0.796	0.93
1.56		0.847	0.832	0.978
3.1		0.847	0.832	0.866
6.25		0.9967	0.867	0.948
12.5		0.856	0.87	0.804
25		0.843	0.816	0.876
50		0.917	0.8525	1.018
100		0.672	0.8	0.854

QA: Mar 3/15

CETIS Analytical Report

Report Date: 03 Mar-15 15:48 (p 2 of 2)
Test Code: 15042b | 16-3040-5720

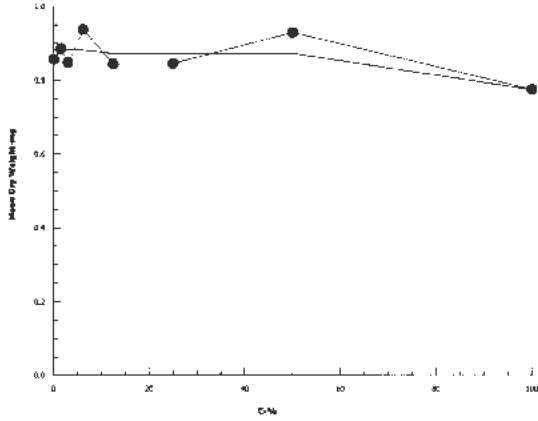
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 12-8736-5209 Endpoint: Mean Dry Weight-mg
Analyzed: 03 Mar-15 15:45 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



ART
QA
Mar 3/15

Client: Mount Pooley

W.O.#: 15042

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
FHM MHW 011615 011615	Jan 21/15	50	3.2	3.3	62	50	5.0	100	MLT
QUL66-DM	Jan 16/15	50	2.5	2.6	48	50	2.9	58	MLT
QUL66-85M	Jan 16/15	50	2.4	2.5	46	50	2.9	58	MLT

Notes: _____

Reviewed by: A. Tong

Date Reviewed: February 26, 2015

APPENDIX D - Chain of Custody Form

autilus Environmental

Chain of Custody (electronic)

British Columbia, 8664 Commerce Court, Burnaby, BC, V5A 4N7

15/01/2015 Page 1 of 1

Sample Collection By:	Mclean Donohoe	Invoice to:	
Report to:		Company:	Mount Polley Mining Corporation
Address:	Mount Polley Mining Corporation Box 12	Address:	Mount Polley Mining Corporation Box 12
City/Prov/Postal Code:	Likely BC V0L 1N0	City/Prov/Postal Code:	Likely BC V0L 1N0
Contact:	Colleen Hughes	Contact:	Colleen Hughes/
Phone:	(250) 790-2617	Phone:	(250) 790-2617
Email:	chughes@mountpolley.com	Email:	chughes@mountpolley.com

W0# 15042
 Fathead Minnow 7D S+G
 W0# 15043
 Rainbow Trout 7D S+G
 W0# 15044
 C. Dubia S+R - Filtered
 C. Dubia S+R - Unfiltered

ANALYSES REQUIRED

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Receipt Temperature (°C)

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	X	X	X	X									
1 QUL-66-0m	15/01/2015	10:30	water	20L	3		X	X	X	X									44
2 QUL-66-3m	15/01/2015	11:30	water	20L	3		X	X	X	X									44
3 (85)																			
4																			
5																			
6																			
7																			
8																			
9																			
0																			

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)				RELIQUISHED BY (COURIER)			
Client: Mount Polley Mining Corporation		Total # Containers:	6	Signature:				Signature:			
P.O. No.:		Good Condition?	Y	Print: Mclean Donohoe				Print:			
Shipped Via: Greyhound		Matches Schedule?	Y	Company: MPMC				Company:			
				Time/Date: 15/01/2015 15:30:00				Time/Date:			
SPECIAL INSTRUCTIONS/COMMENTS:				RECEIVED BY (COURIER)				RECEIVED BY (LABORATORY)			
				Signature: <i>Mon Done</i>				Signature: <i>[Signature]</i>			
				Print:				Print: <i>Yvonne Lam</i>			
				Company:				Company: <i>Nautilus Env.</i>			
				Time/Date:				Time/Date: <i>Jan 16/15 @ 0845</i>			

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 7

Toxicity testing of a sample identified as QUR-1 on *Ceriodaphnia dubia* and fathead minnows: Sample collected February 10, 2015, Work Order #15082 and 15083



Nautilus Environmental

**Toxicity testing on a sample identified as
QUR-1 on *Ceriodaphnia dubia* and fathead minnows**

Sample collected February 10, 2015

Final Report

Report date: March 31, 2015

Submitted to:

Mount Polley Mining Corporation
Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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LIST OF APPENDICES

APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data

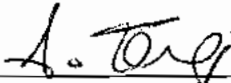
APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

APPENDIX C - Chain of Custody Form

SIGNATURE PAGE



Krysta Pearcy, B.Sc.
Laboratory Biologist



Armando Tang, R.P.Bio.
Laboratory Manager

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted toxicity tests for Mount Polley Mining Corporation on a sample identified as QUR-1. The sample was collected on February 10, 2015 and delivered to the laboratory in Burnaby, BC on February 11, 2015. The sample was transported in two 20-L plastic carboys and coolers. The sample was received at a temperature of 4.0°C and was stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing. The following sub-lethal toxicity tests were performed on the sample:

- *Ceriodaphnia dubia* survival and reproduction
- 7-d fathead minnow (*Pimephales promelas*) survival and growth

This report describes the results of these toxicity tests. Copies of laboratory data sheets and printouts of statistical analyses for each test are provided in Appendices A and B. The chain-of-custody form is provided in Appendix C.

2.0 METHODS

Methods for the toxicity tests are summarized in Tables 1 and 2. Testing was conducted according to procedures described by the Environment Canada protocols (2007 and 2011). Statistical analyses for all tests were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house culture
Test organism age	<24 h old neonates produced within 12 h
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20 mL test tube
Test volume	15 mL
Test replicates	10 test replicates per treatment
Number of organisms	1 per replicate
Control water	20% Perrier water
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	<i>Pseudokirchneriella subcapitata</i> and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada, (2007) EPS 1/RM/21
Statistical software	CETIS (2013)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods
Reference toxicant	Sodium chloride

Table 2. Summary of test conditions: fathead minnow (*Pimephales promelas*) survival and growth test.

Test organism	<i>Pimephales promelas</i>
Test organism source	Aquatic BioSystems, Fort Collins, CO
Test organism age	<24 hours
Test type	Static renewal
Test duration	7 days
Test vessel	375-mL glass containers
Test volume	250 mL
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control water	Moderately-hard water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	Twice a day with newly hatched brine shrimp (<i>Artemia nauplii</i>)
Light intensity	100 – 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test protocol	Environment Canada (2011), EPS 1/RM/22
Statistical software	CETIS (2013)
Test endpoint	Survival and biomass
Test acceptability criteria for controls	≥80% survival, ≥250 µg mean dry weight
Reference toxicant	Sodium chloride

3.0 RESULTS

No adverse effects were observed on survival and reproduction of *C. dubia* (Table 3) or survival, biomass and dry weight of fathead minnows; the LC50, IC25 and IC50 values were >100% in the toxicity tests.

Table 3. Results: *Ceriodaphnia dubia* survival and reproduction test.

Concentration (% v/v)	Survival (%)	Reproduction (mean ± SD)
Control	100	27.3 ± 3.1
1.56	100	26.5 ± 2.6
3.12	100	28.7 ± 3.0
6.25	100	27.6 ± 1.9
12.5	100	26.1 ± 3.9
25	100	27.2 ± 3.3
50	100	23.9 ± 4.0
100	100	23.5 ± 5.0
Test endpoint (% v/v)		
LC50	>100	--
IC25	--	>100
IC50	--	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

Table 4. Results: fathead minnow (*Pimephales promelas*) survival and growth test.

Concentration (% v/v)	Mean ± SD		
	Survival (%)	Biomass (µg)	Dry Weight (µg)
Control	93.3 ± 11.6	774.7 ± 71.1	832.4 ± 30.2
1.56	90.0 ± 0.0	716.0 ± 68.6	795.6 ± 76.2
3.1	93.3 ± 5.8	737.3 ± 45.0	790.3 ± 26.5
6.25	93.3 ± 11.6	765.0 ± 153.8	814.5 ± 74.9
12.5	83.3 ± 20.8	706.7 ± 140.3	857.9 ± 70.2
25	96.7 ± 5.8	791.3 ± 46.0	820.1 ± 57.2
50	96.7 ± 5.8	761.0 ± 113.3	787.3 ± 104.0
100	96.7 ± 5.8	738.0 ± 86.6	762.9 ± 66.5
Test endpoint (% v/v)			
LC25	>100	--	--
LC50	>100	--	--
IC25	--	>100	>100
IC50	--	>100	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

4.0 QA/QC

The health history of the test organisms used in the exposures was acceptable and met the requirements of the Environment Canada protocols. The tests met all control acceptability criteria and water quality parameters remained within ranges specified in the protocols throughout the tests. There were no deviations from the test methodologies. Uncertainty associated with these tests is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

Results of the reference toxicant tests conducted during the testing program are summarized in Table 5. Results of the *C. dubia* test fell within the range for organism performance of mean and two standard deviation range, based on historical results obtained by the laboratory with this tests. Thus, the sensitivity of the organisms used in this test was appropriate. Results of the *P. promelas* test was outside of two standard deviations of the historical results obtained by the laboratory for the survival endpoint. The LC50 was 6.0 g/L NaCl and slightly higher than the two standard deviation range of 3.5 to 5.6 g/L NaCl for this test. Approximately one in twenty reference toxicant results would be expected to fall outside of the two standard deviation range due to variability in organism sensitivity. The IC25 for *P. promelas* biomass fell within two standard deviations of the historical results obtained by the laboratory.

Table 5. Reference toxicant results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>C. dubia</i>	Survival (LC50): 2.0 g/L NaCl	1.9 (1.5 - 2.4)	12	January 28 , 2015
	Reproduction (IC50): 1.6 g/L NaCl	1.4 (1.0 - 2.0)	18	
<i>P. promelas</i>	Survival (LC50): 6.0 g/L NaCl	4.4 (3.5 - 5.6)	12	February 11, 2015
	Biomass (IC50): 4.8 g/L NaCl	3.9 (2.9 - 5.2)	16	

SD = Standard Deviation, CV = Coefficient of Variation, IC = Inhibition Concentration, LC = Lethal Concentration.

5.0 REFERENCES

Environment Canada. 2007. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. Report EPS 1/RM/21, Second Edition, February 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 74 pp.

Environment Canada. 2011. Biological test method: test of larval growth and survival using fathead minnows. Environmental Protection Series, Report EPS 1/RM/22. February 2011,. Environment Canada, Environmental Protection, Conservation and Protection, Ottawa, ON. 73 pp.

Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.4.29 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: Mount Palley Mining Corp Start Date/Time: Feb 11/15 @ 1130h
 Work Order No.: 15083 Set up by: EMM

Sample Information:

Sample ID: 042-1
 Sample Date: Feb 10/15
 Date Received: Feb 11/15
 Sample Volume: 2x20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T (°C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 012915
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 39
 Mortality (%) in previous 7 d: 5
 Individual female # used ≥ 8 young on test day: 11, 15, 16, 17, 18, 19, 20

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd124
 Stock Solution ID: 15 NaCl
 Date Initiated: Jan 28/15

7-d LC50 (95% CL): 2.0 (1.7-2.3) g/L NaCl
 7-d IC50 (95% CL): 1.6 (1.1-1.8) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 1.9 (1.5-2.4) g/L NaCl CV (%): 12
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.4 (1.0-2.0) g/L NaCl CV (%): 18

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	>100	
IC25 % (v/v) (95% CL)		>100
IC50 % (v/v) (95% CL)		>100

Reviewed by: JGU Date reviewed: March 9/15

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: MT Polley
 Sample ID: 042-1
 Work Order #: 15083

Start Date & Time: Feb 11/15 @ 1130h
 Stop Date & Time: Feb 18/15 @ 1030h
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		6		7
<i>control</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	24.5	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	24.0	24.0	24.0
DO (mg/L)	8.0	7.6	8.0	7.7	8.0	7.2	8.1	7.6	8.1	7.4	8.0	7.4	8.0	8.0
pH	8.0	7.6	8.0	7.7	8.0	7.7	8.1	7.8	8.1	7.5	8.0	7.5	7.9	7.6
Cond. (µS/cm)	232	220		220		221		222		221		224		219
Initials	EMM	EMM		EMM		A		A		EMM		EMM		MMJ

Concentration	Days													
	0	1		2		3		4		5		6		7
<i>1.5% (V/V)</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	24.5	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	24.0	24.0	24.0
DO (mg/L)	8.0	7.7	7.9	7.7	8.1	7.3	8.2	7.4	8.2	7.4	8.0	7.4	7.9	8.0
pH	8.0	7.6	7.9	7.7	8.0	7.8	8.1	7.8	8.1	7.5	7.7	7.5	7.7	7.5
Cond. (µS/cm)	226	219		218		224		219		225		227		226
Initials	EMM	EMM		EMM		A		A		EMM		EMM		MMJ

Concentration	Days													
	0	1		2		3		4		5		6		7
<i>12.5% (V/V)</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	24.5	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	24.0	24.5	24.0
DO (mg/L)	8.0	7.6	7.9	7.7	8.2	7.3	8.2	7.4	8.3	7.4	7.9	7.4	7.9	8.0
pH	7.7	7.6	7.7	7.6	7.7	7.8	7.9	7.7	8.0	7.5	7.8	7.5	7.7	7.5
Cond. (µS/cm)	214	209		208		215		211		214		215		214
Initials	EMM	EMM		EMM		A		A		EMM		EMM		MMJ

Concentration	Days													
	0	1		2		3		4		5		6		7
<i>100% (V/V)</i>	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	24.5	24.5	25.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	24.0	25.0	24.0
DO (mg/L)	8.0	7.6	7.9	7.7	8.2	7.3	8.2	7.7	8.3	7.4	7.9	7.4	7.9	8.0
pH	7.3	7.4	7.4	7.2	7.5	7.5	7.6	7.6	7.7	7.3	7.4	7.4	7.4	7.2
Cond. (µS/cm)	127	124		125		125		126		120		124		124
Initials	EMM	EMM		EMM		A		A		EMM		EMM		MMJ

	Control	<i>100% (V/V)</i>		
Hardness*	100	60		
Alkalinity*	86	54		

Analysts: EMM, AWD, MCT
 Reviewed by: JOB
 Date reviewed: March 9/15

* mg/L as CaCO₃

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5

Sample Description: clear, some white ppt

Comments: Broodboard Used: 012915

Chronic Freshwater Toxicity Test
C. dubia Reproduction Data

Client: Mt. Polley
Sample ID: QUR-1
Work Order: 15083

Start Date & Time: Feb 11/15 (Q) 1130h
Stop Date & Time: Feb 18/15 (3) 1030h
Set up by: EMM

Days	Concentration: <u>control</u>											Concentration: <u>1.56% (V/V)</u>											Concentration: <u>3.12% (V/V)</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLT
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~
4	3	4	3	4	3	3	3	3	3	3	~	3	4	3	3	3	3	3	3	3	3	~	3	2	3	3	3	3	3	3	3	3	~
5	7	8	10	8	10	9	10	10	10	10	MLT	7	8	9	7	9	12	10	✓	10	✓	MLT	7	8	9	10	9	11	10	9	10	✓	MLT
6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLT	8	9	✓	7	✓	✓	✓	8	✓	10	MLT	10	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLT
7	12	16	14	12	15	14	16	18	13	17	MLT	15	14	15	12	14	16	16	12	14	14	MLT	19	13	21	15	16	16	16	17	17	14	MLT
8																																	
Total	22	28	27	24	28	26	29	33	26	30	MLT	26	26	27	22	26	31	29	23	28	27	MLT	32	23	33	28	28	30	29	29	30	25	MLT

Days	Concentration: <u>6.25% (V/V)</u>											Concentration: <u>12.5% (V/V)</u>											Concentration: <u>25% (V/V)</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLT
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~
4	3	3	2	3	3	3	3	4	3	3	~	3	3	4	✓	3	3	3	3	3	3	~	3	3	✓	3	3	3	3	4	3	✓	~
5	✓	✓	7	✓	9	✓	11	✓	10	✓	MLT	7	9	10	6	10	✓	✓	7	8	9	MLT	9	10	9	6	9	7	✓	10	✓	9	MLT
6	9	9	✓	9	✓	10	✓	8	✓	9	MLT	✓	✓	✓	13	✓	8	9	✓	✓	✓	MLT	✓	✓	✓	✓	✓	✓	10	✓	7	8	MLT
7	15	16	14	16	16	16	13	15	17	17	MLT	11	15	18	✓	16	14	16	14	16	17	MLT	13	14	17	13	14	15	15	18	18	16	MLT
8																																	
Total	27	28	23	28	28	29	27	27	30	29	MLT	27	27	32	19	29	25	28	24	27	29	MLT	25	27	26	22	26	25	28	32	28	33	MLT

Days	Concentration: <u>50% (V/V)</u>											Concentration: <u>100% (V/V)</u>																					
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLT											
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~											
4	✓	3	3	✓	✓	3	3	3	✓	2	~	3	2	3	✓	3	✓	2	✓	3	3	~											
5	4	8	✓	5	9	9	9	10	8	10	MLT	9	9	10	5	10	4	✓	6	8	7	MLT											
6	12	✓	9	13	✓	✓	✓	✓	✓	✓	MLT	✓	✓	✓	✓	✓	13	9	12	✓	✓	MLT											
7	✓	15	14	✓	15	13	12	15	16	16	MLT	15	14	16	11	17	✓	15	✓	13	13	MLT											
8																																	
Total	16	26	26	18	24	25	24	28	24	28	MLT	27	25	29	16	30	17	26	18	24	23	MLT											

Notes: X = mortality.

Sample Description: clear some white ppt
Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JGW

Date reviewed: March 9/15

CETIS Analytical Report

Report Date: 18 Feb-15 14:55 (p 1 of 2)
 Test Code: 15083 | 19-6044-7628

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 09-5305-9207	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 18 Feb-15 14:54	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 15-6949-6607	Test Type: Reproduction-Survival (7d)	Analyst: Emma Marus
Start Date: 11 Feb-15 11:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 18 Feb-15 10:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 23h	Source: In-House Culture	Age: <24h
Sample ID: 08-5794-9603	Code: 332345A3	Client: Mount Polley
Sample Date: 10 Feb-15 09:30	Material: Water Sample	Project:
Receive Date: 11 Feb-15 08:30	Source: Mount Polley (MT POLLEY)	
Sample Age: 26h (4 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1434924	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 18 Feb-15 14:55 (p 2 of 2)
 Test Code: 15083 | 19-6044-7628

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

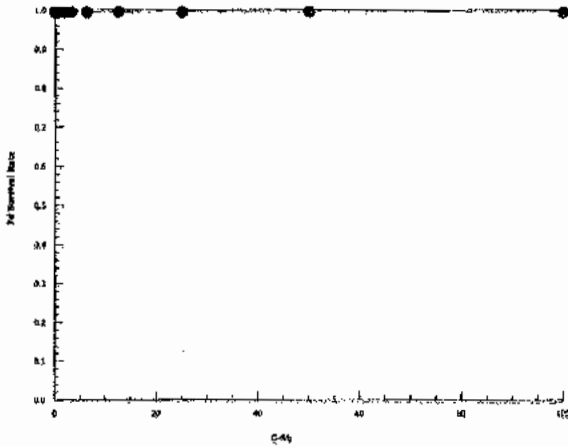
Analysis ID: 09-5305-9207 Endpoint: 7d Survival Rate
 Analyzed: 18 Feb-15 14:54 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



QA: *JG*
 March 9/15

CETIS Analytical Report

Report Date: 18 Feb-15 14:55 (p 1 of 2)
 Test Code: 15083 | 19-6044-7628

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 00-6299-6536	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 18 Feb-15 14:55	Analysis: Linear Interpolation (ICP:N)	Official Results: Yes
Batch ID: 15-8949-6607	Test Type: Reproduction-Survival (7d)	Analyst: Emma Marus
Start Date: 11 Feb-15 11:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 18 Feb-15 10:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 23h	Source: In-House Culture	Age: <24h
Sample ID: 08-5794-9603	Code: 332345A3	Client: Mount Polley
Sample Date: 10 Feb-15 09:30	Material: Water Sample	Project:
Receive Date: 11 Feb-15 08:30	Source: Mount Polley (MT POLLEY)	
Sample Age: 26h (4 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	865332	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	28.4	1.337	42.78	3.521	2.338	74.78
IC10	40.18	11.83	N/A	2.489	NA	8.45
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	27.3	22	33	0.9781	3.093	11.33%	0.0%
1.56		10	26.5	22	31	0.8333	2.635	9.94%	2.93%
3.12		10	28.7	23	33	0.9434	2.983	10.39%	-5.13%
6.25		10	27.6	23	30	0.6	1.897	6.88%	-1.1%
12.5		10	26.1	19	32	1.242	3.929	15.05%	4.4%
25		10	27.2	22	33	1.041	3.293	12.11%	0.37%
50		10	23.9	16	28	1.251	3.957	16.56%	12.45%
100		10	23.5	16	30	1.572	4.972	21.16%	13.92%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	22	28	27	24	28	26	29	33	26	30
1.56		26	26	27	22	26	31	29	23	28	27
3.12		32	23	33	28	28	30	29	29	30	25
6.25		27	28	23	28	28	29	27	27	30	29
12.5		21	27	32	19	29	25	28	24	27	29
25		25	27	26	22	26	25	28	32	28	33
50		16	26	26	18	24	25	24	28	24	28
100		27	25	29	16	30	17	26	18	24	23

CETIS Analytical Report

Report Date: 18 Feb-15 14:55 (p 2 of 2)

Test Code: 15083 | 19-6044-7628

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 00-6299-6536

Endpoint: Reproduction

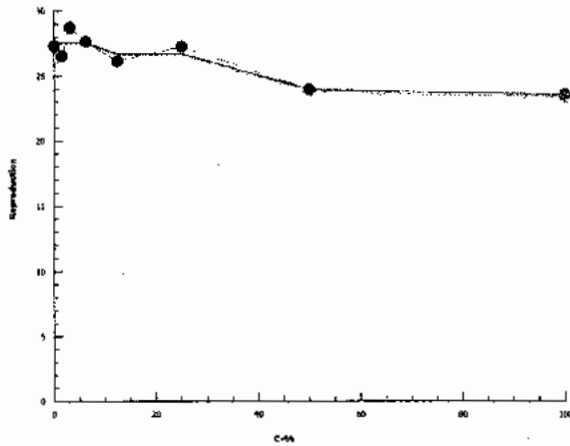
CETIS Version: CETISv1.8.7

Analyzed: 18 Feb-15 14:55

Analysis: Linear Interpolation (ICPIN)

Official Results: Yes

Graphics



Client: Mt. Palmyra

W.O.#: 15083

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
<u>QU2-1</u>	<u>Feb 10/15</u>	<u>50</u>	<u>2.8</u>	<u>2.9</u>	<u>54</u>	<u>50</u>	<u>3.0</u>	<u>60</u>	<u>MLT</u>
<u>20% Perrier Control</u>	<u>Feb 11/15</u>	<u>50</u>	<u>4.4</u>	<u>4.5</u>	<u>86</u>	<u>50</u>	<u>5.0</u>	<u>100</u>	<u>MLT</u>

Notes:

Reviewed by:

Joh

Date Reviewed:

March 9/15

APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

Fathead Minnow Test Summary Sheet
(7-d *Pimephales promelas* Survival and Growth Test)

Client: Mount Polley
Work Order No.: 15082

Start Date/Time: Feb 11/15 @ 1400h
Test Species: P. promelas

Sample Information:

Sample ID: OUR-1
Sample Date: Feb 10/15
Date Received: Feb 11/15
Sample Volume: 2x20L

Dilution Water (initial water quality):

Type: Moderately Hard Water
Temperature (°C): 24.0
pH: 8.0
Dissolved Oxygen (mg/L): 7.8
Hardness (mg/L CaCO₃): 80
Alkalinity (mg/L CaCO₃): 60

Test Validity Criteria:

The test is invalid if:

- 1) for the control solutions, the combined and cumulative incidence of any mortalities, or fish showing loss of equilibrium or other signs of atypical swimming behavior, is >20%
- 2) the average dry weight of the surviving control fish does not attain 250 ug when the fish are dried and weighed.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4; pH = 6.5 to 8.5

Test Organism Information:

Batch No.: 021115
Source: Aquatic Biosystems, CO
Age: 24 hrs

NaCl Reference Toxicant Results:

Reference Toxicant ID: PP106
Stock Solution ID: n/a
Date Initiated: Feb 11/15
7-d EC50 (95% CL): 6.0 (5.3-6.9) (5.2-6.8) g/L NaCl
7-d IC50 (95% CL): 4.8 (4.0-5.9) g/L NaCl

Survival:

Reference Toxicant Mean and Historical Range: 4.4 (3.5-5.6) CV (%): 12

Biomass:

Reference Toxicant Mean and Historical Range: 3.9 (2.9-5.2) CV (%): 16

Test Results:

	Survival	Biomass
LC25 % (v/v) (95% CL)	>100	>100
LC50 % (v/v) (95% CL)	>100	>100
IC25 % (v/v) (95% CL)	>100	>100
IC50 % (v/v) (95% CL)	>100	>100

Reviewed by: JOU

Date reviewed: March 4/15

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: OUR-1
 Work Order #: 15082

Start Date & Time: Feb 11/15 @ 1400h
 Stop Date & Time: Feb 18/15 @ 1300h
 Test Species: Pimephales promelas

7-(V/V) Concentration Control	Days													
	0	1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	24.0	24.0	24.0	25.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
DO (mg/L)	7.8	5.5	7.8	5.6	8.1	5.9	7.7	5.1	7.8	5.0	7.8	6.3	7.9	5.5
pH	8.0	7.5	7.9	7.5	7.9	7.4	7.9	7.5	7.9	7.2	7.9	7.3	7.7	7.2
Cond. (µS/cm)	308	309		332		331		336		339		356		349
Initials	YLP	YLP		YLP		JW		YML		EMM		KJL		KJL

Concentration 1.56	Days													
	0	1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
DO (mg/L)	7.8	5.5	7.9	5.4	8.1	4.8	7.5	5.2	7.4	5.1	7.8	6.3	7.8	5.2
pH	8.0	7.5	7.9	7.5	7.9	7.4	7.8	7.4	7.9	7.4	7.9	7.3	7.9	7.4
Cond. (µS/cm)	305	306		309		328		330		330		336		355
Initials	YLP	YLP		YLP		JW		YML		EMM		KJL		KJL

Concentration 12.5	Days													
	0	1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
DO (mg/L)	7.8	5.5	7.9	5.6	8.2	5.1	7.7	5.1	7.3	5.0	7.8	6.2	7.8	5.3
pH	8.0	7.5	7.9	7.4	8.0	7.4	7.9	7.4	8.0	7.5	7.9	7.3	7.9	7.3
Cond. (µS/cm)	303	303		305		306		306		306		311		325
Initials	YLP	YLP		YLP		JW		YML		EMM		KJL		KJL

Concentration 100	Days													
	0	1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
DO (mg/L)	7.8	5.7	8.2	5.6	8.3	4.9	8.4	5.5	8.4	5.0	8.4	6.3	8.2	5.1
pH	7.8	7.5	7.7	7.4	7.8	7.4	7.6	7.3	7.6	7.5	7.7	7.2	7.7	7.2
Cond. (µS/cm)	122	121		122		121		122		122		121		122
Initials	YLP	YLP		YLP		JW		YML		EMM		KJL		KJL

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6.5 to 8.5

DO meter: 3 pH meter: 3 Conductivity meter: 3

	Control	100-(V/V)		
Hardness*	80	60		
Alkalinity*	60	59		

Analysts: KJL, JW, YML

Reviewed by: JW

Date reviewed: March 9/15

* mg/L as CaCO3

Sample Description: Clear

Comments: _____

7-d Fathead Minnow Toxicity Test Daily Survival

Client: Mount Polley
 Sample ID: QRK-1
 Work Order #: 15082

Start Date & Time: Feb 11/15 @ 1400h
 Stop Date & Time: Feb 18/15 @ 1300h
 Test Species: Pimephales promelas

Concentration % (v/v)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	8	8	8	8	
1.56	A	10	10	10	9	9	9	9	
	B	10	10	10	10	9	9	9	
	C	10	10	9	9	9	9	9	
3.1	A	10	10	10	10	9	9	9	
	B	10	10	10	10	9	9	9	
	C	10	10	10	10	10	10	10	
6.25	A	10	10	10	10	10	10	10	
	B	10	10	10	8	8	8	8	
	C	10	10	10	10	10	6	10	
12.5	A	10	10	10	10	10	10	10	
	B	10	10	10	8	6	6	6	
	C	10	10	10	9	9	9	9	
25	A	10	10	10	9	9	9	9	
	B	6	6	10	10	10	10	6	
	C	10	10	10	10	10	10	10	
50	A	10	10	10	10	10	10	10	
	B	10	10	10	10	9	9	9	
	C	10	10	10	10	10	10	10	
100	A	10	10	10	10	10	9	9	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
	A								
	B								
	C								
	A								
	B								
	C								
Tech Initials		KJL	KJL	JW	YLV	KJL	KJL	KJL	

Comments: _____

Reviewed by: JGh Date reviewed: March 9/15

Fathead Minnow Toxicity Test Data Sheet

Dry Weight Data

Client: Mount Polley

Start Date & Time: Feb 11/15 @ 1400h

Sample ID: QUR-1

Termination Date & Time: Feb 18/15 @ 1300h

Work Order No.: 15082

Concentration % (V/V)	Rep	02 Pan No. Blue	No. alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control	A	1	10	KSL	979.15	987.23	10	KSL
	B	2	10		963.97	972.20	10	
	C	3	8		956.95	963.88	8	
1.56	A	4	9		986.51	993.70	9	
	B	5	9		965.05	971.51	9	
	C	6	9		969.49	977.32	9	
3.1	A	7	9		990.40	997.78	9	
	B	8	9		966.60	973.52	9	
	C	9	10		976.11	983.93	10	
6.25	A	10	10		952.15	960.24	10	
	B	11	8		978.78	984.72	8	
	C	12	10		963.68	972.60	10	
12.5	A	13	10		965.47	973.88	10	
	B	14	6		974.19	979.80	6	
	C	15	9		962.41	969.59	9	
25	A	16	9		964.75	972.51	9	
	B	17	10		962.13	969.68	10	
	C	18	10		955.71	964.14	10	
50	A	19	10		951.92	960.83	10	
	B	20	9		962.61	969.70	9	
	C	21	10		954.17	961.00	10	
100	A	22	9		961.80	968.52	9	
	B	23	10		973.75	982.11	10	
	C	24	10	✓	974.14	981.20	10	✓

Comments: pans re-weighed - 5 - 971.56

13 - 973.91

20 - 969.74

Reviewed by: JGW

Date Reviewed: March 9/15

CETIS Analytical Report

Report Date: 19 Feb-15 16:37 (p 1 of 2)
 Test Code: 15082 | 10-6265-6163

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 20-8899-4611	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 19 Feb-15 16:37	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 17-3099-7619	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 11 Feb-15 14:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 18 Feb-15 13:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 08-5794-9603	Code: 332345A3	Client: Mount Polley
Sample Date: 10 Feb-15 09:30	Material: Water Sample	Project:
Receive Date: 11 Feb-15 08:30	Source: Mount Polley (MT POLLEY)	
Sample Age: 28h (4 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	580383	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	3	0.9333	0.8	1	0.06667	0.1155	12.37%	0.0%	28	30
1.56		3	0.9	0.9	0.9	0	0	0.0%	3.57%	27	30
3.1		3	0.9333	0.9	1	0.03333	0.05773	6.19%	0.0%	28	30
6.25		3	0.9333	0.8	1	0.06667	0.1155	12.37%	0.0%	28	30
12.5		3	0.8333	0.6	1	0.1202	0.2082	24.98%	10.71%	25	30
25		3	0.9667	0.9	1	0.03333	0.05773	5.97%	-3.57%	29	30
50		3	0.9667	0.9	1	0.03333	0.05773	5.97%	-3.57%	29	30
100		3	0.9667	0.9	1	0.03333	0.05773	5.97%	-3.57%	29	30

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	1	1	0.8
1.56		0.9	0.9	0.9
3.1		0.9	0.9	1
6.25		1	0.8	1
12.5		1	0.6	0.9
25		0.9	1	1
50		1	0.9	1
100		0.9	1	1

CETIS Analytical Report

Report Date: 19 Feb-15 16:37 (p 2 of 2)
Test Code: 15082 | 10-6265-6163

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

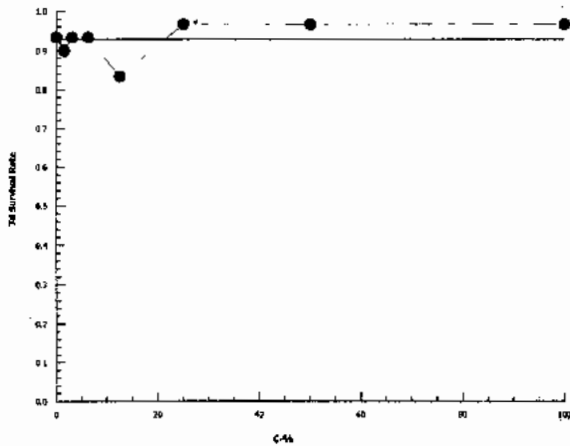
Analysis ID: 20-8899-4611 Endpoint: 7d Survival Rate
Analyzed: 19 Feb-15 16:37 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	10/10	10/10	8/10
1.56		9/10	9/10	9/10
3.1		9/10	9/10	10/10
6.25		10/10	8/10	10/10
12.5		10/10	6/10	9/10
25		9/10	10/10	10/10
50		10/10	9/10	10/10
100		9/10	10/10	10/10

Graphics



CETIS Analytical Report

Report Date: 23 Feb-15 16:28 (p 1 of 2)
 Test Code: 15082 | 10-6265-6163

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 01-1601-1049	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 23 Feb-15 16:28	Analysis: Nonlinear Regression	Official Results: Yes
Batch ID: 17-3099-7619	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 11 Feb-15 14:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 18 Feb-15 13:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 08-5794-9603	Code: 332345A3	Client: Mount Polley
Sample Date: 10 Feb-15 09:30	Material: Water Sample	Project:
Receive Date: 11 Feb-15 08:30	Source: Mount Polley (MT POLLEY)	
Sample Age: 28h (4 °C)	Station: QUR-1	

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Log-Logistic EV [Y=A/(1+(X/D)^C)]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
63	47.1	-87.01	-84.67		Yes	0.394	2.852	0.8457	Non-Significant Lack of Fit

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	645.4	N/A	1.01E+08	0.155	0.0000009	NA
IC10	41400	N/A	N/A	0.002416	NA	NA
IC15	544300	N/A	N/A	0.0001837	NA	NA
IC20	3787000	N/A	N/A	0.0000264	NA	NA
IC25	18790000	N/A	N/A	0.0000053	NA	NA
IC40	89220000	N/A	N/A	0.0000001	NA	NA
IC50	85330000	N/A	N/A	0.0000000	NA	NA

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	0.7598	0.05248	0.657	0.8627	14.48	<0.0001	Significant Parameter
C	0.1796	0.9065	-1.597	1.956	0.1981	0.8449	Non-Significant Parameter
D	8.53E+09	7.96E+11	-1.6E+12	1.57E+12	0.01072	0.9915	Non-Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	0	0	1	0	1.0000	Non-Significant
Lack of Fit	0.019105	0.003821	5	0.394	0.8457	Non-Significant
Pure Error	0.155163	0.009698	16			
Residual	0.174267	0.008298	21			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	4.788	14.07	0.6859	Equal Variances
	Mod Levene Equality of Variance	0.8106	3.5	0.6026	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9775	0.9169	0.8454	Normal Distribution
	Anderson-Darling A2 Normality	0.2283	2.492	0.8492	Normal Distribution

CETIS Analytical Report

Report Date: 23 Feb-15 16:28 (p 2 of 2)
 Test Code: 15082 | 10-6265-6163

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 01-1601-1049 Endpoint: Mean Dry Biomass-mg
 Analyzed: 23 Feb-15 16:28 Analysis: Nonlinear Regression

CETIS Version: CETISv1.8.7
 Official Results: Yes

Mean Dry Biomass-mg Summary

Calculated Variate

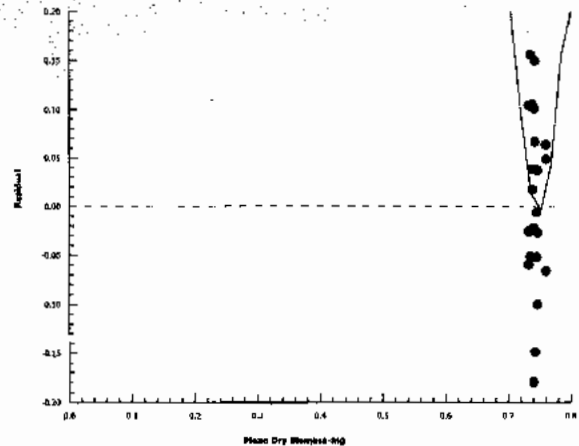
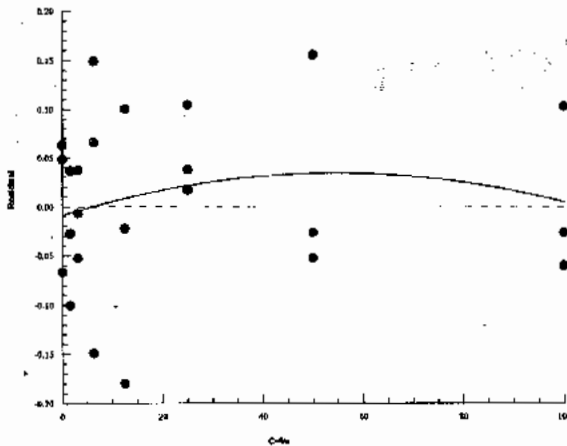
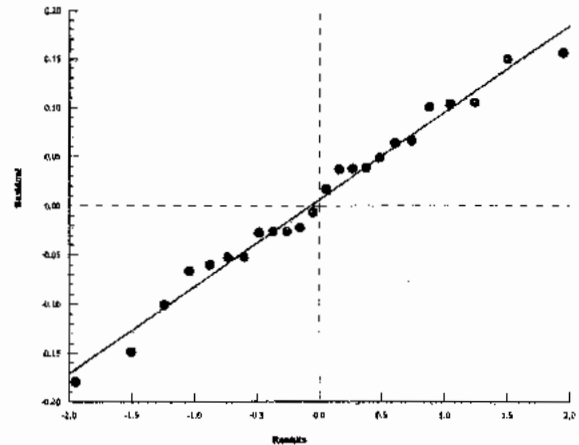
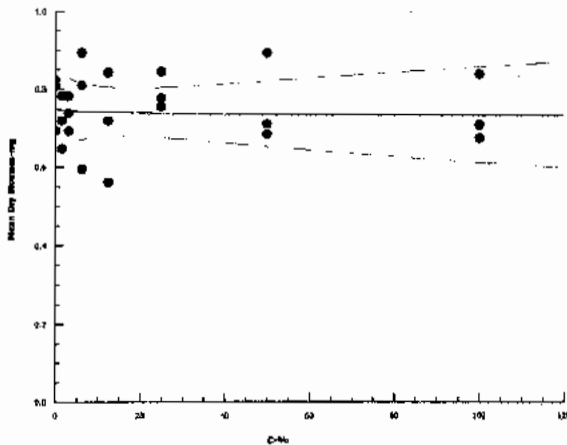
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.7747	0.693	0.823	0.04106	0.07112	9.18%	0.0%
1.56		3	0.718	0.646	0.783	0.03958	0.06855	9.57%	7.57%
3.1		3	0.7373	0.692	0.782	0.02598	0.045	6.1%	4.82%
6.25		3	0.765	0.594	0.892	0.08879	0.1538	20.1%	1.25%
12.5		3	0.7067	0.561	0.841	0.08103	0.1403	19.86%	8.78%
25		3	0.7913	0.755	0.843	0.02653	0.04596	5.81%	-2.15%
50		3	0.761	0.683	0.891	0.06543	0.1133	14.89%	1.76%
100		3	0.738	0.672	0.836	0.04997	0.08655	11.73%	4.73%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.808	0.823	0.693
1.56		0.719	0.646	0.783
3.1		0.738	0.692	0.782
6.25		0.809	0.594	0.892
12.5		0.841	0.561	0.718
25		0.776	0.755	0.843
50		0.891	0.709	0.683
100		0.672	0.836	0.706

Graphics

3P Log-Logistic EV [Y=A/(1+(X/D)^C)]



CETIS Analytical Report

Report Date: 25 Feb-15 16:46 (p 1 of 2)
 Test Code: 15082 | 10-6265-6163

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 10-6380-9298	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 25 Feb-15 16:46	Analysis: Nonlinear Regression	Official Results: Yes
Batch ID: 17-3099-7619	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 11 Feb-15 14:00	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 18 Feb-15 13:00	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 08-5794-9603	Code: 332345A3	Client: Mount Polley
Sample Date: 10 Feb-15 09:30	Material: Water Sample	Project:
Receive Date: 11 Feb-15 08:30	Source: Mount Polley (MT POLLEY)	
Sample Age: 28h (4 °C)	Station: QUR-1	

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Log-Logistic EV [Y=A/(1+(X/D)^C)]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
32	55.97	-104.7	-102.4	0.0046	Yes	0.4513	2.852	0.8062	Non-Significant Lack of Fit

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	81.89	N/A	138.8	1.221	0.7206	NA
IC10	123.7	N/A	252.2	0.8082	0.3966	NA
IC15	159.8	N/A	506.8	0.6259	0.1973	NA
IC20	193.7	N/A	1708	0.5164	0.05853	NA
IC25	227	N/A	N/A	0.4405	NA	NA
IC40	332.9	N/A	N/A	0.3004	NA	NA
IC50	416.5	N/A	N/A	0.2401	NA	NA

7100%b(viv)

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	0.8178	0.01734	0.7838	0.8518	47.17	<0.0001	Significant Parameter
C	1.81	3.224	-4.509	8.129	0.5615	0.5804	Non-Significant Parameter
D	416.5	1078	-1696	2529	0.3864	0.7031	Non-Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	0.008342	0.008342	1	2.105	0.1616	Non-Significant
Lack of Fit	0.010285	0.002057	5	0.4513	0.8062	Non-Significant
Pure Error	0.072920	0.004558	16			
Residual	0.083205	0.003962	21			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	4.118	14.07	0.7661	Equal Variances
	Mod Levene Equality of Variance	1.857	3.5	0.2022	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9855	0.9169	0.9720	Normal Distribution
	Anderson-Darling A2 Normality	0.1939	2.492	0.9430	Normal Distribution

CETIS Analytical Report

Report Date: 25 Feb-15 16:46 (p 2 of 2)
 Test Code: 15082 | 10-6265-6163

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 10-6380-9298
 Analyzed: 25 Feb-15 16:46

Endpoint: Mean Dry Weight-mg
 Analysis: Nonlinear Regression

CETIS Version: CETISv1.8.7
 Official Results: Yes

Mean Dry Weight-mg Summary

Calculated Variate

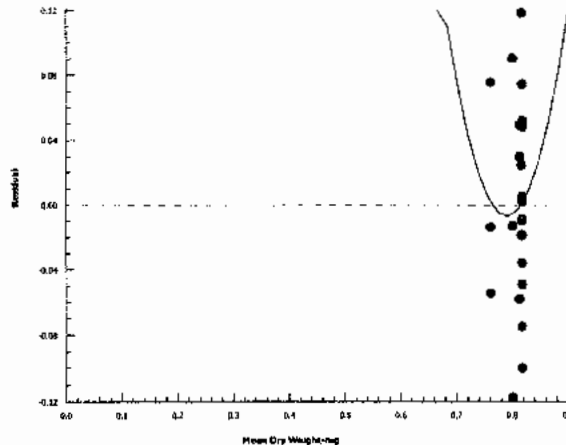
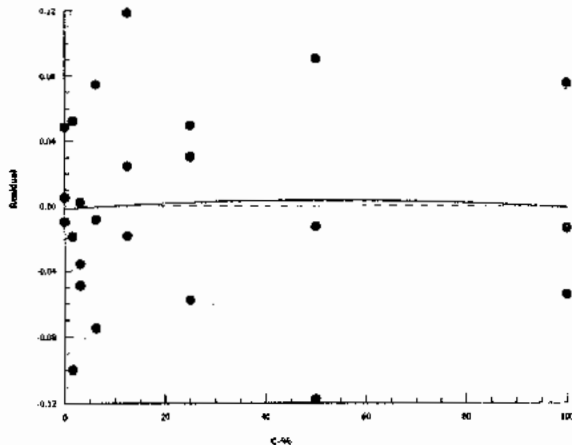
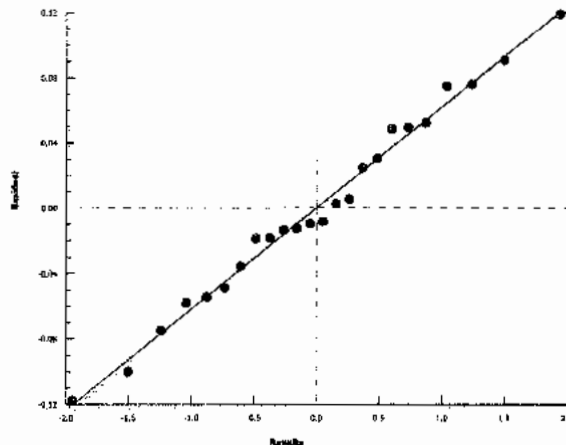
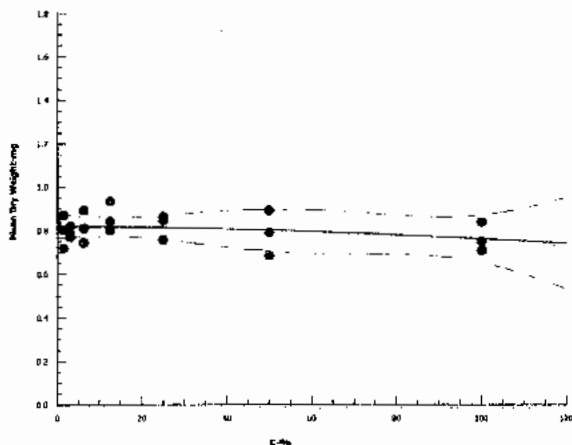
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.8324	0.808	0.8662	0.01746	0.03025	3.63%	0.0%
1.56		3	0.7955	0.7178	0.87	0.04397	0.07617	9.57%	4.43%
3.1		3	0.7903	0.7689	0.82	0.01533	0.02654	3.36%	5.06%
6.25		3	0.8145	0.7425	0.892	0.04325	0.0749	9.2%	2.15%
12.5		3	0.8579	0.7978	0.935	0.0405	0.07016	8.18%	-3.07%
25		3	0.8201	0.755	0.8622	0.03301	0.05717	6.97%	1.48%
50		3	0.7873	0.683	0.891	0.06005	0.104	13.21%	5.42%
100		3	0.7629	0.706	0.836	0.03839	0.0665	8.72%	8.35%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.808	0.823	0.8662
1.56		0.7989	0.7178	0.87
3.1		0.82	0.7689	0.782
6.25		0.809	0.7425	0.892
12.5		0.841	0.935	0.7978
25		0.8622	0.755	0.843
50		0.891	0.7878	0.683
100		0.7467	0.836	0.706

Graphics

3P Log-Logistic EV [Y=A/(1+(X/D)^C)]



Client: Mt. Polley

W.O.#: 15082

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
QUR-1	Feb 10/15	50	2.8	2.9	54	50	3.0	60	MLJ
MHW control 020615	Feb 11/15	50	3.1	3.2	60	50	4.0	90	JW

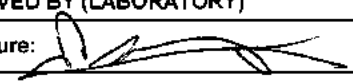
Notes: _____

Reviewed by: JGW

Date Reviewed: March 9/15

APPENDIX C - Chain of Custody Form

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

Sample Collection By: Mclean Donohoe, Shauna Litke							ANALYSES REQUIRED										Receipt Temperature (°C)						
Report to:			Invoice to:				Fathead minnow survival and growth	C. Dubia S&R															
Company: Mount Polley Mining Corporation			Company: Mount Polley Mining Corporation																				
Address: Box 12			Address: Box 12																				
City/Prov/Postal Code: Likely BC V0L 1N0			City/Prov/Postal Code: Likely BC V0L 1N0																				
Contact: Colleen Hughes			Contact: Colleen Hughes/																				
Phone: (250) 790-2617			Phone: (250) 790-2617																				
Email: chughes@mountpolley.com			Email: chughes@mountpolley.com																				
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS																	
1 QUR-1	10/02/2015	9:30	water	20L	2	40L Total	X	X												4°C			
2																							
3																							
4																							
5																							
6																							
7																							
8																							
9																							
10																							
PROJECT INFORMATION			SAMPLE RECEIPT		RELIQUINSHED BY (CLIENT)				RELIQUINSHED BY (COURIER)														
Client: Mount Polley Mining Corporation			Total # Containers: 2		Signature:				Signature:														
P.O. No.:			Good Condition? yes		Print: Mclean Donohoe				Print:														
Shipped Via: Greyhound			Matches Schedule? yes		Company: MPMC				Company:														
					Time/Date: 10/02/2015 15:30:00				Time/Date:														
SPECIAL INSTRUCTIONS/COMMENTS:							RECEIVED BY (COURIER)				RECEIVED BY (LABORATORY)												
							Signature:				Signature: 												
							Print:				Print: EMMA MARKUS												
							Company:				Company: NAUTILUS ENVIRONMENTAL												
							Time/Date:				Time/Date: Feb 11/15 @ 8:30h												

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 8

Toxicity testing of samples identified as QUR-1 and QUL-66-0M on *Ceriodaphnia dubia* and fathead minnows: Samples collected March 2 and 3, 2015, Work Order #15134, 15135, 15137, 15139



Nautilus Environmental

Toxicity testing on samples identified as QUR-1 and QUL-66-0M on *Ceriodaphnia dubia* and fathead minnows

Samples collected March 2 and 3, 2015

Final Report

Report date: May 7, 2015

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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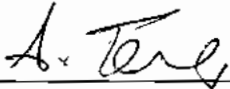
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- APPENDIX B – Fathead Minnow (*Pimephales promelas*) Toxicity Test Data
- APPENDIX C – Chain of Custody Form

SIGNATURE PAGE



Krysta Pearcy, B.Sc.
Laboratory Biologist



Armando Tang, R.P.Bio.
Laboratory Manager

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted toxicity tests for Mount Polley Mining Corporation on samples identified as QUR-1 and QUL-66-0M. The samples were collected on March 2 and 3, 2015 and delivered to the laboratory in Burnaby, BC on March 4, 2015. QUR-1 was transported in two, and QUL-66-0M in three 20-L plastic carboys and coolers. The samples were received at a temperature of 2.5°C, and were stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing. The following sub-lethal toxicity tests were performed on the samples:

- *Ceriodaphnia dubia* survival and reproduction
- 7-d rainbow trout (*Oncorhynchus mykiss*) survival and growth
- 7-d fathead minnow (*Pimephales promelas*) survival and growth

Several protocol deviations occurred during the 7-d rainbow trout survival and growth test. During the QA review of the data, the deviations were determined to invalidate the test results. Therefore, the data for this test is not provided in this report.

Sample QUL-66-0M was vacuum filtered through 0.45 µm filter paper and tested in addition to the unfiltered sample for the *C. dubia* toxicity test.

This report describes the results of the *C. dubia* and fathead minnow toxicity tests. Copies of laboratory data sheets and printouts of statistical analyses for each test are provided in Appendices A and B. The chain-of-custody form is provided in Appendix C.

2.0 METHODS

Methods for the toxicity tests are summarized in Tables 1 and 2. Testing was conducted according to procedures described by the Environment Canada protocols (2007 and 2011). Statistical analyses for all tests were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house culture
Test organism age	<24 h old neonates produced within 12 h
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20 mL test tube
Test volume	15 mL
Test replicates	10 test replicates per treatment
Number of organisms	1 per replicate
Control water	20% Perrier water
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	<i>Pseudokirchneriella subcapitata</i> and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada, (2007) EPS 1/RM/21
Statistical software	CETIS (2013)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods
Reference toxicant	Sodium chloride

Table 2. Summary of test conditions: fathead minnow (*Pimephales promelas*) survival and growth test.

Test organism	<i>Pimephales promelas</i>
Test organism source	Aquatic BioSystems, Fort Collins, CO
Test organism age	<24 hours
Test type	Static renewal
Test duration	7 days
Test vessel	375-mL glass containers
Test volume	250 mL
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control water	Moderately-hard water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	Twice a day with newly hatched brine shrimp (<i>Artemia nauplii</i>)
Light intensity	100 – 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test protocol	Environment Canada (2011), EPS 1/RM/22
Statistical software	CETIS (2013)
Test endpoint	Survival and biomass
Test acceptability criteria for controls	≥80% survival, ≥250 µg mean dry weight
Reference toxicant	Sodium chloride

3.0 RESULTS

Results of the toxicity tests conducted on samples QUR-1 and QUL-66-0M using *C. dubia* and fathead minnow are provided in Tables 3 and 4. No adverse effects on *C. dubia* or fathead minnow survival were observed in the samples, resulting in LC50 values of >100%. There were no adverse effects on fathead minnow biomass or dry weight; the IC25 values were >100%.

A reduction in *C. dubia* reproduction was observed in both samples; the IC25 values were 95.9 and 74.2% for QUR-1 and QUL-66-0M, respectively. The corresponding filtered sample for QUL-66-0M exhibited no toxicity with an IC25 value of >100%.

Table 3. Results: *Ceriodaphnia dubia* survival and reproduction test.

Concentration (% v/v)	QUR-1		QUL-66-0M (Unfiltered)		QUL-66-0M (Filtered)	
	Survival (%)	Reproduction (mean ± SD)	Survival (%)	Reproduction (mean ± SD)	Survival (%)	Reproduction (mean ± SD)
Control	100	25.6 ± 2.3	100	25.4 ± 4.9	100	23.7 ± 6.9
1.56	100	24.9 ± 6.7	100	25.6 ± 4.3	100	27.8 ± 2.5
3.12	100	25.1 ± 3.1	100	23.6 ± 3.2	100	24.4 ± 7.8
6.25	100	26.3 ± 1.2	90	19.3 ± 8.6	100	24.3 ± 3.9
12.5	100	23.7 ± 3.7	100	21.9 ± 4.1	100	25.4 ± 4.2
25	90	23.4 ± 8.5	100	21.1 ± 4.9	100	25.5 ± 6.6
50	100	22.3 ± 5.4	100	21.7 ± 3.8	100	24.4 ± 4.5
100	100	19.0 ± 5.3	100	17.7 ± 3.9	100	25.5 ± 5.1
Test Endpoint (% v/v)						
LC50	>100	--	>100	--	>100	--
IC25 (95% CL)	--	95.9 (50.0-N/A)	--	74.2 (5.7-N/A)	--	>100
IC50	--	>100	--	>100	--	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits, N/A = Not Available.

Table 4. Results: fathead minnow (*Pimephales promelas*) survival and growth test.

Concentration (% v/v)	Mean ± SD					
	QUR-1			QUL-66-0M		
	Survival (%)	Biomass (µg)	Dry Weight (µg)	Survival (%)	Biomass (µg)	Dry Weight (µg)
Control	100.0 ± 0.0	625.0 ± 13.0	625.0 ± 13.0	100.0 ± 0.0	639.7 ± 22.5	639.7 ± 22.5
1.56	100.0 ± 0.0	616.3 ± 20.4	616.3 ± 20.4	100.0 ± 0.0	613.7 ± 57.7	613.7 ± 57.7
3.1	100.0 ± 0.0	602.0 ± 43.9	602.0 ± 43.9	100.0 ± 0.0	625.7 ± 22.5	625.7 ± 22.5
6.25	96.7 ± 5.8	615.0 ± 25.2	636.7 ± 15.1	100.0 ± 0.0	617.0 ± 25.1	617.0 ± 25.1
12.5	100.0 ± 0.0	621.7 ± 29.5	621.7 ± 29.5	100.0 ± 0.0	628.7 ± 20.0	628.7 ± 20.0
25	100.0 ± 0.0	630.0 ± 1.0	630.0 ± 1.0	96.7 ± 5.8	582.7 ± 12.5	604.7 ± 49.3
50	100.0 ± 0.0	615.7 ± 19.3	615.7 ± 19.3	96.7 ± 5.8	621.3 ± 36.8	642.8 ± 3.5
100	96.7 ± 5.8	588.3 ± 65.2	608.4 ± 52.2	100.0 ± 0.0	548.0 ± 35.5	548.0 ± 35.5
Test endpoint						
(% v/v)						
LC50	>100	--	--	>100	--	--
IC25	--	>100	>100	--	>100	>100
IC50	--	>100	>100	--	>100	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

4.0 QA/QC

The health history of the test organisms used in the exposures was acceptable and met the requirements of the protocols. The tests met all control acceptability criteria and water quality parameters remained within ranges specified in the protocols throughout the tests. There were no deviations from the test methodologies. Uncertainty associated with these tests is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

Results of the reference toxicant tests conducted during the testing program are summarized in Table 5. Results for these tests fell within the range for organism performance of mean and two standard deviation range, based on historical results obtained by the laboratory with these tests. Thus, the sensitivity of the organisms used in these tests was appropriate.

Table 5. Reference toxicant results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>C. dubia</i>	Survival (LC50): 2.0 g/L NaCl	2.0 (1.6 - 2.4)	11	February 25, 2015
	Reproduction (IC50): 1.4 g/L NaCl	1.5 (1.1 - 2.0)	16	
<i>P. promelas</i>	Survival (LC50): 5.6 g/L NaCl	4.4 (3.4 - 5.8)	14	March 4, 2015
	Biomass (IC50): 4.6 g/L NaCl	3.9 (2.9 - 5.2)	16	

SD = Standard Deviation, CV = Coefficient of Variation, IC = Inhibition Concentration, LC = Lethal Concentration.

5.0 REFERENCES

- Environment Canada. 2007. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. Report EPS 1/RM/21, Second Edition, February 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 74 pp.
- Environment Canada. 2011. Biological test method: test of larval growth and survival using fathead minnows. Environmental Protection Series, Report EPS 1/RM/22. February 2011,. Environment Canada, Environmental Protection, Conservation and Protection, Ottawa, ON. 73 pp.
- Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.4.29 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: Mount Kelly
 Work Order No.: 15135

Start Date/Time: March 4/15 @ 1300h
 Set up by: EMM

Sample Information:

Sample ID: 042-1
 Sample Date: March 3/15
 Date Received: March 4/15
 Sample Volume: 40L and 16L
(2x20L) (4x4L)

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 021915
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 40
 Mortality (%) in previous 7 d: 0
 Individual female # used ≥ 8 young on test day: 16, 17, 18, 19, 20

NaCl Reference Toxicant Results:

Reference Toxicant ID: 0d126
 Stock Solution ID: 15 NaCl
 Date Initiated: Feb 25/15

7-d LC50 (95% CL): 2.0 (1.7-2.3) g/L NaCl
 7-d IC50 (95% CL): 1.4 (1.2-1.7) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 2.0 (1.6-2.4) g/L NaCl CV (%): 11
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.5 (1.1-2.0) g/L NaCl CV (%): 16

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	>100	50.0
IC25 % (v/v) (95% CL)		95.9 (38.6 - MA)
IC50 % (v/v) (95% CL)		>100

Reviewed by: JOH

Date reviewed: Apr. 15/15

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: OUR-7
 Work Order #: 15135

Start Date & Time: March 4/15 @ 1200
 Stop Date & Time: March 10/15 @ 1630
 Test Species: Ceriodaphnia dubia

Concentration <i>Control</i>	Days															
	0		1		2		3		4		5		Final 6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.0	25.0			
DO (mg/L)	8.0	7.9	8.0	7.8	8.2	7.7	8.1	7.8	8.1	7.3	8.0	6.9				
pH	8.0	7.8	7.9	7.8	7.9	7.7	8.0	7.7	8.0	7.4	8.0	7.7				
Cond. (µS/cm)	221	224		224		222		222		224		232				
Initials	EMM	EMM		ML7		EMM		EMM		EMM		EMM				

(VIV)

Concentration <i>1.56</i>	Days															
	0		1		2		3		4		5		Final 6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	24.0	25.0			
DO (mg/L)	8.0	7.8	8.1	7.8	8.2	7.7	8.2	7.5	8.1	7.4	8.2	6.8				
pH	7.8	7.8	7.9	7.8	7.7	7.7	7.8	7.8	7.9	7.4	7.9	7.6				
Cond. (µS/cm)	219	218		222		220		218		225		228				
Initials	EMM	EMM		ML7		EMM		EMM		EMM		EMM				

(VIV)

Concentration <i>12.5</i>	Days															
	0		1		2		3		4		5		Final 6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	24.0	25.0			
DO (mg/L)	7.9	7.8	8.1	7.7	8.2	7.7	8.2	7.3	8.1	7.5	8.2	6.8				
pH	7.7	7.7	7.7	7.8	7.7	7.4	7.8	7.7	7.9	7.4	7.9	7.6				
Cond. (µS/cm)	213	214		213		215		211		216		214				
Initials	EMM	EMM		ML7		EMM		EMM		EMM		EMM				

(VIV)

Concentration <i>100%</i>	Days															
	0		1		2		3		4		5		Final 6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	24.0	25.0			
DO (mg/L)	7.9	7.8	8.1	7.7	8.2	7.7	8.2	7.4	8.1	7.5	8.2	6.8				
pH	7.5	7.7	7.5	7.3	7.5	7.2	7.5	7.6	7.6	7.1	7.6	7.2				
Cond. (µS/cm)	123	126		125		126		123		125		128				
Initials	EMM	EMM		ML7		EMM		EMM		EMM		EMM				

	Control	<i>100% (VIV)</i>		
Hardness*	100	60		
Alkalinity*	88	50		

Analysts: MLT, AUD, EMM
 Reviewed by: Joe
 Date reviewed: Apr. 13/15

* mg/L as CaCO₃

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5

Sample Description: clear

Comments: Broodboard Used: 021915 (16-20)

Chronic Freshwater Toxicity Test
C. dubia Reproduction Data

Client: Mount Polley
Sample ID: CLR-1
Work Order: 15135

Start Date & Time: March 4/15 @ 1200
Stop Date & Time: March 10/15 @ 1630h
Set up by: EMM

90 (CVIV)

Days	Concentration: <u>control</u>												Concentration: <u>1.56</u>												Concentration: <u>3.12</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7			
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
4	3	4	3	3	2	✓	3	4	3	2	A	3	3	4	3	3	3	4	3	3	3	A	4	3	3	4	3	3	3	4	3	3	A			
5	12	10	12	10	9	11	11	12	8	8	EC	10	11	10	10	3	9	10	13	11	11	EC	14	13	10	11	10	13	13	12	14	12	EC			
6	12	12	14	13	15	12	14	10	12	12	EMM	14	15	14	13	✓	13	12	12	13	13	EMM	14	13	10	11	10	13	13	12	14	12	EMM			
7																																				
8																																				
Total	27	26	29	26	26	23	28	26	23	22	EMM	27	29	28	26	6	25	26	28	27	27	EMM	29	27	24	28	19	24	26	27	28	21	EMM			

Days	Concentration: <u>6.25</u>												Concentration: <u>12.5</u>												Concentration: <u>25</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	ML7			
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
4	3	4	4	3	2	3	3	2	3	3	A	3	3	5	3	3	3	2	3	3	3	A	3	3	2	3	3	3	2	3	3	3	A			
5	11	10	10	12	11	10	10	10	12	11	EC	10	11	13	10	12	9	8	11	10	8	EC	11	11	11	11	7	10	9	9	12	12	EC			
6	14	13	11	12	12	13	12	14	13	12	EMM	13	11	✓	12	13	10	11	14	13	10	EMM	15	14	14	13	14	12	11	12	13	13	EMM			
7																																				
8																																				
Total	28	27	25	27	25	26	25	26	28	26	EMM	26	25	18	25	28	22	21	28	26	18	EMM	29	28	27	27	24	25	22	24	28	28	EMM			

Days	Concentration: <u>50</u>												Concentration: <u>100</u>												Concentration:											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM														
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7														
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM														
4	4	3	3	2	3	3	3	4	3	3	A	3	✓	4	3	3	3	2	3	3	3	A														
5	11	9	10	10	11	9	10	9	10	10	EC	10	5	7	✓	8	7	6	7	8	8	EC														
6	12	10	12	✓	13	13	✓	12	11	10	EMM	12	10	10	8	11	12	10	✓	12	12	EMM														
7																																				
8																																				
Total	27	22	25	12	27	25	13	28	24	23	EMM	25	15	21	11	22	22	18	10	28	23	EMM														

Notes: X = mortality.

Sample Description: clear
Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JG Date reviewed: Apr. 13/15

CETIS Analytical Report

Report Date: 16 Mar-15 11:35 (p 1 of 2)
 Test Code: 15135 | 03-7876-5932

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 11-3862-5311	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 16 Mar-15 11:34	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 00-2437-5686	Test Type: Reproduction-Survival (7d)	Analyst: Emma Marus
Start Date: 04 Mar-15 12:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 10 Mar-15 16:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 4h	Source: In-House Culture	Age: <24h
Sample ID: 03-3317-7950	Code: 13DBE45E	Client: Mount Polley
Sample Date: 03 Mar-15 11:45	Material: Water Sample	Project:
Receive Date: 04 Mar-15 08:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h (2.5 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1107675	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

C-%	Control Type	Count	Mean	Min	Max	Calculated Variate(A/B)					
						Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	0	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 16 Mar-15 11:35 (p 2 of 2)
 Test Code: 15135 | 03-7876-5932

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

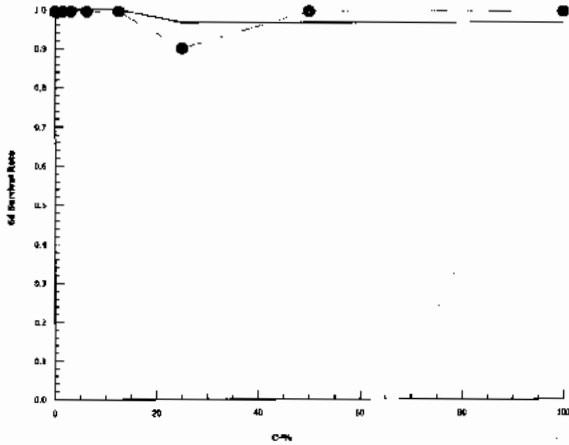
Analysis ID: 11-3862-5311 Endpoint: 6d Survival Rate
 Analyzed: 16 Mar-15 11:34 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 14 Apr-15 16:01 (p 1 of 2)
 Test Code: 15135 | 03-7876-5932

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 15-4206-8160	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 14 Apr-15 16:01	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 00-2437-5686	Test Type: Reproduction-Survival (7d)	Analyst: Emma Marus
Start Date: 04 Mar-15 12:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 10 Mar-15 16:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 4h	Source: In-House Culture	Age: <24h
Sample ID: 03-3317-7950	Code: 13DBE45E	Client: Mount Polley
Sample Date: 03 Mar-15 11:45	Material: Water Sample	Project:
Receive Date: 04 Mar-15 08:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h (2.5 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1430562	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	9.808	0.8437	51.58	10.2	1.939	118.5
IC10	31.41	8.92	61.33	3.183	1.631	11.21
IC15	56.03	14.2	79.89	1.785	1.252	7.042
IC20	73.34	21.3	N/A	1.363	NA	4.694
IC25	95.9	50	N/A	1.043	NA	2
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

C-%	Control Type	Count	Mean	Min	Max	Calculated Variate			
						Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	25.6	22	29	0.718	2.271	8.87%	0.0%
1.56		10	24.9	6	29	2.132	6.74	27.07%	2.73%
3.12		10	25.1	19	29	0.9939	3.143	12.52%	1.95%
6.25		10	26.3	25	28	0.3667	1.16	4.41%	-2.73%
12.5		10	23.7	18	28	1.184	3.743	15.79%	7.42%
25		10	23.4	0	29	2.692	8.514	36.38%	8.59%
50		10	22.3	12	27	1.707	5.397	24.2%	12.89%
100		10	19	10	25	1.673	5.292	27.85%	25.78%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	27	26	29	26	26	23	28	26	23	22
1.56		27	29	28	26	6	25	26	28	27	27
3.12		29	27	24	26	19	24	26	27	28	21
6.25		28	27	25	27	25	26	25	26	28	26
12.5		26	25	18	25	28	22	21	28	26	18
25		29	28	27	27	24	25	22	24	0	28
50		27	22	25	12	27	25	13	25	24	23
100		25	15	21	11	22	22	18	10	23	23

CETIS Analytical Report

Report Date: 14 Apr-15 16:01 (p 2 of 2)
Test Code: 15135 | 03-7876-5932

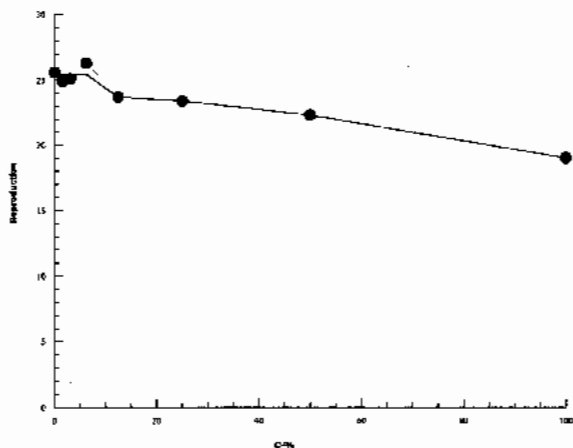
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 15-4206-8160 Endpoint: Reproduction
Analyzed: 14 Apr-15 16:01 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Client: MT. Polley

W.O.#: 15135

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
<u>OUR-1</u>	<u>March 4/15</u>	<u>50</u>	<u>2.6</u>	<u>2.7</u>	<u>50</u>	<u>50</u>	<u>3.0</u>	<u>60</u>	<u>MLT</u>
<u>20% Perrier Control</u>	<u>March 4/15</u>	<u>50</u>	<u>4.5</u>	<u>4.6</u>	<u>88</u>	<u>50</u>	<u>5.0</u>	<u>100</u>	<u>MLT</u>

Notes: _____

Reviewed by: JGU

Date Reviewed: Apr. 13/15

Ceriodaphnia dubia Summary Sheet

Client: Mount Pelley
 Work Order No.: 15139

Start Date/Time: March 4/15 @ 1230h
 Set up by: EMM

Sample Information:

Sample ID: DU-66-01 (unfiltered)
 Sample Date: March 2/15
 Date Received: March 4/15
 Sample Volume: 20 x 3

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: C22015
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 30
 Mortality (%) in previous 7 d: 0
 Individual female # used ≥ 8 young on test day: 1, 4, 6, 10, 12, 13, 15, 16

NaCl Reference Toxicant Results:

Reference Toxicant ID: CD126
 Stock Solution ID: 5% NaCl
 Date Initiated: Feb 25/15

7-d LC50 (95% CL): 2.0 (1.7-2.3) g/L NaCl
 7-d IC50 (95% CL): 1.4 (1.2-1.7) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 2.0 (1.6-2.4) g/L NaCl CV (%): 11
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.5 (1.1-2.0) g/L NaCl CV (%): 16

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	7100	
IC25 % (v/v) (95% CL)		74.2 (5.7 - N/A)
IC50 % (v/v) (95% CL)		7100

Reviewed by: JGU

Date reviewed: Apr. 13/15

**Chronic Freshwater Toxicity Test
Initial and Final Water Quality Measurements**

Client: Maint Polley
 Sample ID: QUL-66-0m (unfiltered)
 Work Order #: 15139

Start Date & Time: March 4/15 @ 1230h
 Stop Date & Time: March 10/15 @ 1330h
 Test Species: Ceriodaphnia dubia

Concentration <i>Control</i>	Days															
	0		1		2		3		4		5		Final 6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	24.0	24.0	24.0		
DO (mg/L)	8.0	7.6	8.0	7.8	8.2	7.7	8.1	7.4	8.2	7.7	8.0	7.7				
pH	8.0	7.8	7.9	7.4	7.9	7.8	8.0	7.7	8.0	7.7	8.0	7.6				
Cond. (µS/cm)	221	224	224	224	224	222		222		224		227				
Initials	EMM	EMM		MLJ		EMM		~		EMM		MLJ				

(VIV) ① 224
② 7.6

Concentration <i>1.56</i>	Days															
	0		1		2		3		4		5		Final 6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	24.0	24.0	24.0		
DO (mg/L)	8.0	7.8	8.1	7.8	8.2	7.8	8.2	7.3	8.2	7.7	8.1	7.7				
pH	8.1	7.8	8.0	7.4	7.7	7.6	7.8	7.7	7.9	7.6	7.9	7.6				
Cond. (µS/cm)	230	224	223	223	220		218		222		220					
Initials	EMM	EMM		MLJ		EMM		~		EMM		MLJ				

(VIV) ③ 7.6

Concentration <i>12.5</i>	Days															
	0		1		2		3		4		5		Final 6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	24.0	24.0	24.0		
DO (mg/L)	8.0	7.7	8.1	7.8	8.2	7.8	8.2	7.5	8.2	7.7	8.1	7.7				
pH	8.0	7.8	8.0	7.4	7.7	7.6	7.8	7.6	7.8	7.6	7.9	7.6				
Cond. (µS/cm)	211	210	218	218	218		213		212		211					
Initials	EMM	EMM		MLJ		EMM		~		EMM		MLJ				

(VIV) ④ 7.6

Concentration <i>100%</i>	Days															
	0		1		2		3		4		5		Final 6		7	
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	24.0	24.0	24.0		
DO (mg/L)	8.0	7.6	8.1	7.8	8.2	7.8	8.2	7.5	8.2	7.7	8.1	7.5				
pH	7.7	7.4	7.6	7.3	7.5	7.4	7.5	7.4	7.6	7.4	7.7	7.3				
Cond. (µS/cm)	116	117	118	118	118		118		119		121					
Initials	EMM	EMM		MLJ		EMM		~		EMM		MLJ				

	Control	<i>100% (VIV)</i>	
Hardness*	100	55	
Alkalinity*	88	48	

Analysts: MLT, AWD, EMM
 Reviewed by: Joe
 Date reviewed: Apr. 13/15

* mg/L as CaCO₃
 WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5
 Sample Description: clear

Comments: Broodboard Used: 022015 (1,4,6,10,12,13,15,16)

Chronic Freshwater Toxicity Test
C. dubia Reproduction Data

Client: Mount Polley
Sample ID: QUL-66-0m (unfiltered)
Work Order: 15139

Start Date & Time: March 4/15 @ 1230h
Stop Date & Time: March 10/15 @ 1330h
Set up by: Emm

90 (VIV)

Days	Concentration: <u>control</u>											Concentration: <u>1.56</u>											Concentration: <u>3.12</u>												
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init		
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLD	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLD	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLD
3	4	✓	✓	✓	✓	✓	✓	✓	4	✓	EMM	4	3	✓	✓	✓	✓	✓	✓	✓	4	EMM	4	✓	✓	4	✓	✓	✓	✓	✓	✓	✓	EMM	
4	3	3	3	3	4	4	✓	3	2	✓	MLD	3	✓	3	4	4	3	2	4	✓	✓	MLD	4	4	4	6	3	4	3	3	3	✓	MLD		
5	9	9	16	11	✓	✓	10	11	9	9	MLD	9	9	10	10	9	10	9	✓	9	10	MLD	8	9	9	10	✓	8	8	6	8	9	MLD		
6	16	11	16	16	14	14	14	15	15	12	MLD	11	16	16	16	12	14	11	14	11	16	MLD	16	7	12	15	14	12	13	11	12	11	MLD		
7																																			
8																																			
Total	29	23	29	30	17	18	28	30	27	23	MLD	23	29	29	29	25	28	23	16	23	30	MLD	28	20	25	29	20	23	25	26	23	23	MLD		

Days	Concentration: <u>6.25</u>											Concentration: <u>12.5</u>											Concentration: <u>25</u>												
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init		
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
2	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	MLD	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLD	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLD
3	3	4	3	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	4	EMM
4	✓	✓	✓	5	4	3	4	4	✓	3	MLD	3	3	2	3	4	3	2	3	3	3	MLD	3	4	2	2	3	3	2	2	3	✓	MLD		
5	8	8	9	✓	✓	✓	8	9	✓	7	MLD	8	9	8	12	✓	9	✓	8	8	9	MLD	9	8	6	7	8	✓	6	✓	8	9	MLD		
6	16	16	14	13	13	8	10	11	✓	10	MLD	12	10	10	13	15	12	11	14	10	12	MLD	12	15	12	11	11	10	13	13	9	16	MLD		
7																																			
8																																			
Total	27	28	26	18	17	11	22	24	X	20	MLD	23	22	20	28	19	24	13	25	21	24	MLD	24	27	20	20	22	13	21	15	20	29	MLD		

Days	Concentration: <u>50</u>											Concentration: <u>100</u>											Concentration:											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLD	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLD											
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
4	4	3	2	2	3	2	4	2	3	3	MLD	2	✓	4	2	3	3	5	4	3	3	MLD												
5	8	✓	7	6	7	6	8	8	6	8	MLD	8	6	✓	6	✓	✓	✓	7	7	✓	MLD												
6	14	11	12	12	16	11	12	15	10	12	MLD	12	11	10	11	10	13	11	13	12	11	MLD												
7																																		
8																																		
Total	26	14	21	20	26	19	24	25	19	23	MLD	22	17	14	19	13	16	16	24	22	14	MLD												

Notes: X = mortality.

Sample Description: clear
Comments: Total # Young only based on the first 3 broods. Fourth and subsequent broods not included in total count.

Reviewed by: JOB

Date reviewed: Apr. 13/15

CETIS Analytical Report

Report Date: 16 Mar-15 11:41 (p 1 of 2)
 Test Code: 15139 | 15-1679-5912

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 13-7890-1116	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 16 Mar-15 11:40	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 06-7878-0056	Test Type: Reproduction-Survival (7d)	Analyst: Emma Marus
Start Date: 04 Mar-15 12:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 10 Mar-15 13:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 1h	Source: In-House Culture	Age: <24h
Sample ID: 03-9053-9699	Code: 174729B3	Client: Mount Polley
Sample Date: 02 Mar-15 13:45	Material: Water Sample	Project:
Receive Date: 04 Mar-15 08:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 47h (2.5 °C)	Station: QUL-66-0m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	573004	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	0	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 16 Mar-15 11:41 (p 2 of 2)
 Test Code: 15139 | 15-1679-5912

Ceriodaphnia 7-d Survival and Reproduction Test

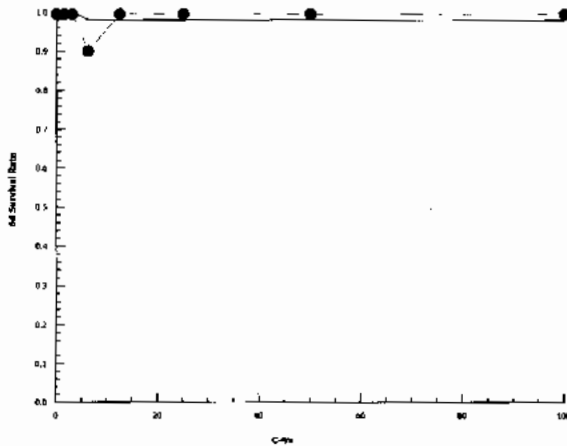
Nautilus Environmental

Analysis ID: 13-7890-1116 Endpoint: 6d Survival Rate CETIS Version: CETISv1.8.7
 Analyzed: 16 Mar-15 11:40 Analysis: Linear Interpolation (ICPIN) Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 16 Mar-15 11:41 (p 1 of 2)
 Test Code: 15139 | 15-1679-5912

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 16-7025-0546	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 16 Mar-15 11:40	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 06-7878-0056	Test Type: Reproduction-Survival (7d)	Analyst: Emma Marus
Start Date: 04 Mar-15 12:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 10 Mar-15 13:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 1h	Source: In-House Culture	Age: <24h
Sample ID: 03-9053-9699	Code: 174729B3	Client: Mount Polley
Sample Date: 02 Mar-15 13:45	Material: Water Sample	Project:
Receive Date: 04 Mar-15 08:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 47h (2.5 °C)	Station: QUL-66-0m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	164011	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	2.523	0.4757	4.35	39.63	22.99	209.8
IC10	3.745	1.181	15.18	26.7	6.588	84.69
IC15	5.261	2.497	59.84	19.01	1.671	40.05
IC20	56.75	3.54	85.12	1.762	1.175	28.25
IC25	74.19	5.669	N/A	1.348	NA	17.64
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

C-%	Control Type	Count	Mean	Min	Max	Calculated Variate			
						Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	25.4	17	30	1.543	4.881	19.22%	0.0%
1.56		10	25.6	16	30	1.368	4.326	16.9%	-0.79%
3.12		10	23.6	20	29	1.013	3.204	13.58%	7.09%
6.25		10	19.3	0	28	2.704	8.551	44.31%	24.02%
12.5		10	21.9	13	28	1.286	4.067	18.57%	13.78%
25		10	21.1	13	29	1.538	4.864	23.05%	16.93%
50		10	21.7	14	26	1.212	3.831	17.66%	14.57%
100		10	17.7	13	24	1.221	3.86	21.81%	30.31%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	29	23	29	30	17	18	28	30	27	23
1.56		23	29	29	29	25	28	23	16	24	30
3.12		28	20	25	29	20	23	25	20	23	23
6.25		27	28	26	18	17	11	22	24	0	20
12.5		23	22	20	28	19	24	13	25	21	24
25		24	27	20	20	22	13	21	15	20	29
50		26	14	21	20	26	19	24	25	19	23
100		22	17	14	19	13	16	16	24	22	14

CETIS Analytical Report

Report Date: 16 Mar-15 11:41 (p 2 of 2)
Test Code: 15139 | 15-1679-5912

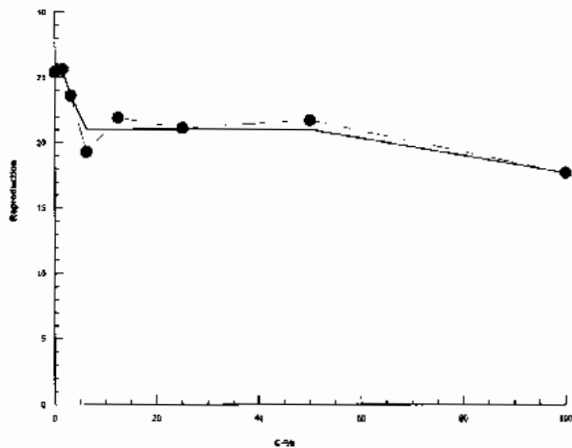
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 16-7025-0546 Endpoint: Reproduction
Analyzed: 16 Mar-15 11:40 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Ceriodaphnia dubia Summary Sheet

Client: Mount Pelley
 Work Order No.: 15139

Start Date/Time: March 4/15 00 12:15h
 Set up by: EMM

Sample Information:

Sample ID: QUL-66-01 (Filtered)
 Sample Date: March 2/15
 Date Received: March 4/15
 Sample Volume: 20 x 3

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 022015
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 30
 Mortality (%) in previous 7 d: 0
 Individual female # used ≥ 8 young on test day: 1, 4, 6, 10, 12, 13, 15, 16.

NaCl Reference Toxicant Results:

Reference Toxicant ID: Cd 126
 Stock Solution ID: 15ba01
 Date Initiated: Feb 25/15

7-d LC50 (95% CL): 2.0 (1.7-2.3) g/L NaCl
 7-d IC50 (95% CL): 1.4 (1.2-1.7) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 2.0 (1.6-2.4) g/L NaCl CV (%): 11
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.5 (1.1-2.0) g/L NaCl CV (%): 16

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	>100	>100
IC25 % (v/v) (95% CL)	>100	>100
IC50 % (v/v) (95% CL)	>100	>100

Reviewed by: JGW

Date reviewed: Apr. 13/15

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: QUL-66-0m (Filtered)
 Work Order #: 15139

Start Date & Time: March 4/15 @ 12:15h
 Stop Date & Time: March 10/15 @ 12:15h
 Test Species: Ceriodaphnia dubia

Concentration <i>control</i>	Days													
	0	1		2		3		4		5		Final 6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	8.0	7.7	8.0	7.7	8.2	7.7	8.1	7.7	8.2	7.7	8.0	7.4		
pH	8.0	7.8	7.9	7.8	7.9	7.7	8.0	7.7	8.0	7.4	8.0	7.6		
Cond. (µS/cm)	221	224		224		222		222		224		239		
Initials	EMM	EMM		MLJ		EMM				EMM		EMM		

Concentration <i>1.56%</i>	Days													
	0	1		2		3		4		5		Final 6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	7.9	7.8	8.0	7.7	8.2	7.6	8.1	7.3	8.2	7.6	8.2	7.4		
pH	7.9	7.8	7.9	7.8	7.7	7.7	8.0	7.7	7.9	7.7	7.9	7.7		
Cond. (µS/cm)	220	221		222		220		223		226		229		
Initials	EMM	EMM		MLJ		EMM				EMM		EMM		

Concentration <i>12.5%</i>	Days													
	0	1		2		3		4		5		Final 6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	7.9	7.6	8.0	7.6	8.2	7.6	8.1	7.5	8.2	7.6	8.2	7.4		
pH	7.7	7.5	7.8	7.7	7.7	7.1	7.8	7.3	7.8	7.5	7.9	7.7		
Cond. (µS/cm)	209	210		214		215		211		213		214		
Initials	EMM	EMM		MLJ		EMM				EMM		EMM		

Concentration <i>100%</i>	Days													
	0	1		2		3		4		5		Final 6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	7.9	7.0	8.0	7.6	8.2	7.6	8.1	7.5	8.2	7.7	8.2	6.1		
pH	7.5	7.5	7.5	7.6	7.5	7.2	7.5	7.3	7.6	7.3	7.6	7.2		
Cond. (µS/cm)	116	118		118		118		119		117		120		
Initials	EMM	EMM		MLJ		EMM				EMM		EMM		

	Control	<i>100% (VIV)</i>
Hardness*	100	58
Alkalinity*	88	48

Analysts: MLJ, AWD, EMM
 Reviewed by: JGW
 Date reviewed: Apr. 13/15

* mg/L as CaCO₃

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5

Sample Description: clear

Comments: Broodboard Used: 022015 (1,4,6,10,12,13,15,16)

Chronic Freshwater Toxicity Test
C. dubia Reproduction Data

Client: Mount Polley
Sample ID: QUL-66-0M (filtered)
Work Order: 15139

Start Date & Time: March 4/15 @ 12:15h
Stop Date & Time: March 10/15 @ 12:15h
Set up by: EMM

% (VIV)

Days	Concentration: <u>control</u>												Concentration: <u>1.56</u>												Concentration: <u>3.12</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
2											EMM											EMM											EMM			
3	3	4									EMM	3										EMM	3										EMM			
4			5	3	2	4	4	3	2	2	EMM		3		2	3	4	2	3	2		EMM		3		2	3	3	2				EMM			
5	9	7	9	10	9	✓	10	10	12	10	ML7	8	8	9	8	12	9	11	9	10	10	ML7	8	9	8	9	9	10	✓	9	10	10	ML7			
6	13	14	15	13	14	6	14	13	16	✓	EMM	15	15	16	15	17	15	17	15	14	16	EMM	14	15	15	17	16	16	4	10	16	15	EMM			
7																																				
8																																				
Total	25	26	24	26	25	10	28	26	30	12	EMM	25	26	28	25	32	28	30	27	26	31	EMM	25	27	25	29	28	28	4	19	30	29	EMM			

Days	Concentration: <u>6.25</u>												Concentration: <u>12.5</u>												Concentration: <u>25</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
2											EMM											EMM											EMM			
3	3	4		3	3						EMM						3	4				4	EMM	3			4	4	✓	✓	✓	✓	✓	EMM		
4			9		4	3	3	2	3		EMM	3	4	4	3	3			3	3		EMM	6	5	4			4	3	3	4	4	EMM			
5	8	9	9	9	8	✓	8	8	9	✓	ML7	9	9	✓	11	9	8	11	9	10	9	ML7	9	✓	10	11	11	13	✓	9	10	11	ML7			
6	15	14	13	16	14	15	13	17	15	12	EMM	15	15	12	14	13	12	17	12	12	13	EMM	12	11	15	17	12	15	9	14	14	14	EMM			
7																																				
8																																				
Total	26	27	25	28	25	19	16	28	25	24	EMM	27	28	16	28	25	23	32	24	25	26	EMM	24	16	29	32	27	32	12	26	28	19	EMM			

Days	Concentration: <u>50</u>												Concentration: <u>100</u>												Concentration:											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM														
2											EMM											EMM														
3	3	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	3	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM														
4	✓	2	3	3	4	2	3	3	3	✓	EMM	2	✓	3	2	3	2	2	2	2	✓	EMM														
5	9	7	8	8	9	9	10	11	10	11	ML7	7	10	9	10	10	10	✓	11	9	10	ML7														
6	13	14	14	12	13	14	14	15	✓	13	EMM	14	14	16	15	15	14	10	15	13	16	EMM														
7																																				
8																																				
Total	25	23	25	23	26	25	27	29	13	28	EMM	23	27	28	27	28	28	12	28	25	30	EMM														

Notes: X = mortality.

Sample Description: clear
Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JOB

Date reviewed: Apr. 13/15

CETIS Analytical Report

Report Date: 16 Mar-15 11:48 (p 1 of 2)
 Test Code: 15139b | 10-3928-4679

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 06-9959-0761	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 16 Mar-15 11:47	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 03-4806-4752	Test Type: Reproduction-Survival (7d)	Analyst: Emma Marus
Start Date: 04 Mar-15 12:15	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 10 Mar-15 12:15	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 0h	Source: In-House Culture	Age: <24h
Sample ID: 11-5217-1557	Code: 44ACBE25	Client: Mount Polley
Sample Date: 02 Mar-15 13:45	Material: Water Sample	Project:
Receive Date: 04 Mar-15 08:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 46h (2.5 °C)	Station: QUL-66-0m (Filtered)	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1162066	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 16 Mar-15 11:48 (p 2 of 2)
 Test Code: 15139b | 10-3928-4679

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

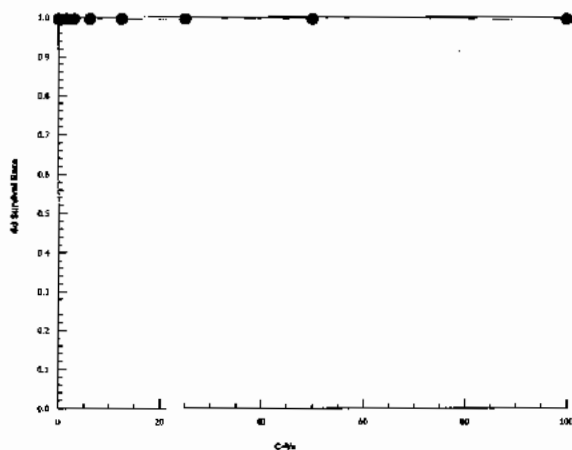
Analysis ID: 06-9959-0761 Endpoint: 6d Survival Rate
 Analyzed: 16 Mar-15 11:47 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 16 Mar-15 11:48 (p 1 of 2)
 Test Code: 15139b | 10-3928-4679

Ceriodaphnia 7-d Survival and Reproduction Test			Nautilus Environmental		
Analysis ID: 20-5657-7092	Endpoint: Reproduction	CETIS Version: CETISv1.8.7	Analyst: Emma Marus	Batch ID: 03-4806-4752	Test Type: Reproduction-Survival (7d)
Analyzed: 16 Mar-15 11:48	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes	Diluent: 20% Perrier Water	Start Date: 04 Mar-15 12:15	Protocol: EC/EPS 1/RM/21
			Brine:	Ending Date: 10 Mar-15 12:15	Species: Ceriodaphnia dubia
			Age: <24h	Duration: 6d 0h	Source: In-House Culture
Sample ID: 11-5217-1557	Code: 44ACBE25	Client: Mount Polley	Project:	Sample Date: 02 Mar-15 13:45	Material: Water Sample
Receive Date: 04 Mar-15 08:15	Source: Mount Polley (MT POLLEY)			Sample Age: 46h (2.5 °C)	Station: QUL-66-0m (Filtered)

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	180678	200	Yes	Two-Point Interpolation

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	23.7	10	30	2.186	6.913	29.17%	0.0%
1.56		10	27.8	25	32	0.786	2.486	8.94%	-17.3%
3.12		10	24.4	4	30	2.477	7.834	32.11%	-2.95%
6.25		10	24.3	16	28	1.23	3.889	16.0%	-2.53%
12.5		10	25.4	16	32	1.318	4.169	16.41%	-7.17%
25		10	25.5	12	32	2.088	6.604	25.9%	-7.6%
50		10	24.4	13	29	1.408	4.452	18.25%	-2.95%
100		10	25.5	12	30	1.614	5.104	20.02%	-7.6%

Reproduction Detail											
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	25	26	29	26	25	10	28	26	30	12
1.56		25	26	28	25	32	28	30	27	26	31
3.12		25	27	25	29	28	28	4	19	30	29
6.25		26	27	25	28	25	19	16	28	25	24
12.5		27	28	16	28	25	23	32	24	25	26
25		24	16	29	32	27	32	12	26	28	29
50		25	23	25	23	26	25	27	29	13	28
100		23	27	28	27	28	27	12	28	25	30

CETIS Analytical Report

Report Date: 16 Mar-15 11:48 (p 2 of 2)
Test Code: 15139b | 10-3928-4679

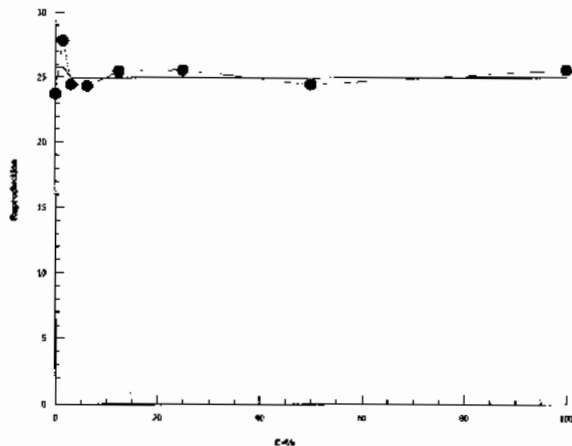
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 20-5657-7092 Endpoint: Reproduction
Analyzed: 16 Mar-15 11:48 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



JOB
Apr 13, 2015

Client: Mt. Polley

W.O.#: 15139

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/LCaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
QUL-66-0 (unfiltered)	March 4/15	50	2.5	2.6	48	50	2.9	58	ML7
QUL-66-0 (filtered)	March 4/15	50	2.5	2.6	48	50	2.9	58	ML7
20% Perrier Control	March 4/15	50	4.5	4.6	88	50	5.0	100	ML7

Notes: _____

Reviewed by: JGB

Date Reviewed: Apr. 13/15

APPENDIX B - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

Fathead Minnow Test Summary Sheet

(7-d *Pimephales promelas* Survival and Growth Test)

Client: Mount Polley
 Work Order No.: 15134

Start Date/Time: Mar 4/15 @ 1415h
 Test Species: P. promelas

Sample Information:

Sample ID: QUR-1
 Sample Date: Mar 3/15
 Date Received: Mar 4/15
 Sample Volume: 2x 20L

Dilution Water (initial water quality):

Type: Moderately Hard Water
 Temperature (°C): 25.0
 pH: 7.8
 Dissolved Oxygen (mg/L): 7.9
 Hardness (mg/L CaCO₃): 100
 Alkalinity (mg/L CaCO₃): 64

Test Validity Criteria:

The test is invalid if:

- 1) for the control solutions, the combined and cumulative incidence of any mortalities, or fish showing loss of equilibrium or other signs of atypical swimming behavior, is >20%
- 2) the average dry weight of the surviving control fish does not attain 250 ug when the fish are dried and weighed.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4; pH = 6.5 to 8.5

Test Organism Information:

Batch No.: 030415
 Source: Aquatic Biosystems, CO
 Age: 24 hrs

NaCl Reference Toxicant Results:

Reference Toxicant ID: PP107
 Stock Solution ID: n/a
 Date Initiated: Mar 4/15
 7-d EC50 (95% CL): 5.6 (4.9-6.5) g/L NaCl
 7-d IC50 (95% CL): 4.6 (4.2-5.2) g/L NaCl

Survival:

Reference Toxicant Mean and Historical Range: 4.4 (3.4-5.8) g/L NaCl CV (%): 14

Biomass:

Reference Toxicant Mean and Historical Range: 3.9 (2.9-5.2) g/L NaCl CV (%): 16

Test Results:

	Survival	Biomass
LC25 % (v/v) (95% CL)	>100	
LC50 % (v/v) (95% CL)	>100	
IC25 % (v/v) (95% CL)		>100
IC50 % (v/v) (95% CL)		>100

Reviewed by: JGa

Date reviewed: Apr. 15/15

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: 002-1 (purple)
 Work Order #: 15134

Start Date & Time: Mar 4/15 @ 14:5h
 Stop Date & Time: Mar 11/15 @ 13:0h
 Test Species: Pimephales promelas

Concentration <i>7-LVIN</i> Control	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	25.0	24.0	25.5	24.0	25.0	24.0	24.0	24.0	24.5	24.0	25.0	24.0	24.0	25.0	24.0
DO (mg/L)	7.9	6.7	7.9	6.1	7.9	6.3	7.7	6.4	7.8	6.6	8.2	6.1	8.2	6.0	6.0
pH	7.5	7.5	7.8	7.5	7.7	7.8	8.0	7.9	8.0	7.9	7.8	7.8	7.8	7.3	7.3
Cond. (µS/cm)	343		340		348		343		358		339		361		344
Initials	KJL		JW		JW		A		KJL		KJL		KJL		KJL

Concentration <i>1.56</i>	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	24.0	24.0	24.0	24.0	24.0	24.0	25.0	24.0	24.0	24.0	25.0	24.0	24.5	24.0	24.0
DO (mg/L)	7.6	6.7	7.8	6.0	8.1	6.7	7.8	6.3	7.9	6.7	8.2	6.2	8.0	5.8	5.8
pH	7.6	7.5	7.7	7.5	7.9	7.7	8.0	7.8	8.2	7.4	8.0	7.7	7.8	7.3	7.3
Cond. (µS/cm)	336		339		340		344		349		337		335		350
Initials	KJL		JW		JW		A		KJL		KJL		KJL		KJL

Concentration <i>12.5</i>	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	24.0	24.0	25.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	25.5	24.0	24.5	24.0	24.0
DO (mg/L)	7.6	6.6	7.9	5.9	8.2	6.4	7.9	6.2	7.9	6.8	8.0	6.2	8.0	5.9	5.9
pH	7.7	7.5	7.8	7.5	7.9	7.7	8.0	7.8	8.1	7.4	7.9	7.6	7.8	7.4	7.4
Cond. (µS/cm)	311		317		316		321		323		313		314		323
Initials	KJL		JW		JW		A		KJL		KJL		KJL		KJL

Concentration <i>100</i>	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	24.5	24.0	26.0	24.0	24.5	24.0	24.0	24.0	24.0	24.0	26.0	24.0	24.5	24.0	24.0
DO (mg/L)	7.8	6.8	8.4	6.1	8.3	6.3	8.0	6.2	7.9	6.6	8.1	6.0	8.0	5.7	5.7
pH	7.6	7.5	7.6	7.5	7.8	7.6	8.1	7.8	8.0	7.4	7.9	7.5	7.6	7.4	7.4
Cond. (µS/cm)	123		125		122		122		124		123		119		129
Initials	KJL		JW		JW		A		KJL		KJL		KJL		KJL

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6.5 to 8.5

DO meter: 3 pH meter: 3 Conductivity meter: 3

	Control	100 <i>7-LVIN</i>		
Hardness*	100	60		
Alkalinity*	100	50		

* mg/L as CaCO₃

Analysts: KJL, JW, AWL
 Reviewed by: JW
 Date reviewed: Apr 15/15

Sample Description: clear

Comments: _____

7-d Fathead Minnow Toxicity Test Daily Survival

Client: MT. Polley
 Sample ID: GUR - 1 (purple)
 Work Order #: 15134

Start Date & Time: March 4 / 15 @ 1415h
 Stop Date & Time: March 11 / 15 @ 1320h
 Test Species: Pimephales promelas

Concentration % (v/v)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
1.56	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
3.12	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
6.25	A	10	10	10	10	10	10	10	
	B	10	10	9	9	9	9	9	
	C	10	10	10	10	10	10	10	
12.5	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
25	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
50	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
100	A	10	10	10	10	10	10	10	
	B	10	10	10	10	10	10	10	
	C	10	10	10	10	10	10	10	
	A								
	B								
	C								
	A								
	B								
	C								
Tech Initials		JW	JW	A	KSC	JW	KSC	KSC	

Comments: _____

Reviewed by: JGU Date reviewed: Apr. 15/15

Fathead Minnow Toxicity Test Data Sheet

Dry Weight Data

Client: Mount Polley

Start Date & Time: Mar 4/15 @ 1415h

Sample ID: QUR-1 purple

Termination Date & Time: Mar 11/15 @ 1330h

Work Order No.: 15134

% (v/v) Concentration	Rep	021 Pan No. purple	No. alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control	A	1	10	KJL	977.70	983.87	10	KJL
	B	2	10		977.24	983.42	10	
	C	3	10		974.16	980.56	10	
1.56	A	4	10		989.99	995.93	10	
	B	5	10		969.10	975.44	10	
	C	6	10		975.65	981.86	10	
3.1	A	7	10		995.66	1002.16	10	
	B	8	10		980.60	986.24	10	
	C	9	10		1000.62	1006.54	10	
6.25	A	10	10		988.01	994.23	10	
	B	11	9		994.06	999.93	9	
	C	12	10		985.33	991.69	10	
12.5	A	13	10		996.82	1003.33	10	
	B	14	10		980.79	986.71	10	
	C	15	10		972.12	978.34	10	
25	A	16	10		974.89	981.18	10	
	B	17	10		982.55	988.85	10	
	C	18	10		978.48	984.79	10	
50	A	19	10		977.33	983.64	10	
	B	20	10		989.80	995.74	10	
	C	21	10		987.06	993.28	10	
100	A	22	9		991.55	996.98	9	
	B	23	10		963.95	969.54	10	
	C	24	10		978.79	985.42	10	

reweighed pans - 7 - 1002.03
 14 - 986.63
 22 - 996.85

Comments:

Reviewed by:

JGL

Date Reviewed:

Apr. 15/15

CETIS Analytical Report

Report Date: 16 Mar-15 10:26 (p 1 of 2)
 Test Code: 15134 | 00-0161-6282

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 15-6373-6249	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 16 Mar-15 10:26	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 00-4352-6217	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 04 Mar-15 14:15	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 11 Mar-15 13:30	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 03-3317-7950	Code: 13DBE45E	Client: Mount Polley
Sample Date: 03 Mar-15 11:45	Material: Water Sample	Project:
Receive Date: 04 Mar-15 08:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 26h (2.5 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1470113	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

C-%	Control Type	Count	Mean	Min	Max	Calculated Variate(A/B)					
						Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	3	1	1	1	0	0	0.0%	0.0%	30	30
1.56		3	1	1	1	0	0	0.0%	0.0%	30	30
3.1		3	1	1	1	0	0	0.0%	0.0%	30	30
6.25		3	0.9667	0.9	1	0.03333	0.05773	5.97%	3.33%	29	30
12.5		3	1	1	1	0	0	0.0%	0.0%	30	30
25		3	1	1	1	0	0	0.0%	0.0%	30	30
50		3	1	1	1	0	0	0.0%	0.0%	30	30
100		3	0.9667	0.9	1	0.03333	0.05773	5.97%	3.33%	29	30

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	1	1	1
1.56		1	1	1
3.1		1	1	1
6.25		1	0.9	1
12.5		1	1	1
25		1	1	1
50		1	1	1
100		0.9	1	1

CETIS Analytical Report

Report Date: 16 Mar-15 10:26 (p 2 of 2)
Test Code: 15134 | 00-0161-6282

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

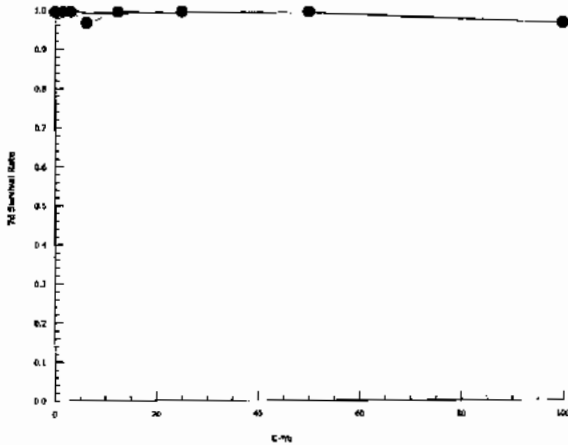
Analysis ID: 15-6373-6249 Endpoint: 7d Survival Rate
Analyzed: 16 Mar-15 10:26 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	10/10	10/10	10/10
1.56		10/10	10/10	10/10
3.1		10/10	10/10	10/10
6.25		10/10	9/10	10/10
12.5		10/10	10/10	10/10
25		10/10	10/10	10/10
50		10/10	10/10	10/10
100		9/10	10/10	10/10

Graphics



CETIS Analytical Report

Report Date: 16 Mar-15 10:26 (p 1 of 2)

Test Code: 15134 | 00-0161-6282

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 12-2172-4334	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 16 Mar-15 10:26	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 00-4352-6217	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 04 Mar-15 14:15	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 11 Mar-15 13:30	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 03-3317-7950	Code: 13DBE45E	Client: Mount Polley
Sample Date: 03 Mar-15 11:45	Material: Water Sample	Project:
Receive Date: 04 Mar-15 08:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 26h (2.5 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	686380	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	87.21	16.4	N/A	1.147	NA	6.099
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.625	0.617	0.64	0.007507	0.013	2.08%	0.0%
1.56		3	0.6163	0.594	0.634	0.01178	0.0204	3.31%	1.39%
3.1		3	0.602	0.564	0.65	0.02532	0.04386	7.29%	3.68%
6.25		3	0.615	0.587	0.636	0.01457	0.02524	4.1%	1.6%
12.5		3	0.6217	0.592	0.651	0.01703	0.0295	4.75%	0.53%
25		3	0.63	0.629	0.631	0.000573	0.000993	0.16%	-0.8%
50		3	0.6157	0.594	0.631	0.01114	0.0193	3.13%	1.49%
100		3	0.5883	0.543	0.663	0.03762	0.06516	11.07%	5.87%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.617	0.618	0.64
1.56		0.594	0.634	0.621
3.1		0.65	0.564	0.592
6.25		0.622	0.587	0.636
12.5		0.651	0.592	0.622
25		0.629	0.63	0.631
50		0.631	0.594	0.622
100		0.543	0.559	0.663

CETIS Analytical Report

Report Date: 16 Mar-15 10:26 (p 2 of 2)
Test Code: 15134 | 00-0161-6282

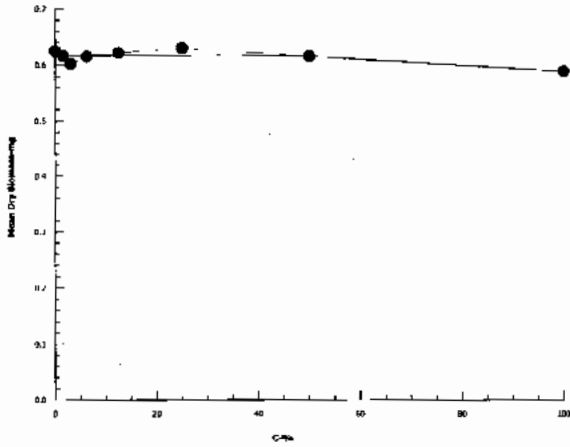
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 12-2172-4334 Endpoint: Mean Dry Biomass-mg
Analyzed: 16 Mar-15 10:26 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 16 Mar-15 10:31 (p 1 of 2)
 Test Code: 15134 | 00-0161-6282

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 06-4492-9601	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 16 Mar-15 10:31	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 00-4352-6217	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 04 Mar-15 14:15	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 11 Mar-15 13:30	Species: Pimephales promelas	Brine:
Duration: 6d 23h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 03-3317-7950	Code: 13DBE45E	Client: Mount Polley
Sample Date: 03 Mar-15 11:45	Material: Water Sample	Project:
Receive Date: 04 Mar-15 08:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 26h (2.5 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	27776	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	Min	Max	Calculated Variate			
						Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.625	0.617	0.64	0.007507	0.013	2.08%	0.0%
1.56		3	0.6163	0.594	0.634	0.01178	0.0204	3.31%	1.39%
3.1		3	0.602	0.564	0.65	0.02532	0.04386	7.29%	3.68%
6.25		3	0.6367	0.622	0.6522	0.008733	0.01513	2.38%	-1.88%
12.5		3	0.6217	0.592	0.651	0.01703	0.0295	4.75%	0.53%
25		3	0.63	0.629	0.631	0.000573	0.000993	0.16%	-0.8%
50		3	0.6157	0.594	0.631	0.01114	0.0193	3.13%	1.49%
100		3	0.6084	0.559	0.663	0.03013	0.05219	8.58%	2.65%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.617	0.618	0.64
1.56		0.594	0.634	0.621
3.1		0.65	0.564	0.592
6.25		0.622	0.6522	0.636
12.5		0.651	0.592	0.622
25		0.629	0.63	0.631
50		0.631	0.594	0.622
100		0.6033	0.559	0.663

CETIS Analytical Report

Report Date: 16 Mar-15 10:31 (p 2 of 2)
Test Code: 15134 | 00-0161-6282

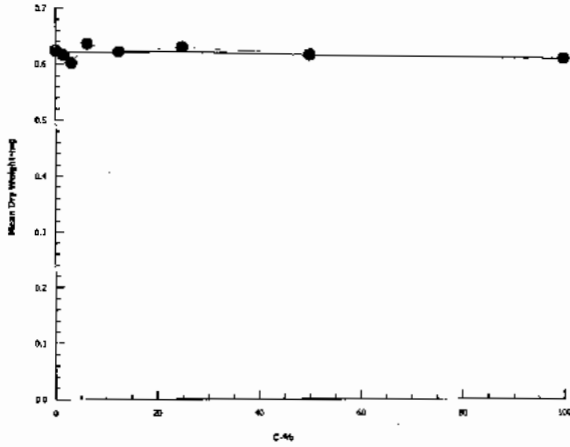
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 06-4492-9601 Endpoint: Mean Dry Weight-mg
Analyzed: 16 Mar-15 10:31 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Client: Mount Tolley

W.O.#: 15134

Hardness and Alkalinity Datasheet

Alkalinity						Hardness			
Sample ID	Sample Date	Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	Technician
QUR-1	Mar 4/15	50	2.6	2.7	50	50	3.0	60	MLT
MHW Control	Mar 10/15	50	3.3	3.4	64	50	5.0	100	NY

Notes: _____

Reviewed by: JGK

Date Reviewed: Apr. 15/15

Fathead Minnow Test Summary Sheet
(7-d *Pimephales promelas* Survival and Growth Test)

Client: Mount Polley
Work Order No.: 15137

Start Date/Time: Mar 4/15 @ 1445h
Test Species: *P. promelas*

Sample Information:

Sample ID: QUL-66-0M
Sample Date: Mar 2/15
Date Received: Mar 4/15
Sample Volume: 38x 20L
13L

Dilution Water (initial water quality):

Type: Moderately Hard Water
Temperature (°C): 25.0
pH: 7.8
Dissolved Oxygen (mg/L): 7.9
Hardness (mg/L CaCO₃): 100
Alkalinity (mg/L CaCO₃): 64

Test Validity Criteria:

The test is invalid if:

- 1) for the control solutions, the combined and cumulative incidence of any mortalities, or fish showing loss of equilibrium or other signs of atypical swimming behavior, is >20%
- 2) the average dry weight of the surviving control fish does not attain 250 ug when the fish are dried and weighed.

WQ Ranges:

T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4; pH = 6.5 to 8.5

Test Organism Information:

Batch No.: 020415 030415
Source: Aquatic Biosystems, CO
Age: 224 hrs

NaCl Reference Toxicant Results:

Reference Toxicant ID: PP107
Stock Solution ID: n/a
Date Initiated: Mar 4/15
7-d EC50 (95% CL): 5.6 (4.9-6.5)
7-d IC50 (95% CL): 4.6 (4.2-5.2)

Survival:

Reference Toxicant Mean and Historical Range: 4.4 (3.4-5.8) CV (%): 14

Biomass:

Reference Toxicant Mean and Historical Range: 3.9 (2.9-5.2) CV (%): 16

Test Results:

	Survival	Biomass
LC25 % (v/v) (95% CL)	>100	
LC50 % (v/v) (95% CL)	>100	
IC25 % (v/v) (95% CL)		>100
IC50 % (v/v) (95% CL)		>100

Reviewed by: JG

Date reviewed: Apr. 15/15

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Foley
 Sample ID: DUL 66-0M (blue)
 Work Order #: 15137

Start Date & Time: Mar 4/15 @ 1445h
 Stop Date & Time: Mar 11/15 @ 1300h
 Test Species: Pimephales promelas

Concentration (Control)	Days															
	0		1		2		3		4		5		6		7	
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	25.0	24.0	25.5	24.0	25.0	24.0	26.0	26.0	24.0	24.5	24.0	25.0	24.0	25.0	24.0	24.0
DO (mg/L)	7.9	6.8	7.9	6.4	7.9	6.1	7.7	6.1	7.9	6.2	8.0	6.0	8.0	6.0	8.0	5.8
pH	7.8	7.5	7.8	7.5	7.7	7.7	8.0	7.9	8.0	7.8	7.8	7.8	7.8	7.8	7.8	7.3
Cond. (µS/cm)	343	340		348		343		358		339		361		351		351
Initials	KJL	JW		JW		A		KJL		KJL		KJL		KJL		KJL

Concentration 1.56	Days															
	0		1		2		3		4		5		6		7	
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.5	24.0	24.0	24.0	24.0	24.0	25.5	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
DO (mg/L)	7.6	6.4	7.8	6.2	8.2	6.2	7.8	6.2	7.9	6.1	7.4	5.9	8.1	5.9	8.1	5.7
pH	7.6	7.5	7.8	7.5	7.8	7.7	8.0	7.8	8.1	7.5	7.9	7.6	8.0	7.6	8.0	7.4
Cond. (µS/cm)	337	335		339		341		351		335		338		345		345
Initials	KJL	JW		JW		A		KJL		KJL		KJL		KJL		KJL

Concentration 2.5	Days															
	0		1		2		3		4		5		6		7	
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.5	24.0	25.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	25.0	24.0	24.0	24.0	24.0	24.0
DO (mg/L)	7.6	6.6	7.9	6.2	8.2	6.2	7.9	6.0	8.0	6.6	8.0	6.0	8.2	6.0	8.2	5.7
pH	7.7	7.5	7.8	7.5	7.8	7.7	8.0	7.8	8.1	7.5	7.9	7.6	7.9	7.6	7.9	7.4
Cond. (µS/cm)	313	315		321		320		327		311		322		321		321
Initials	KJL	JW		JW		A		KJL		KJL		KJL		KJL		KJL

Concentration 100	Days															
	0		1		2		3		4		5		6		7	
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.5	24.0	26.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	25.0	24.0	24.0	24.0	24.0	24.0
DO (mg/L)	7.5	6.7	8.4	6.2	8.3	6.3	8.1	6.1	7.9	6.4	8.0	5.9	8.1	5.9	8.1	5.6
pH	7.7	7.5	7.6	7.5	7.7	7.6	8.1	7.8	8.0	7.6	7.9	7.6	7.8	7.6	7.8	7.4
Cond. (µS/cm)	116	118		118		117		117		117		121		128		128
Initials	KJL	JW		JW		A		KJL		KJL		KJL		KJL		KJL

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6.5 to 8.5

DO meter: 3 pH meter: 3 Conductivity meter: 3

	Control	100% (w/v)	
Hardness*	100	58	
Alkalinity*	64	48	

Analysts: KJL, JW, AWD

Reviewed by: JOL

Date reviewed: Apr. 15/15

Sample Description: clear

Comments: ① 25.0

Fathead Minnow Toxicity Test Data Sheet

Dry Weight Data

Client: Mount Polley

Start Date & Time: Mar 4/15 @ 1445h

Sample ID: QUL66-OM blue

Termination Date & Time: Mar 11/15 @ 1300h

Work Order No.: 15137

% (v/v) Concentration	Rep	022 Pan No. Blue	No. alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control	A	1	10	KJL	989.88	996.47	10	KJL
	B	2	10		994.45	1000.90	10	
	C	3	10		994.01	1000.16	10	
1.56	A	4	10	KJL	994.75	1000.78	10	KJL
	B	5	10		975.84	981.46	10	
	C	6	10		978.99	985.75	10	
3.1	A	7	10	KJL	993.47	999.55	10	KJL
	B	8	10		983.26	989.44	10	
	C	9	10		974.68	981.19	10	
6.25	A	10	10	KJL	970.99	977.14	10	KJL
	B	11	10		989.82	995.785	10	
	C	12	10		975.34	981.77	10	
12.5	A	13	10	KJL	988.09	994.15	10	KJL
	B	14	10		982.69	989.05	10	
	C	15	10		970.28	976.72	10	
25	A	16	9	KJL	994.92	1000.87	9	KJL
	B	17	10		987.90	993.60	10	
	C	18	10		983.31	989.14	10	
50	A	19	10	KJL	975.27	981.73	10	KJL
	B	20	10		990.73	997.12	10	
	C	21	9		986.18	991.97	9	
100	A	22	10	KJL	989.09	994.37	10	KJL
	B	23	10		988.06 988.06	974.32	10	
	C	24	10		978.50	983.737	10	

Comments:

reweighed pans: 6 - 985.62

12 - 981.67

21 - 991.85

Reviewed by:

JOL

Date Reviewed:

Apr. 15/15

7-d Fathead Minnow Toxicity Test Daily Survival

Client: Mt. Polley
 Sample ID: QUL-66 - OM (Blue)
 Work Order #: 15137

Start Date & Time: March 4/15 @ 1445 h
 Stop Date & Time: March 11/15 @ 1300h
 Test Species: Pimephales promelas

Concentration % (v/v)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	10	10	10	10	10	10	10	
	B	10	10		10	10	10	10	
	C	10	10		10	10	10	10	
1.56	A	10	10		10	10	10	10	
	B	10	10		10	10	10	10	
	C	10	10		10	10	10	10	
3.12	A	10	10		10	10	10	10	
	B	10	10		10	10	10	10	
	C	10	10		10	10	10	10	
6.25	A	10	10		10	10	10	10	
	B	10	10		10	10	10	10	
	C	10	10		10	10	10	10	
12.5	A	10	10		10	10	10	10	
	B	10	10		10	10	10	10	
	C	10	10		10	10	10	10	
25	A	10	10		10	9	9	9	
	B	10	10		10	10	10	10	
	C	10	10		10	10	10	10	
50	A	10	10		10	10	10	10	
	B	10	10		10	10	10	10	
	C	10	10		10	10	9	9	
100	A	10	10		10	10	10	10	
	B	10	10		10	10	10	10	
	C	10	10		10	10	10	10	
	A								
	B								
	C								
	A								
	B								
	C								
Tech Initials		JW	JW	A	K	JW	KSL	EJC	

Comments: _____

Reviewed by: JOK Date reviewed: Apr. 15/15

CETIS Analytical Report

Report Date: 16 Mar-15 10:21 (p 1 of 2)
 Test Code: 15137 | 21-1251-0655

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 04-0797-8074	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 16 Mar-15 10:21	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 00-1711-3533	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 04 Mar-15 14:45	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 11 Mar-15 13:00	Species: Pimephales promelas	Brine:
Duration: 6d 22h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 03-9053-9699	Code: 174729B3	Client: Mount Polley
Sample Date: 02 Mar-15 13:45	Material: Water Sample	Project:
Receive Date: 04 Mar-15 08:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 49h (2.5 °C)	Station: QUL-66-0m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	523529	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	3	1	1	1	0	0	0.0%	0.0%	30	30
1.56		3	1	1	1	0	0	0.0%	0.0%	30	30
3.1		3	1	1	1	0	0	0.0%	0.0%	30	30
6.25		3	1	1	1	0	0	0.0%	0.0%	30	30
12.5		3	1	1	1	0	0	0.0%	0.0%	30	30
25		3	0.9667	0.9	1	0.03333	0.05773	5.97%	3.33%	29	30
50		3	0.9667	0.9	1	0.03333	0.05773	5.97%	3.33%	29	30
100		3	1	1	1	0	0	0.0%	0.0%	30	30

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	1	1	1
1.56		1	1	1
3.1		1	1	1
6.25		1	1	1
12.5		1	1	1
25		0.9	1	1
50		1	1	0.9
100		1	1	1

CETIS Analytical Report

Report Date: 16 Mar-15 10:21 (p 2 of 2)
Test Code: 15137 | 21-1251-0655

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 04-0797-8074
Analyzed: 16 Mar-15 10:21

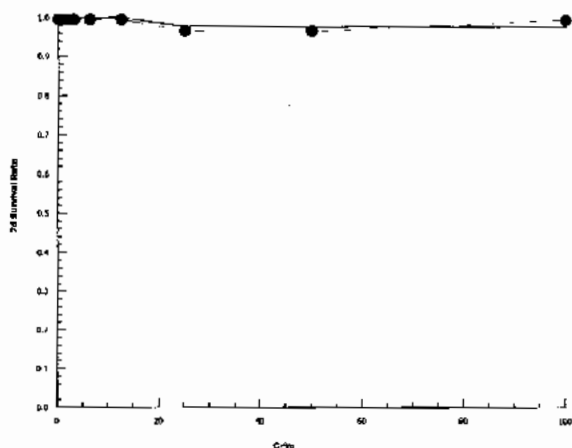
Endpoint: 7d Survival Rate
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	10/10	10/10	10/10
1.56		10/10	10/10	10/10
3.1		10/10	10/10	10/10
6.25		10/10	10/10	10/10
12.5		10/10	10/10	10/10
25		9/10	10/10	10/10
50		10/10	10/10	9/10
100		10/10	10/10	10/10

Graphics



CETIS Analytical Report

Report Date: 16 Mar-15 10:21 (p 1 of 2)
 Test Code: 15137 | 21-1251-0655

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 12-6801-4410	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 16 Mar-15 10:21	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 00-1711-3533	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 04 Mar-15 14:45	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 11 Mar-15 13:00	Species: Pimephales promelas	Brine:
Duration: 6d 22h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 03-9053-9699	Code: 174729B3	Client: Mount Polley
Sample Date: 02 Mar-15 13:45	Material: Water Sample	Project:
Receive Date: 04 Mar-15 08:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 49h (2.5 °C)	Station: QUL-66-0m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	691722	200	Yes	Two-Point interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	20.43	N/A	103.4	4.896	0.967	NA
IC10	70.14	N/A	N/A	1.426	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Mean	Min	Max	Calculated Variate			
						Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.6397	0.615	0.659	0.01298	0.02248	3.51%	0.0%
1.56		3	0.6137	0.562	0.676	0.03334	0.05774	9.41%	4.06%
3.1		3	0.6257	0.608	0.651	0.01299	0.0225	3.6%	2.19%
6.25		3	0.617	0.593	0.643	0.01447	0.02506	4.06%	3.54%
12.5		3	0.6287	0.606	0.644	0.01156	0.02003	3.19%	1.72%
25		3	0.5827	0.57	0.595	0.007221	0.01251	2.15%	8.91%
50		3	0.6213	0.579	0.646	0.02126	0.03683	5.93%	2.87%
100		3	0.548	0.527	0.589	0.0205	0.03551	6.48%	14.33%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.659	0.645	0.615
1.56		0.603	0.562	0.676
3.1		0.608	0.618	0.651
6.25		0.615	0.593	0.643
12.5		0.606	0.636	0.644
25		0.595	0.57	0.583
50		0.646	0.639	0.579
100		0.528	0.589	0.527

CETIS Analytical Report

Report Date: 16 Mar-15 10:21 (p 2 of 2)
Test Code: 15137 | 21-1251-0655

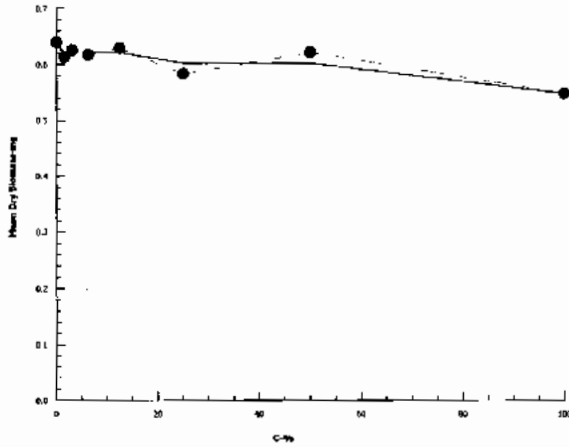
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 12-6801-4410 Endpoint: Mean Dry Biomass-mg
Analyzed: 16 Mar-15 10:21 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 16 Mar-15 10:34 (p 1 of 2)
 Test Code: 15137 | 21-1251-0655

Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 14-4688-5933	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 16 Mar-15 10:34	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 00-1711-3533	Test Type: Growth-Survival (7d)	Analyst: Karen Lee
Start Date: 04 Mar-15 14:45	Protocol: EC/EPS 1/RM/22	Diluent: Mod-Hard Synthetic Water
Ending Date: 11 Mar-15 13:00	Species: Pimephales promelas	Brine:
Duration: 6d 22h	Source: Aquatic Biosystems, CO	Age: <24h
Sample ID: 03-9053-9699	Code: 174729B3	Client: Mount Polley
Sample Date: 02 Mar-15 13:45	Material: Water Sample	Project:
Receive Date: 04 Mar-15 08:15	Source: Mount Polley (MT POLLEY)	
Sample Age: 49h (2.5 °C)	Station: QUL-66-0m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	778060	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	57.24	N/A	81.01	1.747	1.234	NA
IC10	77.23	42.7	N/A	1.295	NA	2.342
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	Min	Max	Calculated Variate			
						Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.6397	0.615	0.659	0.01298	0.02248	3.51%	0.0%
1.56		3	0.6137	0.562	0.676	0.03334	0.05774	9.41%	4.06%
3.1		3	0.6257	0.608	0.651	0.01299	0.0225	3.6%	2.19%
6.25		3	0.617	0.593	0.643	0.01447	0.02506	4.06%	3.54%
12.5		3	0.6287	0.606	0.644	0.01156	0.02003	3.19%	1.72%
25		3	0.6047	0.57	0.6611	0.02845	0.04928	8.15%	5.47%
50		3	0.6428	0.639	0.646	0.002037	0.003529	0.55%	-0.49%
100		3	0.548	0.527	0.589	0.0205	0.03551	6.48%	14.33%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3
0	Negative Control	0.659	0.645	0.615
1.56		0.603	0.562	0.676
3.1		0.608	0.618	0.651
6.25		0.615	0.593	0.643
12.5		0.606	0.636	0.644
25		0.6611	0.57	0.583
50		0.646	0.639	0.6433
100		0.528	0.589	0.527

CETIS Analytical Report

Report Date: 16 Mar-15 10:34 (p 2 of 2)
Test Code: 15137 | 21-1251-0655

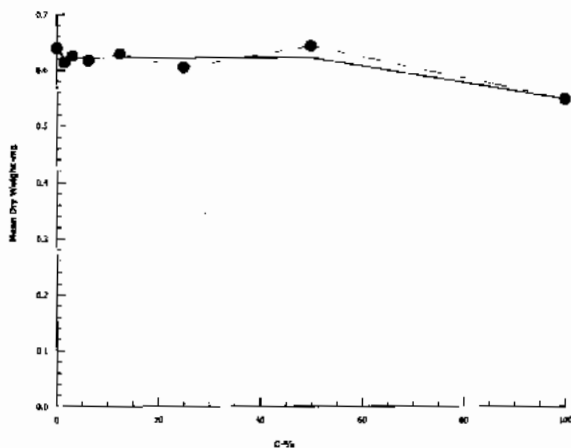
Fathead Minnow 7-d Larval Survival and Growth Test

Nautilus Environmental

Analysis ID: 14-4688-5933 Endpoint: Mean Dry Weight-mg
Analyzed: 16 Mar-15 10:34 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Client: Mount Policy

W.O.#: 15137

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity			Hardness			Technician	
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)		Total Hardness (mg/L CaCO ₃)
QUL-66-0M	Mar 4/15	50	2.5	2.6	48	50	2.9	58	MLT
MHW (control)	Mar 10/15	50	3.3	3.4	64	50	5.0	100	NY

Notes:

Reviewed by: JG

Date Reviewed: Apr. 15/15

APPENDIX C - Chain of Custody Form

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

Sample Collection By: Alethea Andy, Shauna Litke			ANALYSES REQUIRED																		
Report to:	Invoice to:					Fathead minnow survival and growth	7 day Ceriodaphnia	7 day RBT	Swim up												Receipt Temperature (°C)
Company	Mount Polley Mining Corporation																				
Address	Box 12																				
City/Prov/Postal Code	Likely BC V0L 1N0																				
Contact	Colleen Hughes																				
Phone	(250) 790-2617																				
Email	chughes@mountpolley.com																				

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	Fathead minnow survival and growth	7 day Ceriodaphnia	7 day RBT												
1 QUR-1	03/03/2015	11:45	water	20L, 4L	2, 4	40L: 2xcarbboys, 16L: 4x4L jugs	X	X	X												25
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUINSHED BY (CLIENT)		RELIQUINSHED BY (COURIER)	
Client: Mount Polley Mining Corporation		Total # Containers:	6	Signature:		Signature:	
P.O. No.:		Good Condition?	yes	Print: Shauna Litke		Print:	
Shipped Via: Greyhound		Matches Schedule?	yes	Company: MPMC		Company:	
SPECIAL INSTRUCTIONS/COMMENTS:				Time/Date: 03/03/15 15:30:00		Time/Date:	
				RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)	
				Signature:		Signature:	
				Print:		Print: EMMA MARCUS	
				Company:		Company: NAUTILUS ENVIRONMENTAL	
				Time/Date:		Time/Date: March 4/15 @ 8:5h	

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

Sample Collection By: Mclean Donohoe			ANALYSES REQUIRED											
Report to:	Invoice to:		Fathead Minnow 7D S+G	Rainbow Trout 7D S+G - S+G	C. Dubia S+R - Filtered	C. Dubia S+R - Unfiltered								Receipt Temperature (°C)
Company	Mount Polley Mining Corporation													
Address	Box 12													
City/Prov/Postal Code	Likely BC V0L 1N0													
Contact	Colleen Hughes													
Phone	(250) 790-2617													
Email	chughes@mountpolley.com													

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS									
1 QUL-66-0m	02/03/2015	13:45	water	20L	3		X	X	X	X					-25
2															
3															
4															
5															
6															
7															
8															
9															
10															

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)		RELIQUISHED BY (COURIER)	
Client: Mount Polley Mining Corporation		Total # Containers:	3	Signature: <i>Mclean Donohoe</i>		Signature:	
P.O. No.:		Good Condition?	YES	Print: Mclean Donohoe		Print:	
Shipped Via: Greyhound		Matches Schedule?	YES	Company: MPMC		Company:	
SPECIAL INSTRUCTIONS/COMMENTS:				RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)	
				Signature:		Signature: <i>Emma Marus</i>	
				Print:		Print: <i>Emma Marus</i>	
				Company:		Company: Nautilus Environmental	
				Time/Date: 02/03/2015 15:30:00		Time/Date: March 4/15 @ 8:56	

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

PART 9

Toxicity testing of a sampled identified as P2-S on *Ceriodaphnia dubia*, rainbow trout (swim up) and fathead minnows: Sample collected April 14, 2015, Work Order #15298-15300



Nautilus Environmental

**Toxicity testing on a sample identified as P2-S on
Ceriodaphnia dubia, rainbow trout (swim up) and
fathead minnows**

Sample collected April 14, 2015

Final Report

Report date: June 9, 2015

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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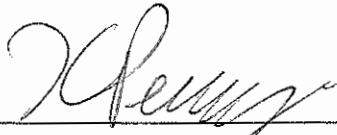
APPENDIX A – *Ceriodaphnia dubia* Toxicity Test Data

APPENDIX B – Rainbow Trout (*Oncorhynchus mykiss*) Toxicity Test Data

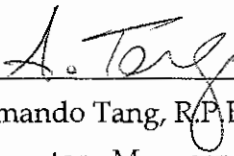
APPENDIX C – Fathead Minnow (*Pimephales promelas*) Toxicity Test Data

APPENDIX D – Chain of Custody Form

SIGNATURE PAGE



Krysta Pearcy, B.Sc.
Laboratory Biologist



Armando Tang, R.P. Bio.
Laboratory Manager

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted toxicity tests for Mount Polley Mining Corporation on a sample identified as P2-S. The sample was collected on April 14, 2015 and delivered to the laboratory in Burnaby, BC on April 15, 2015. The sample was transported in three 20-L plastic carboys and coolers. The sample was received at a temperature of 6.5°C, and was stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing. The following sub-lethal toxicity tests were performed on the samples:

- *Ceriodaphnia dubia* survival and reproduction
- 7-d rainbow trout (*Oncorhynchus mykiss*) survival and growth
- 7-d fathead minnow (*Pimephales promelas*) survival and growth

The 7-d fathead minnow survival and growth test was conducted at Hydroqual Laboratories in Calgary, AB. A 20-L subsample of P2-S was sent from Nautilus Environmental in Burnaby, BC to Hydroqual Laboratories in Calgary, AB on April 16, 2015. The sample arrived at Hydroqual Laboratories on April 17, 2015 and a 7-d fathead minnow survival and growth test was initiated.

This report describes the results of these toxicity tests. Copies of laboratory data sheets and printouts of statistical analyses for each test are provided in Appendices A to C. The chain-of-custody form is provided in Appendix D.

2.0 METHODS

Methods for the toxicity tests are summarized in Tables 1 to 3. Testing was conducted according to procedures described by the Environment Canada protocols (2007 and 2011) and methods described by Lazorchak and Smith (2007). Statistical analyses for all tests were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house culture
Test organism age	<24 h old neonates produced within 12 h
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20 mL test tube
Test volume	15 mL
Test replicates	10 test replicates per treatment
Number of organisms	1 per replicate
Control water	20% Perrier water
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	<i>Pseudokirchneriella subcapitata</i> and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada, (2007) EPS 1/RM/21
Statistical software	CETIS (2013)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods
Reference toxicant	Sodium chloride

Table 2. Summary of test conditions: rainbow trout (*Oncorhynchus mykiss*) survival and growth test.

Test organism	<i>Oncorhynchus mykiss</i>
Test organism source	Aqua Farm, Langley, BC
Test organism age	2-to 6-days post swim up
Test type	Static renewal
Test duration	7 days
Test vessel	1-L glass containers
Test volume	500 mL
Test replicates	4 per treatment
Number of organisms	5 per replicate
Control water	Moderately-hard water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	15 ± 1°C
Feeding	Twice a day with newly hatched brine shrimp (<i>Artemia nauplii</i>)
Light intensity	100 – 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test protocol	Lazorchak and Smith (2007)
Statistical software	CETIS (2013)
Test endpoint	Survival and biomass
Test acceptability criteria for controls	≥90% survival, ≥1.5 times test initiation dry weight
Reference toxicant	Copper chloride

Table 3. Summary of test conditions: fathead minnow (*Pimephales promelas*) survival and growth test.

Test organism	<i>Pimephales promelas</i>
Test organism source	Aquatox Inc., Hot Springs, AR
Test organism age	<24 hours
Test type	Static renewal
Test duration	7 days
Test vessel	500-mL plastic containers
Test volume	250 mL
Test replicates	4 per treatment
Number of organisms	10 per replicate
Control water	Dechlorinated municipal tap water (City of Calgary)
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	Twice a day with newly hatched brine shrimp (<i>Artemia nauplii</i>)
Light intensity	100 – 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test protocol	Environment Canada (2011), EPS 1/RM/22
Statistical software	CETIS (2013)
Test endpoint	Survival and biomass
Test acceptability criteria for controls	≥80% survival, ≥250 µg mean dry weight
Reference toxicant	Sodium chloride

3.0 RESULTS

There were no adverse effects observed on survival and reproduction of *C. dubia* (Table 4), survival and growth of rainbow trout (Table 5) or survival and growth of fathead minnow (Table 6). The LC and IC values were therefore greater than 100% for each of these endpoints in the toxicity tests.

Table 4. Results: *Ceriodaphnia dubia* survival and reproduction test.

Concentration (% v/v)	Survival (%)	Reproduction (mean ± SD)
Control	100	22.3 ± 3.6
1.56	100	21.1 ± 3.5
3.12	100	20.0 ± 4.5
6.25	100	21.4 ± 3.3
12.5	100	20.3 ± 3.7
25	100	22.3 ± 3.2
50	100	20.4 ± 4.7
100	100	23.7 ± 3.4
Test Endpoint (% v/v)		
LC50	>100	--
IC25	--	>100
IC50	--	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

Table 5. Results: rainbow trout (*Oncorhynchus mykiss*) survival and growth test.

Concentration (% v/v)	Survival (%)	Biomass (mg)	Dry Weight (mg)
Control	100.0 ± 0.0	34.7 ± 1.0	34.7 ± 1.0
6.25	100.0 ± 0.0	31.3 ± 1.1	31.3 ± 1.1
12.5	100.0 ± 0.0	28.4 ± 3.3	28.4 ± 3.3
25	100.0 ± 0.0	30.2 ± 0.6	30.2 ± 0.6
50	100.0 ± 0.0	30.1 ± 0.7	30.1 ± 0.7
100	100.0 ± 0.0	29.1 ± 1.6	29.1 ± 1.6
Test endpoint (% v/v)			
LC50	>100	--	--
IC25	--	>100	>100
IC50	--	>100	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

Table 6. Results: fathead minnow (*Pimephales promelas*) survival and growth test.

Concentration (% v/v)	Survival (%)	Biomass (µg)	Dry Weight (µg)
Control	97.5 ± 5.0	450.5 ± 39.7	461.7 ± 25.6
1.56	97.5 ± 5.0	500.7 ± 30.7	515.6 ± 56.8
3.1	90.0 ± 8.2	573.2 ± 184.2	628.6 ± 144.6
6.25	92.5 ± 5.0	509.0 ± 33.8	550.1 ± 13.0
12.5	92.5 ± 9.6	441.7 ± 25.2	480.3 ± 41.4
25	96.7 ± 5.8*	436.7 ± 5.7*	452.8 ± 27.0*
50	92.5 ± 9.6	542.0 ± 105.9	585.1 ± 88.2
100	92.5 ± 5.0	456.5 ± 41.8	492.8 ± 19.0
Test endpoint (% v/v)			
LC50	>100	--	--
IC25	--	>100	>100
IC50	--	>100	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

*Replicate B excluded from statistical analysis. Refer to QA/QC Section 4.0.

4.0 QA/QC

The health history of the test organisms used in the exposures was acceptable and met the requirements of the protocols. The tests met all control acceptability criteria and water quality parameters remained within ranges specified in the protocols throughout the tests. There were no deviations from the test methodologies. Uncertainty associated with these tests is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

On Day 5 of the fathead minnow test, eight of the ten organisms in replicate B of the 25% concentration were accidentally killed due to technician error. Therefore, this replicate was not included in survival, biomass or dry weigh calculations.

Results of the reference toxicant tests conducted during the testing program are summarized in Table 7. Results for the tests fell within the range for organism performance of mean and two standard deviation range, based on historical results obtained by the laboratories with these tests. Thus, the sensitivity of the organisms used in these tests was appropriate.

Table 7. Reference toxicant results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>C. dubia</i>	Survival (LC50): 2.1 g/L NaCl	2.0 (1.6 - 2.4)	11	April 22, 2015
	Reproduction (IC50): 1.4 g/L NaCl	1.5 (1.2 - 1.9)	14	
<i>O. mykiss</i>	Survival (LC50): 51.2 µg/L Cu	67.2 (34.4 - 131.5)	40	April 16, 2015
	Biomass (IC50): 48.0 µg/L Cu	66.6 (31.5 - 140.7)	45	
<i>P. promelas</i>	Survival (LC50): 1.0 g/L NaCl	1.1 (0.7 - 1.7)	14	April 17, 2015
	Biomass (IC50): 1.0 g/L NaCl	0.6 (0.4 - 1.0)	17	

SD = Standard Deviation, CV = Coefficient of Variation, IC = Inhibition Concentration, LC = Lethal Concentration.

5.0 REFERENCES

Environment Canada. 2007. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. Report EPS 1/RM/21, Second Edition, February 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 74 pp.

Environment Canada. 2011. Biological test method: test of larval growth and survival using fathead minnows. Environmental Protection Series, Report EPS 1/RM/22. February 2011,. Environment Canada, Environmental Protection, Conservation and Protection, Ottawa, ON. 73 pp.

Lazorchak, J.M. and Smith, M.E. 2007. Rainbow trout (*Oncorhynchus mykiss*) and brook trout (*Salvelinus fontinalis*) 7-day survival and growth test method. Arch. Environ. Contam. Toxicol. 53:397-405.

Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.4.29 Tidepool Scientific Software, McKinleyville, CA. 222 pp

6.0 END OF REPORT

This is the end of the report.

APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: Mount Polley
 Work Order No.: 15298

Start Date/Time: April 16/15 @ 1030h
 Set up by: MLT

Sample Information:

Sample ID: P2-S
 Sample Date: April 14, 2015
 Date Received: April 16, 2015
 Sample Volume: 3 x 20L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:
 T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 040915B
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 30
 Mortality (%) in previous 7 d: 0
 Individual female # used ≥ 8 young on test day: 22, 23, 26, 27, 28, 29, 30

NaCl Reference Toxicant Results:

Reference Toxicant ID: ^{WQ} Cd127-Cd128
 Stock Solution ID: 15 NaCl
 Date Initiated: ~~March 25, 2015~~ April 22, 2015

7-d LC50 (95% CL): 2.1 (1.5-2.2) ^{WQ} g/L NaCl
 7-d IC50 (95% CL): 1.4 (1.2-1.8) ^{WQ} g/L NaCl
 7-d LC50 Reference Toxicant Mean and Historical Range: 2.0 (1.6-2.4) ^{WQ} g/L NaCl CV (%): 11
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.5 (1.2-1.9) ^{WQ} g/L NaCl CV (%): 14

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	> 100	> 100
IC25 % (v/v) (95% CL)	> 100	> 100
IC50 % (v/v) (95% CL)	> 100	> 100

Reviewed by: JOU

Date reviewed: May 20/15

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Dolley
 Sample ID: P2-5
 Work Order #: 15298

Start Date & Time: April 16/15 @ 1030h
 Stop Date & Time: April 22/15 @ 1300h
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		Final 6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Control														
Temperature (°C)	24.0	25.0	25.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	8.1	7.8	8.1	7.5	8.2	7.5	8.2	7.6	8.2	7.8	8.1	7.6		
pH	7.9	7.8	8.0	7.8	8.1	7.8	8.1	7.7	8.0	7.7	8.1	7.7		
Cond. (µS/cm)	228	225		228		227		226		227		224		
Initials	MLT	MLT		M		M		MLT		MLT		MLT		

D 24.0

Concentration	Days													
	0	1		2		3		4		5		Final 6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
1.56% (v/v)														
Temperature (°C)	24.0	25.0	25.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	8.1	7.7	8.1	7.5	8.1	7.4	8.1	7.6	8.2	7.8	8.1	7.5		
pH	7.8	7.8	7.9	7.8	8.0	7.9	8.1	7.7	8.0	7.7	8.0	7.7		
Cond. (µS/cm)	230	234		229		231		229		228		224		
Initials	MLT	MLT		M		M		MLT		MLT		MLT		

Concentration	Days													
	0	1		2		3		4		5		Final 6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
12.5% (v/v)														
Temperature (°C)	24.0	25.0	25.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	8.0	7.7	8.1	7.5	8.1	7.4	8.1	7.6	8.2	7.8	8.0	7.5		
pH	7.8	7.8	7.8	7.9	7.9	7.9	8.0	7.7	7.9	7.6	7.8	7.7		
Cond. (µS/cm)	235	238		235		234		234		233		228		
Initials	MLT	MLT		M		M		MLT		MLT		MLT		

Concentration	Days													
	0	1		2		3		4		5		Final 6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
100% (v/v)														
Temperature (°C)	24.0	25.0	25.0	25.0	24.0	24.5	24.0	25.0	24.0	25.0	24.0	25.0		
DO (mg/L)	7.7	7.6	7.7	7.6	7.9	7.5	8.0	7.5	8.1	7.6	7.9	7.5		
pH	7.6	7.8	7.6	7.9	7.8	7.9	7.8	7.7	7.7	7.6	7.7	7.7		
Cond. (µS/cm)	288	290		288		289		287		287		278		
Initials	MLT	MLT		M		M		MLT		MLT		MLT		

	Control	100% (v/v)		
Hardness*	100	128		
Alkalinity*	89	96		

Analysts: MLT, AWD

Reviewed by: Jole

Date reviewed: May 20/15

* mg/L as CaCO₃

WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5

Sample Description: clear, organisms present - sieved through 60µm nitex mesh

Comments: Broodboard Used: 040915B (22, 23, 26, 27, 28, 29, 30)

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt. Pulley
 Sample ID: P2-5
 Work Order: 15298

Start Date & Time: April 16/15 @ 1030h
 Stop Date & Time: April 22/15 @ 1700h
 Set up by: MLS

Days	Concentration: Control											Init	Concentration: 1.56% (v/v)											Init	Concentration: 3.12% (v/v)											Init
	A	B	C	D	E	F	G	H	I	J	A		B	C	D	E	F	G	H	I	J	A	B		C	D	E	F	G	H	I	J				
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7		
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A		
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~		
4	4	4	6	3	3	3	3	4	4	6	ML7	3	4	3	4	4	4	5	3	4	3	ML7	4	4	4	5	6	4	5	4	4	3	ML7			
5	7	7	11	7	9	8	10	7	9	10	ML7	6	7	8	✓	8	8	11	10	7	9	ML7	11	8	8	9	10	7	✓	10	9	6	ML7			
6	12	13	✓	10	14	15	12	11	11	✓	ML7	10	11	10	11	11	13	✓	12	10	12	ML7	✓	12	11	13	✓	11	10	✓	12	12	ML7			
7																																				
8																																				
Total	23	24	17	20	26	26	24	22	24	16	ML7	19	22	21	15	23	25	16	25	21	24	ML7	15	24	23	25	16	22	15	14	25	21	ML7			

Days	Concentration: 6.25% (v/v)											Init	Concentration: 12.5% (v/v)											Init	Concentration: 25% (v/v)											Init
	A	B	C	D	E	F	G	H	I	J	A		B	C	D	E	F	G	H	I	J	A	B		C	D	E	F	G	H	I	J				
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7		
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A			
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~			
4	3	4	3	5	3	3	3	4	4	5	ML7	3	5	3	5	5	3	3	4	4	4	ML7	3	4	4	4	4	5	6	4	3	4	ML7			
5	6	8	9	✓	6	7	7	10	7	11	ML7	8	9	6	✓	10	7	7	7	8	7	ML7	8	12	7	8	9	9	✓	10	7	9	ML7			
6	11	12	12	12	10	12	12	12	13	✓	ML7	10	✓	12	✓	✓	11	13	13	13	11	ML7	13	✓	11	11	9	12	12	11	12	12	ML7			
7																																				
8	ML7																																			
Total	19	24	24	17	19	22	22	26	24	16	ML7	21	14	21	17	15	21	23	24	25	22	ML7	24	16	22	23	22	26	18	25	22	25	ML7			

Days	Concentration: 50% (v/v)											Init	Concentration: 100% (v/v)											Init
	A	B	C	D	E	F	G	H	I	J	A		B	C	D	E	F	G	H	I	J			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7		
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A		
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	~		
4	4	6	4	3	5	4	4	4	5	6	ML7	3	4	4	4	6	4	4	4	3	3	ML7		
5	✓	11	9	10	13	7	9	9	10	9	ML7	8	11	9	9	9	8	11	9	10	10	ML7		
6	12	✓	12	11	✓	13	13	12	✓	✓	ML7	12	10	10	12	✓	11	13	12	12	12	ML7		
7																								
8																								
Total	16	17	25	24	17	24	26	25	15	15	ML7	23	25	23	25	15	23	28	25	25	25	ML7		

Notes: X = mortality.

Sample Description: clear, organisms present - sieved through 60um nitex mesh
 Comments: Total # Young only based on the first 3 broods. Fourth and subsequent broods not included in total count.

Reviewed by: JLW Date reviewed: May 20/15

CETIS Analytical Report

Report Date: 28 Apr-15 16:31 (p 1 of 2)
 Test Code: 15298 | 14-2208-2220

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 15-7792-7106	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 28 Apr-15 16:27	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 18-2097-0910	Test Type: Reproduction-Survival (7d)	Analyst: Emma Marus
Start Date: 16 Apr-15 10:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 22 Apr-15 17:00	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 7h	Source: In-House Culture	Age: <24h
Sample ID: 11-5968-2765	Code: 451F5ACD	Client: Mount Polley
Sample Date: 14 Apr-15 15:30	Material: Water Sample	Project:
Receive Date: 16 Apr-15 09:25	Source: Mount Polley (MT POLLEY)	
Sample Age: 43h (6.5 °C)	Station: P2-S	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1988041	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

C-%	Control Type	Count	Calculated Variate(A/B)								
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 28 Apr-15 16:31 (p 2 of 2)
 Test Code: 15298 | 14-2208-2220

Ceriodaphnia 7-d Survival and Reproduction Test

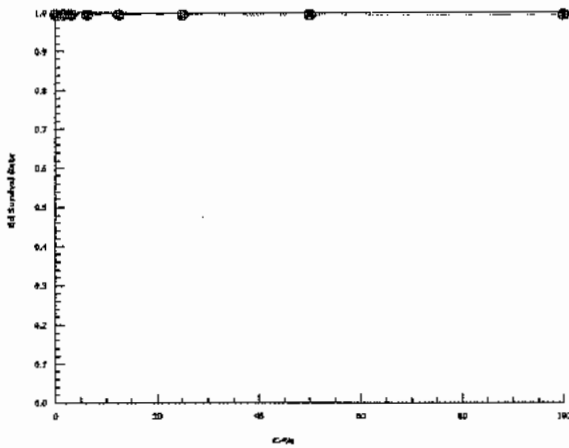
Nautilus Environmental

Analysis ID: 15-7792-7106 Endpoint: 6d Survival Rate CETIS Version: CETISv1.8.7
 Analyzed: 28 Apr-15 16:27 Analysis: Linear Interpolation (ICPIN) Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 28 Apr-15 16:32 (p 1 of 2)
 Test Code: 15298 | 14-2208-2220

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 07-2812-5729	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 28 Apr-15 16:31	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 18-2097-0910	Test Type: Reproduction-Survival (7d)	Analyst: Emma Marus
Start Date: 16 Apr-15 10:30	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 22 Apr-15 17:00	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 7h	Source: In-House Culture	Age: <24h
Sample ID: 11-5968-2765	Code: 451F5ACD	Client: Mount Polley
Sample Date: 14 Apr-15 15:30	Material: Water Sample	Project:
Receive Date: 16 Apr-15 09:25	Source: Mount Polley (MT POLLEY)	
Sample Age: 43h (6.5 °C)	Station: P2-S	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	295437	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	22.3	16	26	1.126	3.561	15.97%	0.0%
1.56		10	21.1	15	25	1.11	3.51	16.64%	5.38%
3.12		10	20	14	25	1.422	4.497	22.48%	10.31%
6.25		10	21.4	16	26	1.046	3.307	15.45%	4.04%
12.5		10	20.3	14	25	1.184	3.743	18.44%	8.97%
25		10	22.3	16	26	1.001	3.164	14.19%	0.0%
50		10	20.4	15	26	1.492	4.719	23.13%	8.52%
100		10	23.7	15	28	1.075	3.401	14.35%	-6.28%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	23	24	17	20	26	26	25	22	24	16
1.56		19	22	21	15	23	25	16	25	21	24
3.12		15	24	23	25	16	22	15	14	25	21
6.25		20	24	24	17	19	22	22	26	24	16
12.5		21	14	21	17	15	21	23	24	25	22
25		24	16	22	23	22	26	18	25	22	25
50		16	17	25	24	17	24	26	25	15	15
100		23	25	23	25	15	23	28	25	25	25

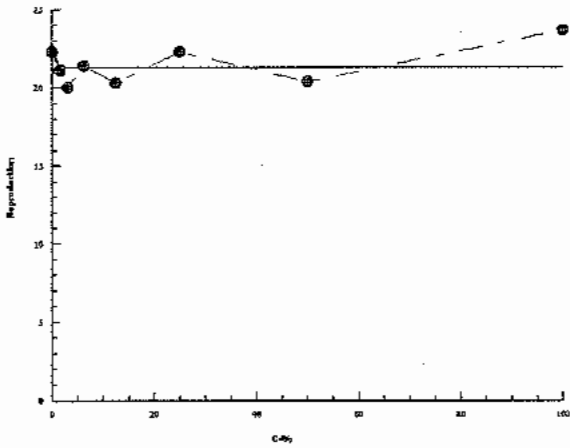
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 07-2812-5729 Endpoint: Reproduction
Analyzed: 28 Apr-15 16:31 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Client: M. Polley

W.O.#: 15298

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity			Hardness			Technician	
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)		Total Hardness (mg/L CaCO ₃)
P2-S	April 14/15	50	5.0	5.2	96	50	6.4	128	EMM
201 perox cat	April 16/15	50	4.3	4.4	84	50	5.0	100	EMM

Notes: _____

Reviewed by: Joh

Date Reviewed: May 20/15

APPENDIX B - Rainbow Trout (*Oncorhynchus mykiss*) Toxicity Test Data

Rainbow Trout Swimup Test Summary Sheet

Client: Mount Polly Start Date/Time: Apr 16/15 @ 1330h
 Work Order No.: WB 15300 Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: P2-S
 Sample Date: Apr 14/15
 Date Received: Apr 16/15
 Sample Volume: 3x20L

Dilution Water:

Type: Moderately Hard Water
 Hardness (mg/L CaCO₃): 98 | 100
 Alkalinity (mg/L CaCO₃): 64 | 64
 Batch # 041315 | 041715

Test Organism Information:

Batch No.: 041415
 Source: Aqua Farm
 Average Initial Dry Weight: 15.4 (mg)

Copper Reference Toxicant Results:

Reference Toxicant ID: RTCL14
 Stock Solution ID: 15CuO2
 Date Initiated: Apr 16/15
 7-d LC50 (95% CL): 51.2 (45.7-57.5) (Cu (ug/L))
 7-d IC50 (95% CL): 48.0 (46.3-50.2) (Cu (ug/L))

7-d LC50 Reference Toxicant Mean and Historical Range: 67.2 (34.4-131.5) (Cu (ug/L)) CV(%) 39.9
 7-d IC50 Reference Toxicant Mean and Historical Range: 66.6 (31.5-140.7) (Cu (ug/L)) CV(%) 45.4

Test Results:

	Survival	Biomass	Dry Weight
LC25 % (v/v) (95% CL)	>100%		
LC50 % (v/v) (95% CL)	>100%		
IC25 % (v/v) (95% CL)		>100%	>100%
IC50 % (v/v) (95% CL)		>100%	>100%

Reviewed by: JGL Date reviewed: May 20/15

ECR 1/2

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mt. Polley
 Sample ID: P2-S
 Work Order #: 15300

Start Date & Time: Apr 16/15 @ 1330h
 Stop Date & Time: Apr 23/15 @ 1330h
 Test Species: Oncorhynchus mykiss

Concentration CTL	Days													
	0	1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.9	5.9	10.0	9.9	10.1	9.9	10.1	9.6	10.0	8.9	10.0	9.0	10.0	9.1
pH	7.5	6.9	7.4	7.4	7.6	7.5	7.5	7.6	7.7	7.5	7.5	7.5	7.5	7.6
Cond. (µS/cm)	320	323		328		328		335		333		341		347
Initials	KS	EC		A		A		EL		EL		EL		EC

Concentration (% v/v) 6.25	Days													
	0	1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.9	6.4	10.0	9.9	10.1	9.8	10.1	9.6	10.0	8.9	10.0	9.0	10.0	9.1
pH	7.4	7.0	7.3	7.5	7.5	7.6	7.5	7.7	7.7	7.7	7.5	7.5	7.5	7.6
Cond. (µS/cm)	318	327		328		322		333		339		336		345
Initials	KS	EC		A		A		EL		EL		EL		EC

Concentration (% v/v) 12.5	Days													
	0	1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.9	6.5	10.0	9.9	10.1	9.8	10.0	9.6	10.0	9.0	10.0	9.1	10.0	9.2
pH	7.4	7.0	7.4	7.5	7.4	7.6	7.5	7.7	7.7	7.7	7.5	7.5	7.5	7.6
Cond. (µS/cm)	315	324		325		322		330		340		332		341
Initials	KS	EL		A		A		EL		EL		EL		EL

Concentration (% v/v) 25	Days													
	0	1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.9	6.5	10.0	9.8	10.1	9.9	10.1	9.7	10.0	9.1	10.0	9.1	10.0	9.3
pH	7.5	7.0	7.4	7.5	7.4	7.6	7.4	7.8	7.7	7.7	7.5	7.5	7.5	7.6
Cond. (µS/cm)	311	317		318		319		325		344		325		339
Initials	KS	EL		A		A		EL		EL		EL		EL

DO meter: DO-1/2 pH meter: pH-1/2 Conductivity meter: C-1/2

	Control	(% v/v)	CTL
Hardness*	98	128	100
Alkalinity*	64	96	64

* mg/L as CaCO3 Batch # 041715

Analysts: EC, AWD
 Reviewed by: JOB
 Date reviewed: May 20/15

Sample Description: Clear, Colorless

Comments: DO fell below 6.0 mg/L overnight. Aeration initiated.
 EC

2/2

**7-d Chronic Freshwater Toxicity Test
Initial and Final Water Quality Measurements**

Client: Mt. Polley
 Sample ID: P2-S
 Work Order #: 15300

Start Date & Time: Apr 16/15 @ 1330h
 Stop Date & Time: Apr 23/15 @ 1330h
 Test Species: Oncorhynchus mykiss

Concentration (% v/v) 50	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.9	6.5	10.0	9.9	10.1	9.9	10.0	9.7	10.0	9.1	10.0	9.1	10.0	9.2	9.2
pH	7.4	7.0	7.4	7.5	7.4	7.6	7.4	7.8	7.7	7.7	7.5	7.46	7.4	7.6	7.6
Cond. (µS/cm)	302	306		303		302		314		358		311		327	
Initials	KS	EC		A		A		EC		EC		EC		EC	

Concentration (% v/v) 100	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	8.7	6.5	9.7	9.6	9.8	9.8	9.9	9.7	10.0	9.1	9.3	9.2	10.0	9.3	9.3
pH	7.4	7.0	7.4	7.6	7.3	7.7	7.4	7.8	7.4	7.7	7.5	7.47	7.4	7.8	7.8
Cond. (µS/cm)	283	284		280		279		284		288		286		296	
Initials	KS	EC		A		A		EC		EC		EC		EC	

Concentration	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)															
DO (mg/L)															
pH															
Cond. (µS/cm)															
Initials															

Concentration	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)															
DO (mg/L)															
pH															
Cond. (µS/cm)															
Initials															

DO meter: DO-1/2 pH meter: pH-1/2 Conductivity meter: C-1/2

	Control	(% v/v)	C-1
Hardness*	98	38/17/103	100
Alkalinity*	64	96	64

* mg/L as CaCO3 Batch #041315 Batch #041715

Analysts: EC, AWD

Reviewed by: JGK
 Date reviewed: May 20/15

Sample Description: Clear, Colorless

Comments: View page 1

7-d Chronic Freshwater Toxicity Test Daily Mortality

Client: Mt. Polley
 Sample ID: PZ-S 0
 Work Order #: 15300

Start Date & Time: Apr 16/15 @ 1330h
 Stop Date & Time: Apr 23/15 @ 1330h
 Test Species: Oncorhynchus mykiss

Concentration % (v/v)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	5	5	5	5	5	5	5	
	B								
	C								
	D								
6.25	A								
	B								
	C								
	D								
12.5	A								
	B								
	C								
	D								
25	A								
	B								
	C								
	D								
50	A								
	B								
	C								
	D								
100	A								
	B								
	C	↓	↓	↓	↓	↓	↓	↓	
	D	↓	↓	↓	↓	↓	↓	↓	
	A								
	B								
	C								
	D								
	A								
	B								
	C								
	D								
Tech Initials		EL	A	~	EL	EL	EL	EL	

Comments: _____

Reviewed by: JG

Date reviewed: May 20/15

7d Chronic Freshwater Toxicity Test Data Sheet
Swim-up Survival and Dry Weight

Client: Mt. Palley
Work Order No.: 15300
Sample ID: P2-S

Start Date: Apr 16/15
Termination Date: Apr 23/15
Test Species: Oncorhynchus mykiss

Concentration % (v/v)	Rep	Pan No.	No. Alive	Initials	Pan weight Euler mg	Pan + ^{EC} organism (g) mg	No. weighed	Initials
Control	A	1	5	EC	983.75	1160.12	5	EC
	B	2			979.74	1158.93		
	C	3			993.67	1162.09		
	D	4			983.45	1153.46		
6.25	A	5			978.25	1127.58		
	B	6			984.84	1139.82		
	C	7			1007.52	1168.89		
	D	8			992.86	1152 ^{EC} 3.06		
12.5	A	9			990.60	1149.74		
	B	10			995.08	1147.03		
	C	11			983.99	1107.03		
	D	12			996.37	1130.31		
25	A	13			987.67	1136.23		
	B	14			998.66	1153.97		
	C	15			998.70	1147.06		
	D	16			994.61	1145.94		
50	A	17			990.13	1143.63		
	B	18			985.43	1139.35		
	C	19			983.04	1131.17		
	D	20			996.61	1143.48		
100	A	21			987.33	1137.53		
	B	22			996.72	1151.09		
	C	23			994.38	1134.46		
	D	24		↓	984.41	1121.40	↓	↓

Thermometer: Calibrated Thermometer 2 DO meter: 1/2 pH meter: 1/2

Comments: Reweighed on Pan # 1 = 1162.03 mg # 11 = 1154.50 mg # 22 = 1152.14 mg

Reviewed by: John Date Reviewed: May 20/15

7d Chronic Freshwater Toxicity Test Data Sheet
Swim-up Survival and Dry Weight

Client: Mt. Polley
Work Order No.: 15300
Sample ID: P2-S

Start Date: Apr 16/15
Termination Date: Apr 23/15
Test Species: Oncorhynchus mykiss

Concentration	Rep	Pan No.	No. Alive	Initials	Pan weight EC (g) mg	Pan + EC organism (g) mg	No. weighed	Initials
To	A	1	5	EC	980.21	1054.47	5	EC
	B	2	↓	↓	982.77	1056.56	↓	↓
	C	3	↓	↓	987.70	1065.25	↓	↓
	D	4	↓	↓	991.87	1073.50	↓	↓
	A							
	B							
	C							
	D							
	A							
	B							
	C							
	D							
	A							
	B							
	C							
	D							
	A							
	B							
	C							
	D							

Thermometer: Calibrated Thermometer 2 DO meter: 1/2 pH meter: 1/2

Comments: Re-weighed on Pan #A: 1054.59
EC

Reviewed by: JGU Date Reviewed: May 20/15

CETIS Analytical Report

Report Date: 27 Apr-15 17:06 (p 1 of 6)
 Test Code: 15300 | 15-8601-1714

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 11-3983-2861	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 27 Apr-15 17:00	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 20-2898-3400	Test Type: Growth-Survival (7d)	Analyst: Josh Baker
Start Date: 16 Apr-15 13:30	Protocol: Washington DOE (2008) (Lazerchak)	Diluent: Mod-Hard Synthetic Water
Ending Date: 23 Apr-15 13:30	Species: Oncorhynchus mykiss	Brine:
Duration: 7d 0h	Source: Aqua Farm	Age:
Sample ID: 11-5968-2765	Code: 451F5ACD	Client: Mount Polley
Sample Date: 14 Apr-15 15:30	Material: Water Sample	Project:
Receive Date: 16 Apr-15 09:25	Source: Mount Polley (MT POLLEY)	
Sample Age: 46h (6.5 °C)	Station: P2-S	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1585787	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

C-%	Control Type	Count	Calculated Variate(A/B)									
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B	
0	Negative Control	4	1	1	1	0	0	0.0%	0.0%	20	20	
6.25		4	1	1	1	0	0	0.0%	0.0%	20	20	
12.5		4	1	1	1	0	0	0.0%	0.0%	20	20	
25		4	1	1	1	0	0	0.0%	0.0%	20	20	
50		4	1	1	1	0	0	0.0%	0.0%	20	20	
100		4	1	1	1	0	0	0.0%	0.0%	20	20	

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1	1	1	1
6.25		1	1	1	1
12.5		1	1	1	1
25		1	1	1	1
50		1	1	1	1
100		1	1	1	1

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	5/5	5/5	5/5	5/5
0	Time Zero	5/5	5/5	5/5	5/5
6.25		5/5	5/5	5/5	5/5
12.5		5/5	5/5	5/5	5/5
25		5/5	5/5	5/5	5/5
50		5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5

CETIS Analytical Report

Report Date: 27 Apr-15 17:06 (p 2 of 6)
Test Code: 15300 | 15-8601-1714

Fish Survival Development Growth (w/Length)

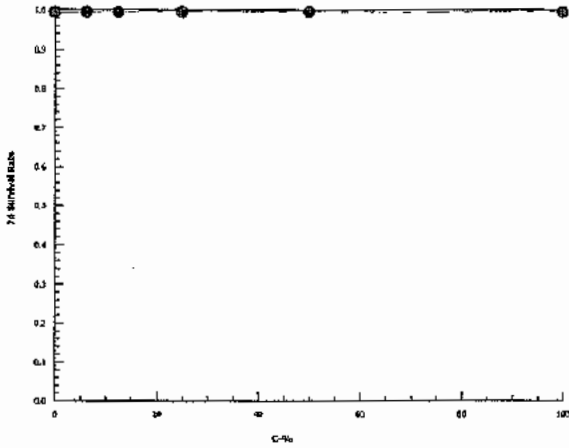
Nautilus Environmental

Analysis ID: 11-3983-2861
Analyzed: 27 Apr-15 17:00

Endpoint: 7d Survival Rate
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 27 Apr-15 17:06 (p 3 of 6)
 Test Code: 15300 | 15-8601-1714

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 01-9917-8606	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 27 Apr-15 17:00	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 20-2898-3400	Test Type: Growth-Survival (7d)	Analyst: Josh Baker
Start Date: 16 Apr-15 13:30	Protocol: Washington DOE (2008) (Lazordhak)	Diluent: Mod-Hard Synthetic Water
Ending Date: 23 Apr-15 13:30	Species: Oncorhynchus mykiss	Brine:
Duration: 7d 0h	Source: Aqua Farm	Age:
Sample ID: 11-5968-2765	Code: 451F5ACD	Client: Mount Polley
Sample Date: 14 Apr-15 15:30	Material: Water Sample	Project:
Receive Date: 16 Apr-15 09:25	Source: Mount Polley (MT POLLEY)	
Sample Age: 46h (6.5 °C)	Station: P2-S	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1978859	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	1.744	0.6504	4.852	57.35	20.61	153.8
IC10	6.42	1.34	14.76	15.58	6.774	74.64
IC15	55.51	N/A	N/A	1.801	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	34.7	33.68	35.84	0.5119	1.024	2.95%	0.0%
6.25		4	31.29	29.87	32.27	0.5511	1.102	3.52%	9.81%
12.5		4	28.4	24.61	31.83	1.65	3.301	11.62%	18.14%
25		4	30.18	29.67	31.06	0.3243	0.6487	2.15%	13.03%
50		4	30.12	29.37	30.78	0.3626	0.7252	2.41%	13.19%
100		4	29.08	27.4	30.87	0.8216	1.643	5.65%	16.19%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	35.27	35.84	33.68	34
6.25		29.87	31	32.27	32.04
12.5		31.83	30.39	24.61	26.79
25		29.71	31.06	29.67	30.27
50		30.7	30.78	29.63	29.37
100		30.04	30.87	28.02	27.4

QA: *Jbb*
May 20/15

CETIS Analytical Report

Report Date: 27 Apr-15 17:06 (p 4 of 6)
Test Code: 15300 | 15-8601-1714

Fish Survival Development Growth (w/Length)

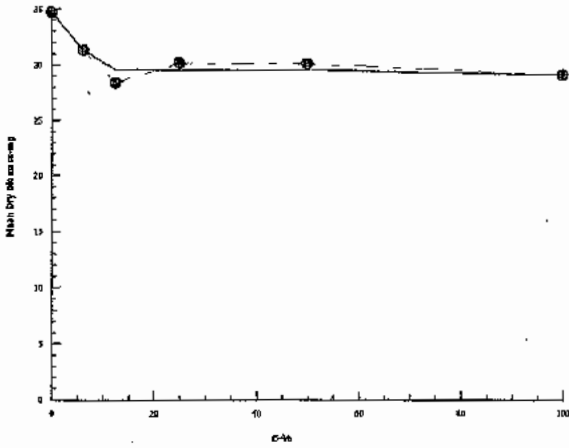
Nautilus Environmental

Analysis ID: 01-9917-8606
Analyzed: 27 Apr-15 17:00

Endpoint: Mean Dry Biomass-mg
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 27 Apr-15 17:06 (p 5 of 6)
 Test Code: 15300 | 15-8601-1714

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 14-3341-3185	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 27 Apr-15 17:00	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 20-2898-3400	Test Type: Growth-Survival (7d)	Analyst: Josh Baker
Start Date: 16 Apr-15 13:30	Protocol: Washington DOE (2008) (Lazur chak)	Diluent: Mod-Hard Synthetic Water
Ending Date: 23 Apr-15 13:30	Species: Oncorhynchus mykiss	Brine:
Duration: 7d 0h	Source: Aqua Farm	Age:
Sample ID: 11-5968-2765	Code: 451F5ACD	Client: Mount Polley
Sample Date: 14 Apr-15 15:30	Material: Water Sample	Project:
Receive Date: 16 Apr-15 09:25	Source: Mount Polley (MT POLLEY)	
Sample Age: 46h (6.5 °C)	Station: P2-S	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	775258	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	1.744	0.6611	4.481	57.35	22.32	151.3
IC10	6.42	1.384	13.11	15.58	7.627	72.27
IC15	55.51	N/A	N/A	1.801	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	34.7	33.68	35.84	0.5119	1.024	2.95%	0.0%
6.25		4	31.29	29.87	32.27	0.5511	1.102	3.52%	9.81%
12.5		4	28.4	24.61	31.83	1.65	3.301	11.62%	18.14%
25		4	30.18	29.67	31.06	0.3243	0.6487	2.15%	13.03%
50		4	30.12	29.37	30.78	0.3626	0.7252	2.41%	13.19%
100		4	29.08	27.4	30.87	0.8216	1.643	5.65%	16.19%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	35.27	35.84	33.68	34
6.25		29.87	31	32.27	32.04
12.5		31.83	30.39	24.61	26.79
25		29.71	31.06	29.67	30.27
50		30.7	30.78	29.63	29.37
100		30.04	30.87	28.02	27.4

CETIS Analytical Report

Report Date: 27 Apr-15 17:06 (p 6 of 6)
Test Code: 15300 | 15-8601-1714

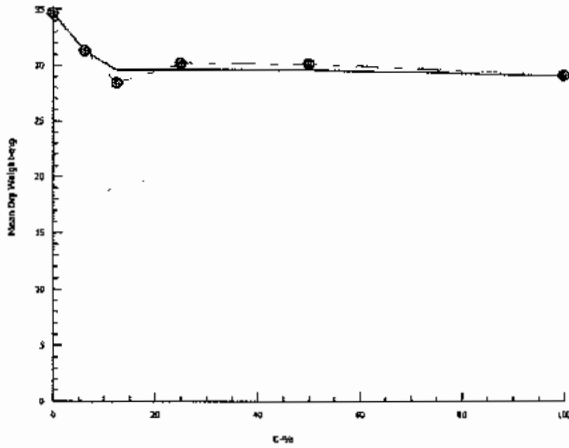
Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 14-3341-3185 Endpoint: Mean Dry Weight-mg
Analyzed: 27 Apr-15 17:00 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 27 Apr-15 17:06 (p 1 of 1)
 Test Code: 15300 | 15-8601-1714

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 04-1665-8771	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 27 Apr-15 17:00	Analysis: Parametric-Two Sample	Official Results: Yes
Batch ID: 20-2898-3400	Test Type: Growth-Survival (7d)	Analyst: Josh Baker
Start Date: 16 Apr-15 13:30	Protocol: Washington DOE (2008) (Lazorchak)	Diluent: Mod-Hard Synthetic Water
Ending Date: 23 Apr-15 13:30	Species: Oncorhynchus mykiss	Brine:
Duration: 7d 0h	Source: Aqua Farm	Age:
Sample ID: 11-5968-2765	Code: 451F5ACD	Client: Mount Polley
Sample Date: 14 Apr-15 15:30	Material: Water Sample	Project:
Receive Date: 16 Apr-15 09:25	Source: Mount Polley (MT POLLEY)	
Sample Age: 46h (6.5 °C)	Station: P2-S	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	3.51%	Fails mean dry weight-mg

Equal Variance t Two-Sample Test

Control	vs Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	Time Zero	30.83	1.943	1.219	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	747.9166	747.9166	1	950.7	<0.0001	Significant Effect
Error	4.720137	0.7866896	6			
Total	752.6367		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.995	47.47	0.5850	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9099	0.6451	0.3537	Normal Distribution

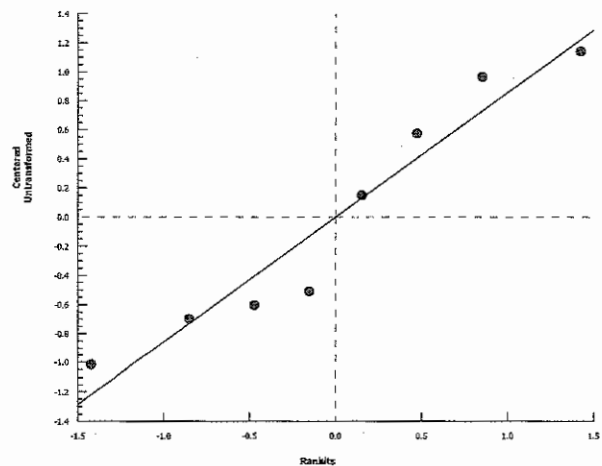
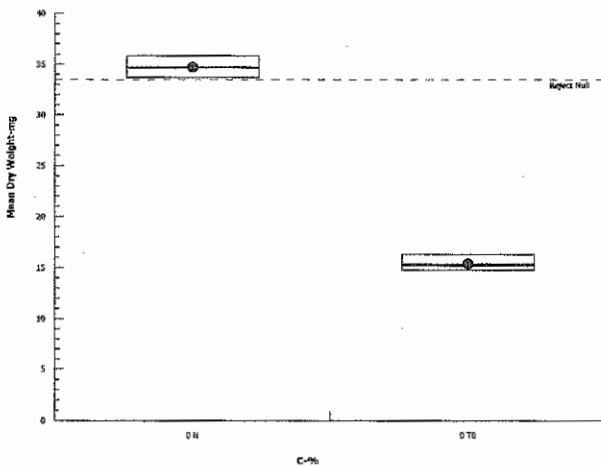
Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Time Zero	4	15.36	14.21	16.51	15.18	14.76	16.33	0.3624	4.72%	0.0%
0	Negative Control	4	34.7	33.07	36.33	34.64	33.68	35.84	0.5119	2.95%	-125.9%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	35.27	35.84	33.68	34
0	Time Zero	14.85	14.76	15.51	16.33

Graphics



Client: Mount Holly
 W.O.: 15300

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
PZ-S	Apr 16/15	50	4.9	5.0	96	50	5.76 4.9	128.4 98	EC
MHW (# 041315)	Apr 16/15	50	3.3	3.4	64	50	4.9	98	EC
MHW (# 041715)	Apr 18/15	50	3.3	3.4	64	50	5.0	100	EC

Notes: _____

Reviewed by: JGL

Date Reviewed: May 20/15

APPENDIX C - Fathead Minnow (*Pimephales promelas*) Toxicity Test Data



HydroQual
Laboratories Ltd.

ATTN: James Elphic
Nautilus Environmental Company Inc.
Burnaby
8664 Commerce Court, Burnaby
BC Canada

Received: 2015/04/17
Report Date: 2015/05/27
Version: REVISION 2

HydroQual Test Report

Client: NAU104
Reference: 15-0428
Billing: not given

Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

HydroQual Laboratories Ltd., #4, 6125 12th Street SE, Calgary, Alberta, Canada T2H 2K1
Tel (403) 253-7121 fax (403) 252-9363 www.hydroqual.ca



Result Summary

Client: NAU104
Reference: 15-0428-01-FMD

Client: Nautilus Environmental Company Inc.; operation V5A 4N7

Sample: P2-S

Collection: collected on 2015/04/14 at 1530 by not given

Receipt: received on 2015/04/17 at 0900 by AH

Containers: received 8 x 2 L bottles at 3 °C, in good condition with no seals and no initials

Description: type: water, collection method: not given

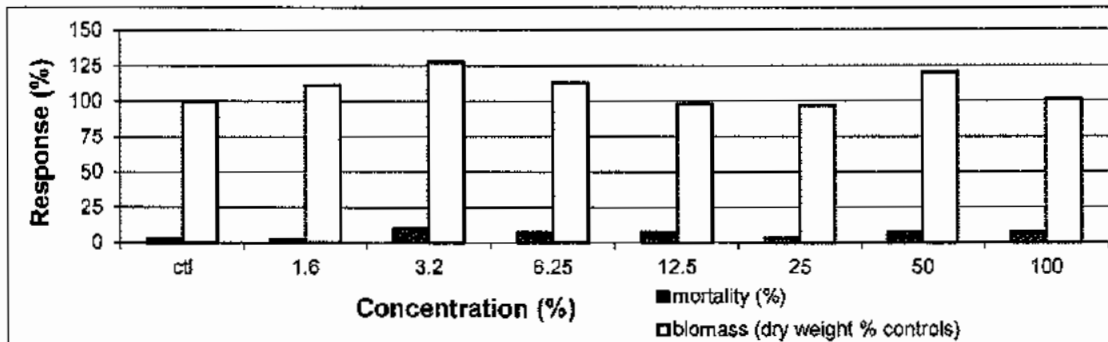
Test: started on 2015/04/17 ; ended on 2015/04/24

Contents	
Result Summary.....	1
Test Conditions.....	2
Test Data.....	4
Comments/Statistics..	9
QA/QC.....	10

Result:

	Endpoint (7-day)	Value	Confidence Limits (95%) lower upper	Units	Method Calculated
Acute: (survival)	LC25	>100		%	could not be calculated
	LC50	>100		%	could not be calculated
Chronic: (growth)	IC25	>100		%	could not be calculated
	IC50	>100		%	could not be calculated

Notes: LCx & ICx, concentrations lethal or inhibitory to 'x' percent of the test population;



The test data and results are authorized and verified correct.

Jaclyn Rose

Senior Verifier

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability is whole or in part assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results.

Test Conditions

Client: NAU104
Reference: 15-0428-01-FMD

Method: Biological Test Method: Test of Larval Growth and Survival Using Fathead minnows. Environment Canada, EPS 1/RM/22, Second Edition, February 2011.

Test type: Fathead Minnow 7-d Survival and Growth Static Renewal Test (WTR-ME-052)

Species: *Pimephales promelas*

Age: ≤ 24 hour post hatch

Organism source: Aquatox Inc., Hot Springs, Arkansas (Batch 20150417FM)

Culture conditions: temperature, 25 °C; dissolved oxygen, 95-100 % saturation

Shipped: 2015/04/16

Breeding Stock Mortality: < 1 % during the week prior to test initiation

Organisms upon receipt: mortality, < 1 %; temperature, 25°C; dissolved oxygen, 13.8 mg/L

No acclimation was necessary. Test organisms maintained at 25 ± 1°C until loaded. The EC guidance document on the importation of test organisms (1999) has been followed. Test organisms were received in good condition, with inflated swim bladders and normal feeding behaviour.

Organism observation: No unusual behaviour or appearance or treatment of test organisms was noted prior to shipping, upon arrival, preceding or during the test. Normal feeding behaviour was noted during the test.

Sample initial chemistry: pH: 6.5; EC: 279 (µS/cm); DO: 9.5 (mg/L); temperature: 18 °C
hardness (mg CaCO₃/L): 88; colour: colourless; odour: odourless

Sample holding time: 3 days (must be ≤ 3 days); The test was conducted with three subsamples samples a, b, and c were for days 0 to 2, 3 to 5, and 6 respectively

Sample storage: 4 ± 2°C in darkness

Test vessel: Tests were conducted in 500 mL plastic vessels

Test volume: 250 mL of solution (depth of 6.5 cm), replenished daily

Control/dilution water: The control and dilution water was dechlorinated City of Calgary water acclimated to the test conditions; no chemicals were added to the dilution/control water
A second control was not set up for this test. However, duplicate controls are run in the reference toxicant for each batch of fish.

Test concentrations: 7 effluent concentrations (1.6, 3.2, 6.3, 13, 25, 50, 100% (v/v)
plus a negative control)

Test replicates: Ten fish ≤ 24 hours old were loaded per test vessel; 4 replicates/conc.

Feeding: The test organisms were fed twice daily newly-hatched brine shrimp nauplii
The fish are not fed during the final 12 hours of the test

Measurements: pH, conductivity, dissolved oxygen and temperature were measured daily

Sample pre-treatment: The sample was not aerated, pH or hardness adjusted prior to or during testing.
No sample filtration, settling, or decanting occurred prior to or during testing
The dissolved oxygen concentration (mg/L) was: 9.4
The sample pH was: 7.6

Lighting: Overhead full spectrum fluorescent lights

Photoperiod: 16h light:8h dark

Test temperature: 25 ± 1°C

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Note: Outlined sections are protocol deviations explained on the comment page

Test Conditions

Client: NAU104 Reference: 15-0428-01-FMD

Endpoint: Survival, 7-d LC50 (with 95% confidence limits)
Biomass, 7-d IC25 (with 95% confidence limits)
Test endpoints were bracketed by at least 1 test concentration
(except for <1.6% or >100 %)
No outliers were observed within the data set

Test validity: Control had 98% survival (must \geq 80%)
Control had 0% abnormal behaviour (must < 20%), e.g. atypical swimming, loss of equilibrium

The average dry weight of the control fish was 0.46 (must \geq 0.25 mg)

Reference toxicant: 7-d test with NaCl initiated April 17, 2015;
current results: (7-d LC50 and 95% confidence limits) = 3.09 (3.05-3.13) log (mg/L NaCl)
current results: (7-d IC25 and 95% confidence limits) = 3.01 (2.94-3.03) log (mg/L NaCl)
The reference toxicant test was performed under the same conditions as those used during this test.

Note: Outlined sections are protocol deviations explained on the comment page

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Test Data

Client: NAU104
Reference: 15-0428-01-FMD

Test Log:

Date	Day	Time	Technicians	Temperature Before Use(°C)	
				Control	Sample
2015/04/17	0	1500	HKS/JK	25	25
2015/04/18	1	1230	JK	25	25
2015/04/19	2	1330	ML	25	25
2015/04/20	3	1400	JK	25	25
2015/04/21	4	1345	JK	25	25
2015/04/22	5	1115	JK	25	25
2015/04/23	6	1400	DS	25	25
2015/04/24	7	0915	NM/JK	na	na

Combined Mortality and Atypical Swimming Behavior (%):

Day	ctl	1.6	3.2	6.3	12.5	25	50	100
0	0%	0%	0%	0%	0%	0%	0%	0%
1	0%	3%	3%	3%	3%	0%	5%	3%
2	0%	3%	8%	5%	5%	3%	5%	5%
3	5%	5%	7%	8%	5%	3%	8%	10%
4	3%	3%	13%	8%	8%	3%	8%	8%
5	5%	3%	10%	8%	8%	8%	8%	10%
6	3%	3%	10%	8%	8%	5%	8%	10%
7	3%	3%	10%	8%	8%	3%	8%	8%

Chemistry Summary Tables:

Conc. (%)	ctl	New Solutions							Old Solutions						
		1.6	3.2	6.25	12.5	25	50	100	ctl	1.6	3.2	6.25	12.5	25	50

Average Values

pH	8.0	8.0	8.0	8.0	8.0	7.9	7.8	7.5	7.7	7.8	7.8	7.7	7.8	7.7	7.6	7.6
cond.	418	411	404	400	392	379	352	296	409	424	418	413	407	398	365	305
DO	7.8	7.7	7.7	7.7	7.7	7.8	8.0	8.4	6.8	6.9	6.8	6.7	6.9	6.7	6.6	6.7
temp	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25

Coefficients of Variation (%)

pH	3	2	3	3	3	3	3	4	3	2	2	2	2	2	2	2
cond.	9	3	4	5	4	4	3	2	5	5	5	5	5	5	3	1
DO	2	2	2	2	2	3	4	6	5	6	6	6	7	6	8	6
temp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Test Data

Client: NAU104
Reference: 15-0428-01-FMD

Biology (number alive):

Biology (% mortality):

Conc. (%)	ctl	1.6	3.2	6.25	12.5	25	50	100	ctl	1.6	3.2	6.25	12.5	25	50	100
-----------	-----	-----	-----	------	------	----	----	-----	-----	-----	-----	------	------	----	----	-----

Replicate	Day 1								Day 1							
	a	10	10	10	10	10	10	9	10	0	0	0	0	0	0	10
b	10	9	10	9	10	10	10	10	0	10	0	10	0	0	0	0
c	10	10	10	10	9	10	10	10	0	0	0	0	10	0	0	0
d	10	10	10	10	10	10	9	10	0	0	0	0	0	0	10	0

Replicate	Day 2								Day 2							
	a	10	10	9	10	10	10	9	9	0	0	10	0	0	0	10
b	10	9	9	9	10	10	10	10	0	10	10	10	0	0	0	0
c	10	10	9	10	9	10	10	9	0	0	10	0	10	0	0	10
d	10	10	10	9	9	9	9	10	0	0	0	10	10	10	10	0

Replicate	Day 3								Day 3							
	a	10	10	9	9	10	10	9	9	0	0	10	10	0	0	10
b	10	9	9	9	10	10	10	9	0	10	10	10	0	0	0	10
c	10	10	9	10	9	10	10	9	0	0	10	0	10	0	0	10
d	9	10	10	9	9	9	8	10	10	0	0	10	10	10	20	0

Replicate	Day 4								Day 4							
	a	10	10	9	9	10	10	9	9	0	0	10	10	0	0	10
b	10	9	9	9	10	10	10	9	0	10	10	10	0	0	0	10
c	10	10	8	10	9	10	10	9	0	0	20	0	10	0	0	10
d	9	10	10	9	9	9	8	10	10	0	0	10	10	10	20	0

Replicate	Day 5								Day 5							
	a	10	10	9	9	10	10	9	9	0	0	10	10	0	0	10
b	10	9	9	9	10	2*	10	9	0	10	10	10	0	0	0	10
c	10	10	8	10	9	10	10	9	0	0	20	0	10	0	0	10
d	9	10	10	9	8	9	8	10	10	0	0	10	20	10	20	0

*see test result comments

Replicate	Day 6								Day 6							
	a	10	10	9	9	10	10	9	9	0	0	10	10	0	0	10
b	10	9	9	9	10	2*	10	9	0	10	10	10	0	0	0	10
c	10	10	8	10	9	10	10	9	0	0	20	0	10	0	0	10
d	9	10	10	9	8	9	8	10	10	0	0	10	20	10	20	0

Replicate	Day 7								Day 7							
	a	10	10	9	9	10	10	9	9	0	0	10	10	0	0	10
b	10	9	9	9	10	2*	10	9	0	10	10	10	0	0	0	10
c	10	10	8	10	9	10	10	9	0	0	20	0	10	0	0	10
d	9	10	10	9	8	9	8	10	10	0	0	10	20	10	20	0

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Client: NAU104
Reference: 15-0428-01-FMD

Biology (number displaying atypical swimming):								Biology (% atypical swimming behavior):								
Conc. (%)	ctl	1.6	3.2	6.25	12.5	25	50	100	ctl	1.6	3.2	6.25	12.5	25	50	100

Replicate	Day 1								Day 1								
	a	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
b	0	0	1	0	0	0	0	0	0	0	10	0	0	0	0	0	0
c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
d	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Day 2								Day 2								
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
d	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Day 3								Day 3								
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
d	1	0	0	0	0	0	0	1	10	0	0	0	0	0	0	0	10
	Day 4								Day 4								
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b	0	0	1	0	0	0	0	0	0	0	10	0	0	0	0	0	0
c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
d	0	0	0	0	1	0	0	0	0	0	0	0	10	0	0	0	0
	Day 5								Day 5								
a	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	10
b	0	0	0	0	0	2	0	0	0	0	0	0	0	20	0	0	0
c	1	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0
d	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Day 6								Day 6								
a	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	10
b	0	0	0	0	0	1	0	0	0	0	0	0	0	10	0	0	0
c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
d	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Day 7								Day 7								
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
d	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Test Data

Client: NAU104
Reference: 15-0428-01-FMD

Unpreserved Dry Weights (mg)

Conc. (%)	ctl	1.6	3.2	6.25	12.5	25	50	100
	4.7	4.6	5.1	4.8	4.5	4.4	4.2	4.4
	4.9	5.4	5.0	5.0	4.4	1.2	6.6	4.4
	4.3	4.9	4.4	5.6	4.7	4.3	5.8	4.3
	4.0	5.1	8.4	5.0	4.1	4.4	5.1	5.2

Biology Summary Tables:

Conc. (%)	ctl	1.6	3.2	6.25	12.5	25	50	100	ctl	1.6	3.2	6.25	12.5	25	50	100
Mortality (%)									Biomass Data (mg per fish)							
a	0	0	10	10	0	0	10	10	0.47	0.46	0.51	0.48	0.45	0.44	0.42	0.44
b	0	10	10	10	0	80*	0	10	0.49	0.54	0.50	0.50	0.44	0.12*	0.66	0.44
c	0	0	20	0	10	0	0	10	0.43	0.49	0.44	0.56	0.47	0.43	0.58	0.43
d	10	0	0	10	20	10	20	0	0.40	0.51	0.84	0.50	0.41	0.44	0.51	0.52
*see test result comments									*see test result comments							
mean	3	3	10	8	8	3	8	8	0.45	0.50	0.57	0.51	0.44	0.44	0.54	0.46
sd	5	5	8	5	10	6	10	5	0.04	0.03	0.18	0.03	0.03	0.01	0.11	0.04
cv(%)	200	200	82	67	128	173	128	67	9	6	32	7	6	1	20	9

Biomass as a Percent of Controls

Average Dry Weight of Surviving Control Fish:	0.46	100	111	127	113	98	97	120	101
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Test Data

Client: NAU104
Reference: 15-0428-01-FMD

Chemistry:

New Solutions									Old Solutions							
Conc. (%)	ctl	1.6	3	6.25	12.5	25	50	100	ctl	1.6	3	6.25	12.5	25	50	100

Day	pH (units)								pH (units)								
	0	8.2	8.2	8.2	8.3	8.3	8.2	8.1	7.6								
1	7.5	7.6	7.6	7.6	7.6	7.6	7.4	7.0	7.5	7.6	7.6	7.6	7.6	7.5	7.4	7.3	
2	8.1	8.1	8.2	8.1	8.1	8.1	8.0	7.8	8.0	8.1	8.0	8.0	8.0	7.9	7.8	7.8	
3	7.9	7.9	7.9	8.0	8.0	7.9	7.9	7.5	7.8	7.9	7.9	7.9	7.9	7.8	7.7	7.6	
4	8.1	7.9	7.9	7.9	8.0	7.7	7.7	7.5	7.8	7.7	7.7	7.6	7.6	7.7	7.5	7.4	
5	7.8	8.0	8.0	8.0	8.0	8.0	7.8	7.6	7.7	7.8	7.8	7.7	7.8	7.7	7.6	7.6	
6	8.1	8.1	8.1	8.1	8.1	8.1	8.0	7.8	7.6	7.8	7.7	7.7	7.8	7.8	7.7	7.7	
7									7.4	7.6	7.6	7.6	7.7	7.7	7.7	7.7	
8																	
Conductivity (µS/cm)									Conductivity (µS/cm)								
0	401	425	422	418	407	387	355	291									
1	420	425	420	417	409	392	361	296	428	434	434	431	421	417	371	303	
2	428	420	419	418	409	397	369	291	434	444	434	430	422	411	369	308	
3	429	413	408	403	396	384	356	297	427	447	439	434	431	419	382	309	
4	393	395	389	386	377	367	341	293	411	433	420	419	411	401	369	302	
5	372	389	387	384	379	367	347	301	396	422	419	411	408	397	368	311	
6	486	408	380	374	367	357	335	292	388	397	391	383	383	374	350	299	
7								304	377	391	389	380	376	369	347	304	
8																	
Dissolved Oxygen (mg/L)									Dissolved Oxygen (mg/L)								
0	7.9	7.8	7.8	7.8	7.8	8.1	8.5	9.4									
1	7.6	7.7	7.6	7.6	7.7	7.7	8.0	8.2	7.0	7.2	7.1	7.1	7.1	7.1	7.3	7.1	
2	8.1	8.0	8.0	8.0	8.0	8.1	8.2	8.6	7.4	7.5	7.4	7.3	7.3	7.4	7.3	7.3	
3	7.9	7.7	7.7	7.7	7.7	7.8	7.8	8.2	7.0	7.0	7.0	6.8	6.9	6.7	6.6	6.7	
4	7.7	7.5	7.5	7.5	7.5	7.6	7.7	8.1	6.6	6.6	6.4	6.2	6.3	6.3	5.9	6.2	
5	7.9	7.6	7.5	7.5	7.5	7.7	7.8	8.2	6.6	6.9	6.6	6.6	6.6	6.6	6.2	6.5	
6	7.6	7.6	7.6	7.5	7.6	7.6	7.7	7.8	6.6	6.6	6.6	6.5	6.4	6.4	6.5	6.4	
7									6.4	6.2	6.3	6.2	7.5	6.4	6.5	6.6	
8																	
Temperature (°C)									Temperature (°C)								
0	25	25	25	25	25	25	25	25									
1	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	
2	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	
3	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	
4	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	
5	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	
6	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	
7									25	25	25	25	25	25	25	25	
8																	

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Comments/Statistics

Client: NAU104 Reference: 15-0428-01-FMD

Test Result Comments:

Due to technician error, eight organisms were killed in the 25% concentration on day 5. This replicate is not included in mortality or biomass calculations.

Data Analysis:

Endpoints for mortality could not be calculated. No effect occurred.

Endpoints for biomass could not be calculated. No effect occurred.

Protocol Deviations:

None.

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Test Method: 7 days Fathead minnow Survival and Growth Test (7 treatments plus a control)
HydroQual Test Method: WTR-ME-046

Reference: Biological Test Method: Test of Larval Growth and Survival Using Fathead minnows. Environment Canada, EPS 1/RM/22, Second Edition, February 2011.

Test Organism:

test species: *Pimephales promelas*
culture source: Aquatox
(Arkansas, USA)
temp of breeding aquaria: 23 - 26 °C
food type: newly-hatched brine shrimp nauplii
frequency of feeding: daily
breeding colony mortality: <1% (last 7 days)
age of test organisms: <24 hours
condition prior to test initiation: normal
batch number: 20150417FM

Test Design:

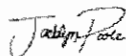
test type: static renewal
toxicant: sodium chloride
test vessel: polypropylene cups, 11 x 9 cm
volume of test vessel (ml): 500
test volume (ml): 250
depth of test solution: >3 cm
replicates per treatment: 4 replicates
organisms per replicate: 10
feeding: twice daily
temperature (°C): 24-26
photoperiod: 16 hours light: 8 hours dark
light level (surface): 100-500 lux (full spectrum)

Control/Dilution Water:

source: dechlorinated City of Calgary tap water
no chemicals were added to the dilution water
pH (units): 6.9
conductance (µS/cm): 411
dissolved oxygen (mg/L): 5.9
NH₄⁺ (mg/L): <0.1
hardness (mg CaCO₃/L): 174
alkalinity (mg CaCO₃/L): 148
total residual chlorine (mg/L): <0.01

Comments: None

The test data and results are authorized and verified correct.



Technical Lead

Our liability is limited to the cost of the test requested on the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results in part or in whole.

Mortality

Current Test

toxicant Sodium Chloride (NaCl)

started on 2015/04/17 ended on 2015/04/24

Result (7 d LC50): 3.09 log (mg NaCl/L); geometric mean

Confidence Limits (95%) lower 3.05 upper 3.13

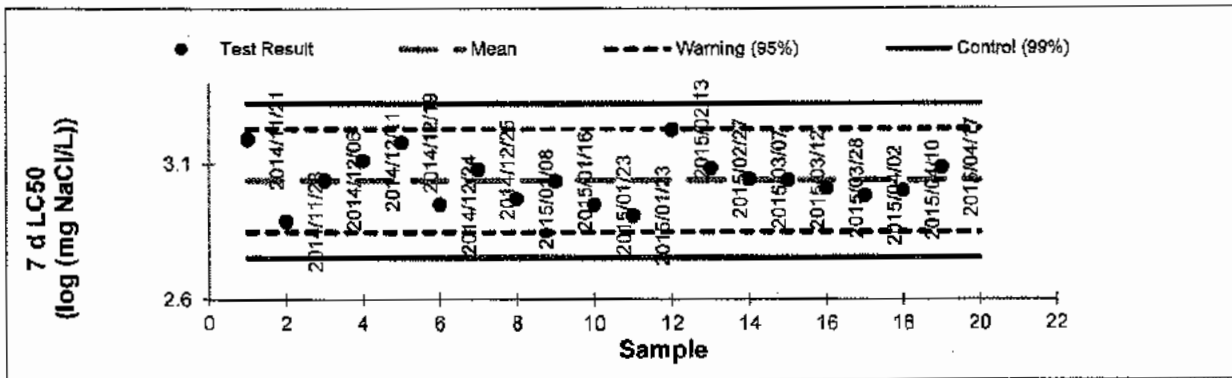
Historical Values

mean 3.04 sd 0.10 cv(%): 14.5

lower upper

warning limits (± 2 sd) 2.85 3.23 (95% confidence limits)

control limits (± 3 sd) 2.75 3.32 (99% confidence limits)



Biomass

started on 2015/04/17 ended on 2015/04/24

Result (7 d IC25): 3.01 log (mg NaCl/L); geometric mean

Confidence Limits (95%) lower 2.94 upper 3.03

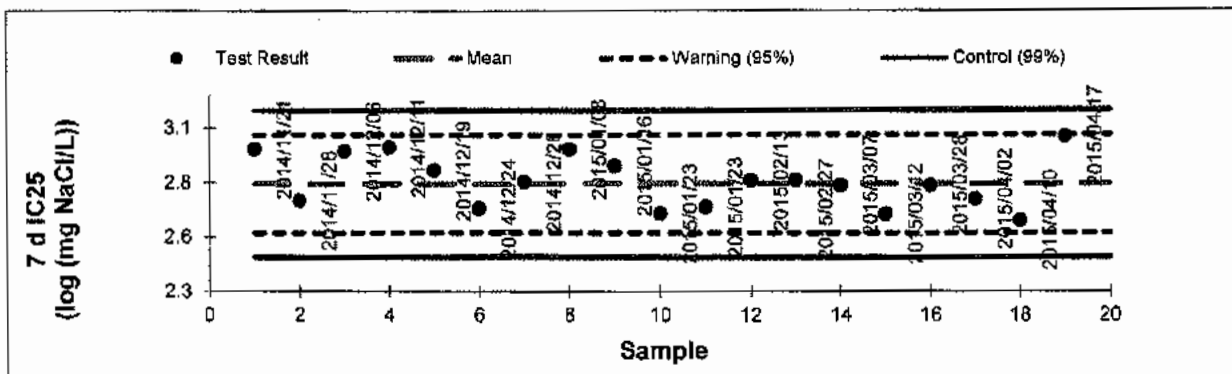
Historical Values

mean 2.79 sd 0.11 cv(%): 17.1

lower upper

warning limits (± 2 sd) 2.57 3.02 (95% confidence limits)

control limits (± 3 sd) 2.46 3.13 (99% confidence limits)



notes: sd, standard deviation; cv, coefficient of variance; N/A, could not be calculated

Our liability is limited to the cost of the test requested on the sample as received. No liability in whole or in part is assumed for the collection, handling or transport of the sample, application or interpretation of the test data or results in part or in whole.

GENERAL TERMS AND CONDITIONS:

These terms and conditions are incorporated into and form part of the Chain of Custody between HydroQual Laboratories Ltd. ("HydroQual") and the party named in the Chain of Custody (the "Client").

1. **Definitions:** Capitalized terms shall have the definition ascribed as such in these General Terms and Conditions and the Chain of Custody.
2. **The Services:** HydroQual will provide the Services to the Client as listed and described in the Chain of Custody.
3. **Prices:** HydroQual may review and change all prices, fees, surcharges or other charges as set out in proposals and/or price quotations if there are changes to HydroQual's cost beyond HydroQual's control, including changes in legislative requirements, Client variations of sample numbers and Client requests for changes to standard reporting requirements. Notwithstanding condition 3, all quotations are reviewed and updated on a yearly basis.
4. **Payment Terms:** The Client shall pay HydroQual within 30 days of the invoice date as provided by HydroQual. HydroQual may, for reasonable business reasons, require the Client to arrange for payment in advance.
5. **Quotation Numbers:** The Client shall provide the proposal and/or price quotation number to HydroQual (where applicable) to ensure correct pricing.
6. **Taxes:** Applicable taxes are not included in prices, surcharges and additional fees and will be added at the time of invoicing.
7. **No Guarantee of Results:** The Client is responsible for informing itself on the limitation of the results and acknowledges that the results are not guaranteed.
8. **Standard of Care:** HydroQual will use reasonable care and diligence as required by the laws of the province or territory where the sample is tested, subject to that level of care and skill ordinarily exercised by other laboratories currently practicing under similar conditions in the same locality, subject to the time limits and financial, physical or other constraints applicable to the Services. No warranty, express or implied, is made.
9. **Storage:** Where possible, HydroQual will store samples until a final report is issued to the Client, after which time HydroQual may discard the sample.
10. **Holds:** If the Client requests a sample be placed on hold, HydroQual will store the sample for the mutually agreed upon written time and price, after which HydroQual will invoice the Client and discard the sample.
11. **Archives:** If the Client requests a sample be archived, HydroQual will store the sample for a mutually agreed upon written time frame and price, after which HydroQual will invoice the Client and discard the sample.
12. **Handling Protocol:** Legal sample handling protocol must be arranged, and provided in writing, before samples are collected. HydroQual will provide a price quotation for legal sample protocol. Samples processed under legal protocol are stored indefinitely, subject to a storage charge as advised by HydroQual.
13. **Samples:** The quality, condition, content and source of samples stored and tested are not known to HydroQual except as declared and described on the Chain of Custody completed and submitted by the Client and accompanying the sample.
14. **Risk of Loss:** HydroQual will use reasonable care to protect samples during storage, however, all samples are stored at the Client's risk and the Client is responsible for obtaining appropriate insurance, if desired. The Client acknowledges that during the performance of the Services samples may be altered, lost, damaged or destroyed and the client forever releases HydroQual from any and all claims the Client may have for any loss or damage to the sample.
15. **Environmental:** the Client must comply with all applicable environmental legislation, including labeling all hazardous samples to comply with Canada's *Workplace Hazardous Materials Information System* and the Alberta *Transfer of Dangerous Goods* regulations, and must provide appropriate material safety data sheets that include the nature of the hazard and a contact name and phone number to call for information. The Client shall defend, indemnify and hold harmless HydroQual for all loss or damages, including any fine or cost of complying with an order of any government authority, resulting from the Client's breach of this paragraph.
16. **Hazardous Materials Disposal:** HydroQual may return, at the Client's cost, hazardous material to the Client for disposal.
17. **Hazardous Materials Surcharge:** HydroQual may apply an additional surcharge for handling of hazardous samples or samples with Naturally Occurring Radioactive Materials ("NORM"), such as and including without limitation, H₂S and CN.
18. **Sample Containers:** HydroQual may ship sample containers to the Client's location by the most cost effective means using HydroQual's preferred courier suppliers, within the specified project timeline. Shipping will be charged back to the Client.
19. **Additional Charges:** HydroQual may charge the Client:
 - (a) for pick-up and delivery services when provided subject in each instance to a minimum charge of \$50.00; and,
 - (b) for rush service (processing samples and/or reporting).
20. **Large Bottle Orders:** The Client shall provide HydroQual with not less than 24 hours' notice for large bottle orders.
21. **Re-Tests:** HydroQual reserves the right to re-test any samples that remain in HydroQual's possession. Re-tests requested by the Client may be charged to Client and Client agrees to pay for such charges.
22. **Waiver:** The Client is responsible for making any assessment regarding the suitability of the Services and the intended results for the Client's purposes and waives any and all claims against HydroQual that the Client may have against HydroQual as a result of the interpretation of the results provided to the Client. The Client shall defend, indemnify and save harmless HydroQual for any and all claims made by any third party against HydroQual in respect of all losses however arising from the performance of the Services or the use of any report provided in the performance of the Services.
23. **LIMITATION OF LIABILITY:** IN NO EVENT SHALL HYDROQUAL BE RESPONSIBLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY OR PUNITIVE DAMAGES, WHETHER FORESEEABLE OR UNFORESEEABLE (INCLUDING CLAIMS FOR LOSS OF PROFITS OR REVENUE OR LOSSES CAUSED BY STOPPAGE OF OTHER WORK OR IMPAIRMENT OF OTHER ASSETS) INCURRED BY THE CLIENT ARISING OUT OF BREACH OR FAILURE OF EXPRESS OR IMPLIED WARRANTY, BREACH OF CONTRACT, BREACH OF WARRANTY, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE. IN ANY EVENT, THE LIABILITY OF HYDROQUAL TO THE CLIENT SHALL BE LIMITED TO THE COST OF TESTING THE SAMPLE AS REQUESTED IN THE CHAIN OF CUSTODY UNDER WHICH THE SAMPLE WAS ORIGINALLY DEPOSITED. FOR THE PURPOSES OF THIS PARAGRAPH AND PARAGRAPHS 7, 14, 15, 22, AND 24, AS APPLICABLE, "HYDROQUAL" INCLUDES WITHOUT LIMITATIONS ITS DIRECTORS, OFFICERS, EMPLOYEES AND AFFILIATES AND THE "CLIENT" INCLUDES WITHOUT LIMITATION ANY THIRD PARTY THAT MAY HAVE A CLAIM AGAINST HYDROQUAL THROUGH THE CLIENT.
24. **Notice of Liability:** Notwithstanding paragraph 23, HydroQual shall not be liable to the Client unless the Client provides notice in writing to HydroQual of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk between the Client and HydroQual, and the fees to be paid by the Client to HydroQual reflect this allocation of any such risks and the limitations of liability in these General Terms and Conditions.
25. **Entire Agreement:** These General Terms and Conditions, the Chain of Custody and price quotations constitute the entire agreement between the parties and supersede and take precedence over any terms and conditions contained in any documentation provided by the Client. HydroQual's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein unless expressly stipulated otherwise by HydroQual. If there is a conflict between these General Terms and Conditions and any other document, these General Terms and Conditions prevail.

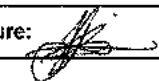
APPENDIX D - Chain of Custody Form

Nautilus Environmental

Chain of Custody (electronic)

British Columbia: 8884 Commerce Court, Burnaby, BC, V6A 4N7

Date 14/04/15 Page 1 of 1

Sample Collection By: Katie McMahan, Shauna Litke							ANALYSES REQUIRED							Receipt Temperature (C)	
Report to:		Invoice to:													
Company: Mount Polley Mining Corporation		Mount Polley Mining Corporation													
Address: Box 12		Box 12													
City/Prov/Postal Code: Likely BC V0L 1N0		Likely BC V0L 1N0													
Contact: Colleen Hughes		Colleen Hughes/													
Phone: (250) 790-2617		(250) 790-2617													
Email: chughes@mountpolley.com		chughes@mountpolley.com													
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	7d C. dubia S+R	7d fathead S+G	7d RBT S+G	Surfm up					
1	P2-S	14/04/2014	15:30	water	20L	3		X	X	X					
2															
3															
4															
5															
6															
7															
8															
9															
10															
PROJECT INFORMATION				SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)			RELIQUISHED BY (COURIER)						
Client: Mount Polley Mining Corporation				Total # Containers:		Signature: 			Signature:						
P.O. No.:				Good Condition?					Print:						
Shipped Via: Greyhound				Matches Schedule?		Company: MPMC Time/Date: 14/04/2015 15:30:00			Company: Time/Date:						
SPECIAL INSTRUCTIONS/COMMENTS: Use sparingly - only 60L could be collected. ① Subcontracted to HydroQual - NY						RECEIVED BY (COURIER)			RECEIVED BY (LABORATORY)						
						Signature:			Signature: NY						
						Print:			Print: NAIR YAMAMOTO						
						Company:			Company: NAUTILUS						
Time/Date:			Time/Date: Apr 16/15 @ 09:25												

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

APPENDIX B

Reference Values for Condition-Specific British Columbia Water Quality Guidelines (Aquatic Life) and Resulting Guideline Values

Appendix Table B.1: Reference Values and Condition-Specific Guidelines for the Protection fo Aquatic Life in Polley Lake/Hazeltine Creek Water and in Quesnel Lake/River Water

A) Reference Water Quality

Analyte	Units	Polley Lake		Hazeltine Discharge					Summary Statistics			
		POL-2	POL-6-14M	HAD-1	HAD-1	HAD-1	HAD-1	HAD-2	Mean	Median	Min	Max
		2014 08 09	2014 09 16	2014 08 13	2014 08 20	2014 08 27	2014 09 10	2014 09 03				
Hardness	(mg/L)	96.7	144	97.4	102	106	107	107	109	106	96.7	144
pH (field)	(pH)	-	6.94	9.11	-	8.83	8.66	8.2	8.35	8.66	6.94	9.11
pH (lab)	(pH)	8.87	8.03	8.80	8.21	8.35	8.26	8.38	8.41	8.35	8.03	8.87
Temperature (field)	(C)	-	8.3	21.2	-	18.8	14.9	21.6	17.0	18.8	8.3	21.6
Chloride	(mg/L)	< 0.5	1.88	< 0.5	< 0.5	<0.5	0.52	< 0.5	1.20	1.20	0.52	1.88

Analyte	Units	Quesnel River		Quesnel Lake				Summary Statistics			
		QUR-1	QUR-1(10:40)	QUL66-40M	QUL-66-40M	QUL-66-45M	QUL-66-40M	Mean	Median	Min	Max
		2014 08 06	2014 08 22	2014 08 21	2014 08 28	2014 09 03	2014 09 16				
Hardness	(mg/L)	48.5	51.6	69.4	67.5	67.8	66	62	67	48.5	69.4
pH (field)	(pH)	8.08	8.05	8.09	7.92	-	-	8.04	8.07	7.92	8.09
pH (lab)	(pH)	7.94	7.91	7.9	8	8.06	8.01	7.97	7.97	7.9	8.06
Temperature (field)	(C)	17.3	14.3	6.8	6.3	6.8	-	10.3	6.8	6.3	17.3
Chloride	(mg/L)	< 0.5	< 0.5	0.56	0.52	0.57	< 0.5	0.55	0.56	0.52	0.57

B) Selected Reference Values

Analyte	Units	Polley/Hazeltine	Quesnel
Hardness	(mg/L)	100	60
pH (field)	(pH)	8.0	8.0
Temperature (field)	(C)	20	20
Chloride	(mg/L)	1.2	0.5

C) Condition-Specific British Columbia Water Quality Guidelines (BCMOE 2015a, BCMOE 2015b)

Analyte	Approved or Working	Chronic or Acute	Condition or Equation	Applicable Guideline			
				Apply to Polley / Hazeltine		Apply to Quesnel	
				ug/L	mg/L	ug/L	mg/L
Ammonia	Approved	Chronic	use tables	760	0.76	760	0.76
		Acute	use tables	5,600	5.6	5,600	5.6
Nitrite	Approved	Condition:	Cl <2 mg/L Cl 2 -4 mg/L Cl 4-6 mg/L				
		Chronic	0.02 0.04 0.06	20	0.02	20	0.02
		Acute	0.06 0.12 0.18	60	0.06	60	0.06
Fluoride	Approved	Maximum	$-51.73 + 92.57(\log(\text{hardness})) \times 0.01$	1,334	1.3	1,129	1.1
Sulphate	Approved	Condition:	H ¹ 31-75 mg/L H ¹ 76-180 mg/L H ¹ 181-250 mg/L				
		30-day average	218 309 429	309,000	309	218,000	218
Cadmium (Dissolved)	Approved	Long - Term	$e^{(0.736 \cdot \ln(\text{hardness})) - 4.943}$	0.211	0.000211	0.145	0.000145
		Short - Term	$e^{(1.03 \cdot \ln(\text{hardness})) - 5.274}$	0.59	0.0006	0.35	0.0003
Copper	Approved	30-day average	$0.04 \cdot \text{hardness}$	4	0.004	2.4	0.002
		Maximum	$0.094 \cdot \text{hardness} + 2$	11.4	0.0114	7.64	0.0076
Lead	Approved	30-day average	$3.31 + e^{(1.273 \cdot \ln(\text{hardness})) - 4.704}$	6.5	0.0065	5.0	0.0050
		Maximum	$e^{(1.273 \cdot \ln(\text{hardness})) - 1.46}$	82	0.082	43	0.043
Manganese	Approved	30-day average	$0.0044 \cdot \text{hardness} - 0.605$	1,045	1.045	869	0.869
		Maximum	$0.01102 \cdot \text{hardness} + 0.54$	1,642	1.642	1,201	1.201
Mercury ²	Approved	30-day average	when MeHg = 0.5% of THg; 0.02 ug/L	0.02	0.00002	0.02	0.00002
			when MeHg = 1.0% of THg; 0.01 ug/L	-	-	-	-
			when MeHg = 8.0% of THg; 0.00125 ug/L	-	-	-	-
Nickel	Working	Long - Term	when hardness ≤ 60: 25 ug/L				
			when hardness 60 - 180 mg/L; $e^{(0.76 \cdot \ln(\text{hardness})) + 1.06}$	96	0.096	65	0.065
			when hardness ≥ 180 mg/L; 150 ug/L				
Silver	Approved	Condition:	H ¹ ≤ 100 mg/L H ¹ > 100 mg/L				
		30-day average	0.05 1.5	0.05	0.00005	0.05	0.00005
		Maximum	0.1 3	0.1	0.0001	0.1	0.0001
Zinc	Approved	30-day average	when hardness <90: 7.5 ug/L			7.5	0.0075
			when hardness >90: $7.5 + 0.75 \cdot (\text{hardness} - 90)$	15	0.015		
			Maximum	when hardness <90: 33 ug/L			33
			when hardness >90: $33 + 0.75 \cdot (\text{hardness} - 90)$	40.5	0.0405		

¹ H = hardness

² Highest mercury guideline value used for application to mercury; MeHg = 0.5% of THg

APPENDIX C

Summary of Biotic Ligand Model-Derived Predictions of Copper Toxicity and No-Effect Concentrations (PNECs)

APPENDIX C

SUMMARY OF BIOTIC LIGAND MODEL-DERIVED PREDICTIONS OF COPPER TOXICITY AND NO-EFFECT CONCENTRATIONS

Background

Biotic Ligand Models (BLMs) combine a geochemical model, a metal-organic matter binding model and a toxicological model to account for the key factors that determine the bioavailability and toxicity of metals (e.g., DiToro et al. 2001; Santore et al. 2001; Niyogi and Wood 2004; De Schamphelaere and Janssen 2004; USEPA 2007; Peters et al. 2011; Erickson 2013; Smith et al. 2014). In lay terms, they account for the factors that determine the bioavailability of metals in order to predict metal toxicity under specific water quality conditions. Ligands include any ion, molecule, or substance that can bind a metal ion. The models treat organisms as “biotic ligands” that are in competition for metal binding with other ligands (such as dissolved organic matter) and also account for competition between metals and major ions for both abiotic and biotic ligands. BLMs have been developed by a number of organizations and are particularly well accepted for copper due to the strong affinity of copper and aquatic ligands (e.g., USEPA 2007; Peters et al. 2009; Verschoor et al. 2012).

To determine if responses observed in toxicity testing of water samples collected in the Mount Polley Mining Corporation’s (MPMC) aquatic receiving environment between November 2014 and April 2015 were potentially attributable to copper, three BLMs were applied to predict lethal concentrations and predicted no-effect concentrations (PNECs) of copper under the site-specific water quality conditions encountered in the Mount Polley Mine receiving environments evaluated by toxicity testing. The three BLMs applied were: 1) the HydroQual BLM (HydroQual 2007; USEPA 2007) 2) the Bio-Met bioavailability tool (ECHA 2008; Bio-Met 2013); and 3) the PNEC.pro BLM (ECHA 2008; Verschoor et al. 2012; Deltares 2013). Each model requires different inputs and reports different outputs as outlined in Table C.1 and briefly discussed below.

The HydroQual BLM has been adopted by the USEPA and provides Instantaneous Water Quality Criteria, both acute and chronic, that define copper concentrations below which adverse effects would not be expected under the specific water quality that co-occurs with the copper. The HydroQual BLM can be used to calculate the number of toxic units, also referred

to as a risk characterization ratio (RCR) or hazard quotient (HQ). The term RCR is used throughout this letter report, and represents the ratio of the dissolved copper concentration to the BLM-derived no effect concentration. An RCR greater than 1 indicates a dissolved copper concentration greater than the BLM-derived no effect concentration, whereas an RCR lower than 1 indicates a dissolved copper concentration lower than the BLM-derived no effect concentration.

The Bio-Met bioavailability tool is a chronic BLM tool that is a simplification of a “full” chronic BLM developed by the European Chemicals Agency (ECHA 2008). The Bio-Met tool uses pH and concentrations of copper, dissolved organic carbon (DOC) and calcium to calculate “local Environmental Quality Standards” (EQS) for copper under pH and concentrations of dissolved organic carbon and calcium that co-occur with the copper. The corresponding bioavailable copper fraction and a Risk Characterization Ratio (RCR) are also calculated. The Bio-Met model is based on chronic toxicity relationships developed under a variety of water quality conditions. The EQS is a 5th percentile Hazard Concentration (HC5), which is calculated from a Species Sensitivity Distribution (SSD) according to European Union Water Framework Directive (WFD) methodology (European Communities 2011).

PNEC.pro is a simplified chronic BLM tool similar to the Bio-Met tool, with dissolved organic carbon being the only required input and pH, calcium, magnesium and sodium designated as optional input parameters (all of these inputs were used in the present analysis). PNEC.pro calculates Predicted No Effect Concentrations (PNECs), which are similar to EQS determined using the Bio-Met tool (PNECs are also HC5s and are therefore expected to be similar to the EQS). PNEC.pro also provides an RCR and additionally provides a risk probability that characterizes the likelihood of concentrations exceeding the PNEC.

Results

The first question addressed using BLM was whether or not copper concentrations in the toxicity test samples were at or near those that might cause acute lethality to the toxicity test organisms. This question was addressed using the LC50 model in the HydroQual BLM for water quality samples collected concurrent with the toxicity test water samples. Model results indicated that acute toxicity to rainbow trout would not be expected at dissolved copper concentrations lower than approximately 139 µg/L (the lower 95% confidence limit of the mean for Quesnel Lake; Table C.2). The number of copper acute toxic units (actual concentration of dissolved copper divided by the predicted LC50) was 0.016 or lower, meaning that the

dissolved copper concentrations were no more than 1.6% of that required to kill rainbow trout. LC50 values and acute toxic unit values for fathead minnow were generally similar to those for rainbow trout (Table C.2). Acute toxicity to *Ceriodaphnia dubia* (a test organism known to be sensitive to copper; USEPA 2007) would not be expected at dissolved copper concentrations lower than approximately 28 µg/L (the lower 95% confidence limit of the mean for Quesnel Lake; Table C.2). The number of copper acute toxic units (actual concentration of dissolved copper divided by the predicted LC50) was 0.083 or lower, meaning that the dissolved copper concentrations were no more than 8.3% of that required to kill *C. dubia*.

The second question addressed using BLM was whether or not copper concentrations in the toxicity test samples were at or near those that might cause effects to any organism at any life stage and exposure duration. This question was addressed using all three BLMs to predict water-specific safe concentrations (criteria, PNECs, and EQS in the three models, respectively) for water quality samples collected concurrently with samples for toxicity testing. Model results indicated that adverse effects due to copper would not be expected in any of the samples collected for toxicity testing, and all “risk characterization ratios” (RCR; the actual concentration of dissolved copper divided by the water-specific criterion, PNEC or EQS) were no greater than 0.40 (Table C.3). Within Quesnel Lake specifically, which is the only waterbody that contained samples associated with adverse effects, effects to any organism at any life stage and exposure duration would not be expected above 4.7 µg/L (the lowest predicted water-specific safe concentration among the three models). All dissolved copper concentrations measured in Quesnel Lake were well below this level (Table C.3).

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Table C.1: Overview of the Copper Biotic Ligand Models Applied to Predict Copper Toxicity and No-Effect Concentrations

Model	Input Data Requirements	Model Output
<p>HydroQual / United States Environmental Protection Agency</p> <p>DiToro et al. 2001; Santore et al. 2001; HydroQual 2007; USEPA 2007</p>	<p>Temperature, pH, dissolved organic carbon, humic acid content, calcium, magnesium, sodium, potassium, sulphate, chloride and alkalinity</p>	<p>Final Acute Value, Instantaneous Criterion Maximum Concentration (CMC; acute criterion), Instantaneous Criterion Chronic Concentration (CCC; chronic criterion) and acute toxic units (copper concentration divided by the CMC)</p>
<p>Bio-Met Bioavailability Tool</p> <p>ECHA 2008; Bio-Met 2013</p>	<p>pH, dissolved organic carbon and calcium</p>	<p>Local Environmental Quality Standard (EQS; based on a generic EQS of 1 µg/L for bioavailable copper [local EQS = generic EQS/bioavailable fraction]), bioavailable fraction (BioF) and Risk Characterization Ratio (RCR; copper concentration divided by the PNEC; RCR values greater than 1 indicate potential ecotoxicological risk)</p>
<p>Deltares PNEC.pro</p> <p>Verschoor et al. 2012; Deltares 2013</p>	<p>Required: dissolved organic carbon Optional: pH, calcium, magnesium and sodium</p>	<p>Predicted no-effect concentration (PNEC), Risk Characterization Ratio (RCR; copper concentration divided by the PNEC; RCR values greater than 1 indicate potential ecotoxicological risk) and p (probability that the calculated PNEC is exceeded based on residual standard error and the normal distribution)</p>

Table C.2: BLM-Predicted Acute Toxicity of Copper to Toxicity Test Organisms under Specific Water Quality Conditions Associated with MPMC Toxicity Test Waters, November 2014 to April 2015 (HydroQual, Version 2.2.3)

Sample Area	Sample Location	Sample Date	Sample Depth	Model Mode	Dissolved Copper	Rainbow Trout			Fathead Minnow			<i>Ceriodaphnia dubia</i>		
						LC50 Values		ATU ¹	LC50 Values		ATU ¹	LC50 Values		ATU ¹
						µg/L	mol/L	µg/L	unitless	mol/L	µg/L	unitless	mol/L	µg/L
Polley Lake	POL-4	16-Dec-14	surface	LC50	1.67	8.6E-06	547	0.003	1.0E-05	636	0.003	2.1E-06	132	0.013
	P2	6-Jan-15	surface	LC50	2.09	8.8E-06	562	0.004	1.0E-05	653	0.003	2.1E-06	132	0.016
		14-Apr-15	surface	LC50	1.93	1.1E-05	712	0.003	1.4E-05	873	0.002	2.9E-06	181	0.011
Quesnel Lake	QUL-66	25-Nov-14	0 m	LC50	2.06	2.2E-06	142	0.015	2.7E-06	169	0.012	4.6E-07	29	0.071
		25-Nov-14	20 m	LC50	2.06	2.8E-06	181	0.011	3.3E-06	211	0.010	5.8E-07	37	0.056
		25-Nov-14	45 m	LC50	2.05	2.5E-06	156	0.013	2.9E-06	184	0.011	4.9E-07	31	0.065
		15-Dec-15	0 m	LC50	2.02	2.0E-06	127	0.016	2.4E-06	151	0.013	3.8E-07	24	0.083
		15-Dec-15	40 m	LC50	2.14	2.4E-06	153	0.014	2.8E-06	179	0.012	4.9E-07	31	0.069
		15-Jan-15	0 m	LC50	1.87	2.8E-06	178	0.011	3.2E-06	206	0.009	5.9E-07	37	0.050
		15-Jan-15	85 m	LC50	1.98	2.2E-06	141	0.014	2.6E-06	167	0.012	4.6E-07	29	0.068
		2-Mar-15	0 m	LC50	1.21	2.4E-06	154	0.008	2.9E-06	181	0.007	5.2E-07	33	0.037
Quesnel River	QUR-1	25-Nov-14	surface	LC50	1.70	2.5E-06	156	0.011	2.9E-06	184	0.009	5.2E-07	33	0.051
		9-Dec-14	surface	LC50	2.20	2.6E-06	166	0.013	3.1E-06	195	0.011	5.8E-07	37	0.060
		16-Dec-14	surface	LC50	2.47	2.5E-06	156	0.016	2.9E-06	182	0.014	4.9E-07	31	0.079
		7-Jan-15	surface	LC50	1.74	2.9E-06	182	0.010	3.3E-06	211	0.008	6.2E-07	39	0.044
		10-Feb-15	surface	LC50	1.27	2.9E-06	184	0.007	3.4E-06	215	0.006	6.7E-07	42	0.030
		3-Mar-15	surface	LC50	1.26	2.9E-06	186	0.007	3.4E-06	215	0.006	6.4E-07	41	0.031

Test Organism	Sample Area	Sample Size	Mean Predicted LC50	Standard Deviation	Coefficient of Variation	Standard Error	L95% CL ²	U95% CL ³
Rainbow Trout	Polley Lake	3	607	92	15%	53	379	834
	Quesnel Lake	8	154	18	12%	6	139	169
	Quesnel River	6	172	14	8%	6	157	187
Fathead Minnow	Polley Lake	3	720	132	18%	76	391	1050
	Quesnel Lake	8	181	20	11%	7	164	198
	Quesnel River	6	200	15	8%	6	184	216
<i>Ceriodaphnia dubia</i>	Polley Lake	3	148	29	19%	16	78	219
	Quesnel Lake	8	32	4.3	14%	1.5	28	35
	Quesnel River	6	37	4.4	12%	1.8	33	42

¹ Acute Toxic Units



² lower 95% confidence limit of the mean

³ upper 95% confidence limit of the mean

Table C.3: Summary of Biotic Ligand Model Results under Specific Water Quality Conditions Associated with MPMC Toxicity Test Waters, November 2014 to April 2015 ¹.

Sample Area	Sample Location	Sample Date	Sample Depth	Dissolved Copper	Biotic Ligand Model Applied										Maximum TU or RCR
					HydroQual / USEPA				Deltares PNEC Pro			Bio-Met Bioavailability Tool			
					CMC ²	ATU ³	CCC ⁴	CTU ⁵	PNEC ⁶	p ⁷	RCR ⁸	EQS ⁹	BioF ¹⁰	RCR ⁸	
µg/L	unitless	µg/L	unitless	µg/L	unitless	unitless	µg/L	unitless	unitless	µg/L	unitless	unitless			
Polley Lake	POL-4	16-Dec-14	surface	1.67	42.6	0.04	26.5	0.06	18.9	0.008	0.089	16.7	0.06	0.10	0.10
	P2	6-Jan-15	surface	2.09	42.5	0.05	26.4	0.08	19.5	0.008	0.107	20.1	0.05	0.10	0.11
		14-Apr-15	surface	1.93	60.6	0.03	37.6	0.05	11.1	0.101	0.174	10.1	0.10	0.19	0.19
Quesnel Lake	QUL-66	25-Nov-14	0 m	2.06	9.3	0.22	5.8	0.36	12.1	0.080	0.170	5.8	0.17	0.35	0.36
		25-Nov-14	20 m	2.06	10.5	0.20	6.5	0.32	12.5	0.073	0.165	5.8	0.17	0.35	0.35
		25-Nov-14	45 m	2.05	10.5	0.20	6.5	0.32	12.6	0.070	0.162	5.8	0.17	0.35	0.35
		15-Dec-15	0 m	2.02	11.7	0.17	7.3	0.28	12.2	0.078	0.166	7.2	0.14	0.28	0.28
		15-Dec-15	40 m	2.14	9.8	0.22	6.1	0.35	14.0	0.049	0.152	9.8	0.10	0.22	0.35
		15-Jan-15	0 m	1.87	12.4	0.15	7.7	0.24	14.3	0.042	0.131	8.5	0.12	0.22	0.24
		15-Jan-15	85 m	1.98	13.6	0.15	8.5	0.23	12.6	0.069	0.157	7.2	0.14	0.27	0.27
		2-Mar-15	0 m	1.21	12.8	0.09	8.0	0.15	14.7	0.030	0.083	8.5	0.12	0.14	0.15
Quesnel River	QUR-1	25-Nov-14	surface	1.70	9.1	0.19	5.7	0.30	12.5	0.066	0.136	5.8	0.17	0.29	0.30
		9-Dec-14	surface	2.20	11.6	0.19	7.2	0.31	14.4	0.044	0.152	9.8	0.10	0.23	0.31
		16-Dec-14	surface	2.47	9.8	0.25	6.1	0.40	13.6	0.061	0.182	9.8	0.10	0.25	0.40
		7-Jan-15	surface	1.74	7.6	0.23	4.7	0.37	12.6	0.065	0.138	6.7	0.15	0.26	0.37
		10-Feb-15	surface	1.27	9.6	0.13	6.0	0.21	13.8	0.041	0.092	9.7	0.10	0.13	0.21
		3-Mar-15	surface	1.26	11.7	0.11	7.2	0.17	14.4	0.033	0.087	9.7	0.10	0.13	0.17

¹ all Instantaneous Water Quality Criteria (IWQC), Predicted No-Effect Concentrations (PNECs), and Environmental Quality Standards (EQS) apply only to the specific water quality combinations for which they were calculated
² Criterion Maximum Concentration (acute criterion) = the USEPA national water quality criterion for the highest instream concentration of a toxicant to which organisms can be exposed for a brief period of time without causing an acute effect
³ Acute Toxic Units = dissolved copper concentration divided by the Criterion Maximum Concentration
⁴ Criterion Continuous Concentration (chronic criterion) = the USEPA national water quality criterion for the highest instream concentration of a toxicant to which organisms can be exposed indefinitely without causing unacceptable effect
⁵ Chronic Toxic Units = dissolved copper concentration divided by the Criterion Continuous Concentration
⁶ Predicted No-Effect Concentration
⁷ p-value represents the probability that concentrations exceed the predicted no-effect concentration.
⁸ Risk Characterization Ratio = the ratio of the predicted copper concentration to the concurrent (instantaneous) criterion, standard or predicted no-effect concentration.
⁹ Environmental Quality Standard based bioavailability and a 5th percentile hazard concentration (HC5).
¹⁰ BioF is the bioavailability factor - the ratio of condition-specific bioavailability to generic bioavailability (reference EQS / condition-specific EQS).

 indicates a toxic unit value or a risk characterization ratio of 0.5 to 1.0
 indicates a toxic unit value or a risk characterization ratio ≥ 1.0

Sample Area	Sample Size	Mean RCR ¹	Standard Deviation	Coefficient of Variation	Standard Error	L95% CL ²	U95% CL ³
Polley Lake	3	0.13	0.05	39%	0.03	0.01	0.26
Quesnel Lake (0 - 85m depth)	8	0.29	0.08	26%	0.03	0.23	0.36
Quesnel River	6	0.29	0.07	23%	0.03	0.22	0.37

¹ maximum TU or RCR (last column in top table) used to calculate summary statistics
² lower 95% confidence limit of the mean
³ upper 95% confidence limit of the mean

APPENDIX D

Plots of Toxicity Test Results Relative to Turbidity and Total Suspended Solids

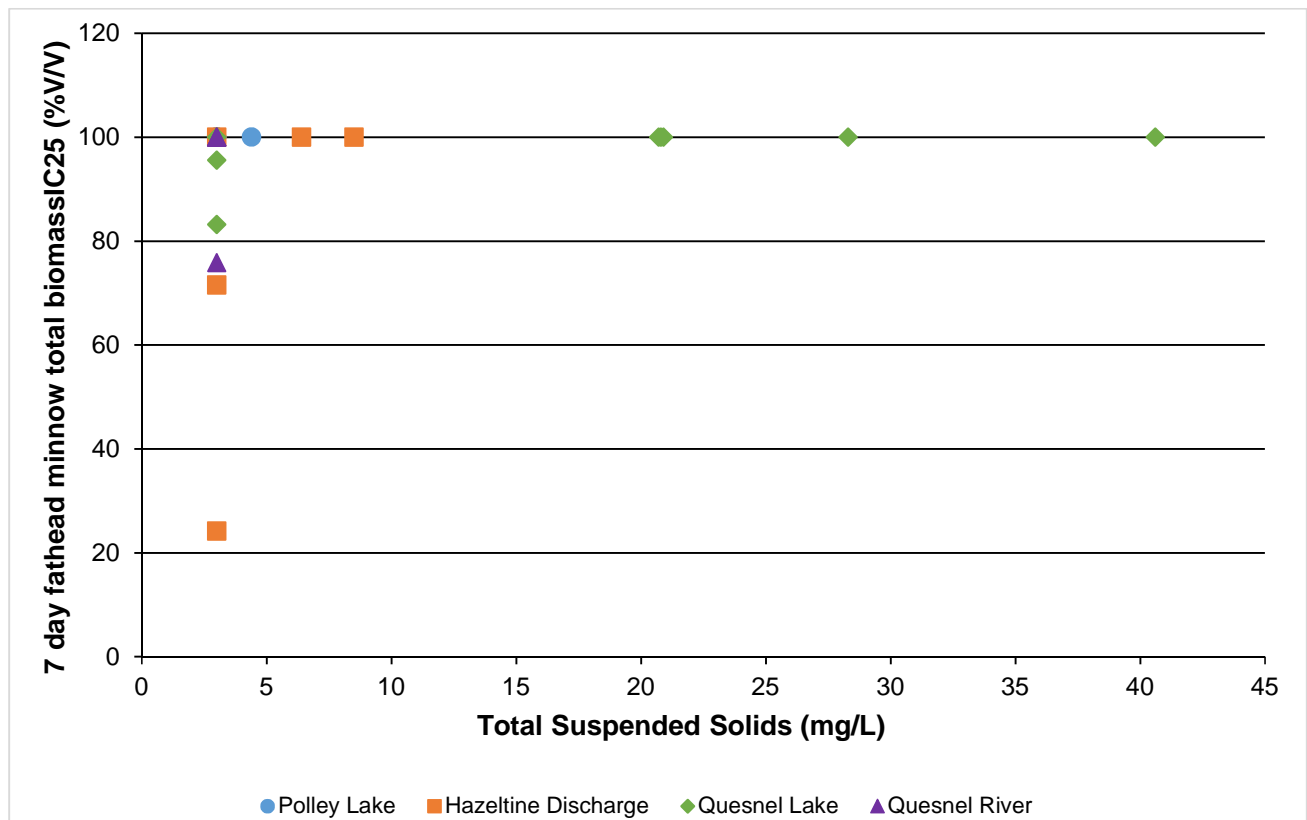
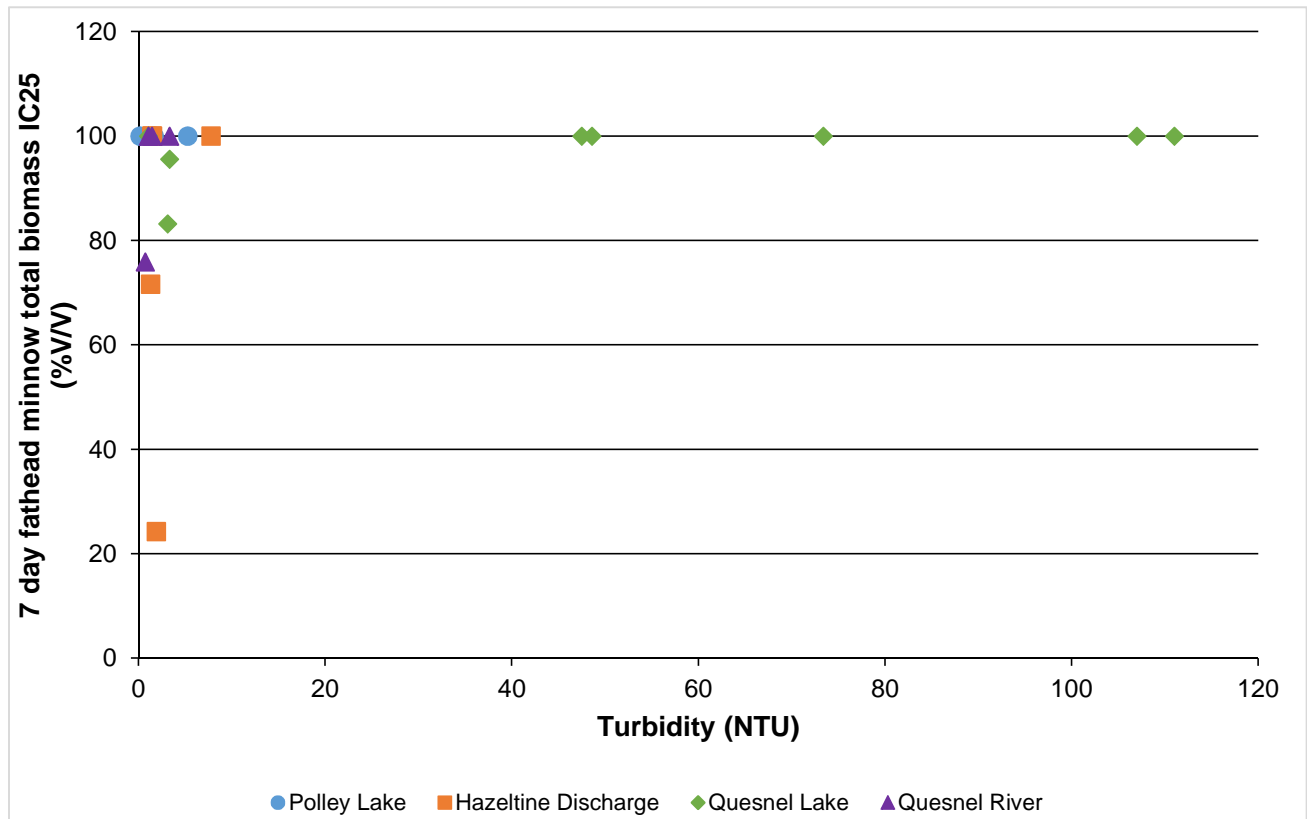


Figure D.1: Scatterplots of fathead minnow 25th percentile inhibitory concentration (IC25) for total biomass (7-day survival and growth toxicity test), relative to turbidity (NTU) and total suspended solids (mg/L) in measured in accompanying water quality samples.

All existing data from August 2014 to April 2015 included in scatterplot.

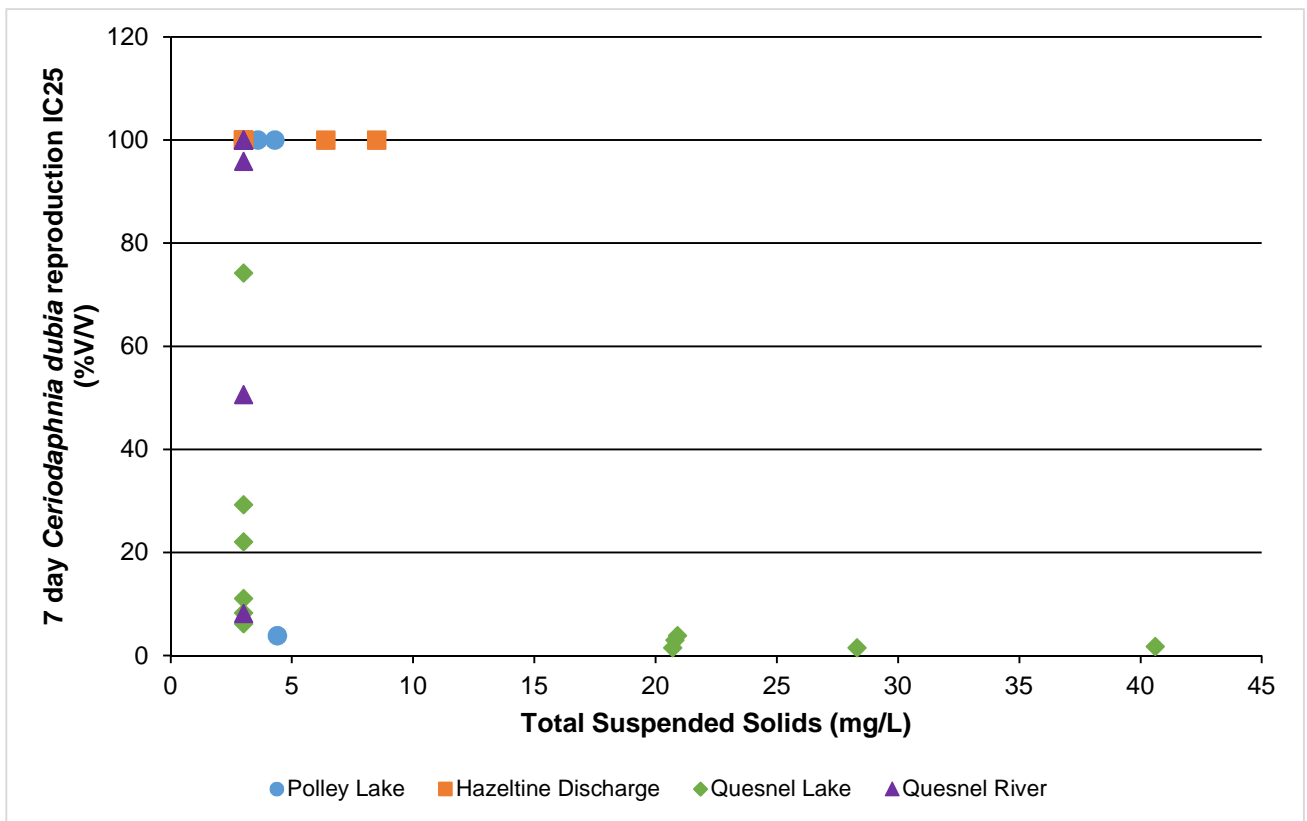
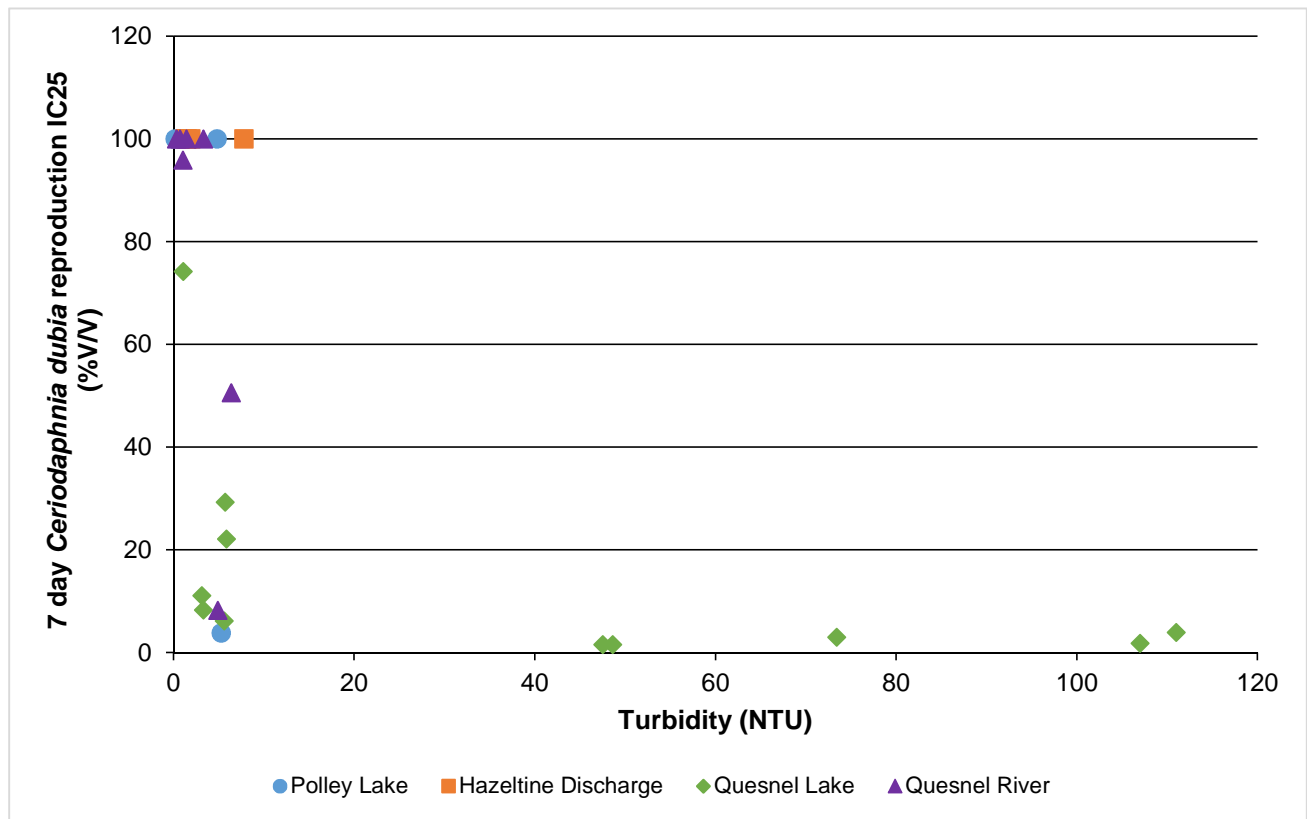


Figure D.2: Scatterplots of *Ceriodaphnia dubia* 25th percentile inhibitory concentration (IC25) for reproduction (7-day survival and reproduction toxicity test), relative to turbidity (NTU) and total suspended solids (mg/L) in measured in accompanying water quality samples.

All existing data from August 2014 to April 2015 included in scatterplot.

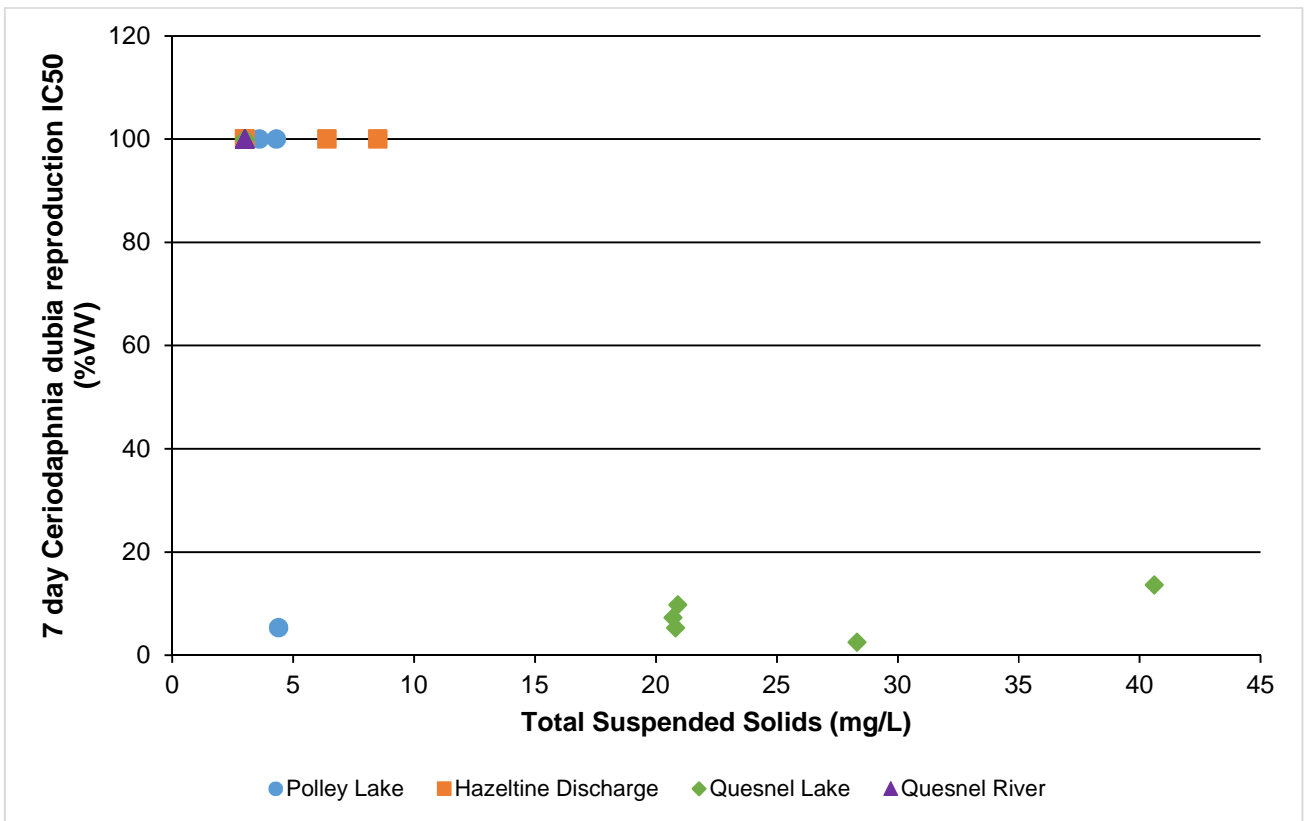
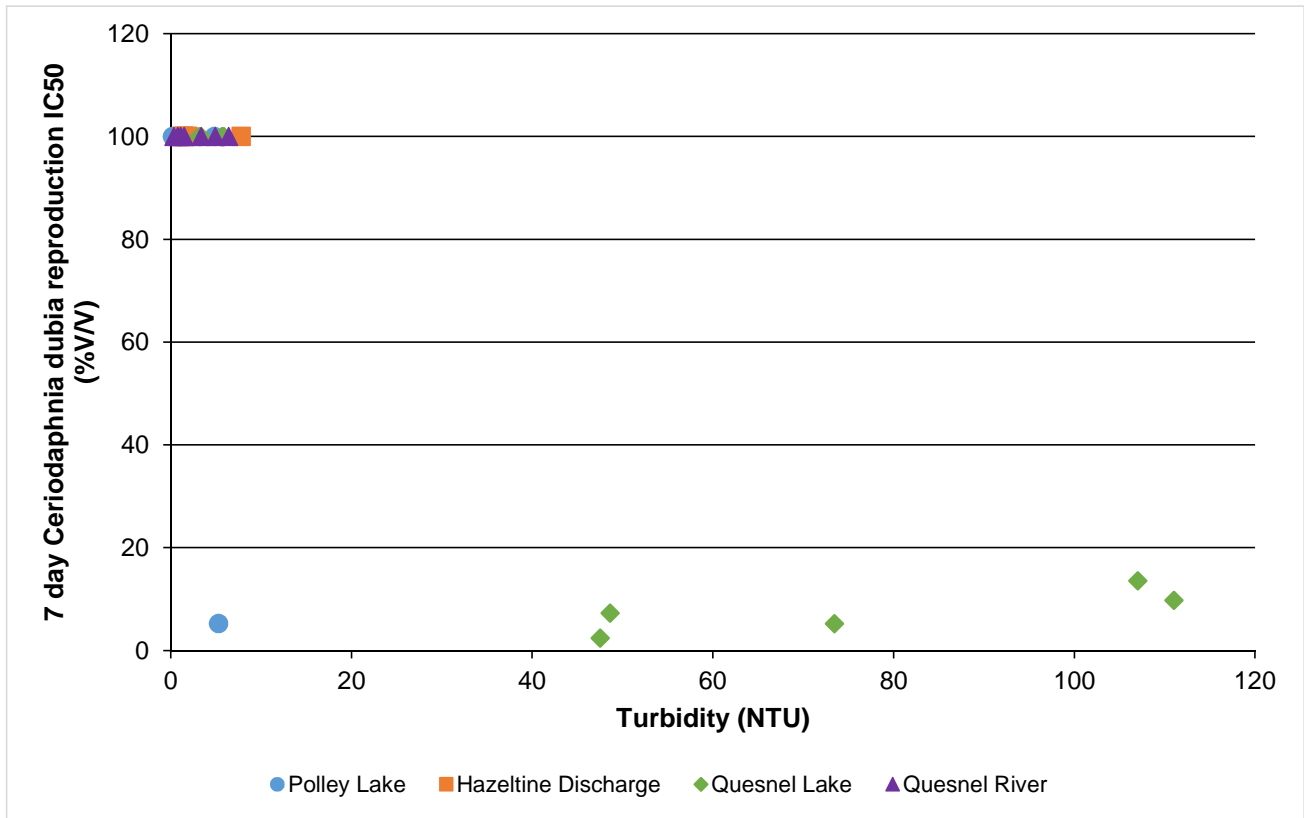


Figure D.3: Scatterplots of *Ceriodaphnia dubia* median percentile inhibitory concentration (IC50) for reproduction (7-day survival and reproduction toxicity test), relative to turbidity (NTU) and total suspended solids (mg/L) in measured in accompanying water quality samples.

All existing data from August 2014 to April 2015 included in scatterplot.

DATE 30 May 2016**REFERENCE No.** 1411734-147-TM-Rev1-10000**TO** Colleen Hughes
Mount Polley Mining Corporation**CC** Trish Miller**FROM** Jordana Van Geest
Gary Lawrence**EMAIL** jvangeest@golder.com
glawrence@golder.com**UPDATE ON POST-EVENT AQUATIC TOXICITY TESTING – MARCH TO NOVEMBER 2015**

Golder Associates Ltd. (Golder) is pleased to provide Mount Polley Mining Corporation (MPMC) with the following update on results of aquatic toxicity testing not previously reported in the Surface Water Quality Impact Assessment that was submitted as part of the Post-Event Environmental Impact Assessment Report (PEEIAR) in June 2015 (MPMC 2015; Appendix F). This update focuses on toxicity tests conducted on water samples that were collected by MPMC from receiving environment locations between March and November 2015. Previously reported results of aquatic toxicity tests conducted prior to March 2015 are discussed briefly for context of more recent results.

1.0 POST-EVENT AQUATIC TOXICITY TESTING

In addition to monitoring water quality following the tailings storage facility dam breach (hereafter referred to as the “event”), MPMC also initiated a toxicity testing program where water samples taken from the receiving environment were subject to a battery of standard laboratory tests using sensitive plant, invertebrate, and fish test species. The program provides an important evaluation of the bioavailable fraction of contaminants of potential concern as it is a direct measure of effect using water from the site, and includes sensitive test species representing primary producers, primary consumers, and secondary consumers.

1.1 Initial Toxicity Testing (August 2014 to February 2015)

The results of the initial post-event toxicity testing (August to September 2014) and follow-up toxicity testing (November 2014 to February 2015) were summarized in the PEEIAR (MPMC 2015; Appendix F) and by Minnow Environmental Inc. (Minnow 2015a,b). The toxicity testing program initiated immediately after the event (and carried through the post-event period) indicated that receiving environment waters in Polley Lake, Quesnel Lake, and Quesnel River were not acutely toxic to sensitive plant, invertebrate, and fish species. Sub-lethal, longer term effects were not observed for sensitive plant, invertebrate, and fish species, with the exception of a reproductive test response in invertebrates in some samples.



Golder Associates Ltd.Suite 200 - 2920 Virtual Way, Vancouver, BC, V5M 0C4
Tel: +1 (604) 296 4200 Fax: +1 (604) 298 5253 www.golder.com**Golder Associates: Operations in Africa, Asia, Australasia, Europe, North America and South America**

The latter responses were inferred to be related to suspended matter in the samples, and filtered samples from the same locations did not elicit toxicity. One of the objectives of the follow-up testing was to validate the findings of the initial testing program, both in terms of evaluating filtered versus non-filtered samples and in terms of the overall frequency and magnitude of the reproductive responses previously observed.

1.2 Follow-Up Toxicity Testing (March to November 2015)

Subsequent to the PEEIAR, water samples collected from March to November 2015 were tested using the following sub-lethal toxicity tests:

- 7- to 8-d survival and reproduction of the water flea *Ceriodaphnia dubia* (*C. dubia*) on filtered (0.45 µm) and unfiltered samples to examine the influence of suspended solid, using procedures described by Environment Canada (2007);
- 7-d survival and growth of rainbow trout (*Oncorhynchus mykiss*) swim-up fry using procedures described by Lazorchak and Smith (2007) and WDOE (2008); and,
- 7-d survival and growth of early life stage fathead minnow (*Pimephales promelas*), using procedures described by Environment Canada (2011).

Minnow (2015b) reported the results of the March and April 2015 toxicity tests. Results of the June through November 2015 toxicity tests are reported in this memo (Table 1; Attachment 1), and are summarized below.

- **Fish Toxicity Testing** — No impacts on survival and growth of either fathead minnows or rainbow trout were observed for water samples collected from Polley Lake (P2-Surface), Quesnel Lake (QUL-66, QUL-55, QUL-55a), and Quesnel River (QUR-1).
- **Invertebrate Toxicity Testing** — No impacts on *C. dubia* survival were observed in water samples collected from Polley Lake (P2-Surface), Quesnel Lake (QUL-66, QUL-55a), or Quesnel River (QUR-1). Likewise, no impacts on *C. dubia* reproduction were observed in the samples from Polley Lake (P2-Surface), the filtered samples from Quesnel Lake, or the August and November 2015 unfiltered samples from Quesnel Lake (QUL-55a). The only observed reproduction effects were for a subset of the unfiltered samples.

Reproductive effects in *C. dubia* were reported for the unfiltered samples taken from Quesnel Lake close to the Hazeltine Creek mouth in January and March 2015, but no effects were reported in the corresponding filtered samples. In the unfiltered samples all measured analytes were below corresponding BC water quality guidelines, suggesting that exposure to suspended particulate matter in the unfiltered samples may have resulted in the reproduction responses. One unfiltered sample collected from Quesnel River in March 2015 also showed a slight reproductive test response (Table 1). This response was not associated with elevated water chemistry (i.e., concentrations of all analytes in this sample were below applicable BC water quality guidelines), nor did the response align with fish toxicity testing results reported for the same sample (Table 1).

Table 1: Summary of Post-event Surface Water Sub-lethal Toxicity Testing (March to November 2015)

Test	Sample ID ^a	Date	LC50 ^b (% v/v) ^c (Median Lethal Concentration)	IC25 (% v/v) ^c (25 th Percentile Inhibitory Concentration)	IC50 (% v/v) ^c (Median Inhibitory Concentration)
7-d fathead minnow survival and growth	QUL-66-0M	2 March 2015	>100	>100	>100
	QUR-1	3 March 2015	>100	>100	>100
	P2-Surface	14 April 2015	>100	>100	>100
7-d rainbow trout swim-up survival and growth	P2-Surface	14 April 2015	>100	>100	>100
	QUL-55-0M	16 June 2015	>100	>100	>100
	QUR-1	16 June 2015	>100	>100	>100
	P2-Surface	25 August 2015	>100	>100	>100
	QUL-55a-0M	25 August 2015	>100	>100	>100
	QUR-1	24 August 2015	>100	>100	>100
	P2-Surface	12 November 2015	>100	>100	>100
	QUR-1	12 November 2015	>100	>100	>100
7- to 8-d <i>C. dubia</i> survival and reproduction	P2-Surface	14 April 2015	>100	>100	>100
	QUL-66-0M	2 March 2015	>100	74.2 (5.7-NC)	>100
	QUL-66-0M (Filtered)		>100	>100	>100
	QUR-1	3 March 2015	>100	95.9 (50-NC)	>100
	P2-Surface	25 August 2015	>100	>100	>100
	QUL-55a-0M	25 August 2015	>100	>100	>100
	QUR-1	24 August 2015	>100	>100	>100
	P2-Surface	11 November 2015	>100	>100	>100
QUR-1	12 November 2015	>100	>100	>100	

a. Samples were not filtered, unless indicated otherwise.

b. LC50 = Lethal concentration causing 50% mortality.

c. Effect concentration expressed on a volume/volume basis; in instances where an effect was observed, 95% confidence limits were not always calculable (NC).

2.0 CLOSURE

We trust that this Technical Memorandum provides sufficient information for your present needs. If you have any questions, please do not hesitate to contact the undersigned at (604) 296-4200.

Yours truly,

GOLDER ASSOCIATES LTD.



Jordana Van Geest, Ph.D., R.P.Bio
Environmental Scientist



Gary Lawrence, M.R.M., R.P.Bio.
Associate, Senior Environmental Scientist

JVG/GL/kv

Attachments: Attachment 1: Toxicity Test Reports (Nautilus Environmental)

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3.0 REFERENCES

- Environment Canada. 2007. Biological Test Method: Test of Reproduction and Survival using the Cladoceran *Ceriodaphnia dubia*. Second Edition. EPS 1/RM/21, February 2007. Environment Canada, Science and Technology Branch, Ottawa, ON. 74 pp.
- Environment Canada. 2011. Biological Test Method: Test of Larval Growth and Survival using Fathead Minnows. Second Edition. EPS/1/RM/22. February 2011. Environment Canada, Science and Technology Branch, Ottawa, ON. 73 pp.
- Lazorchak, JM, Smith, ME. 2007. Rainbow trout (*Oncorhynchus mykiss*) and brook trout (*Salvelinus fontinalis*) 7-day Survival and Growth Test Method. Arch. Environ. Contam. Toxicol. 53: 397-405.
- Minnow (Minnow Environmental Inc). 2015a. Summary and Interpretation of Water Toxicity Tests. Memorandum prepared for MPMC, January 9, 2015.
- Minnow. 2015b. Summary and Interpretation of Water Toxicity Tests (Nov 2014 to Apr 2015). Memorandum prepared for MPMC, July 10, 2015.
- MPMC (Mount Polley Mining Company). 2015. *Post-Event Environmental Impact Assessment Report – Key Findings Report*. June 5, 2015. Submitted to Ministry of Environment. Appendix F: Mount Polley Tailings Dam Failure – Surface Water Quality Impact Assessment.
- WDOE (Washington State Department of Ecology). 2008. Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria. Water Quality Program. Publication number: WQ-R-95-80, Revised December 2008.

ATTACHMENT 1

Toxicity Test Reports (Nautilus Environmental)



Nautilus Environmental

Toxicity testing on samples identified as QUR-1 and QUL-55-0m on rainbow trout (swim up)

Samples collected June 16, 2015

Revised Final Report

Report date:

July 21, 2015, revised July 22, 2015

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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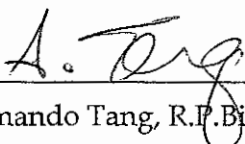
LIST OF APPENDICES

- APPENDIX A – Rainbow Trout (*Oncorhynchus mykiss*) Toxicity Test Data
- APPENDIX B – Chain-of-Custody Form

SIGNATURE PAGE



Krysta Pearcy, B.Sc.
Laboratory Biologist



Armando Tang, R.P.Bio.
Laboratory Manager

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted toxicity tests for Mount Polley Mining Corporation on samples identified as QUR-1 and QUL-55-0m. The samples were initially collected on June 1, 2015 but the control criteria for minimum dry weight at test termination was not achieved. The samples were subsequently collected on June 16, 2015 and delivered to the laboratory in Burnaby, BC on June 17, 2015. Each sample was transported in three 20-L plastic carboys and coolers. The samples were received at temperatures of 10.0 and 10.5°C, respectively and were stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing.

This report describes the results of the 7-d rainbow trout (*Oncorhynchus mykiss*) survival and growth toxicity test performed on samples QUR-1 and QUL-55-0m. Copies of laboratory data sheets and printouts of statistical analyses are provided in Appendix A. The chain-of-custody forms are provided in Appendix B.

2.0 METHODS

Methods for the toxicity test are summarized in Table 1. Testing was conducted according to methods described by Lazorchak and Smith (2007). Statistical analyses were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: rainbow trout (*Oncorhynchus mykiss*) survival and growth test.

Test organism	<i>Oncorhynchus mykiss</i>
Test organism source	Aqua Farms JV, Burnaby, BC
Test organism age	3 to 6 days post swim up
Test type	Static renewal
Test duration	7 days
Test vessel	1-L glass containers
Test volume	500 mL
Test replicates	4 per treatment
Number of organisms	5 per replicate
Control water	Moderately-hard water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	15 ± 1°C
Feeding	Twice a day with newly hatched brine shrimp (<i>Artemia nauplii</i>)
Light intensity	100 - 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test protocol	Lazorchak and Smith (2007)
Statistical software	CETIS (2013)
Test endpoint	Survival and biomass
Test acceptability criteria for controls	≥90% survival, ≥1.5 times test initiation dry weight
Reference toxicant	Copper chloride

3.0 RESULTS

Results of the rainbow trout survival and growth test are summarized in Table 2. There were no adverse effects observed on survival and growth of rainbow trout. The LC and IC values for QUR-1 and QUL-55-0m were therefore greater than 100%.

Table 2. Results: rainbow trout (*Oncorhynchus mykiss*) survival and growth test.

Concentration (% v/v)	Mean ± SD					
	QUR-1			QUL-55-0m		
	Survival (%)	Biomass (mg)	Dry Weight (mg)	Survival (%)	Biomass (mg)	Dry Weight (mg)
Control	100.0 ± 0.0	25.1 ± 2.2	25.1 ± 2.2	100.0 ± 0.0	24.3 ± 1.7	24.3 ± 1.7
6.25	95.0 ± 10.0	21.0 ± 2.5	22.1 ± 0.8	100.0 ± 0.0	24.4 ± 1.8	24.4 ± 1.8
12.5	100.0 ± 0.0	22.8 ± 1.2	22.8 ± 1.2	95.0 ± 10.0	23.4 ± 2.0	24.7 ± 0.5
25	95.0 ± 10.0	21.6 ± 2.4	22.7 ± 0.4	100.0 ± 0.0	22.3 ± 0.9	22.3 ± 0.9
50	100.0 ± 0.0	24.4 ± 1.0	24.4 ± 1.0	100.0 ± 0.0	23.7 ± 0.8	23.7 ± 0.8
100	100.0 ± 0.0	23.1 ± 2.0	23.1 ± 2.0	100.0 ± 0.0	23.0 ± 1.2	23.0 ± 1.2
Test endpoint						
(% v/v)						
LC50	>100	--	--	>100	--	--
IC25	--	>100	>100	--	>100	>100
IC50	--	>100	>100	--	>100	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

4.0 QA/QC

The health history of the test organisms used in the exposure was acceptable and met the requirements of the protocol. The test met all control acceptability criteria and water quality parameters remained within ranges specified in the protocol throughout the test. There were no deviations from the test methodology. Uncertainty associated with this test is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

Results of the reference toxicant test conducted during the testing program are summarized in Table 3. Results of the reference toxicant test fell within range for organism performance of mean and range, based on historical results obtained by the laboratory with this test. Thus, the sensitivity of the organisms used in this test was appropriate.

Table 3. Reference toxicant results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>O. mykiss</i>	Survival (LC50): 28.4 µg/L Cu	61.9 (28.4 - 134.7)	48	June 17, 2015
	Biomass (IC50): 27.5 µg/L Cu	61.0 (26.7 - 139.2)	51	

SD = Standard Deviation, CV = Coefficient of Variation, LC = Lethal Concentration, IC = Inhibition Concentration.

5.0 REFERENCES

Lazorchak, J.M. and Smith, M.E. 2007. Rainbow trout (*Oncorhynchus mykiss*) and brook trout (*Salvelinus fontinalis*) 7-day survival and growth test method. Arch. Environ. Contam. Toxicol. 53:397-405.

Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.4.29 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - Rainbow Trout (*Oncorhynchus mykiss*) Toxicity Test Data

Rainbow Trout Swimup Test Summary Sheet

Client: Mount Polley Mining Corporation Start Date/Time: June 17/15 @ 12:55 1145h 550

Work Order No.: 15432 Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: OUR-1
 Sample Date: June 16/15
 Date Received: June 17/15
 Sample Volume: 3 x 20L

Dilution Water:

Type: Moderately Hard Water
 Hardness (mg/L CaCO₃): 100
 Alkalinity (mg/L CaCO₃): 70

Test Organism Information:

Batch No.: 061515
 Source: Aqua Farm
 Average Initial Dry Weight 16.2 (mg)

Copper Reference Toxicant Results:

Reference Toxicant ID: RTCL 15
 Stock Solution ID: 15CuO3
 Date Initiated: June 17/15
 7-d LC50 (95% CL): 28.4 (25.9-31.2) µg/L Cu
 7-d IC50 (95% CL): 27.5 (25.5-31.7) µg/L Cu

7-d LC50 Reference Toxicant Mean and Historical Range: 61.9 (28.4-134.7) µg/L Cu CV(%) 48%
 7-d IC50 Reference Toxicant Mean and Historical Range: 61.0 (26.7-139.2) µg/L Cu CV(%) 51%

Test Results:

	Survival	Biomass	Dry Weight
LC25 % (v/v) (95% CL)	> 100		
LC50 % (v/v) (95% CL)	> 100		
IC25 % (v/v) (95% CL)		> 100	> 100
IC50 % (v/v) (95% CL)		> 100	> 100

Reviewed by: 

Date reviewed: July 16/15

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Palley
 Sample ID: Q4B-1
 Work Order #: 1543/2 SSD

Start Date & Time: June 17/2015 11:45h
 Stop Date & Time: June 24/15 12:15h
 Test Species: Oncorhynchus mykiss

Concentration Control	Days														
	0		1		2 (1)		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	old
Temperature (°C)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.5	7.2	9.4	7.2	9.8	9.8	9.8	9.7	9.8	9.3	9.2	9.4	9.8	9.4	
pH	7.9	7.4	7.8	7.2	7.9	7.9	7.8	7.8	7.8	7.6	7.8	7.7	7.9	7.8	
Cond. (µS/cm)	312	SSD	323	305	318	308	316	312	318	318	320	325	325	325	
Initials	AW/SSD	SSD	SSD	SSD	AW	AW	SSD/KL	SSD	KL	SSD/KL	SSD	KL	SSD	KL	

Concentration 6.25	Days														
	0		1		2 (1)		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	old
Temperature (°C)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.6	7.3	9.7	7.4	9.7	9.9	9.8	9.8	9.8	9.3	9.7	9.6	9.6	9.5	
pH	7.9	7.4	7.9	7.2	7.8	7.8	7.8	7.8	7.8	7.7	7.8	7.8	7.8	7.9	
Cond. (µS/cm)	300	SSD	296	311	305	312	306	307	303	303	304	308	308	308	
Initials	AW/SSD	SSD	SSD	SSD	AW	AW	SSD/KL	SSD	KL	SSD/KL	SSD	KL	SSD	KL	

Concentration 12.5	Days														
	0		1		2 (1)		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	old
Temperature (°C)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.6	7.8	9.5	7.6	9.5	9.8	9.9	9.8	9.7	9.3	9.7	9.7	9.7	9.6	
pH	7.9	7.5	7.9	7.3	7.8	7.8	7.8	7.8	7.8	7.7	7.8	7.8	7.9	7.9	
Cond. (µS/cm)	288	SSD	294	296	293	308	294	294	294	289	288	288	294	294	
Initials	AW/SSD	SSD	SSD	SSD	AW	AW	SSD/KL	SSD	KL	SSD/KL	SSD	KL	SSD	KL	

Concentration 25	Days														
	0		1		2 (1)		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	old
Temperature (°C)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.7	7.4	9.9	7.7	9.7	9.9	9.9	9.7	9.9	9.5	9.8	9.8	9.8	9.8	
pH	7.9	7.4	7.9	7.3	7.8	7.6	7.8	7.8	7.8	7.8	7.8	7.8	7.9	7.9	
Cond. (µS/cm)	263	274	267	309	269	269	268	268	264	262	262	271	271	271	
Initials	AW/SSD	SSD	SSD	AW	AW	SSD/KL	SSD	KL	SSD/KL	SSD	KL	SSD	KL	KL	

Temp: Temp - 2

DO meter: DO-1/2 pH meter: pH-1/2 Conductivity meter: C-1/2

Control	100%		
Hardness*	100	58	
Alkalinity*	70	50	

* mg/L as CaCO3

Analysts: SSD, AW
 Reviewed by: [Signature]
 Date reviewed: July 15/15

Sample Description: light yellow - clear Comments: 1 control check @ 1800h, 6.2mg/L control addition initiated

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Palley
 Sample ID: Q4E-1
 Work Order #: 1543/2 SSD

Start Date & Time: June 17/2015 11:54^{15 A}
 Stop Date & Time: June 24/15 @ 12:15h
 Test Species: Oncorhynchus mykiss

% (J/V) Concentration 50	Days														
	0		1		2 (1)		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.8	7.6	9.8	7.7	9.6	9.9	9.9	9.8	9.8	9.4	9.8	9.8	9.7	9.7	9.7
pH	7.9	7.4	7.9	7.3	7.8	7.7	7.7	7.7	7.8	7.7	7.8	7.8	7.9	7.9	7.9
Cond. (µS/cm)	204	219	219	219	219	216	216	217	217	212	212	208	214	214	214
Initials	AW/SSD	SSD	SSD	SSD	SSD	AW	AW	AW	AW	SSD/AL	SSD/AL	SSD	MS	MS	MS

Concentration 100	Days														
	0		1		2 (1)		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	10.1	7.8	9.8	7.6	9.7	9.9	9.8	9.8	9.8	9.7	9.8	9.8	9.7	9.7	9.9
pH	7.7	7.4	7.8	7.3	7.8	7.7	7.7	7.8	7.8	7.7	7.7	7.8	7.8	7.8	7.9
Cond. (µS/cm)	113	113	113	114	114	113	113	113	113	113	113	114	118	118	118
Initials	AW/SSD	SSD	SSD	SSD	SSD	AW	AW	AW	AW	SSD/AL	SSD/AL	SSD	MS	MS	MS

Concentration	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)															
DO (mg/L)															
pH															
Cond. (µS/cm)															
Initials															

Concentration	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)															
DO (mg/L)															
pH															
Cond. (µS/cm)															
Initials															

Temp: Temp - 2
 DO meter: DO-1/2 pH meter: pH-1/2 Conductivity meter: C-1/2

Hardness*	Control	100%		
Alkalinity*	100	58		
	70	50		

Analysts: SSD, AW
 Reviewed by: [Signature]
 Date reviewed: July 15/15

Sample Description: light yellow - clear Comments: DO check @ 1800h
6.2 mg/L control aeration initiate

7-d Chronic Freshwater Toxicity Test Daily Mortality

Client: Mount Polley
 Sample ID: QUE-1 D
 Work Order #: 1543/2^{SSD}

Start Date & Time: June 17/15 @ 1145h
 Stop Date & Time: June 24/15 @ 1215h
 Test Species: Oncorhynchus mykiss

Concentration % (w/v)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	5	5	5	5	5	5	5	
	B	↓	↓	↓	↓	↓	↓	↓	
	C	↓	↓	↓	↓	↓	↓	↓	
	D	↓	↓	↓	↓	↓	↓	↓	
6.25	A	↓	↓	↓	↓	↓	↓	4	
	B	↓	↓	↓	↓	↓	↓	5	
	C	↓	↓	↓	↓	↓	↓	↓	
	D	↓	↓	↓	↓	↓	↓	↓	
12.5	A	↓	↓	↓	↓	↓	↓	↓	
	B	↓	↓	↓	↓	↓	↓	↓	
	C	↓	↓	↓	↓	↓	↓	↓	
	D	↓	↓	↓	↓	↓	↓	↓	
25	A	↓	↓	↓	↓	↓	↓	↓	
	B	↓	↓	↓	↓	↓	↓	↓	
	C	4	4	4	4	4	4	4	
	D	5	5	5	5	5	5	5	
50	A	↓	↓	↓	↓	↓	↓	5	
	B	↓	↓	↓	↓	↓	↓	↓	
	C	↓	↓	↓	↓	↓	↓	↓	
	D	↓	↓	↓	↓	↓	↓	↓	
100	A	↓	↓	↓	↓	↓	↓	↓	
	B	↓	↓	↓	↓	↓	↓	↓	
	C	↓	↓	↓	↓	↓	↓	↓	
	D	↓	↓	↓	↓	↓	↓	↓	
Tech Initials	A								
	B								
	C								
	D								

Comments: Remaining fish all ok.

Reviewed by: [Signature]

Date reviewed: July 15/15

7d Chronic Freshwater Toxicity Test Data Sheet

Swim-up Survival and Dry Weight

Sample I.D.: Que-1

Client: Mount Polley

Work Order No.: 15432

Start Date: June 17/15 @ 1145h

Termination Date: June 24/15 @ 1215h

Sample ID % (v/v)	Rep	Pan No.	No. Alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control	A	1	5	KL	951.21	1092.88	5	KL/SSD
	B	2	↓		949.40	1068.65	↓	
	C	3	↓		955.28	1076.41	↓	
	D	4	↓		954.23	1073.81	↓	
6.25	A	5	4		949.51	1036.58	4	
	B	6	5		953.25	1060.48	5	
	C	7	↓		949.61	1059.21	↓	
	D	8	↓		964.39	1080.41	↓	
12.5	A	9	↓		966.57	1080.83	↓	
	B	10	↓		952.88	1071.95	↓	
	C	11	↓		984.82	1090.87	↓	
	D	12	↓		991.88	1109.57	↓	
25	A	13	↓		989.78	1101.56	↓	
	B	14	↓		988.78	1101.87	↓	
	C	15	4		998.93	1089.18	4	
	D	16	5		982.12	1089.18	5	
50	A	17	↓		1001.16	1127.05	↓	
	B	18	↓		995.46	1113.57	↓	
	C	19	↓		998.26	1125.11	↓	
	D	20	↓		979.03	1097.09	↓	
100	A	21	↓		985.78	1108.87	↓	
	B	22	↓		981.31	1095.20	↓	
	C	23	↓		984.07	1086.34	↓	
	D	24	↓		989.50	1112.50	↓	

Thermometer: Temp-2 | Cond: C-2 | DO meter: DO-2/1 | pH meter: pH-1

Comments: ① 1099.03, Reweighed Pan # 5: 1036.83, Pan # 15: 1089.52
② 1068.65

Reviewed by: [Signature]

Date Reviewed: July 16/15

CETIS Analytical Report

Report Date: 06 Jul-15 11:37 (p 1 of 2)
 Test Code: 15432 | 01-1001-8460

Fish Survival Development Growth (w/Length)			Nautilus Environmental		
Analysis ID:	16-4187-0851	Endpoint:	7d Survival Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Jul-15 12:19	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes
Batch ID:	08-5817-3958	Test Type:	Growth-Survival (7d)	Analyst:	
Start Date:	17 Jun-15 11:45	Protocol:	Washington DOE (2008)	Diluent:	Mod-Hard Synthetic Water
Ending Date:	24 Jun-15 12:15	Species:	Oncorhynchus mykiss	Brine:	
Duration:	7d 0h	Source:	Aqua Farm	Age:	
Sample ID:	19-1004-5458	Code:	71D8FB12	Client:	Mount Polley
Sample Date:	16 Jun-15 10:30	Material:	Water Sample	Project:	
Receive Date:	17 Jun-15 09:10	Source:	Mount Polley (MT POLLEY)		
Sample Age:	25h (10 °C)	Station:	QUR-1		

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	291631	200	Yes	Two-Point Interpolation

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary			Calculated Variate(A/B)									
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B	
0	Negative Control	4	1	1	1	0	0	0.0%	0.0%	20	20	
6.25		4	0.95	0.8	1	0.05	0.1	10.53%	5.0%	19	20	
12.5		4	1	1	1	0	0	0.0%	0.0%	20	20	
25		4	0.95	0.8	1	0.05	0.1	10.53%	5.0%	19	20	
50		4	1	1	1	0	0	0.0%	0.0%	20	20	
100		4	1	1	1	0	0	0.0%	0.0%	20	20	

7d Survival Rate Detail					
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1	1	1	1
6.25		0.8	1	1	1
12.5		1	1	1	1
25		1	1	0.8	1
50		1	1	1	1
100		1	1	1	1

7d Survival Rate Binomials					
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	5/5	5/5	5/5	5/5
0	Time Zero	5/5	5/5	5/5	5/5
6.25		4/5	5/5	5/5	5/5
12.5		5/5	5/5	5/5	5/5
25		5/5	5/5	4/5	5/5
50		5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5

CETIS Analytical Report

Report Date: 06 Jul-15 11:37 (p 2 of 2)
Test Code: 15432 | 01-1001-8460

Fish Survival Development Growth (w/Length)

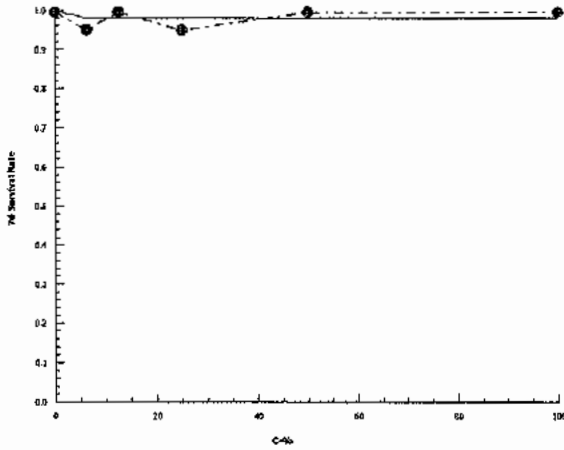
Nautilus Environmental

Analysis ID: 16-4187-0851
Analyzed: 03 Jul-15 12:19

Endpoint: 7d Survival Rate
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 16 Jul-15 10:22 (p 1 of 2)
 Test Code: 15432 | 01-1001-8460

Fish Survival Development Growth (w/Length)			Nautilus Environmental
Analysis ID: 03-9580-1048	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7	
Analyzed: 16 Jul-15 10:21	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes	
Batch ID: 08-5817-3958	Test Type: Growth-Survival (7d)	Analyst:	
Start Date: 17 Jun-15 11:45	Protocol: Washington DOE (2008)	Diluent: Mod-Hard Synthetic Water	
Ending Date: 24 Jun-15 12:15	Species: Oncorhynchus mykiss	Brine:	
Duration: 7d 0h	Source: Aqua Farm	Age:	
Sample ID: 19-1004-5458	Code: 71D8FB12	Client: Mount Polley	
Sample Date: 16 Jun-15 10:30	Material: Water Sample	Project:	
Receive Date: 17 Jun-15 09:10	Source: Mount Polley (MT POLLEY)		
Sample Age: 25h (10 °C)	Station: QUR-1		

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1067790	200	Yes	Two-Point Interpolation

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	1.724	0.2325	N/A	58.02	NA	430.1
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	25.08	23.85	28.33	1.087	2.175	8.67%	0.0%
6.25		4	21	17.41	23.21	1.251	2.502	11.92%	16.28%
12.5		4	22.85	21.21	23.81	0.584	1.168	5.11%	8.88%
25		4	21.6	18.05	23.38	1.204	2.407	11.14%	13.87%
50		4	24.45	23.61	25.37	0.48	0.9599	3.93%	2.54%
100		4	23.11	20.45	24.62	0.9857	1.971	8.53%	7.85%

Mean Dry Biomass-mg Detail					
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	28.33	23.85	24.23	23.92
6.25		17.41	21.45	21.92	23.21
12.5		22.85	23.81	21.21	23.54
25		22.36	22.62	18.05	23.38
50		25.18	23.62	25.37	23.61
100		24.62	22.78	20.45	24.6

EC *July 16/15*

CETIS Analytical Report

Report Date: 16 Jul-15 10:22 (p 1 of 2)
 Test Code: 15432 | 01-1001-8460

Fish Survival Development Growth (w/Length)			Nautilus Environmental
Analysis ID: 19-4161-2529	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7	
Analyzed: 16 Jul-15 10:21	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes	
Batch ID: 08-5817-3958	Test Type: Growth-Survival (7d)	Analyst:	
Start Date: 17 Jun-15 11:45	Protocol: Washington DOE (2008)	Diluent: Mod-Hard Synthetic Water	
Ending Date: 24 Jun-15 12:15	Species: Oncorhynchus mykiss	Brine:	
Duration: 7d 0h	Source: Aqua Farm	Age:	
Sample ID: 19-1004-5458	Code: 71D8FB12	Client: Mount Polley	
Sample Date: 16 Jun-15 10:30	Material: Water Sample	Project:	
Receive Date: 17 Jun-15 09:10	Source: Mount Polley (MT POLLEY)		
Sample Age: 25h (10 °C)	Station: QUR-1		

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	72705	200	Yes	Two-Point Interpolation

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	2.387	0.08689	N/A	41.89	NA	1151
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	25.08	23.85	28.33	1.087	2.175	8.67%	0.0%
6.25		4	22.09	21.45	23.21	0.387	0.7741	3.51%	11.95%
12.5		4	22.85	21.21	23.81	0.584	1.168	5.11%	8.88%
25		4	22.73	22.36	23.38	0.2246	0.4493	1.98%	9.38%
50		4	24.45	23.61	25.37	0.48	0.9599	3.93%	2.54%
100		4	23.11	20.45	24.62	0.9857	1.971	8.53%	7.85%

Mean Dry Weight-mg Detail					
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	28.33	23.85	24.23	23.92
6.25		21.77	21.45	21.92	23.21
12.5		22.85	23.81	21.21	23.54
25		22.36	22.62	22.56	23.38
50		25.18	23.62	25.37	23.61
100		24.62	22.78	20.45	24.6

CETIS Analytical Report

Report Date: 16 Jul-15 10:22 (p 2 of 2)
Test Code: 15432 | 01-1001-8460

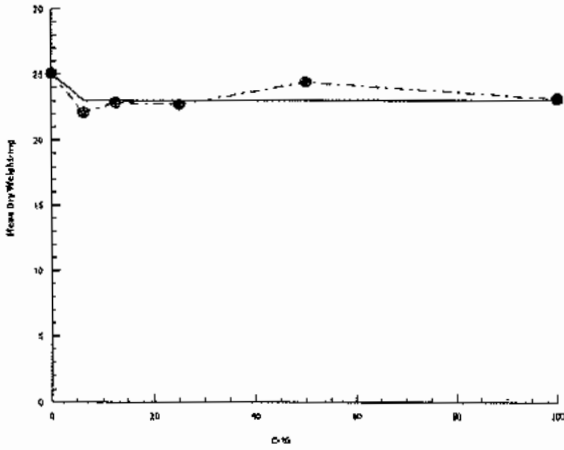
Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 19-4161-2529 Endpoint: Mean Dry Weight-mg
Analyzed: 16 Jul-15 10:21 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Rainbow Trout Swimup Test Summary Sheet

Client: Mount Polley Mining Corporation Start Date/Time: June 17/15 @ 1200h

Work Order No.: 15431 Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: QUL-55-0m
 Sample Date: June 16/15
 Date Received: June 17/15
 Sample Volume: 3 x 20L

Dilution Water:

Type: Moderately Hard Water
 Hardness (mg/L CaCO₃): 100
 Alkalinity (mg/L CaCO₃): 70

Test Organism Information:

Batch No.: 061515
 Source: Aqua Farm
 Average Initial Dry Weight 15.1 (mg)

Copper Reference Toxicant Results:

Reference Toxicant ID: RTCL16
 Stock Solution ID: 15CuO3
 Date Initiated: June 17/15
 7-d LC50 (95% CL): 28.4 (25.9-31.2) µg/L Cu
 7-d IC50 (95% CL): 27.5 (25.5-31.7) µg/L Cu

7-d LC50 Reference Toxicant Mean and Historical Range: 61.9 (28.4-134.7) µg/L Cu CV(%) 48%
 7-d IC50 Reference Toxicant Mean and Historical Range: 61.0 (26.7-139.2) µg/L Cu CV(%) 51%

Test Results:

	Survival	Biomass	Dry Weight
LC25 % (v/v) (95% CL)	>100		
LC50 % (v/v) (95% CL)	>100		
IC25 % (v/v) (95% CL)		>100	>100
IC50 % (v/v) (95% CL)		>100	>100

Reviewed by: [Signature]

Date reviewed: July 16/15

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: 046-55-02
 Work Order #: 15431

Start Date & Time: June 17/2015 @ 12:00h
 Stop Date & Time: June 24/15 @ 12:30h
 Test Species: Oncorhynchus mykiss

Concentration Control	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	old
Temperature (°C)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.5	7.5	9.4	6.3	7.8	9.8	9.8	9.9	9.8	9.5	9.7	9.5	9.8	9.5	
pH	7.9	7.3	7.8	7.1	7.8	7.7	7.8	7.8	7.8	7.6	7.8	7.8	7.9	8.0	
Cond. (µS/cm)	312	323		318		316		317		310		320		329	
Initials	AW/SSD		SSD		SSD		AW		A		SSD/ML		SSD		KS

Concentration 6.25	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	old
Temperature (°C)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.7	7.5	9.8	6.6	9.7	9.8	9.9	9.8	9.8	9.7	9.7	9.6	9.8	9.6	
pH	7.9	7.4	7.8	7.2	7.8	7.7	7.8	7.9	7.8	7.8	7.8	7.9	7.9	7.9	
Cond. (µS/cm)	300	314		307		305		306		304		304		311	
Initials	AW/SSD		SSD		SSD		AW		A		SSD/ML		SSD		KS

Concentration 12.5	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	old
Temperature (°C)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.8	7.2	9.6	6.8	7.8	9.9	9.8	9.8	9.9	9.8	9.8	7.8	9.6	9.8	
pH	7.9	7.4	7.9	7.3	7.8	7.8	7.8	7.8	7.8	7.8	7.9	7.9	7.9	7.9	
Cond. (µS/cm)	284	260		294		292		294		287		289		295	
Initials	AW/SSD		SSD		SSD		AW		A		SSD/ML		SSD		KS

Concentration 25	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	old
Temperature (°C)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.8	7.6	9.7	7.1	9.8	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.7	9.8	
pH	7.9	7.4	7.9	7.3	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.9	8.0	7.9	
Cond. (µS/cm)	258	272		268		266		266		260		261		265	
Initials	AW/SSD		SSD		SSD		AW		A		SSD/ML		SSD		KS

Temp: Temp - 2

DO meter: DO-1/2 pH meter: pH-1/2 Conductivity meter: C-1/2

	Control	100%		
Hardness*	100	54		
Alkalinity*	70	48		

Analysts: SSD, AW

Reviewed by: [Signature]

Date reviewed: July 15/15

* mg/L as CaCO3

Sample Description: light yellow - clear

Comments: 1) section DO (mg/L) checked
control 6.1 mg/L, section 1 checked

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Palley
 Sample ID: 202 246-55-0m
 Work Order #: 15431

Start Date & Time: June 17/2006 12:00h
 Stop Date & Time: June 24/15 12:30h
 Test Species: Oncorhynchus mykiss

Concentration 50	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	
DO (mg/L)	9.8	7.4	9.8	7.3	9.8	9.9	9.9	9.9	9.8	9.7	9.9	9.9	9.8	9.8	
pH	7.9	7.4	7.9	7.3	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.9	8.0	7.9	
Cond. (µS/cm)	201	217		212		217		218		208		209		214	
Initials	AW/SSD	SSD		SSD		AW		AW		SSD/AL		SSD		KS	

Concentration 100	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	
DO (mg/L)	9.9	7.5	9.8	7.3	9.7	9.8	9.8	9.8	9.8	9.7	9.9	9.9	9.8	9.7	
pH	8.0	7.4	8.0	7.3	7.8	7.9	7.8	7.9	7.8	7.8	7.8	7.9	7.8	7.9	
Cond. (µS/cm)	107	107		108		107		107		108		108		114	
Initials	AW/SSD	SSD		SSD		AW		AW		SSD/AL		SSD		KS	

Concentration	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)															
DO (mg/L)															
pH															
Cond. (µS/cm)															
Initials															

Concentration	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)															
DO (mg/L)															
pH															
Cond. (µS/cm)															
Initials															

Temp: Temp - 2

DO meter: DO-1/2 pH meter: pH-1/2 Conductivity meter: C-1/2

	Control	100%		
Hardness*	100	54		
Alkalinity*	70	48		

* mg/L as CaCO₃

Analysts: SSD, AW
 Reviewed by: [Signature]
 Date reviewed: July 15/06

Sample Description:

Comments: P.O. (mg/L) checked
control 6.1mg/L, aeration initiated

7-d Chronic Freshwater Toxicity Test Daily Mortality

Client: Mount Polley
 Sample ID: QUL-85-0m
 Work Order #: 15431

Start Date & Time: June 17/15 @ 1200h
 Stop Date & Time: June 24/15 @ 1230h
 Test Species: Oncorhynchus mykiss

Concentration % (w/v)	Rep	Day of Test - No. of Survivors							Comments	
		1	2	3	4	5	6	7		
Control	A	5	5	5	5	5	5	5	0	
	B	↓	↓	↓	↓	↓	↓	↓	↓	
	C	↓	↓	↓	↓	↓	↓	↓	↓	
	D	↓	↓	↓	↓	↓	↓	↓	↓	
6.25	A	↓	↓	↓	↓	↓	↓	↓	↓	
	B	↓	↓	↓	↓	↓	↓	↓	↓	
	C	↓	↓	↓	↓	↓	↓	↓	↓	
	D	↓	↓	↓	↓	↓	↓	↓	↓	
12.5	A	↓	↓	↓	↓	↓	↓	↓	↓	
	B	↓	↓	↓	↓	↓	↓	↓	↓	
	C	↓	↓	↓	↓	↓	↓	↓	↓	
	D	↓	4	4	4	4	4	4	4	
25	A	↓	5	5	5	5	5	5	5	
	B	↓	↓	↓	↓	↓	↓	↓	↓	
	C	↓	↓	↓	↓	↓	↓	↓	↓	
	D	↓	↓	↓	↓	↓	↓	↓	↓	
50	A	↓	↓	↓	↓	↓	↓	↓	↓	
	B	↓	↓	↓	↓	↓	↓	↓	↓	
	C	↓	↓	↓	↓	↓	↓	↓	↓	
	D	↓	↓	↓	↓	↓	↓	↓	↓	
100	A	↓	↓	↓	↓	↓	↓	↓	↓	
	B	↓	↓	↓	↓	↓	↓	↓	↓	
	C	↓	↓	↓	↓	↓	↓	↓	↓	
	D	↓	↓	↓	↓	↓	↓	↓	↓	
Tech Initials	A									
	B									
	C									
	D									
Tech Initials		SSD	SSD	ms	ms	KS	SSD	KS		

Comments: ① All remaining fish appear OK

Reviewed by: [Signature]

Date reviewed: July 15/15

7d Chronic Freshwater Toxicity Test Data Sheet

Swim-up Survival and Dry Weight

Sample I.D.: QUL-55-0m

Client: Mount Pelley

Start Date: June 17/15

Work Order No.: 1543P

Termination Date: June 24/15

Sample ID % (d/d)	Rep	Pan No.	No. Alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control	A	1	5	SSD	995.91	1129.84	5	KL / SSD
	B	2			985.45	1101.07		
	C	3			971.21	1088.32		
	D	4			995.36	1115.22		
6.25	A	5			980.98	1114.81		
	B	6			1012.88	1132.50		
	C	7			985.94	1098.40		
	D	8			993.62	1115.17		
12.5	A	9			996.82	1119.66		
	B	10			992.52	1113.95		
	C	11			1000.17	1122.65		
	D	12	4		1007.02	1109.11	4	
25	A	13	5		991.26	1106.38	5	
	B	14			982.03	1095.45		
	C	15			997.03	1106.71		
	D	16			991.77	1096.88		
50	A	17			994.05	1117.78		
	B	18			990.78	1109.79		
	C	19			980.87	1094.72		
	D	20			991.36	1109.12		
100	A	21			971.15	1082.69		
	B	22			970.08	1078.62		
	C	23			988.71	1110.24		
	D	24			990.59	1108.55		

Thermometer: Temp-2 | Cond: C-2 DO meter: DO-2/1 pH meter: pH-1

Comments: Reweighed Pan #8: 1115.87, Pan #16: 1097.03, Pan #22: 1078.63

Reviewed by: [Signature]

Date Reviewed: July 15/15

CETIS Analytical Report

Report Date: 06 Jul-15 11:34 (p 1 of 2)
 Test Code: 15431 | 01-0655-4155

Fish Survival Development Growth (w/Length)				Nautilus Environmental	
Analysis ID:	21-2592-4970	Endpoint:	7d Survival Rate	CETIS Version:	CETISv1.8.7
Analyzed:	03 Jul-15 13:53	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes
Batch ID:	17-2166-5847	Test Type:	Growth-Survival (7d)	Analyst:	
Start Date:	17 Jun-15 12:00	Protocol:	Washington DOE (2008)	Diluent:	Mod-Hard Synthetic Water
Ending Date:	24 Jun-15 12:30	Species:	Oncorhynchus mykiss	Brine:	
Duration:	7d 1h	Source:	Aqua Farm	Age:	
Sample ID:	09-8091-9273	Code:	3A77A3E9	Client:	Mount Polley
Sample Date:	16 Jun-15 11:00	Material:	Water Sample	Project:	
Receive Date:	17 Jun-15 09:10	Source:	Mount Polley (MT POLLEY)		
Sample Age:	25h (10.5 °C)	Station:	QUL-55-0m		

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1566039	200	Yes	Two-Point Interpolation

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary			Calculated Variate(A/B)									
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B	
0	Negative Control	4	1	1	1	0	0	0.0%	0.0%	20	20	
6.25		4	1	1	1	0	0	0.0%	0.0%	20	20	
12.5		4	0.95	0.8	1	0.05	0.1	10.53%	5.0%	19	20	
25		4	1	1	1	0	0	0.0%	0.0%	20	20	
50		4	1	1	1	0	0	0.0%	0.0%	20	20	
100		4	1	1	1	0	0	0.0%	0.0%	20	20	

7d Survival Rate Detail					
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1	1	1	1
6.25		1	1	1	1
12.5		1	1	1	0.8
25		1	1	1	1
50		1	1	1	1
100		1	1	1	1

7d Survival Rate Binomials					
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	5/5	5/5	5/5	5/5
0	Time Zero	5/5	5/5	5/5	5/5
6.25		5/5	5/5	5/5	5/5
12.5		5/5	5/5	5/5	4/5
25		5/5	5/5	5/5	5/5
50		5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5

CETIS Analytical Report

Report Date: 06 Jul-15 11:34 (p 2 of 2)
Test Code: 15431 | 01-0655-4155

Fish Survival Development Growth (w/Length)

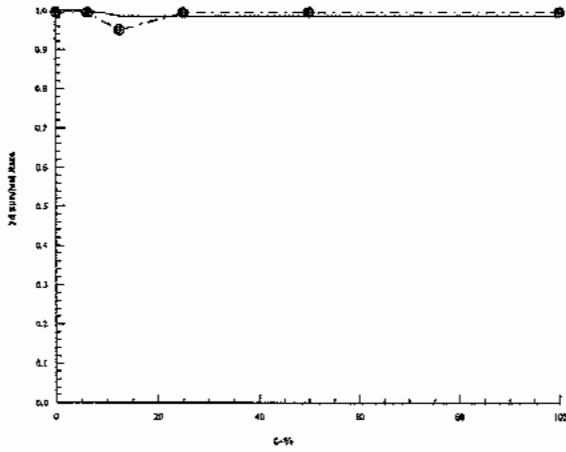
Nautilus Environmental

Analysis ID: 21-2592-4970
Analyzed: 03 Jul-15 13:53

Endpoint: 7d Survival Rate
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 06 Jul-15 11:34 (p 1 of 1)
 Test Code: 15431 | 01-0655-4155

Fish Survival Development Growth (w/Length)			Nautilus Environmental		
Analysis ID: 13-6036-9521	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7	Analyst:		
Analyzed: 03 Jul-15 14:00	Analysis: Parametric-Two Sample	Official Results: Yes	Diluent: Mod-Hard Synthetic Water		
Batch ID: 17-2166-5847	Test Type: Growth-Survival (7d)		Brine:		
Start Date: 17 Jun-15 12:00	Protocol: Washington DOE (2008)		Age:		
Ending Date: 24 Jun-15 12:30	Species: Oncorhynchus mykiss				
Duration: 7d 1h	Source: Aqua Farm				
Sample ID: 09-8091-9273	Code: 3A77A3E9	Client: Mount Polley			
Sample Date: 16 Jun-15 11:00	Material: Water Sample	Project:			
Receive Date: 17 Jun-15 09:10	Source: Mount Polley (MT POLLEY)				
Sample Age: 25h (10.5 °C)	Station: QUL-55-0m				

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	7.41%	Fails mean dry biomass-mg

Equal Variance t Two-Sample Test									
Control	vs	Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		Time Zero	9.912	1.943	1.804	6	<0.0001	CDF	Significant Effect

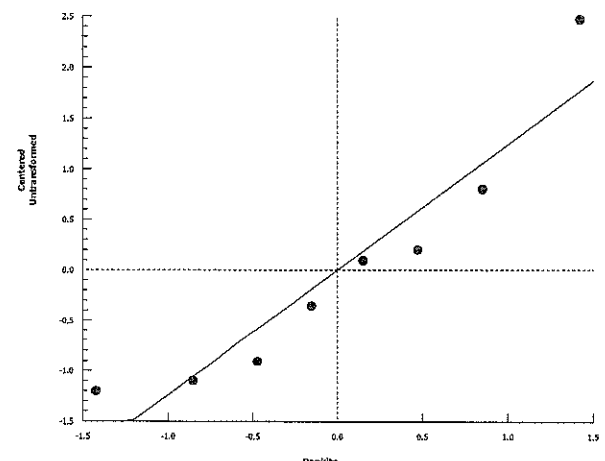
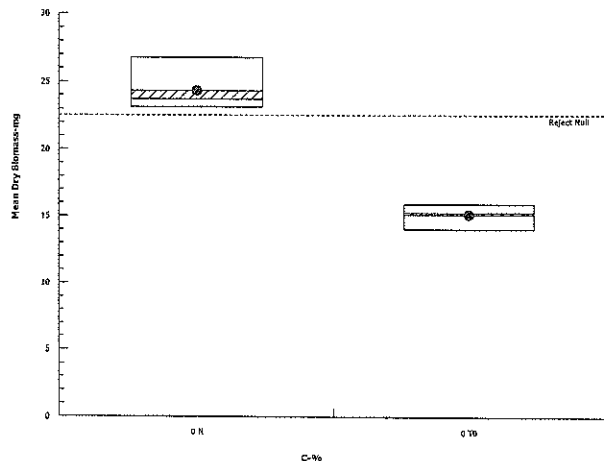
ANOVA Table						
Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	169.261	169.261	1	98.24	<0.0001	Significant Effect
Error	10.33783	1.722971	6			
Total	179.5989		7			

Distributional Tests						
Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)	
Variances	Variance Ratio F	4.444	47.47	0.2520	Equal Variances	
Distribution	Shapiro-Wilk W Normality	0.8914	0.6451	0.2413	Normal Distribution	

Mean Dry Biomass-mg Summary											
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Time Zero	4	15.13	13.86	16.39	15.28	14.03	15.93	0.3978	5.26%	0.0%
0	Negative Control	4	24.33	21.66	26.99	23.7	23.12	26.79	0.8386	6.9%	-60.82%

Mean Dry Biomass-mg Detail						
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	
0	Negative Control	26.79	23.12	23.42	23.97	
0	Time Zero	15.93	15.33	15.22	14.03	

Graphics



CETIS Analytical Report

Report Date: 06 Jul-15 11:34 (p 1 of 2)
 Test Code: 15431 | 01-0655-4155

Fish Survival Development Growth (w/Length)			Nautilus Environmental		
Analysis ID:	04-5141-1708	Endpoint:	Mean Dry Biomass-mg	CETIS Version:	CETISv1.8.7
Analyzed:	03 Jul-15 13:55	Analysis:	Nonlinear Regression	Official Results:	Yes
Batch ID:	17-2166-5847	Test Type:	Growth-Survival (7d)	Analyst:	
Start Date:	17 Jun-15 12:00	Protocol:	Washington DOE (2008)	Diluent:	Mod-Hard Synthetic Water
Ending Date:	24 Jun-15 12:30	Species:	Oncorhynchus mykiss	Brine:	
Duration:	7d 1h	Source:	Aqua Farm	Age:	
Sample ID:	09-8091-9273	Code:	3A77A3E9	Client:	Mount Polley
Sample Date:	16 Jun-15 11:00	Material:	Water Sample	Project:	
Receive Date:	17 Jun-15 09:10	Source:	Mount Polley (MT POLLEY)		
Sample Age:	25h (10.5 °C)	Station:	QUL-55-0m		

Non-Linear Regression Options				
Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Log-Logistic EV [Y=A/(1+(X/D)^C)]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary									
Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
31	-19.87	46.94	49.28	0.0124	Yes	1.179	3.16	0.3454	Non-Significant Lack of Fit

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	52.77	1.475	319.9	1.895	0.3126	67.8
IC10	679.6	N/A	62100	0.1471	0.00161	NA
IC15	3307	N/A	3416000	0.03024	0.0000292	NA
IC20	10880	N/A	1.01E+09	0.009188	0.0000000	NA
IC25	29110	N/A	N/A	0.003435	NA	NA
IC40	311600	N/A	N/A	0.0003209	NA	NA
IC50	1247000	N/A	N/A	0.0000801	NA	NA

The IC25 + IC50 > 100% (V/V)

Regression Parameters							
Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	24.38	0.7402	22.93	25.83	32.94	<0.0001	Significant Parameter
C	0.2924	0.4181	-0.527	1.112	0.6994	0.4920	Non-Significant Parameter
D	1247000	17260000	-3.3E+07	35080000	0.07224	0.9431	Non-Significant Parameter

ANOVA Table						
Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	5.041888	5.041888	1	2.29	0.1452	Non-Significant
Lack of Fit	7.596406	2.532135	3	1.179	0.3454	Non-Significant
Pure Error	38.64918	2.147177	18			
Residual	46.24559	2.202171	21			

Residual Analysis						
Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)	
Variances	Bartlett Equality of Variance	3.49	11.07	0.6250	Equal Variances	
	Mod Levene Equality of Variance	0.2326	2.773	0.9432	Equal Variances	
Distribution	Shapiro-Wilk W Normality	0.983	0.9169	0.9441	Normal Distribution	
	Anderson-Darling A2 Normality	0.264	2.492	0.7249	Normal Distribution	

Mean Dry Biomass-mg Summary			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	24.33	23.12	26.79	0.8386	1.677	6.9%	0.0%
6.25		4	24.37	22.49	26.76	0.8861	1.772	7.27%	-0.18%
12.5		4	23.44	20.42	24.57	1.01	2.02	8.62%	3.63%
25		4	22.32	21.02	23.02	0.4434	0.8869	3.97%	8.26%
50		4	23.72	22.77	24.75	0.4072	0.8145	3.43%	2.5%
100		4	22.98	21.71	24.31	0.5918	1.184	5.15%	5.54%

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 04-5141-1708 Endpoint: Mean Dry Biomass-mg
 Analyzed: 03 Jul-15 13:55 Analysis: Nonlinear Regression

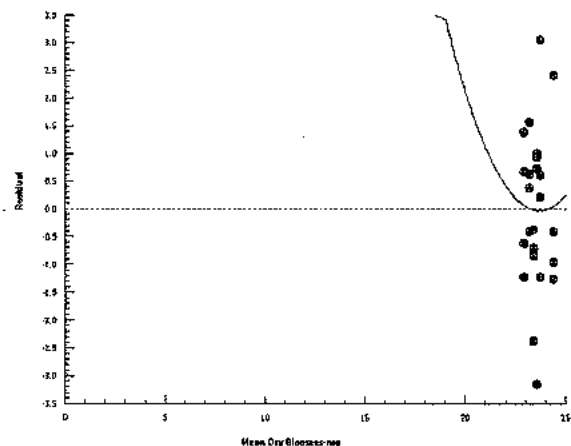
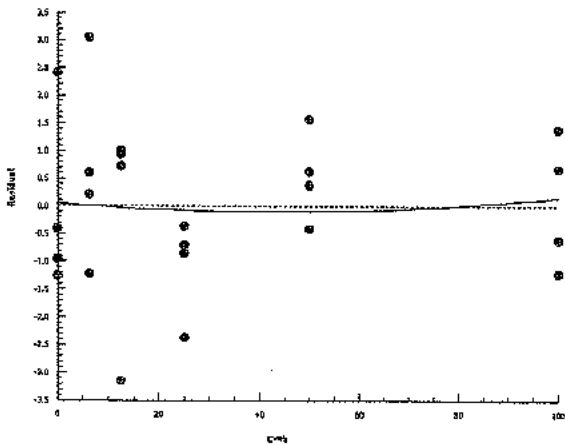
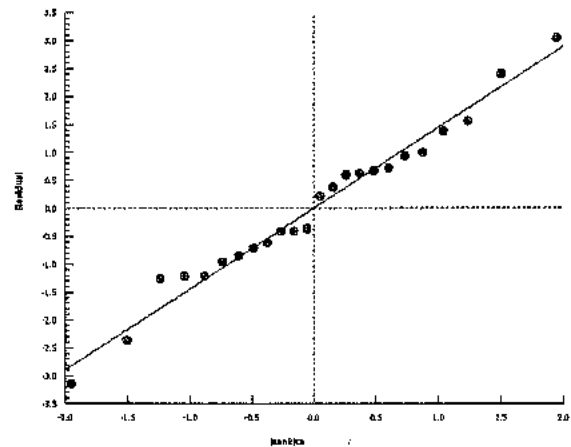
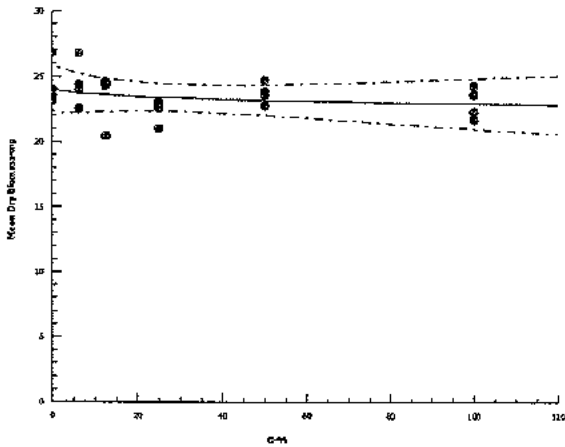
CETIS Version: CETISv1.8.7
 Official Results: Yes

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	26.79	23.12	23.42	23.97
6.25		26.76	23.92	22.49	24.31
12.5		24.57	24.29	24.5	20.42
25		23.02	22.68	22.54	21.02
50		24.75	23.8	22.77	23.55
100		22.31	21.71	24.31	23.59

Graphics

3P Log-Logistic EV [Y=A/(1+(X/D)^C)]



CETIS Analytical Report

Report Date: 06 Jul-15 11:35 (p 1 of 2)
 Test Code: 15431 | 01-0655-4155

Fish Survival Development Growth (w/Length)			Nautilus Environmental		
Analysis ID: 08-3472-5172	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7	Batch ID: 17-2166-5847	Test Type: Growth-Survival (7d)	Analyst:
Analyzed: 03 Jul-15 16:06	Analysis: Nonlinear Regression	Official Results: Yes	Start Date: 17 Jun-15 12:00	Protocol: Washington DOE (2008)	Diluent: Mod-Hard Synthetic Water
Ending Date: 24 Jun-15 12:30	Species: Oncorhynchus mykiss	Brine:	Duration: 7d 1h	Source: Aqua Farm	Age:
Sample ID: 09-8091-9273	Code: 3A77A3E9	Client: Mount Polley	Sample Date: 16 Jun-15 11:00	Material: Water Sample	Project:
Receive Date: 17 Jun-15 09:10	Source: Mount Polley (MT POLLEY)		Sample Age: 25h (10.5 °C)	Station: QUL-55-0m	

Non-Linear Regression Options				
Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Log-Logistic EV [Y=A/(1+(X/D)^C)]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary									
Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
30	-17.62	42.43	44.77	0.0576	Yes	2.417	3.16	0.1000	Non-Significant Lack of Fit

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	59.93	9.38	157.3	1.669	0.6356	10.66
IC10	245.6	N/A	1655	0.4071	0.06041	NA
IC15	588.3	N/A	10150	0.17	0.00985	NA
IC20	1136	N/A	61480	0.08806	0.001627	NA
IC25	1955	N/A	1277000	0.05116	0.0000783	NA
IC40	7235	N/A	N/A	0.01382	NA	NA
IC50	15560	N/A	N/A	0.006429	NA	NA

The IC25 + IC50 > 100% (w/w)

Regression Parameters							
Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	24.47	0.6601	23.18	25.77	37.08	<0.0001	Significant Parameter
C	0.5297	0.5798	-0.6068	1.666	0.9135	0.3713	Non-Significant Parameter
D	15560	85620	-152300	183400	0.1817	0.8576	Non-Significant Parameter

ANOVA Table						
Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	6.214775	6.214775	1	3.406	0.0791	Non-Significant
Lack of Fit	11.00279	3.667597	3	2.417	0.1000	Non-Significant
Pure Error	27.31906	1.517725	18			
Residual	38.32185	1.82485	21			

Residual Analysis						
Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)	
Variances	Bartlett Equality of Variance	4.875	11.07	0.4313	Equal Variances	
	Mod Levene Equality of Variance	0.621	2.773	0.6857	Equal Variances	
Distribution	Shapiro-Wilk W Normality	0.9799	0.9169	0.8942	Normal Distribution	
	Anderson-Darling A2 Normality	0.2685	2.492	0.7101	Normal Distribution	

Mean Dry Weight-mg Summary			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	24.33	23.12	26.79	0.8386	1.677	6.9%	0.0%
6.25		4	24.37	22.49	26.76	0.8861	1.772	7.27%	-0.18%
12.5		4	24.72	24.29	25.52	0.2747	0.5494	2.22%	-1.61%
25		4	22.32	21.02	23.02	0.4434	0.8869	3.97%	8.26%
50		4	23.72	22.77	24.75	0.4072	0.8145	3.43%	2.5%
100		4	22.98	21.71	24.31	0.5918	1.184	5.15%	5.54%

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 08-3472-5172
 Analyzed: 03 Jul-15 16:06

Endpoint: Mean Dry Weight-mg
 Analysis: Nonlinear Regression

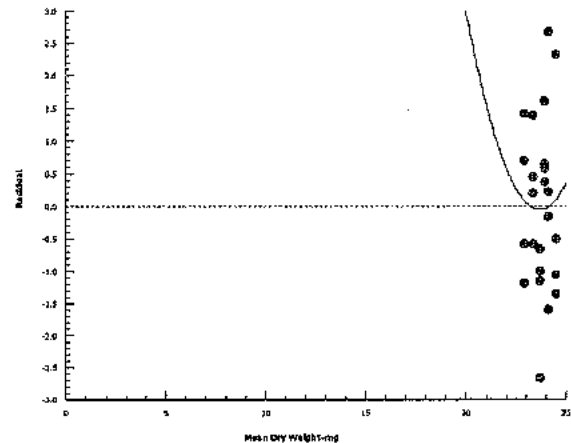
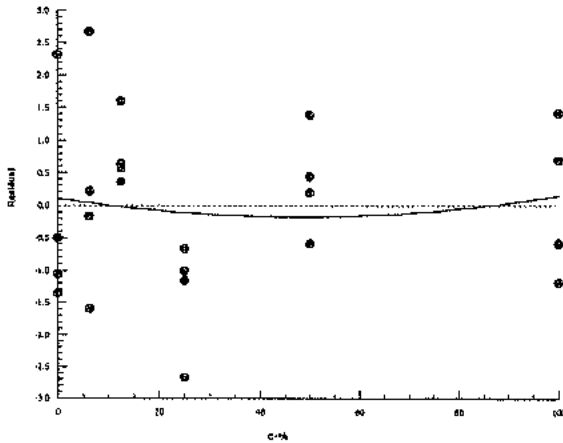
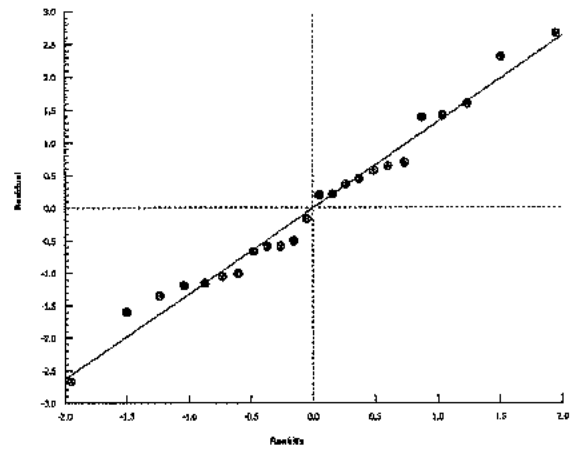
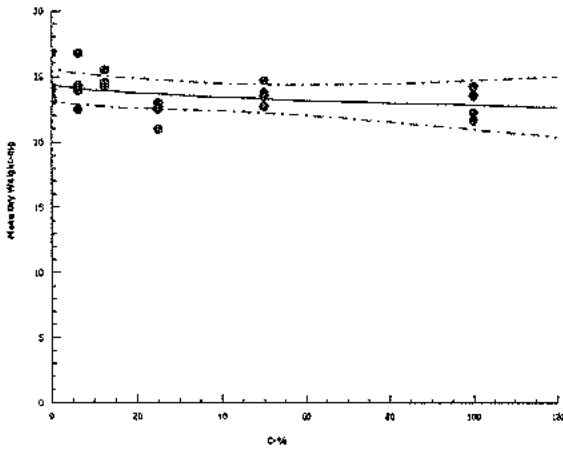
CETIS Version: CETISv1.8.7
 Official Results: Yes

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	26.79	23.12	23.42	23.97
6.25		26.76	23.92	22.49	24.31
12.5		24.57	24.29	24.5	25.52
25		23.02	22.68	22.54	21.02
50		24.75	23.8	22.77	23.55
100		22.31	21.71	24.31	23.59

Graphics

3P Log-Logistic EV [Y=A/(1+(X/D)^C)]



Client: Mount Polley

W.O.#: 15431

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
MHW 061615	June 16/15	50	3.8 ⁵	3.7	70	50	5.0	100	SSD/KL
QWR-1	June 17/15	50	2.6	2.7	50	↓	2.9	58	↓
QWL-55-0M	↓	50	2.5	2.6	48	↓	2.7	54	↓
MHW 0618/15	June 20/15	50	3.6	3.7	70	50	5.0	100	↑

Notes: _____

Reviewed by: 

Date Reviewed: July 15/15

APPENDIX B - Chain-of-Custody Form

Nautilus Environmental

Chain of Custody (electronic)

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

Date: 16/06/2015 Page 1 of 1

Sample Collection By: Shauna Litke							ANALYSES REQUIRED										Recept. Temperature (°C)														
Report to:		Invoice to:					7 day RBT S&G																								
Company	Mount Polley Mining Corporation	Mount Polley Mining Corporation																													
Address	Box 12	Box 12																													
City/Prov/Postal Code	Likely BC V0L 1N0	Likely BC V0L 1N0																													
Contact	Colleen Hughes	Colleen Hughes/																													
Phone	(250) 790-2617	(250) 790-2617																													
Email	chughes@mountpolley.com	chughes@mountpolley.com																													
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS																									
1	QUR-1	16/06/2015	10:30	water	20L	3													10.0												
2																															
3																															
4																															
5																															
6																															
7																															
8																															
9																															
10																															
PROJECT INFORMATION		SAMPLE RECEIPT			RELIQUINSHED BY (CLIENT)			RELIQUINSHED BY (COURIER)																							
Client: Mount Polley Mining Corporation		Total # Containers:	3	Signature:			Signature:																								
P.O. No.:		Good Condition?	Y	Shauna Litke			Print:																								
Shipped Via: Greyhound		Matches Schedule?	Y	Company: MPMC			Company:																								
				Time/Date: 16/06/2015 15:30:00			Time/Date:																								
SPECIAL INSTRUCTIONS/COMMENTS:							RECEIVED BY (COURIER)			RECEIVED BY (LABORATORY)																					
							Signature:			Signature: NY																					
							Print:			Print: Nair Yamamoto																					
							Company:			Company: Nautilus																					
							Time/Date:			Time/Date: Jun 17/15 @ 09:10																					

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

British Columbia: 8684 Commerce Court, Burnaby, BC, V5A 4N7

Date: 16/06/2015 Page 1 of 1

Sample Collection By: Mclean Donohoe, Gabriel Holmes							ANALYSES REQUIRED										Receipt Temperature (°C)					
Report to:		Invoice to:					7 day RBT S&G															
Company		Mount Polley Mining Corporation																				
Address		Box 12																				
City/Prov/Postal Code		Likely BC VOL 1N0																				
Contact		Colleen Hughes																				
Phone		(250) 790-2617																				
Email		chughes@mountpolley.com																				
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS																
1	QUL-65-0m	16/06/2015	11:00	water	20L	3																
2																						
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						
PROJECT INFORMATION			SAMPLE RECEIPT			RELIQUISHED BY (CLIENT)				RELIQUISHED BY (COURIER)												
Client: Mount Polley Mining Corporation			Total # Containers:	3		Signature: <i>[Signature]</i>				Signature:												
P.O. No.:			Good Condition?	Y		Mclean Donohoe				Print:												
Shipped Via: Greyhound			Matches Schedule?	Y		Company: MPMC				Company:												
						Time/Date: 16/06/2015 15:30:00				Time/Date:												
SPECIAL INSTRUCTIONS/COMMENTS:						RECEIVED BY (COURIER)				RECEIVED BY (LABORATORY)												
						Signature:				Signature: NY												
						Print:				Print: Nari Yamamoto												
						Company:				Company: Nautilus												
				Time/Date:				Time/Date: Jun 17/15 @ 09:10														

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.



Nautilus Environmental

**Toxicity testing on samples identified as QUR-1,
QUL-55a-0M and P2-S on *Ceriodaphnia dubia* and
rainbow trout (swim-up)**

Samples collected August 24 and 25, 2015

Final Report

Report date: Oct 1, 2015

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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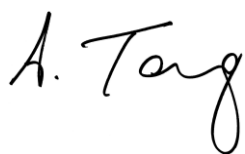
LIST OF APPENDICES

- APPENDIX A – *Ceriodaphnia dubia* Toxicity Test Data
- APPENDIX B – Rainbow trout (*Oncorhynchus mykiss*) Toxicity Test Data
- APPENDIX C – Chain of Custody Form

SIGNATURE PAGE



Josh Baker, M.Sc., P.Chem.
Environmental Chemist



Armando Tang, R.P.Bio.
Laboratory Manager

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted toxicity tests for Mount Polley Mining Corporation on samples identified as QUR-1, QUL-55a-0M and P2-S. QUR-1 was collected on August 24 while QUL-55a-0M and P2-S were collected on August 25, 2015. All samples were delivered to the laboratory in Burnaby, BC on August 26, 2015. Samples were transported in in three 20-L plastic carboys and seven 1-L plastic bottles within coolers. The samples were received at temperatures between 8.5 and 11.5°C, and were stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing. The following sub-lethal toxicity tests were performed on the samples:

- *Ceriodaphnia dubia* survival and reproduction
- 7-d rainbow trout (*Oncorhynchus mykiss*) survival and growth

This report describes the results of the *C. dubia* and swim-up rainbow trout toxicity tests. Copies of laboratory data sheets and printouts of statistical analyses for each test are provided in Appendices A and B. The chain-of-custody form is provided in Appendix C.

2.0 METHODS

Methods for the toxicity tests are summarized in Tables 1 and 2. Testing was conducted according to procedures described by Environment Canada (2007) and methods described by Lazorchak and Smith (2007). Statistical analyses for all tests were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house culture
Test organism age	<24 hour old neonates within 12 hours of the same age
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20-mL glass test tube
Test volume	15 mL
Test concentrations	Seven concentrations plus laboratory control
Test replicates	10 test replicates per treatment
No. of organisms	1 per replicate
Control water	20% Perrier water and 80% deionized water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	Daily with <i>Pseudokirchneriella subcapitata</i> and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada (2007), EPS 1/RM/21
Statistical software	CETIS (2013)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods; no ephippia present
Reference toxicant	Sodium chloride

Table 2. Summary of test conditions: rainbow trout (*Oncorhynchus mykiss*) survival and growth test.

Test organism	<i>Oncorhynchus mykiss</i>
Test organism source	Aqua Farms, Langley, BC
Test organism age	3 to 6 days post swim up
Test type	Static renewal
Test duration	7 days
Test vessel	1-L glass containers
Test volume	500 mL
Test replicates	4 per treatment
Number of organisms	5 per replicate
Control water	Moderately-hard water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	15 ± 1°C
Feeding	Twice a day with newly hatched brine shrimp (<i>Artemia nauplii</i>)
Light intensity	100 – 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test protocol	Lazorchak and Smith (2007)
Statistical software	CETIS (2013)
Test endpoint	Survival and biomass
Test acceptability criteria for controls	≥90% survival, ≥1.5 times test initiation dry weight
Reference toxicant	Copper chloride

3.0 RESULTS

Results of the toxicity tests conducted on samples QUR-1, QUL-55a-0M and P2-S using *C. dubia* and rainbow trout are provided in Tables 3 and 4. No adverse effects on *C. dubia* or rainbow trout survival were observed in the samples, resulting in LC50 values of >100%. There were no effects on rainbow trout biomass or dry weight; the IC25 values were >100%. No reduction in *C. dubia* reproduction was observed; the IC25 values were >100%.

Table 3. Results: *Ceriodaphnia dubia* survival and reproduction test.

Concentration (% v/v)	QUR-1		QUL-55a-0M		P2-S	
	Survival (%)	Reproduction (mean ± SD)	Survival (%)	Reproduction (mean ± SD)	Survival (%)	Reproduction (mean ± SD)
Control	100	19.7 ± 6.0	100	18.7 ± 3.1	100	18.9 ± 3.4
1.56	100	22.1 ± 3.6	100	19.0 ± 3.9	100	18.2 ± 5.6
3.12	100	23.1 ± 2.1	100	20.6 ± 3.5	100	18.6 ± 3.0
6.25	100	23.1 ± 2.8	100	18.5 ± 5.2	100	15.7 ± 6.6
12.5	100	21.9 ± 2.6	100	18.2 ± 4.4	100	16.7 ± 3.1
25	90	21.6 ± 7.0	100	18.0 ± 4.7	100	17.5 ± 4.8
50	100	23.9 ± 1.9	100	20.7 ± 4.6	100	20.2 ± 4.2
100	100	21.5 ± 4.8	100	16.3 ± 5.7	100	18.8 ± 6.6
Test Endpoint						
(% v/v)						
LC50	>100	--	>100	--	>100	--
IC25	--	>100	--	>100	--	>100
IC50	--	>100	--	>100	--	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration, CL = Confidence Limits, N/A = Not Available.

Table 4. Results: rainbow trout (*Oncorhynchus mykiss*) survival and growth test.

Concentration (% v/v)	Mean ± SD								
	QUR-1			QUL-55a-0M			P2-S		
	Survival (%)	Biomass (mg)	Dry Weight (mg)	Survival (%)	Biomass (mg)	Dry Weight (mg)	Survival (%)	Biomass (mg)	Dry Weight (mg)
Control	100.0 ± 0.0	32.6 ± 2.0	32.6 ± 2.0	100.0 ± 0.0	37.4 ± 2.6	37.4 ± 2.6	100.0 ± 0.0	40.1 ± 2.5	40.1 ± 2.5
6.25	100.0 ± 0.0	32.4 ± 2.8	32.4 ± 2.8	100.0 ± 0.0	33.3 ± 2.8	33.3 ± 2.8	100.0 ± 0.0	32.6 ± 2.3	32.6 ± 2.3
12.5	95.0 ± 10.0	29.7 ± 0.9	31.5 ± 3.3	100.0 ± 0.0	34.0 ± 2.1	34.0 ± 2.1	100.0 ± 0.0	34.6 ± 2.4	34.6 ± 2.4
25	100.0 ± 0.0	32.2 ± 1.8	32.2 ± 1.8	95.0 ± 10.0	32.2 ± 4.0	33.9 ± 1.2	100.0 ± 0.0	34.7 ± 4.1	34.7 ± 4.1
50	100.0 ± 0.0	31.6 ± 1.8	31.6 ± 1.8	100.0 ± 0.0	34.6 ± 3.8	34.6 ± 3.8	100.0 ± 0.0	32.2 ± 1.4	32.2 ± 1.4
100	100.0 ± 0.0	31.7 ± 3.0	31.7 ± 3.0	100.0 ± 0.0	30.6 ± 2.7	30.6 ± 2.7	100.0 ± 0.0	32.5 ± 2.7	32.5 ± 2.7
Test endpoint (% v/v)									
LC50	>100	--	--	>100	--	--	>100	--	--
IC25	--	>100	>100	--	>100	>100	--	>100	>100
IC50	--	>100	>100	--	>100	>100	--	>100	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

4.0 QA/QC

The health history of the test organisms used in the exposures was acceptable and met the requirements of the protocols. The tests met all control acceptability criteria and water quality parameters remained within ranges specified in the protocols throughout the tests. There were no deviations from the test methodologies. Uncertainty associated with these tests is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

Results of the reference toxicant tests conducted during the testing program are summarized in Table 5. Results for the *C. dubia* test fell within the range for organism performance of mean and two standard deviation range, based on historical results obtained by the laboratory with these tests. The *O. mykiss* result was outside two standard deviations of the historical range for the 7-d larval reference toxicant test with copper, but was within three standard deviations of this historical range. An internal investigation did not reveal any issues with the health of the organisms, solution preparation, water quality or other technical errors. Thus, the result was likely due to variability. This high reference toxicant result was unlikely to have affected to test results.

Table 5. Reference toxicant results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>C. dubia</i>	Survival (LC50): 2.0 g/L NaCl	2.0 (1.8-2.2) g/L NaCl	5	August 14, 2015
	Reproduction (IC50): 1.8 g/L NaCl	1.5 (1.2-1.9) g/L NaCl	14	
<i>O. mykiss</i>	Survival (LC50): 184.7 µg/L Cu	58.7 (26.5-130.2) µg/L Cu	49	August 26, 2015
	Biomass (IC50): 181.9 µg/L Cu	57.9 (25.4-132.1) µg/L Cu	51	

SD = Standard Deviation, CV = Coefficient of Variation, IC = Inhibition Concentration, LC = Lethal Concentration.

5.0 REFERENCES

- Environment Canada. 2007. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. Report EPS 1/RM/21, Second Edition, February 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 74 pp.
- Environment Canada. 2011. Biological test method: test of larval growth and survival using fathead minnows. Environmental Protection Series, Report EPS 1/RM/22. February 2011,. Environment Canada, Environmental Protection, Conservation and Protection, Ottawa, ON. 73 pp.
- Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.4.29 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: Mount Polley Mining Corporation Start Date/Time: AUG 26, 2015 @ 10:25h
 Work Order No.: 15697 Set up by: EMM

Sample Information:

Sample ID: OUR - 1
 Sample Date: AUG 24, 2015
 Date Received: AUG 26, 2015
 Sample Volume: 7 x 1L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 081415 B
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 30 31
 Mortality (%) in previous 7 d: 10
 Individual female # used ≥ 8 young on test day: 21 - 32

NaCl Reference Toxicant Results:

Reference Toxicant ID: Cd 133
 Stock Solution ID: 15NA02
 Date Initiated: AUG 14, 2015

7-d LC50 (95% CL): 2.0 (1.7 - 2.3) g/L NaCl
 7-d IC50 (95% CL): 1.8 (1.7 - 1.9) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 2.0 (1.8 - 2.2) g/L NaCl CV (%): 5
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.5 (1.2 - 1.9) g/L NaCl CV (%): 14

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	> 100	> 100
IC25 % (v/v) (95% CL)	> 100	> 100
IC50 % (v/v) (95% CL)	> 100	> 100

Reviewed by: JOU

Date reviewed: SEP. 24/15

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: HE Polley
 Sample ID: BUR-1
 Work Order #: 15657

Start Date & Time: August 26/15 @ 10:25h
 Stop Date & Time: September 2/15 @ 13:00h
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		6		7
Control	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	24.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.1	7.6	8.1	7.7	8.0	7.8	8.0	7.3	8.2	7.5	8.0	7.5	8.0	7.3
pH	8.1	7.8	8.0	7.8	8.0	7.7	7.7	7.7	7.9	7.5	7.8	7.5	7.7	7.7
Cond. (µS/cm)	220	221		217		217		218		220		218		220
Initials	EMM	MLT		JW		JW		VNL		EMM		MLT		EMM

Concentration	Days													
	0	1		2		3		4		5		6		7
1.56% (v/v)	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	24.0	24.0	25.0	24.5	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.1	7.6	8.0	7.7	8.1	7.8	7.8	7.9	8.2	7.5	8.2	7.5	8.0	7.3
pH	8.1	7.8	8.0	7.8	8.0	7.7	7.8	7.7	8.0	7.5	7.8	7.5	7.7	7.6
Cond. (µS/cm)	221	220		217		216		218		212		220		221
Initials	EMM	MLT		JW		JW		VNL		EMM		MLT		EMM

Concentration	Days													
	0	1		2		3		4		5		6		7
12.5% (v/v)	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	25.0	24.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.1	7.6	8.0	7.6	8.1	7.5	7.9	7.3	8.2	7.3	8.2	7.6	8.0	7.4
pH	8.0	7.8	8.0	7.8	7.7	7.6	7.8	7.6	8.0	7.5	7.9	7.5	7.7	7.6
Cond. (µS/cm)	208	209		206		207		206		209		208		205
Initials	EMM	MLT		JW		JW		VNL		EMM		MLT		EMM

Concentration	Days													
	0	1		2		3		4		5		6		7
100% (v/v)	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	25.0	24.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.1	7.6	8.0	7.7	8.2	7.4	8.1	7.2	8.2	7.3	8.2	7.5	8.1	7.4
pH	7.9	7.7	8.0	7.6	7.8	7.4	7.5	7.3	7.8	7.3	7.8	7.3	7.6	7.3
Cond. (µS/cm)	111	112		110		111		109		109		112		110
Initials	EMM	MLT		JW		JW		VNL		EMM		MLT		EMM

	Control	100% (v/v)		
Hardness*	100	58		
Alkalinity*	102	JW X 50		

JW
 Analysts: EMM, VNL, MLT
JW, EMM
 Reviewed by: JGK
 Date reviewed: sep. 22/15

* mg/L as CaCO₃
 WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5
 Sample Description: clear

Comments: Broodboard Used: 081415B (21→32)

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt. Palmyra
 Sample ID: 09E-1
 Work Order: 16657

Start Date & Time: August 26/15 @ 10:25h
 Stop Date & Time: September 2/15 @ 13:00h
 Set up by: EMM

% (VIV)

Days	Concentration: <u>Control</u>											Concentration: <u>1.56</u>											Concentration: <u>3.12</u>												
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init		
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLP
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
3	✓	✓	2	✓	4	✓	✓	✓	✓	✓	JW	✓	4	✓	✓	✓	3	✓	✓	✓	✓	✓	JW	2	✓	✓	3	✓	✓	5	✓	3	✓	✓	JW
4	✓	✓	✓	2	✓	2	3	3	2	3	M	2	✓	2	3	3	✓	3	2	3	3	✓	A	✓	3	2	✓	7	3	✓	2	✓	2	✓	A
5	✓	8	8	13	6	9	5	7	8	8	KC	5	6	8	10	10	5	7	7	10	10	KC	8	8	✓	9	10	9	8	9	7	8	KC		
6	✓	✓	12	✓	12	✓	✓	✓	10	✓	MLP	11	12	✓	✓	✓	10	✓	✓	✓	✓	MLP	10	✓	10	12	✓	✓	12	✓	11	✓	MLP		
7	5	10	✓	13	✓	10	9	10	✓	14	EMM	✓	✓	13	14	12	✓	8	10	12	13	EMM	✓	14	12	✓	13	11	✓	12	✓	10	EMM		
8																																			
Total	5	18	27	27	22	21	17	20	20	25	EMM	18	22	23	27	25	18	18	19	25	26	EMM	20	25	24	24	26	23	25	23	21	20	EMM		

Days	Concentration: <u>6.25</u>											Concentration: <u>12.5</u>											Concentration: <u>25</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLP
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
3	✓	✓	✓	✓	✓	✓	✓	4	✓	✓	JW	3	✓	✓	✓	✓	✓	4	✓	4	✓	JW	4	4	2	✓	4	✓	2	4	✓	4	JW
4	3	3	3	3	2	3	3	✓	2	3	M	✓	2	3	3	4	3	✓	3	5	✓	A	2	2	✓	2	✓	2	✓	2	✓	2	A
5	12	8	7	10	8	7	8	9	8	7	KC	7	10	7	7	7	8	9	9	9	9	KC	8	7	8	8	9	8	8	9	9	10	KC
6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLP	11	✓	✓	✓	✓	✓	11	✓	10	✓	MLP	11	12	✓	✓	11	✓	11	12	✓	11	MLP
7	13	13	11	14	11	14	13	10	10	10	EMM	✓	11	12	13	14	12	✓	11	✓	8	EMM	✓	✓	✓	13	✓	13	✓	✓	12	✓	
8																																	
Total	28	23	21	27	21	24	24	23	20	20	EMM	21	23	22	23	25	23	24	23	18	17	EMM	25	25	24	23	24	23	21	25	23	25	EMM

Days	Concentration: <u>50</u>											Concentration: <u>100</u>											Concentration:										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLP											
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
3	4	4	✓	✓	2	✓	✓	✓	✓	4	JW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	JW											
4	6	7	3	3	3	2	3	2	✓	3	M	3	4	3	3	3	2	3	✓	2	2	A											
5	8	8	11	8	9	8	11	8	11	8	KC	15	5	8	7	11	12	8	6	10	7	KC											
6	10	✓	✓	✓	✓	✓	✓	✓	✓	11	MLP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MLP											
7	✓	12	13	14	10	14	12	10	11	✓	EMM	10	10	9	9	10	14	12	6	11	10	EMM											
8		JW																															
Total	24	18	27	25	21	25	25	21	24	23	EMM	22	19	20	19	24	28	23	12	23	19	EMM											

Notes: X = mortality.

Sample Description: Clear
 Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JGU Date reviewed: sep. 24/15

CETIS Analytical ReportReport Date: 08 Sep-15 10:25 (p 1 of 2)
Test Code: 15657a | 03-4805-4467

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 14-1628-2245	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 08 Sep-15 10:22	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 01-3171-6086	Test Type: Reproduction-Survival (7d)	Analyst: Jeslin Wijaya
Start Date: 26 Aug-15 10:25	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 02 Sep-15 13:00	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 3h	Source: In-House Culture	Age: <24H
Sample ID: 02-6485-8711	Code: FC96C57	Client: Mount Polley
Sample Date: 24 Aug-15 09:00	Material: Water Sample	Project:
Receive Date: 26 Aug-15 08:40	Source: Mount Polley (MT POLLEY)	
Sample Age: 49h (8.5 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1817434	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

C-%	Control Type	Count	Calculated Variate(A/B)								
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	0	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

Ceriodaphnia 7-d Survival and Reproduction Test

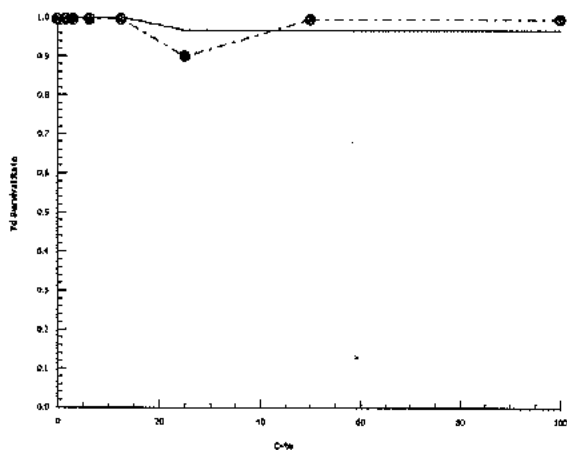
Nautilus Environmental

Analysis ID: 14-1628-2245 Endpoint: 7d Survival Rate CETIS Version: CETISv1.8.7
 Analyzed: 08 Sep-15 10:22 Analysis: Linear Interpolation (ICPIN) Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 24 Sep-15 08:41 (p 1 of 2)
 Test Code: 15657a | 03-4805-4467

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 16-7622-7882	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 24 Sep-15 8:40	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 01-3171-6086	Test Type: Reproduction-Survival (7d)	Analyst: Jeslin Wijaya
Start Date: 26 Aug-15 10:25	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 02 Sep-15 13:00	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 3h	Source: In-House Culture	Age: <24H
Sample ID: 02-6485-8711	Code: FC96C57	Client: Mount Polley
Sample Date: 24 Aug-15 09:00	Material: Water Sample	Project:
Receive Date: 26 Aug-15 08:40	Source: Mount Polley (MT POLLEY)	
Sample Age: 49h (8.5 °C)	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	488360	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	19.7	5	27	1.886	5.964	30.27%	0.0%
1.56		10	22.1	18	27	1.14	3.604	16.31%	-12.18%
3.12		10	23.1	20	26	0.6741	2.132	9.23%	-17.26%
6.25		10	23.1	20	28	0.875	2.767	11.98%	-17.26%
12.5		10	21.9	17	25	0.809	2.558	11.68%	-11.17%
25		10	21.6	2	25	2.217	7.011	32.46%	-9.65%
50		10	23.9	21	27	0.5859	1.853	7.75%	-21.32%
100		10	21.5	12	28	1.515	4.79	22.28%	-9.14%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	5	18	22	27	22	21	17	20	20	25
1.56		18	22	23	27	25	18	18	19	25	26
3.12		20	25	24	24	26	23	25	23	21	20
6.25		28	23	21	27	21	24	24	23	20	20
12.5		21	23	22	23	25	23	24	23	18	17
25		25	25	2	23	24	23	21	25	23	25
50		24	24	27	25	21	25	25	21	24	23
100		28	19	20	19	24	28	23	12	23	19

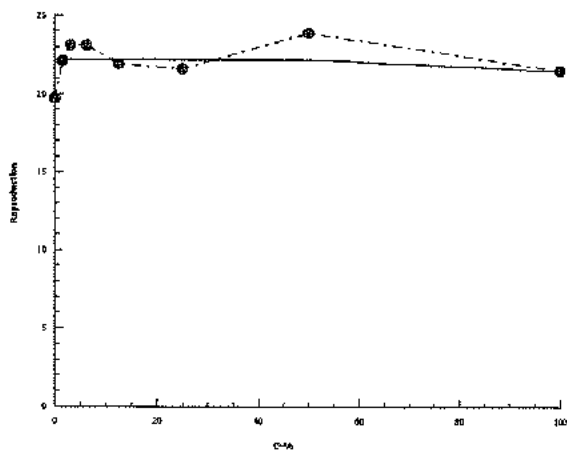
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 16-7622-7882 Endpoint: Reproduction
Analyzed: 24 Sep-15 8:40 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 24 Sep-15 08:41 (p 1 of 2)
 Test Code: 15657a | 03-4805-4467

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 13-4849-4207	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 24 Sep-15 8:40	Analysis: Nonparametric-Control vs Treatments	Official Results: Yes
Batch ID: 01-3171-6086	Test Type: Reproduction-Survival (7d)	Analyst: Jeslin Wijaya
Start Date: 26 Aug-15 10:25	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 02 Sep-15 13:00	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 3h	Source: In-House Culture	Age: <24H
Sample ID: 02-6485-8711	Code: FC96C57	Client: Mount Polley
Sample Date: 24 Aug-15 09:00	Material: Water Sample	Project:
Receive Date: 26 Aug-15 08:40	Source: Mount Polley (MT POLLEY)	
Sample Age: 49h (8.5 °C)	Station: QUR-1	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C < T	NA	NA	22.9%	100	>100	NA	1

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		1.56	94	74	4	18	0.5561	Asymp	Non-Significant Effect
		3.12	83.5	74	3	18	0.2099	Asymp	Non-Significant Effect
		6.25	84.5	74	3	18	0.2367	Asymp	Non-Significant Effect
		12.5	90	74	5	18	0.4122	Asymp	Non-Significant Effect
		25	83.5	74	2	18	0.2099	Asymp	Non-Significant Effect
		50	77	74	3	18	0.0831	Asymp	Non-Significant Effect
		100	97	74	1	18	0.6609	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	116.4875	16.64107	7	0.9321	0.4873	Non-Significant Effect
Error	1285.5	17.85417	72			
Total	1401.988		79			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	27.93	18.48	0.0002	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8413	0.9579	<0.0001	Non-normal Distribution

Reproduction Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	10	19.7	15.43	23.97	20.5	5	27	1.886	30.27%	0.0%
1.56		10	22.1	19.52	24.68	22.5	18	27	1.14	16.31%	-12.18%
3.12		10	23.1	21.58	24.62	23.5	20	26	0.6741	9.23%	-17.26%
6.25		10	23.1	21.12	25.08	23	20	28	0.875	11.98%	-17.26%
12.5		10	21.9	20.07	23.73	23	17	25	0.809	11.68%	-11.17%
25		10	21.6	16.58	26.62	23.5	2	25	2.217	32.46%	-9.65%
50		10	23.9	22.57	25.23	24	21	27	0.5859	7.75%	-21.32%
100		10	21.5	18.07	24.93	21.5	12	28	1.515	22.28%	-9.14%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	5	18	22	27	22	21	17	20	20	25
1.56		18	22	23	27	25	18	18	19	25	26
3.12		20	25	24	24	26	23	25	23	21	20
6.25		28	23	21	27	21	24	24	23	20	20
12.5		21	23	22	23	25	23	24	23	18	17
25		25	25	2	23	24	23	21	25	23	25
50		24	24	27	25	21	25	25	21	24	23
100		28	19	20	19	24	28	23	12	23	19

Ceriodaphnia 7-d Survival and Reproduction Test

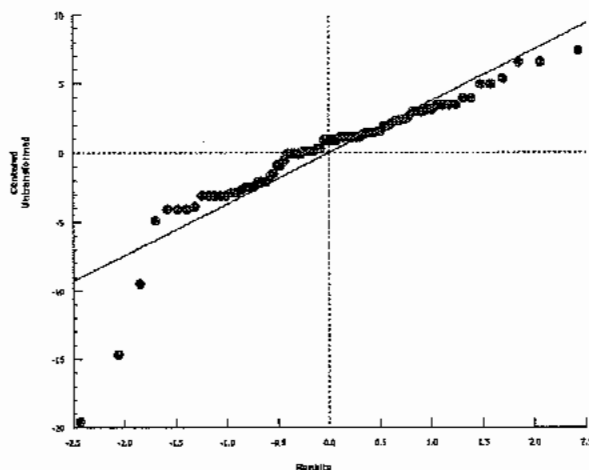
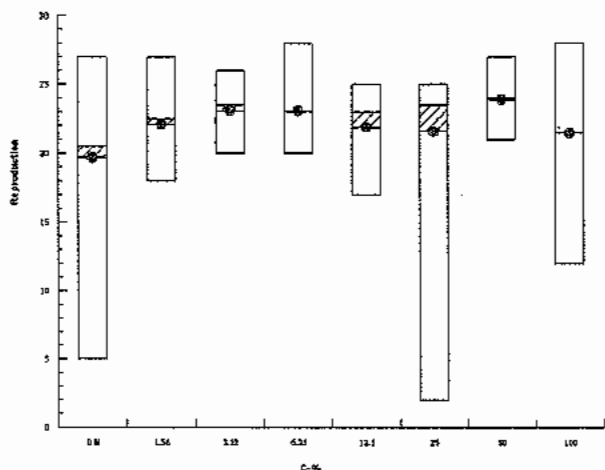
Nautilus Environmental

Analysis ID: 13-4849-4207
Analyzed: 24 Sep-15 8:40

Endpoint: Reproduction
Analysis: Nonparametric-Control vs Treatments

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Nautilus Environmental

Chain of Custody (electronic)

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

Date: 24/08/2015 Page 1 of 1

Sample Collection By: Shauna Litke, Sky Freeman		Report to:					Invoice to:					ANALYSES REQUIRED										Receipt Temperature (°C)
Company	Mount Polley Mining Corporation	Mount Polley Mining Corporation																				
Address	Box 12	Box 12																				
City/Prov/Postal Code	Likely BC V0L 1N0	Likely BC V0L 1N0																				
Contact	Colleen Hughes	Colleen Hughes/																				
Phone	(250) 790-2617	(250) 790-2617																				
Email	chughes@mountpolley.com	chughes@mountpolley.com																				
							7 day RBT SaG	7 day C.Dubia S+R														
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS																
1	QUR-1	24/08/2015	9:00	water	3x20L, 7x1L	10		X	X									8.5				
2																						
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						
PROJECT INFORMATION		SAMPLE RECEIPT			RELIQUISHED BY (CLIENT)			RELIQUISHED BY (COURIER)														
Client: Mount Polley Mining Corporation		Total # Containers:	10	Signature: <i>[Signature]</i>			Signature:															
P.O. No.:		Good Condition?	Y	Company: MPMC Time/Date: 25/08/15 15:30			Print:															
Shipped Via: Greyhound		Matches Schedule?	Y	RECEIVED BY (COURIER)			RECEIVED BY (LABORATORY)															
SPECIAL INSTRUCTIONS/COMMENTS:		Signature:			Signature: KL																	
		Print:			Print: KL																	
		Company:			Company: Nautilus Environmental																	
		Time/Date:			Time/Date: Aug 26/15 @ 08:40																	

COPY

9551566
with 1566

15661
with 1566

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

Ceriodaphnia dubia Summary Sheet

Client: Mount Polley Mining Corporation
 Work Order No.: 15657

Start Date/Time: AUG 26, 2015 @ 1000h
 Set up by: EMM

Sample Information:

Sample ID: SUL-550 -0m
 Sample Date: AUG 25, 2015
 Date Received: AUG 26, 2015
 Sample Volume: 7 x 1L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T (°C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 081415 B
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 30 31 3W
 Mortality (%) in previous 7 d: 10
 Individual female # used ≥ 8 young on test day: 21 - 32

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd 133
 Stock Solution ID: 15 NA 02
 Date Initiated: AUG 14, 2015

7-d LC50 (95% CL): 2.0 (1.7 - 2.3) g/L NaCl
 7-d IC50 (95% CL): 1.8 (1.7 - 1.9) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 2.0 (1.8 - 2.2) g/L NaCl CV (%): 5
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.5 (1.2 - 1.9) g/L NaCl CV (%): 14

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	> 100	> 100
IC25 % (v/v) (95% CL)	> 100	> 100
IC50 % (v/v) (95% CL)	> 100	> 100

Reviewed by: JGh

Date reviewed: Sept. 24/15

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: MA Polley
 Sample ID: QUL-550-CM
 Work Order #: 15657

Start Date & Time: August 26/15 @ 1000h
 Stop Date & Time: September 1/15 @ 1200h
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		6		7
Control	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	
DO (mg/L)	8.1	7.3	8.1	7.6	8.0	7.8	8.0	7.6	8.2	7.4	8.0	7.6	8.0	
pH	8.1	7.8	8.0	7.8	8.0	7.7	7.7	7.7	7.9	7.5	7.8	7.6	7.7	
Cond. (µS/cm)	220	221		217		217		218		220		221		
Initials	FMM	MLT		JW		JW		YWL		FMM		MLT		

Concentration	Days													
	0	1		2		3		4		5		6		7
1.56% (v/v)	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	
DO (mg/L)	8.2	7.3	8.0	7.6	7.9	7.8	7.9	7.7	8.2	7.4	8.1	7.4	8.0	
pH	8.1	7.8	7.9	7.8	7.8	7.6	7.8	7.7	7.9	7.5	7.9	7.6	7.8	
Cond. (µS/cm)	220	218		216		217		219		219		219		
Initials	FMM	MLT		JW		JW		YWL		FMM		MLT		

Concentration	Days													
	0	1		2		3		4		5		6		7
12.5% (v/v)	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	
DO (mg/L)	8.1	7.4	8.0	7.6	8.0	7.8	8.0	7.7	8.2	7.4	8.2	7.4	8.0	
pH	7.9	7.8	8.0	7.8	7.9	7.6	7.8	7.7	7.9	7.5	7.9	7.6	7.7	
Cond. (µS/cm)	206	208		205		206		205		208		202		
Initials	FMM	MLT		JW		JW		YWL		FMM		MLT		

Concentration	Days													
	0	1		2		3		4		5		6		7
100% (v/v)	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Temperature (°C)	25.0	25.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	
DO (mg/L)	7.9	7.5	8.0	7.6	8.1	7.8	8.1	7.8	8.2	7.4	8.2	7.9	8.0	
pH	7.7	7.5	8.0	7.6	7.9	7.4	7.7	7.4	7.8	7.3	7.8	7.4	7.7	
Cond. (µS/cm)	106	111		107		105		108		107		102		
Initials	FMM	MLT		JW		JW		YWL		FMM		MLT		

	Control	100% (v/v)
Hardness*	100	66
Alkalinity*	102	48

Analysts: FMM, MLT, JW, YWL
 Reviewed by: JWL
 Date reviewed: Sept. 23/15

* mg/L as CaCO₃
 WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5
 Sample Description: clear

Comments: Broodboard Used: 081415B (21→32)

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt. Doleys
 Sample ID: BU-552-0M
 Work Order: 10257

Start Date & Time: August 26/15 @ 1000h
 Stop Date & Time: September 15/15 @ 1200h
 Set up by: EMM

% (v/v)

Days	Concentration: <u>Control</u>												Concentration: <u>1.5G</u>												Concentration: <u>3.12</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
2											JW											JW											JW			
3	4	4	4	4	✓	✓	✓	✓	✓	✓	JW	4	✓	✓	✓	4	4	✓	✓	4	✓	JW	✓	4	2	4	4	✓	✓	3	4	4	JW			
4	✓	✓	✓	6	5	5	5	4	4	✓	WAL	✓	4	4	5	✓	4	4	✓	4	✓	WAL	3	✓	✓	✓	✓	✓	✓	✓	✓	✓	WAL			
5	7	7	7	9	✓	✓	✓	10	6	8	JW	7	8	✓	✓	8	8	✓	✓	7	11	JW	9	11	8	8	8	8	7	8	9	9	JW			
6	9	8	10	9	9	11	10	✓	12	10	EMM	10	9	11	12	13	12	11	12	10	✓	EMM	10	11	10	11	11	6	9	10	8	9	EMM			
7																																				
8																																				
Total	20	19	21	22	15	16	15	15	22	22	EMM	21	21	15	17	25	24	15	16	21	15	EMM	22	26	20	23	23	14	16	21	21	20	EMM			

Days	Concentration: <u>6.25</u>												Concentration: <u>12.5</u>												Concentration: <u>25</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM			
2											JW											JW											JW			
3	3	✓	✓	3	✓	✓	✓	✓	4	✓	JW	2	✓	4	4	✓	✓	✓	4	2	✓	JW	✓	4	3	4	✓	✓	✓	✓	3	✓	JW			
4	✓	4	5	✓	4	✓	2	4	✓	3	WAL	✓	2	✓	✓	4	3	3	✓	5	✓	WAL	4	✓	✓	✓	2	4	6	5	✓	5	WAL			
5	9	11	8	8	8	8	7	8	8	7	JW	9	15	6	7	9	9	6	8	8	7	JW	6	8	9	7	7	8	✓	✓	8	10	JW			
6	13	10	8	9	✓	9	10	11	11	✓	EMM	9	10	11	11	12	10	9	12	14	9	EMM	✓	9	10	12	10	✓	11	12	13	✓	EMM			
7																																				
8																																				
Total	25	25	3	19	13	12	18	21	23	10	EMM	20	7	21	22	16	13	12	25	24	14	EMM	10	21	22	23	19	12	17	17	29	15	EMM			

Days	Concentration: <u>50</u>												Concentration: <u>100</u>												Concentration:											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM														
2											JW											JW														
3	✓	✓	3	✓	3	3	3	4	✓	3	JW	✓	3	✓	✓	✓	✓	✓	✓	✓	✓	JW														
4	4	3	✓	3	✓	✓	✓	✓	4	✓	WAL	4	✓	4	2	✓	3	5	4	4	✓	WAL														
5	12	10	8	✓	11	8	8	9	✓	7	JW	11	9	10	7	9	✓	✓	✓	7	✓	JW														
6	✓	12	13	9	12	12	10	11	12	10	EMM	✓	12	13	✓	12	10	10	9	✓	9	EMM														
7																																				
8																																				
Total	16	25	24	12	26	23	21	24	16	20	EMM	15	24	27	11	21	13	15	13	11	13	EMM														

Notes: X = mortality.

Sample Description: clear
 Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JGB Date reviewed: Sep. 23/15

CETIS Analytical Report

Report Date: 08 Sep-15 10:38 (p 1 of 2)
 Test Code: 15657b | 04-8366-7996

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 19-9524-0587	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 08 Sep-15 10:37	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 05-3511-6730	Test Type: Reproduction-Survival (7d)	Analyst: Jeslin Wijaya
Start Date: 26 Aug-15 10:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 01 Sep-15 12:00	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 2h	Source: In-House Culture	Age: <24h
Sample ID: 18-3181-0298	Code: 6D2F34FA	Client: Mount Polley
Sample Date: 25 Aug-15 10:20	Material: Water Sample	Project:
Receive Date: 26 Aug-15 08:40	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h (11.5 °C)	Station: QUL-55a-0m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	638077	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

C-%	Control Type	Count	Calculated Variate(A/B)								
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 08 Sep-15 10:38 (p 2 of 2)
Test Code: 15657b | 04-8366-7996

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 19-9524-0587
Analyzed: 08 Sep-15 10:37

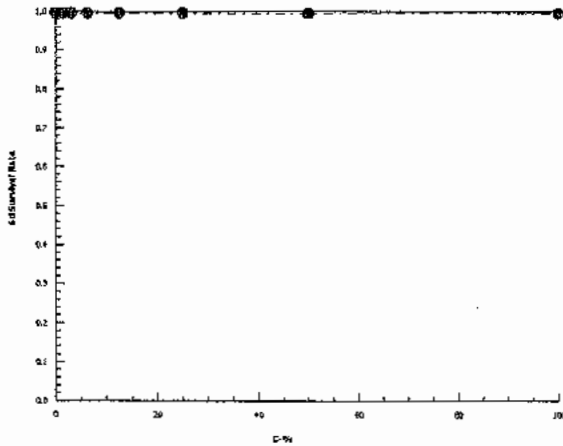
Endpoint: 6d Survival Rate
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 08 Sep-15 10:38 (p 1 of 2)
 Test Code: 15657b | 04-8366-7996

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 18-5997-7684	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 08 Sep-15 10:38	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 05-3511-6730	Test Type: Reproduction-Survival (7d)	Analyst: Jeslin Wijaya
Start Date: 26 Aug-15 10:00	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 01 Sep-15 12:00	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 2h	Source: In-House Culture	Age: <24h
Sample ID: 18-3181-0298	Code: 6D2F34FA	Client: Mount Polley
Sample Date: 25 Aug-15 10:20	Material: Water Sample	Project:
Receive Date: 26 Aug-15 08:40	Source: Mount Polley (MT POLLEY)	
Sample Age: 24h (11.5 °C)	Station: QUL-55a-0m	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1907375	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	55.59	3.159	N/A	1.799	NA	31.66
IC10	72.42	5.696	N/A	1.381	NA	17.56
IC15	94.26	57.92	N/A	1.061	NA	1.727
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	18.7	15	22	0.9894	3.129	16.73%	0.0%
1.56		10	19	15	25	1.22	3.859	20.31%	-1.6%
3.12		10	20.6	14	26	1.097	3.471	16.85%	-10.16%
6.25		10	18.5	10	25	1.648	5.212	28.17%	1.07%
12.5		10	18.2	12	24	1.381	4.367	23.99%	2.67%
25		10	18	10	24	1.483	4.69	26.06%	3.74%
50		10	20.7	12	26	1.469	4.644	22.43%	-10.7%
100		10	16.3	11	27	1.789	5.658	34.71%	12.83%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	20	19	21	22	15	16	15	15	22	22
1.56		21	21	15	17	25	24	15	16	21	15
3.12		22	26	20	23	23	14	16	21	21	20
6.25		25	25	13	19	13	18	18	21	23	10
12.5		20	17	21	22	16	13	12	23	24	14
25		10	21	22	23	19	12	17	17	24	15
50		16	25	24	12	26	23	21	24	16	20
100		15	24	27	11	21	13	15	13	11	13

CETIS Analytical Report

Report Date: 08 Sep-15 10:38 (p 2 of 2)

Test Code: 15657b | 04-8366-7996

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 18-5997-7684

Endpoint: Reproduction

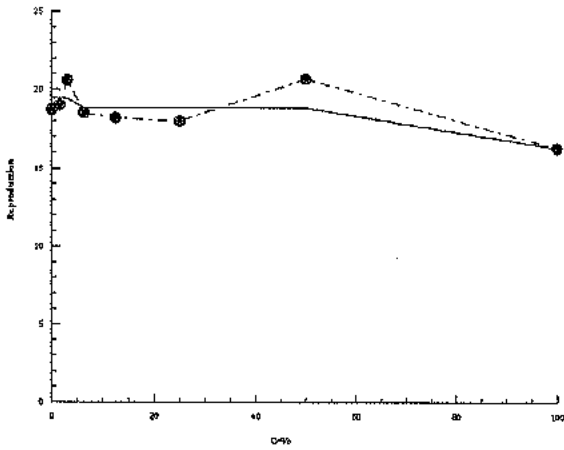
CETIS Version: CETISv1.8.7

Analyzed: 08 Sep-15 10:38

Analysis: Linear Interpolation (ICPIN)

Official Results: Yes

Graphics



British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

Date: 25/08/2015 Page 1 of 1

Sample Collection By: Alethea Andy, Valerie Holweck							ANALYSES REQUIRED										Receipt Temperature (°C)				
Report to:		Invoice to:																			
Company		Mount Polley Mining Corporation			Mount Polley Mining Corporation																
Address		Box 12			Box 12																
City/Prov/Postal Code		Likely BC V0L 1N0			Likely BC V0L 1N0																
Contact		Colleen Hughes			Colleen Hughes/																
Phone		(250) 790-2617			(250) 790-2617																
Email		chughes@mountpolley.com			chughes@mountpolley.com																
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS															
1	QUL-55a-0m	25/08/2015	10:20	water	3x20L, 7x1L	10														15.5	
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
PROJECT INFORMATION				SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)				RELIQUISHED BY (COURIER)											
Client: Mount Polley Mining Corporation				Total # Containers:	10	Signature:				Signature:											
P.O. No.:				Good Condition?	Y	Shauna Litke				Print:											
Shipped Via: Greyhound				Matches Schedule?	Y	Company: MPMC				Company:											
						Time/Date: 25/08/2015 15:30				Time/Date:											
SPECIAL INSTRUCTIONS/COMMENTS:						RECEIVED BY (COURIER)				RECEIVED BY (LABORATORY)											
						Signature:				Signature: <i>AL</i>											
						Print:				Print: <i>AL</i>											
						Company:				Company: <i>lautilus Environmental</i>											
						Time/Date:				Time/Date: <i>Aug 26/15 @ 08:40</i>											

COPY

7-day RBT S&G
7 day C.Dubia S+R
W# 1566
W# 1567

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

Ceriodaphnia dubia Summary Sheet

Client: Mount Polley Mining Corporation
 Work Order No.: 15657

Start Date/Time: AUG 26, 2015 @ 10:5h
 Set up by: EMM

Sample Information:

Sample ID: P2-S
 Sample Date: AUG 25, 2015
 Date Received: AUG 26, 2015
 Sample Volume: 7 x 1L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 081415 B
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 31 24
 Mortality (%) in previous 7 d: 10
 Individual female # used ≥ 8 young on test day: 32 - 37

NaCl Reference Toxicant Results:

Reference Toxicant ID: Cd 133
 Stock Solution ID: 15 Na02
 Date Initiated: AUG 14, 2015

7-d LC50 (95% CL): 2.0 (1.7 - 2.3) g/L NaCl
 7-d IC50 (95% CL): 1.8 (1.7 - 1.9) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 2.0 (1.8 - 2.2) g/L NaCl CV (%): 5
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.5 (1.2 - 1.9) g/L NaCl CV (%): 14

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	> 100	> 100
IC25 % (v/v) (95% CL)	> 100	> 100
IC50 % (v/v) (95% CL)	> 100	> 100

Reviewed by: JOU

Date reviewed: Sept. 24/15

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: MA Polley
 Sample ID: P2-S
 Work Order #: 15657

Start Date & Time: August 26/15 @ 10:15h
 Stop Date & Time: September 1/15 @ 13:00h
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		Final 6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Control														
Temperature (°C)	24.0	25.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	
DO (mg/L)	8.1	7.6	8.1	7.6	8.0	7.9	8.0	7.8	8.2	7.5	8.0	7.4	8.0	
pH	8.1	7.9	8.0	7.8	8.0	7.7	7.7	7.8	7.9	7.6	7.8	7.6	7.7	
Cond. (µS/cm)	220		221		217		217		218		220		218	219
Initials	EMM		MLT		JW		JW		YWL		EMM		EMM	

Concentration	Days													
	0	1		2		3		4		5		Final 6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
1.56% (v/v)														
Temperature (°C)	24.0	25.0	24.0	25.0	24.5	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	
DO (mg/L)	8.1	7.6	8.1	7.6	7.9	7.8	7.8	7.8	8.2	7.5	8.2	7.4	8.1	
pH	8.0	7.9	8.0	7.8	8.0	7.7	7.9	7.7	8.0	7.6	7.8	7.6	7.9	
Cond. (µS/cm)	220		223		209		221		221		218		223	219
Initials	EMM		MLT		JW		JW		YWL		EMM		EMM	

Concentration	Days													
	0	1		2		3		4		5		Final 6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
12.5% (v/v)														
Temperature (°C)	24.5	25.0	24.0	25.0	24.5	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	
DO (mg/L)	8.0	7.6	8.1	7.6	8.0	7.6	8.0	7.9	8.2	7.5	8.2	7.3	8.1	
pH	8.1	7.9	8.0	7.8	8.1	7.7	7.9	7.7	8.0	7.6	7.9	7.6	7.8	
Cond. (µS/cm)	231		230		220	218 JW	228		235		232		232	231
Initials	EMM		MLT		JW		JW		YWL		EMM		EMM	

Concentration	Days													
	0	1		2		3		4		5		Final 6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
100% (v/v)														
Temperature (°C)	25.0	25.0	24.0	25.0	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	
DO (mg/L)	7.9	7.6	8.0	7.6	8.0	7.5	8.1	7.8	8.3	7.5	8.2	7.3	8.1	
pH	8.2	7.9	8.3	7.8	8.2	7.7	8.1	7.8	8.3	7.6	8.2	7.6	8.1	
Cond. (µS/cm)	284		287		284		283		287		283		281	283
Initials	EMM		MLT		JW		JW		YWL		EMM		EMM	

	Control	100% (v/v)		
Hardness*	100	134		
Alkalinity*	102	98		

Analysts: JW, EMM, YWL, MLT
 Reviewed by: JPH
 Date reviewed: sep-23/15

* mg/L as CaCO₃
 WQ Ranges: T (°C) = 25 ± 1; DO (mg/L) = 3.3 to 8.4 (mg/L); pH = 6 to 8.5
 Sample Description: clear

Comments: Broodboard Used: OSKHER (33→37)

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mt. Polley
 Sample ID: P2-S
 Work Order: 10657

Start Date & Time: August 26/15 @ 1015h
 Stop Date & Time: September 1/15 @ 1300h
 Set up by: EMM

%(V/V)

Days	Concentration: <u>Control</u>											Concentration: <u>1.56</u>											Concentration: <u>3.12</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
3	✓	4	✓	✓	✓	✓	✓	4	✓	4	JW	✓	4	✓	4	✓	✓	4	✓	✓	4	JW	✓	2	✓	2	✓	✓	2	✓	✓	4	JW
4	4	✓	4	3	3	5	7	✓	3	✓	ML7	3	✓	5	✓	5	4	✓	4	4	✓	ML7	3	3	4	✓	4	4	✓	4	3	✓	ML7
5	7	9	✓	8	✓	✓	✓	9	6	8	ML7	7	8	8	7	✓	6	7	✓	9	✓	ML7	7	✓	7	6	✓	6	✓	6	✓	6	ML7
6	9	10	8	8	11	12	12	11	7	10	KL	12	8	✓	8	11	✓	10	11	14	✓	KL	9	12	12	12	12	15	13	13	11	✓	KL
7																																	
8			15																	26													
Total	20	23	28	19	14	17	19	24	16	22	KL	22	20	13	19	16	10	24	14	15	27	JW	19	15	23	20	16	16	23	17	16	21	JW

Days	Concentration: <u>6.25</u>											Concentration: <u>12.5</u>											Concentration: <u>25</u>										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM
3	✓	✓	✓	✓	✓	✓	3	✓	✓	✓	JW	✓	✓	✓	✓	4	✓	✓	✓	✓	✓	JW	✓	✓	✓	✓	✓	✓	4	✓	✓	4	JW
4	3	4	4	4	2	4	2	✓	3	4	ML7	4	5	4	4	✓	5	4	✓	6	4	ML7	4	4	5	3	6	2	✓	4	3	✓	ML7
5	✓	8	4	✓	6	✓	9	✓	✓	✓	ML7	7	✓	✓	✓	8	9	✓	7	✓	9	ML7	6	✓	✓	8	9	8	6	✓	7	6	ML7
6	12	9	11	14	✓	11	10	12	13	12	KL	10	11	10	11	10	✓	11	12	12	✓	KL	✓	13	12	9	6	✓	12	10	11	13	KL
7																																	
8																																	
Total	15	21	24	18	8	15	22	2	16	16	JW	21	16	14	15	22	14	15	19	18	13	JW	10	17	17	20	21	10	22	14	21	23	JW

Days	Concentration: <u>50</u>											Concentration: <u>100</u>											Concentration:										
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	ML7											
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	EMM											
3	✓	✓	✓	✓	✓	✓	✓	4	✓	✓	JW	✓	4	✓	✓	4	✓	✓	✓	5	✓	JW											
4	2	3	3	4	5	3	4	✓	4	3	ML7	3	✓	3	4	✓	4	2	2	✓	3	ML7											
5	8	✓	8	✓	9	✓	9	9	✓	✓	ML7	✓	6	✓	6	9	8	10	8	8	✓	ML7											
6	12	12	12	13	11	13	12	12	2	15	EMM	8	13	13	✓	11	13	13	✓	14	12	EMM											
7																																	
8																																	
Total	22	15	23	17	25	16	25	25	16	18	JW	11	23	16	12	24	25	25	10	27	15	JW											

Notes: X = mortality.

Sample Description: clear
 Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JGH Date reviewed: sep. 23/15

CETIS Analytical Report

Report Date: 08 Sep-15 10:32 (p 1 of 2)
 Test Code: 15657c | 19-6559-3574

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 19-9282-6357	Endpoint: 6d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 08 Sep-15 10:31	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 11-1256-4969	Test Type: Reproduction-Survival (7d)	Analyst: Jeslin Wijaya
Start Date: 26 Aug-15 10:15	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 01 Sep-15 13:00	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 3h	Source: In-House Culture	Age: <24h
Sample ID: 02-0908-1130	Code: C76532A	Client: Mount Polley
Sample Date: 25 Aug-15 14:35	Material: Water Sample	Project:
Receive Date: 26 Aug-15 08:40	Source: Mount Polley (MT POLLEY)	
Sample Age: 20h (12 °C)	Station: P2-S	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1478678	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

C-%	Control Type	Count	Calculated Variate(A/B)							A	B
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect		
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	1	1	1	0	0	0.0%	0.0%	10	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 08 Sep-15 10:32 (p 2 of 2)
 Test Code: 15657c | 19-6559-3574

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 19-9282-6357
 Analyzed: 08 Sep-15 10:31

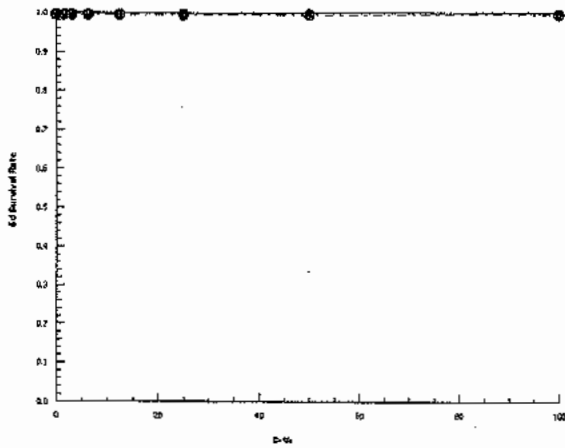
Endpoint: 6d Survival Rate
 Analysis: Linear Interpolation (CPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

6d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 24 Sep-15 08:46 (p 1 of 2)
 Test Code: 15657c | 19-6559-3574

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 14-1226-3080	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 24 Sep-15 8:44	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 11-1256-4969	Test Type: Reproduction-Survival (7d)	Analyst: Jeslin Wijaya
Start Date: 26 Aug-15 10:15	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 01 Sep-15 13:00	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 3h	Source: In-House Culture	Age: <24h
Sample ID: 02-0908-1130	Code: C76532A	Client: Mount Polley
Sample Date: 25 Aug-15 14:35	Material: Water Sample	Project:
Receive Date: 26 Aug-15 08:40	Source: Mount Polley (MT POLLEY)	
Sample Age: 20h (12 °C)	Station: P2-S	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	267016	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	5.181	0.4757	N/A	19.3	NA	210.2
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	18.9	14	24	1.08	3.414	18.06%	0.0%
1.56		10	18.2	10	27	1.775	5.613	30.84%	3.7%
3.12		10	18.6	15	23	0.9568	3.026	16.27%	1.59%
6.25		10	15.7	2	24	2.082	6.584	41.93%	16.93%
12.5		10	16.7	13	22	0.9894	3.129	18.73%	11.64%
25		10	17.5	10	23	1.515	4.79	27.37%	7.41%
50		10	20.2	15	25	1.323	4.185	20.72%	-6.88%
100		10	18.8	10	27	2.097	6.63	35.27%	0.53%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	20	23	15	19	14	17	19	24	16	22
1.56		22	20	13	19	16	10	26	14	15	27
3.12		19	15	23	20	16	16	23	17	16	21
6.25		15	21	24	18	8	15	22	2	16	16
12.5		21	16	14	15	22	14	15	19	18	13
25		10	17	17	20	21	10	22	14	21	23
50		22	15	23	17	25	16	25	25	16	18
100		11	23	16	12	24	25	25	10	27	15

CETIS Analytical Report

Report Date: 24 Sep-15 08:46 (p 2 of 2)

Test Code: 15657c | 19-6559-3574

Ceriodaphnia 7-d Survival and Reproduction Test

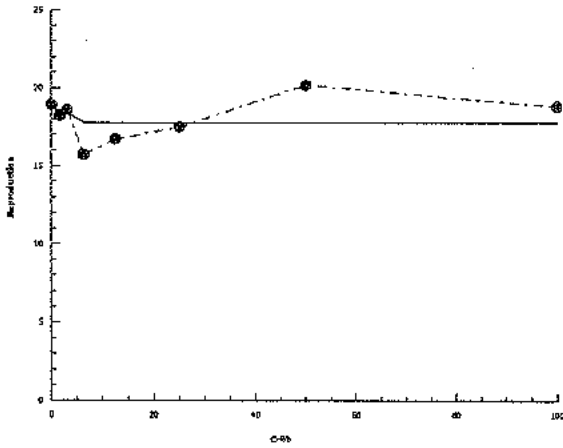
Nautilus Environmental

Analysis ID: 14-1226-3080
Analyzed: 24 Sep-15 8:44

Endpoint: Reproduction
Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Client: Mount Polley

W.O.#: 15657

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
QUR-1	AUG 26 / 15	50	2.6	2.7	50	50	2.9	58	KL
P2-S	↓	50	5.4 ^{HL}	5.3	98	50	6.7	134	↓
QUL-SSA-0m	↓	50	2.5	2.6	48	50	3.3	66	↓
20 % Ferrier	↓	50	5.2	5.3	102	50	5.0	100	JW

Notes: _____

Reviewed by: JPK

Date Reviewed: Sept. 16/15

Jautilus Environmental

Chain of Custody (electronic)

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

Date: 25/08/2015 Page 1 of 1

Sample Collection By: Alethea Andy, Valerie Holweck							ANALYSES REQUIRED										Receipt Temperature (C)	
Report to:		Invoice to:																
Company	Mount Polley Mining Corporation	Mount Polley Mining Corporation																
Address	Box 12	Box 12																
City/Prov/Postal Code	Likely BC V0L 1N0	Likely BC V0L 1N0																
Contact	Colleen Hughes	Colleen Hughes/																
Phone	(250) 790-2617	(250) 790-2617																
Email	chughes@mountpolley.com	chughes@mountpolley.com																
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS	7 day RBT S&G	7 day C.Dubia S+R										
1	P2-S	25/08/2015	14:35	water	3x20L, 7x1L	10		X	X									
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

PROJECT INFORMATION		SAMPLE RECEIPT		RELIQUINSHED BY (CLIENT)		RELIQUINSHED BY (COURIER)	
Client: Mount Polley Mining Corporation		Total # Containers:	10	Signature:		Signature:	
P.O. No.:		Good Condition?	Y	Shauna Litke		Print:	
Shipped Via: Greyhound		Matches Schedule?	Y	Company: MPMC		Company:	
				Time/Date: 25/08/2015 15:30		Time/Date:	
SPECIAL INSTRUCTIONS/COMMENTS:				RECEIVED BY (COURIER)		RECEIVED BY (LABORATORY)	
				Signature:		Signature: <i>AP</i>	
				Print:		Print: <i>KL</i>	
				Company:		Company: Nautilus Environmental	
				Time/Date:		Time/Date: Aug 26/15 @ 08:40	

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

COPY

(21-40)

Brood board Data Sheet
C. dubia Reproduction Data

Client: Various
Sample ID: Broodboard 081415R (21-40)
From Broodboard 080615A

Start Date: Aug 14/15

Day	Brood cup number										Time	Init
	21	2	3	4	5	6	7	8	9	20		
1	/	/	/	/	/	/	/	/	/	/	11:55	A
2	/	/	/	/	/	/	/	/	/	/	12:35	A
3	2	3	3	3	3	3	3	3	3	3	9:30	FMW
4	3	3	3	3	3	3	3	3	3	3	9:50	FMW
5	4	5	5	5	5	5	5	5	5	5	10:50	FMW
6	12	12	13	13	13	13	13	13	13	13	8:30	FMW
7	11	13	12	12	10	11	10	12	10	10	10:40	FMW
8	12	13	12	12	10	11	10	12	10	10	12:40	JW
9	17	16	14	18	16	17	19	17	21	17	10:30	WJL
10	18	16	15	13	15	16	16	15	16	13	10:50	FMW
11	17	14	19	15	17	15	15	13	14	16	11:30	FMW
12	17	14	19	15	17	15	13	14	16	16	10:40	FMW
13	17	20	18	18	19	18	17	13	18	19		
14												

Day	Brood cup number										Time	Init
	31	32	33	34	35	36	37	38	39	40		
1	/	/	/	/	/	/	/	/	/	/	12:00	P
2	/	/	/	/	/	/	/	/	/	/	12:00	A
3	3	3	3	3	3	4	3	3	4	4	9:35	FMW
4	3	3	3	3	3	3	3	3	4	4	9:52	FMW
5	6	7	8	9	9	7	6	9	9	7	10:55	FMW
6	10	9	10	10	9	14	10	9	10	9	8:35	FMW
7	12	12	12	12	12	14	12	12	12	13	10:45	FMW
8	12	15	12	13	14	14	16	12	12	13	12:45	JW
9	17	18	15	20	17	22	18	17	19	16	10:35	WJL
10	14	15	16	15	16	18	17	15	14	15	10:55	FMW
11	17	16	18	18	18	15	18	X	X	18	11:35	FMW
12	17	18	18	18	18	15	18			18	10:45	FMW
13	17	18	19	20	18	17	16			20		
14												

Initiation date: Aug 27/15
Client: Mt. Polley
W.O. No.: Aug 26/15
Sample ID: 15657
Previous 7-d % Mortality: 15-1050, 15-1056
Avg. young/daphnid: 10
(first 3 broods) in prev. 7 d: 30.67 ~ 31
Cup # used ≥ 8 young on test day: 21-32
Ephippia (y/n): NO

Reviewed by: _____
Date reviewed: _____

APPENDIX B - Rainbow trout (*Onchorynchus mykiss*) Toxicity Test Data

Rainbow Trout Swimup Test Summary Sheet

Client: Mount Polley Start Date/Time: Aug 26/15 @ 1100h

Work Order No.: 15656 Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: QUR-1
 Sample Date: Aug 24/15
 Date Received: Aug 26/15
 Sample Volume: 3 x 20L

Dilution Water:

Type: Moderately Hard Water (MHW)
 Hardness (mg/L CaCO₃): 96
 Alkalinity (mg/L CaCO₃): 78

Test Organism Information:

Batch No.: 082015
 Source: Aqua Farm (Langley, BC)
 Average Initial Dry Weight 17.3 (mg)

Copper Reference Toxicant Results:

Reference Toxicant ID: RTCL20
 Stock Solution ID: 15Cu03
 Date Initiated: Aug 26/15 209.6
 7-d LC50 (95% CL): 184.7 (163.1 - 209.6) mg/L Cu
 7-d IC50 (95% CL): 181.7 (160.1 - 196.3) mg/L Cu

7-d LC50 Reference Toxicant Mean and Historical Range: 57.9 (25.4 - 132.1) mg/L Cu CV(%) 57.9
 7-d IC50 Reference Toxicant Mean and Historical Range: 57.9 (25.4 - 132.1) mg/L Cu CV(%) 57.9

Test Results:

	Survival	Biomass	Dry Weight
LC25 % (v/v) (95% CL)	> 100		
LC50 % (v/v) (95% CL)	> 100		
IC25 % (v/v) (95% CL)		> 100	> 100
IC50 % (v/v) (95% CL)		> 100	> 100

Reviewed by: JCH

Date reviewed: Sep-25/15

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Palley
 Sample ID: QUE-01
 Work Order #: 15656

Start Date & Time: Aug 26/15 @ 1100h
 Stop Date & Time: Sept 2/15 @ 1000h
 Test Species: Oncorhynchus mykiss

Concentration Control	Days													
	0	1		① 2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	15.0	14.0	15.0	14.5	15.0	14.5	14.5	14.5	14.5	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.5	7.0	9.6	5.9	9.7	9.9	9.8	6.5	9.8	9.3	9.8	9.5	9.7	8.6
pH	8.0	7.4	7.9	7.3	7.9	7.9	8.0	7.3	7.9	7.8	8.1	7.6	8.0	7.9
Cond. (µS/cm)	334	326	332	333		332		333		334		333		349
Initials	SSD	SSD		SSD		A		A		SSD		SSD		KL

Concentration 6.25	Days													
	0	1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	15.0	14.0	15.0	14.5	15.0	14.5	14.5	14.5	14.5	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.6	6.9	9.4	6.0	9.4	9.9	9.8	6.6	9.8	9.4	9.6	9.6	9.9	8.7
pH	7.9	7.4	8.1	7.3	7.9	7.9	8.0	7.4	8.0	7.8	8.0	7.7	7.8	7.9
Cond. (µS/cm)	320	307	326	330		329		330		319		320		338
Initials	SSD	SSD		SSD		A		A		SSD		SSD		KL

Concentration 12.5	Days													
	0	1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	15.0	14.0	15.0	14.5	15.0	14.5	14.5	14.5	14.5	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.7	7.0	9.4	6.0	9.5	9.9	9.9	6.4	9.9	9.4	9.6	9.4	9.9	8.8
pH	7.9	7.4	8.1	7.3	7.9	8.0	7.9	7.3	8.0	7.8	8.0	7.7	7.8	7.8
Cond. (µS/cm)	306	279	307	310		311		310		308		308		329
Initials	SSD	SSD		SSD		A		A		SSD		SSD		SSD

Concentration 25	Days													
	0	1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	15.0	14.0	15.0	14.5	15.0	14.5	14.5	14.5	14.5	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.7	7.1	9.4	6.0	9.4	9.8	9.8	6.5	9.8	9.3	9.7	9.4	9.8	8.9
pH	7.9	7.4	8.1	7.3	7.9	8.0	7.9	7.4	8.0	7.8	8.0	7.7	7.9	7.8
Cond. (µS/cm)	277	274	272	273		280		284		278		278		309
Initials	SSD	SSD		SSD		A		A		SSD		SSD		SSD

Thermometer: Temp-2 DO meter: DO-2 pH meter: pH-1 Conductivity meter: C-2

	Control	100% (w/v)
Hardness*	96	58
Alkalinity*	78	50

Analysts: SSD, AWD
 Reviewed by: JOL
 Date reviewed: Sept. 24/15

* mg/L as CaCO₃

Sample Description: clear

Comments: ① aeration initiated

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Palley
 Sample ID: QUE-01
 Work Order #: 15656

Start Date & Time: Aug 26/15 @ 11:00h
 Stop Date & Time: Sept 2/15 @ 10:00h
 Test Species: Oncorhynchus mykiss

Concentration 50 % (v/v)	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	15.0	14.0	15.0	14.5	15.0	14.6	14.6	14.5	14.6	15.0	15.0	15.0	14.8	15.0	15.0
DO (mg/L)	9.7	6.9	9.4	5.9	9.5	9.9	9.8	6.6	9.9	9.4	9.5	9.5	9.8	8.9	
pH	7.9	7.4	8.1	7.3	7.9	8.0	7.9	7.3	7.9	7.8	8.0	7.7	7.9	7.7	
Cond. (µS/cm)	221	224	225	222	221	224	223	243							
Initials	SSD	SSD	SSD	A	A	SSD	SSD	SSD							

Concentration 100 % (v/v)	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	15.0	14.0	15.0	14.5	15.0	14.6	14.6	14.5	14.6	15.0	15.0	15.0	15.0	15.0	
DO (mg/L)	9.8	7.2	9.4	5.7	9.5	9.8	9.8	6.6	9.9	9.5	9.5	7.6	9.8	9.1	
pH	7.9	7.4	8.0	7.3	7.7	8.0	7.8	7.4	7.9	7.7	7.7	7.7	7.7	7.7	
Cond. (µS/cm)	109	108	108	109	108	109	108	130							
Initials	SSD	SSD	SSD	A	A	SSD	SSD	SSD							

Concentration	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)															
DO (mg/L)															
pH															
Cond. (µS/cm)															
Initials															

Concentration	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)															
DO (mg/L)															
pH															
Cond. (µS/cm)															
Initials															

Thermometer: Temp-2 DO meter: DO-2 pH meter: pH-1 Conductivity meter: C-2

	Control	100% (v/v)
Hardness*	96	58
Alkalinity*	78	50

Analysts: SSD, Aao
 Reviewed by: JGL
 Date reviewed: Sept. 29/15

* mg/L as CaCO₃

Sample Description: _____

Comments: _____

7-d Chronic Freshwater Toxicity Test Daily Mortality

Client: Mount Palley
 Sample ID: QUR-1
 Work Order #: 15056

Start Date & Time: Aug 26/15 @ 1100h
 Stop Date & Time: Sept 2/15 @ 1000h
 Test Species: Oncorhynchus mykiss

Concentration % (v/v)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	5	5	5	5	5	5	5	(1)
	B	↓	↓	↓	↓	↓	↓	↓	
	C	↓	↓	↓	↓	↓	↓	↓	
	D	↓	↓	↓	↓	↓	↓	↓	
6.25	A	↓	↓	↓	↓	↓	↓	↓	
	B	↓	↓	↓	↓	↓	↓	↓	
	C	↓	↓	↓	↓	↓	↓	↓	
	D	↓	↓	↓	↓	↓	↓	↓	
12.5	A	↓	↓	↓	↓	↓	↓	↓	
	B	↓	↓	↓	↓	↓	↓	↓	
	C	↓	↓	↓	↓	↓	↓	↓	
	D	↓	↓	↓	↓	↓	↓	↓	
25	A	↓	↓	↓	↓	↓	↓	↓	
	B	↓	↓	↓	↓	↓	↓	↓	
	C	↓	↓	↓	↓	↓	↓	↓	
	D	↓	↓	↓	↓	↓	↓	↓	
50	A	↓	↓	↓	↓	↓	↓	↓	
	B	↓	↓	↓	↓	↓	↓	↓	
	C	↓	↓	↓	↓	↓	↓	↓	
	D	↓	↓	↓	↓	↓	↓	↓	
100	A	↓	↓	↓	↓	↓	↓	↓	
	B	↓	↓	↓	↓	↓	↓	↓	
	C	↓	↓	↓	↓	↓	↓	↓	
	D	↓	↓	↓	↓	↓	↓	↓	
Tech Initials	A	SSD	SSD	A	A	SSD	SSD	SSD	JAB
	B								
	C								
	D								

Comments: ① No signs of stress in surviving fish

Reviewed by: JOU Date reviewed: Sept. 24/15

7d Chronic Freshwater Toxicity Test Data Sheet
Swim-up Survival and Dry Weight

Client: Mount Foley
Sample ID: OUR-1
Work Order No.: 15656

Start Date: Aug 26/15 @ 1100h
Termination Date: Sep 2/15 @ 1000h

7.1(v/v) Sample ID	Rep Reed	Pan No. QR	No. Alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
control	A	1	5	KL	992.73	1141.77	5	KL
	B	2			966.39	1136.98		
	C	3			990.85	1152.47		
	D	4			975.47	1146.58		
6-25	A	5			985.33	1130.47		
	B	6			989.49	1156.52		
	C	7			994.37	1152.18		
	D	8			986.77	1165.08 ⁷⁰		
125	A	9			972.13	1126.37 ⁴²		
	B	10			977.52	1121.60		
	C	11	↓		969.87	1119.38	↓	
	D	12	4		976.31	1121.44	4	
25	A	13	5		990.98	1150.68	5	
	B	14			975.26	1144.62		
	C	15			988.63	1138.14		
	D	16			984.37	1150.64		
50	A	17			970.20	1136.8 ⁹⁰		
	B	18			966.12	1118.00		
	C	19			968.65	1133.00		
	D	20			972.52	1120.71		
100	A	21			975.65	1148.22		
	B	22			986.74	1132.54		
	C	23			982.71	1127.52		
	D	24	↓	↓	979.8 ⁹¹	1150.47	↓	↓

Comments: 10% re-weigh: #3: 1152.28mg, #18: 1117.80mg.

Reviewed by: Joh

Date Reviewed: Sept. 29/15

CETIS Analytical Report

Report Date: 24 Sep-15 14:19 (p 1 of 2)
 Test Code: 15656a | 03-5298-8589

Fish Survival Development Growth (w/Length) TAB

Nautilus Environmental

Analysis ID: 07-3060-8407	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 24 Sep-15 14:17	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 02-5011-6667	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 26 Aug-15 11:00	Protocol: Washington DOE (2008) + Lazorchak (2007)	Diluent: Mod-Hard Synthetic Water
Ending Date: 02 Sep-15 10:00	Species: Oncorhynchus mykiss	Brine:
Duration: 6d 23h	Source: Aqua Farm	Age:
Sample ID: 08-5806-7476	Code: 33251214	Client: Mount Polley
Sample Date: 24 Aug-15 09:00	Material: Water Sample	Project:
Receive Date: 26 Aug-15 08:40	Source: Mount Polley (MT POLLEY)	
Sample Age: 50h	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	276814	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	4	1	1	1	0	0	0.0%	0.0%	20	20
6.25		4	1	1	1	0	0	0.0%	0.0%	20	20
12.5		4	0.95	0.8	1	0.05	0.1	10.53%	5.0%	19	20
25		4	1	1	1	0	0	0.0%	0.0%	20	20
50		4	1	1	1	0	0	0.0%	0.0%	20	20
100		4	1	1	1	0	0	0.0%	0.0%	20	20

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1	1	1	1
6.25		1	1	1	1
12.5		1	1	1	0.8
25		1	1	1	1
50		1	1	1	1
100		1	1	1	1

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	5/5	5/5	5/5	5/5
0	Time Zero	5/5	5/5	5/5	5/5
6.25		5/5	5/5	5/5	5/5
12.5		5/5	5/5	5/5	4/5
25		5/5	5/5	5/5	5/5
50		5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5

CETIS Analytical Report

Report Date: 24 Sep-15 14:19 (p 2 of 2)
Test Code: 15656a | 03-5298-8589

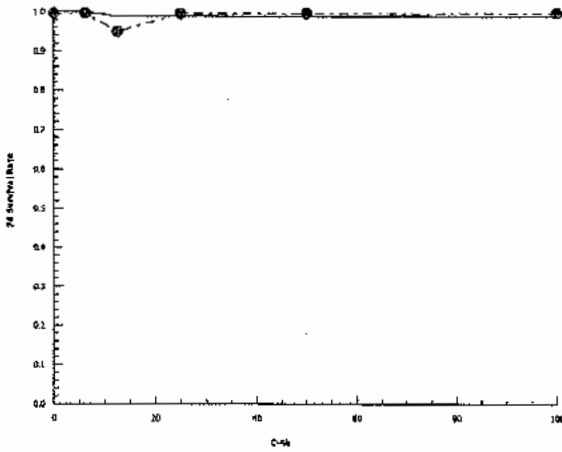
Fish Survival Development Growth (w/Length) ^{7d}

Nautilus Environmental

Analysis ID: 07-3060-8407 Endpoint: 7d Survival Rate
Analyzed: 24 Sep-15 14:17 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 24 Sep-15 14:19 (p 1 of 2)
 Test Code: 15656a | 03-5298-8589

Fish Survival Development Growth (w/^{SAB}Length) Nautilus Environmental

Analysis ID: 12-6403-3034 Endpoint: Mean Dry Weight-mg CETIS Version: CETISv1.8.7
 Analyzed: 24 Sep-15 14:17 Analysis: Linear Interpolation (ICPIN) Official Results: Yes

Batch ID: 02-5011-6667 Test Type: Growth-Survival (7d) Analyst:
 Start Date: 26 Aug-15 11:00 Protocol: Washington DOE (2008) + *Lezo-chak (2007)* Diluent: Mod-Hard Synthetic Water
 Ending Date: 02 Sep-15 10:00 Species: Oncorhynchus mykiss Brine:
 Duration: 6d 23h Source: Aqua Farm Age:

Sample ID: 08-5806-7476 Code: 33251214 Client: Mount Polley
 Sample Date: 24 Aug-15 09:00 Material: Water Sample Project:
 Receive Date: 26 Aug-15 08:40 Source: Mount Polley (MT POLLEY)
 Sample Age: 50h Station: QUR-1

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1921872	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	32.58	29.81	34.22	1.017	2.033	6.24%	0.0%
6.25		4	32.42	29.03	35.67	1.407	2.814	8.68%	0.51%
12.5		4	31.48	28.82	36.28	1.653	3.306	10.5%	3.37%
25		4	32.24	29.9	33.87	0.8779	1.756	5.45%	1.05%
50		4	31.56	29.64	33.34	0.912	1.824	5.78%	3.15%
100		4	31.69	28.96	34.51	1.519	3.038	9.59%	2.75%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	29.81	33.98	32.32	34.22
6.25		29.03	33.41	31.56	35.67
12.5		30.86	28.82	29.98	36.28
25		31.94	33.87	29.9	33.25
50		33.34	30.38	32.87	29.64
100		34.51	29.16	28.96	34.11

CETIS Analytical Report

Report Date: 24 Sep-15 14:19 (p 2 of 2)
Test Code: 15656a | 03-5298-8589

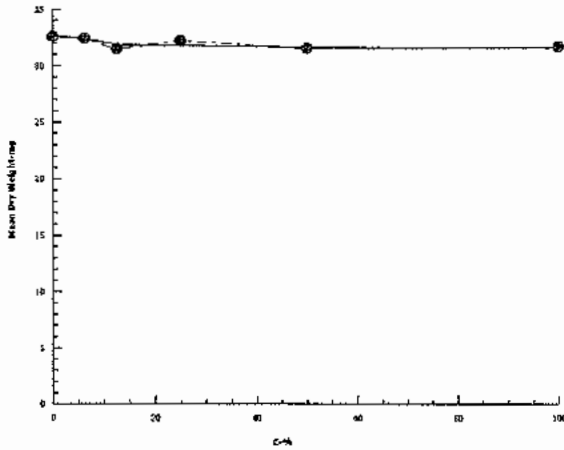
Fish Survival Development Growth (w/Length) RB

Nautilus Environmental

Analysis ID: 12-6403-3034 Endpoint: Mean Dry Weight-mg
Analyzed: 24 Sep-15 14:17 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 08 Sep-15 12:30 (p 3 of 6)
 Test Code: 15656a | 03-5298-8589

Fish Survival Development Growth (w/Length) ²⁰⁸

Nautilus Environmental

Analysis ID: 08-4121-4074	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 08 Sep-15 12:28	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 02-5011-6667	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 26 Aug-15 11:00	Protocol: Washington DOE (2008)+Lazorchak (2007)	Diluent: Mod-Hard Synthetic Water
Ending Date: 02 Sep-15 10:00	Species: Oncorhynchus mykiss	Brine:
Duration: 6d 23h	Source: Aqua Farm	Age:
Sample ID: 08-5806-7476	Code: 33251214	Client: Mount Polley
Sample Date: 24 Aug-15 09:00	Material: Water Sample	Project:
Receive Date: 26 Aug-15 08:40	Source: Mount Polley (MT POLLEY)	
Sample Age: 50h	Station: QUR-1	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	344540	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	32.58	29.81	34.22	1.017	2.033	6.24%	0.0%
6.25		4	32.42	29.03	35.67	1.407	2.814	8.68%	0.51%
12.5		4	29.67	28.82	30.86	0.4702	0.9404	3.17%	8.94%
25		4	32.24	29.9	33.87	0.8779	1.756	5.45%	1.05%
50		4	31.56	29.64	33.34	0.912	1.824	5.78%	3.15%
100		4	31.69	28.96	34.51	1.519	3.038	9.59%	2.75%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	29.81	33.98	32.32	34.22
6.25		29.03	33.41	31.56	35.67
12.5		30.86	28.82	29.98	29.03
25		31.94	33.87	29.9	33.25
50		33.34	30.38	32.87	29.64
100		34.51	29.16	28.96	34.11

CETIS Analytical Report

Report Date: 08 Sep-15 12:30 (p 4 of 6)
Test Code: 15656a | 03-5298-8589

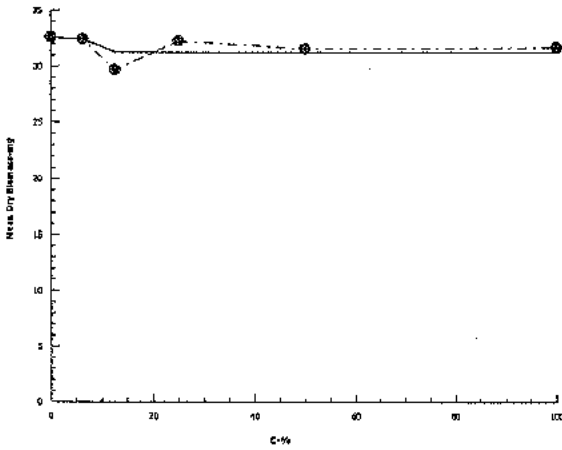
Fish Survival Development Growth (w/Length) ^{3/13}

Nautilus Environmental

Analysis ID: 08-4121-4074 Endpoint: Mean Dry Biomass-mg
Analyzed: 08 Sep-15 12:28 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 08 Sep-15 12:30 (p 1 of 1)
 Test Code: 15656a | 03-5298-8589

Fish Survival Development Growth (w/Length) JAB

Nautilus Environmental

Analysis ID: 19-3501-1556	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 08 Sep-15 12:29	Analysis: Parametric-Two Sample	Official Results: Yes
Batch ID: 02-5011-6667	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 26 Aug-15 11:00	Protocol: Washington DOE (2008) + Lazorchak (2007)	Diluent: Mod-Hard Synthetic Water
Ending Date: 02 Sep-15 10:00	Species: Oncorhynchus mykiss	Brine:
Duration: 6d 23h	Source: Aqua Farm	Age:
Sample ID: 08-5806-7476	Code: 33251214	Client: Mount Polley
Sample Date: 24 Aug-15 09:00	Material: Water Sample	Project:
Receive Date: 26 Aug-15 08:40	Source: Mount Polley (MT POLLEY)	
Sample Age: 50h	Station: QUR-1	

Control weight > 1.5X Time

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	6.21%	Fails mean dry weight-mg JAB

Zero Weig

Equal Variance t Two-Sample Test

Control	vs Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	Time Zero	14.63	1.943	2.024	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	464.5459	464.5459	1	214	<0.0001	Significant Effect
Error	13.02226	2.170377	6			
Total	477.5681		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	19.93	47.47	0.0350	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8986	0.6451	0.2805	Normal Distribution

Mean Dry Weight-mg Summary

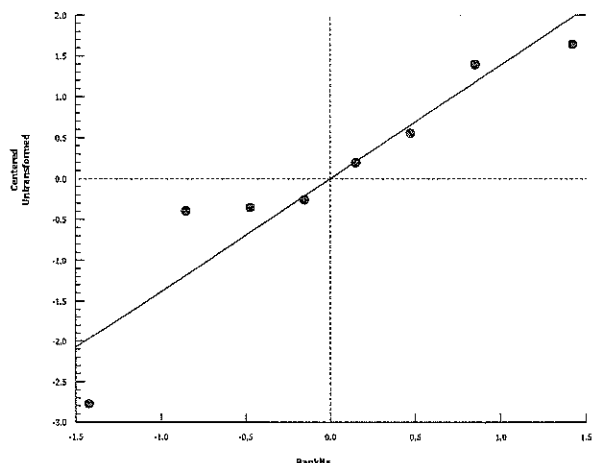
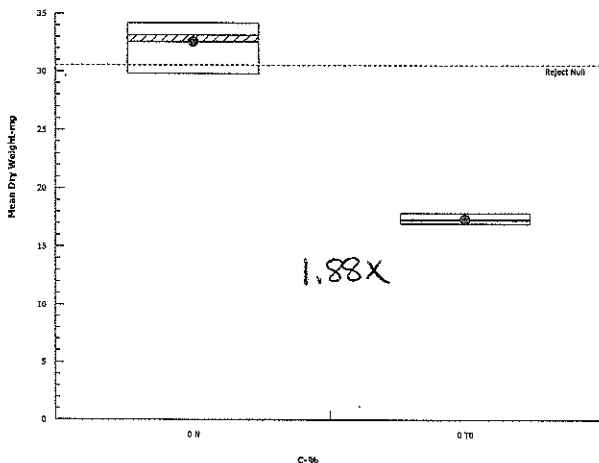
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Time Zero	4	17.34	16.62	18.07	17.26	16.95	17.89	0.2277	2.63%	0.0%
0	Negative Control	4	32.58	29.35	35.82	33.15	29.81	34.22	1.017	6.24%	-87.88%

Mean Dry Weight-mg Detail

Note: Control weight 1.88X the initial weight

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	29.81	33.98	32.32	34.22
0	Time Zero	17.54	16.95	16.99	17.89

Graphics



Rainbow Trout Swimup Test Summary Sheet

Client: Mount Polley Start Date/Time: Aug 26/15 @ 1115h

Work Order No.: 15656 Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: QUL-55a-0m
 Sample Date: Aug 25/15
 Date Received: Aug 26/15
 Sample Volume: 3x 20L

Dilution Water:

Type: Moderately Hard Water (MHW)
 Hardness (mg/L CaCO₃): 96
 Alkalinity (mg/L CaCO₃): 78

Test Organism Information:

Batch No.: 082015
 Source: Aqua Farm (Langley, BC)
 Average Initial Dry Weight: 16.2 (mg)

Copper Reference Toxicant Results:

Reference Toxicant ID: RTCL20
 Stock Solution ID: 15CuO3
 Date Initiated: Aug 26/15
 7-d LC50 (95% CL): 184.7 (163.1-2079.0) µg/L Cu
 7-d IC50 (95% CL): 181.9 (160.1-196.3) µg/L Cu

7-d LC50 Reference Toxicant Mean and Historical Range: 58.7 (26.5-130.2) µg/L Cu CV(%) 48.9
 7-d IC50 Reference Toxicant Mean and Historical Range: 57.9 (25.4-132.1) µg/L Cu CV(%) 51.1

Test Results:

	Survival	Biomass	Dry Weight
LC25 % (v/v) (95% CL)	> 100		
LC50 % (v/v) (95% CL)	> 100		
IC25 % (v/v) (95% CL)		> 100	> 100
IC50 % (v/v) (95% CL)		> 100	> 100

Reviewed by: John

Date reviewed: Sept. 24/15

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: QUL 255a-Dm
 Work Order #: 15656

Start Date & Time: Aug 26/15 @ 11:15h
 Stop Date & Time: Sept 2/15 @ 11:00h
 Test Species: Oncorhynchus mykiss

Concentration <i>Control</i>	Days														
	0		1		① 2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	15.0	14.0	15.0	14.5	15.0	14.5	14.5	14.5	14.5	15.0	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.5	7.4	9.6	5.5	9.7	9.9	9.8	6.4	9.8	9.1	9.8	8.9	9.7	8.7	8.7
pH	8.0	7.5	8.0	7.3	7.9	7.9	8.0	7.4	7.9	7.7	8.1	7.6	8.0	7.9	7.9
Cond. (µS/cm)	334	332		353		333		332		334		333		345	
Initials	SSD	SSD		SSD		A		A		SSD		SSD		SSD	

Concentration <i>6.25</i>	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	15.0	14.0	15.0	14.5	15.0	14.5	14.5	14.5	14.5	15.0	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.7	7.2	9.4	5.4	9.4	9.8	9.8	6.3	9.8	8.8	9.5	9.4	9.8	8.8	8.8
pH	7.9	7.4	8.0	7.3	7.9	7.9	7.9	7.5	8.0	7.8	8.0	7.7	7.9	7.9	7.9
Cond. (µS/cm)	319	318		320		318		320		319		319		331	
Initials	SSD	SSD		SSD		A		A		SSD		SSD		SSD	

Concentration <i>12.5</i>	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	15.0	14.0	15.0	14.5	15.0	14.5	14.5	14.5	14.5	15.0	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.7	7.2	9.4	4.8	9.5	9.8	9.8	6.4	9.8	8.9	9.5	9.5	9.8	8.8	8.8
pH	7.9	7.4	8.0	7.3	7.9	8.0	7.9	7.5	8.0	7.8	8.0	7.8	7.9	7.9	7.9
Cond. (µS/cm)	303	305		307		305		302		310		311		330	
Initials	SSD	SSD		SSD		A		A		SSD		SSD		SSD	

Concentration <i>25</i>	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	15.0	14.0	15.0	14.5	15.0	14.5	14.5	14.5	14.5	15.0	16.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.8	6.9	9.4	5.0	9.4	9.9	9.8	6.4	9.7	8.8	9.6	9.6	9.8	8.9	8.9
pH	8.0	7.4	8.1	7.2	7.9	8.0	7.9	7.5	8.0	7.9	8.0	7.8	7.9	7.9	7.9
Cond. (µS/cm)	267	278		280		278		277		283		284		293	
Initials	SSD	SSD		SSD		A		A		SSD		SSD		SSD	

Thermometer: Temp-2 DO meter: DO-2 pH meter: pH-1 Conductivity meter: C-2

	Control	<i>100% (v/v)</i>
Hardness*	96	66
Alkalinity*	78	48

* mg/L as CaCO₃

Analysts: SSD, AND

Reviewed by: Joh

Date reviewed: sep-24/15

Sample Description: clear

Comments: ① aeration initiated

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Palley
 Sample ID: QJPC-55a-0m
 Work Order #: 1565b

Start Date & Time: Aug 26/50 1115h
 Stop Date & Time: 05 Sep 2/15 @ 1100h
 Test Species: Oncorhynchus mykiss

Concentration 50	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	15.0	14.0	15.0	14.5	15.0	14.5	14.5	14.5	14.5	15.0	15.0	15.0	14.5	15.0	
DO (mg/L)	9.8	7.1	9.4	5.3	9.4	9.9	9.9	6.4	9.9	8.9	9.6	9.5	9.8	9.0	
pH	8.0	7.4	8.2	7.3	7.9	8.0	8.0	7.5	8.0	7.8	8.0	7.8	7.9	7.9	
Cond. (µS/cm)	216	222	224	221	222	226	226	226	226	226	226	226	243	243	
Initials	SSD	SSD	SSD	A	A	SSD	SSD	SSD	SSD	SSD	SSD	SSD	SSD	SSD	

Concentration 100	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	15.0	14.0	15.0	14.5	15.0	14.5	14.5	14.5	14.5	15.0	15.0	15.0	15.0	15.0	
DO (mg/L)	8.8	6.8	9.3	5.4	9.4	9.9	9.8	6.4	9.9	8.8	9.1	9.4	9.8	9.0	
pH	8.1	7.4	8.2	7.3	7.8	8.1	8.0	7.5	8.0	7.7	7.8	7.7	7.7	7.8	
Cond. (µS/cm)	106	104	105	106	105	105	105	105	105	105	105	106	124	124	
Initials	SSD	SSD	SSD	A	A	SSD	SSD	SSD	SSD	SSD	SSD	SSD	SSD	SSD	

Concentration	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)															
DO (mg/L)															
pH															
Cond. (µS/cm)															
Initials															

Concentration	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)															
DO (mg/L)															
pH															
Cond. (µS/cm)															
Initials															

Thermometer: Temp-2 DO meter: DO-2 pH meter: pH-1 Conductivity meter: C-2

	Control	100% (VW)
Hardness*	96	66
Alkalinity*	78	48

Analysts: SSD, Ans
 Reviewed by: JCh
 Date reviewed: Sept-24/15

Sample Description: _____
 Comments: _____

7-d Chronic Freshwater Toxicity Test Daily Mortality

Client: Mount Palley
 Sample ID: QUL-55A-On 7
 Work Order #: 15056

Start Date & Time: Aug 26/15 @ 1115h
 Stop Date & Time: Sept 2/15 @ 1100h
 Test Species: Oncorhynchus mykiss

Concentration % (v/v)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	5	5	5	5	5	5	5	0
	B	5	5	5	5	5	5	5	
	C	5	5	5	5	5	5	5	
	D	5	5	5	5	5	5	5	
6.25	A	5	5	5	5	5	5	5	
	B	5	5	5	5	5	5	5	
	C	5	5	5	5	5	5	5	
	D	5	5	5	5	5	5	5	
12.5	A	5	5	5	5	5	5	5	
	B	5	5	5	5	5	5	5	
	C	5	5	5	5	5	5	5	
	D	5	5	5	5	5	5	5	
25	A	5	5	5	5	5	5	5	
	B	5	5	5	5	5	5	5	
	C	5	5	5	5	5	5	5	
	D	5	5	5	5	5	5	5	
50	A	5	5	5	5	5	5	5	
	B	5	5	5	5	5	5	5	
	C	5	5	5	5	5	5	5	
	D	5	5	5	5	5	5	5	
100	A	5	5	5	5	5	5	5	
	B	5	5	5	5	5	5	5	
	C	5	5	5	5	5	5	5	
	D	5	5	5	5	5	5	5	
Tech Initials		SSD	SSD	A	A	SSD	SSD	SSD	JAB

Comments: 0 No stress apparent in surviving fish

Reviewed by: JOL Date reviewed: Sep. 24/15

7d Chronic Freshwater Toxicity Test Data Sheet

Swim-up Survival and Dry Weight

Client: Mount Ridley

Sample ID: QUL-55a-0m

Work Order No.: 15656

Start Date: Aug 26/15 @ 1115h

Termination Date: Sep 2/15 @ 1100h

Sample ID	Rep	Pan No.	No. Alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
QUL-55a-0m (Control)	A	1	5	KC	975.17	1171.45	5	KC
	B	2			980.19	1150.27		
	C	3			996.91	1180.28		
	D	4			982.75	1180.79		
6-25	A	5			983.60	1135.69		
	B	6			971.24	1154.72		
	C	7			979.79	1139.15		
	D	8			963.12	1134.85		
12-5	A	9			985.08	1167.87		
	B	10			992.54	1150.36		
	C	11			986.30	1153.32		
	D	12			987.30	1159.84		
25	A	13			972.68	1136.79		
	B	14			983.30	1158.58		
	C	15	↓		988.19	1161.69	↓	
	D	16	4		990.79	1122.71	4	
50	A	17	5		989.51	1155.81	5	
	B	18			992.42	1192.79		
	C	19			980.64	1136.69		
	D	20			972.30	1140.68		
100	A	21			1001.18	1153.65		
	B	22			982.13	1153.74		
	C	23			991.61	1131.89		
	D	24	↓	↓	984.29	1132.78	↓	↓

Comments: 10% re-weigh: #2: 1149.49 mg, #21: 1152.57 mg

Reviewed by: JGH

Date Reviewed: Sep-29/15

CETIS Analytical Report

Report Date: 08 Sep-15 12:54 (p 1 of 2)
 Test Code: 15656b | 12-9559-2327

Fish Survival Development Growth (w/Length) JAB Nautilus Environmental

Analysis ID: 06-6503-7956 **Endpoint:** 7d Survival Rate **CETIS Version:** CETISv1.8.7
 Analyzed: 08 Sep-15 12:52 **Analysis:** Linear Interpolation (ICPIN) **Official Results:** Yes

Batch ID: 10-5104-0273 **Test Type:** Growth-Survival (7d) **Analyst:**
 Start Date: 26 Aug-15 11:15 **Protocol:** Washington DOE (2008)+Lazorchak(2007) **Diluent:** Mod-Hard Synthetic Water
 Ending Date: 02 Sep-15 11:00 **Species:** Oncorhynchus mykiss **Brine:**
 Duration: 7d **Source:** Aqua Farm **Age:**

Sample ID: 18-3181-0298 **Code:** 6D2F34FA **Client:** Mount Polley
 Sample Date: 25 Aug-15 10:20 **Material:** Water Sample **Project:**
 Receive Date: 26 Aug-15 08:40 **Source:** Mount Polley (MT POLLEY)
 Sample Age: 25h (11.5 °C) **Station:** QUL-55a-0m

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1651776	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

C-%	Control Type	Count	Calculated Variate(A/B)									
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B	
0	Negative Control	4	1	1	1	0	0	0.0%	0.0%	20	20	
6.25		4	1	1	1	0	0	0.0%	0.0%	20	20	
12.5		4	1	1	1	0	0	0.0%	0.0%	20	20	
25		4	0.95	0.8	1	0.05	0.1	10.53%	5.0%	19	20	
50		4	1	1	1	0	0	0.0%	0.0%	20	20	
100		4	1	1	1	0	0	0.0%	0.0%	20	20	

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1	1	1	1
6.25		1	1	1	1
12.5		1	1	1	1
25		1	1	1	0.8
50		1	1	1	1
100		1	1	1	1

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	5/5	5/5	5/5	5/5
0	Time Zero	5/5	5/5	5/5	5/5
6.25		5/5	5/5	5/5	5/5
12.5		5/5	5/5	5/5	5/5
25		5/5	5/5	5/5	4/5
50		5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5

CETIS Analytical Report

Report Date: 08 Sep-15 12:54 (p 2 of 2)
Test Code: 15656b | 12-9559-2327

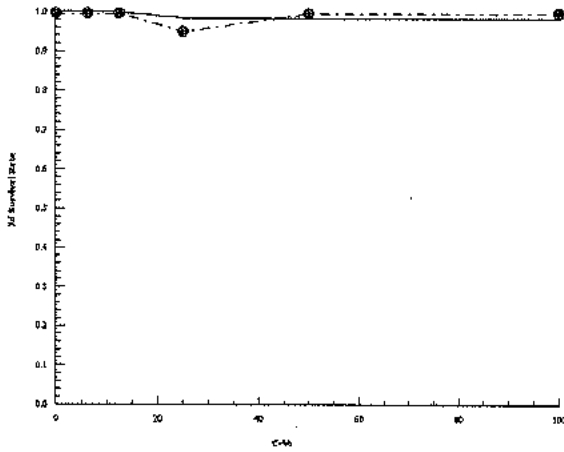
Fish Survival Development Growth (w/Length) ~~26~~

Nautilus Environmental

Analysis ID: 06-6503-7956 Endpoint: 7d Survival Rate
Analyzed: 08 Sep-15 12:52 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 08 Sep-15 12:54 (p 3 of 4)
 Test Code: 15656b | 12-9559-2327

Fish Survival Development Growth (w/Length) JAG

Nautilus Environmental

Analysis ID: 01-5308-2778	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 08 Sep-15 12:53	Analysis: Nonlinear Regression	Official Results: Yes
Batch ID: 10-5104-0273	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 26 Aug-15 11:15	Protocol: Washington DOE (2008)+Lazorchak (2007)	Diluent: Mod-Hard Synthetic Water
Ending Date: 02 Sep-15 11:00	Species: Oncorhynchus mykiss	Brine:
Duration: 7d	Source: Aqua Farm	Age:
Sample ID: 18-3181-0298	Code: 6D2F34FA	Client: Mount Polley
Sample Date: 25 Aug-15 10:20	Material: Water Sample	Project:
Receive Date: 26 Aug-15 08:40	Source: Mount Polley (MT POLLEY)	
Sample Age: 25h (11.5 °C)	Station: QUL-55a-0m	

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Log-Logistic EV [Y=A/(1+(X/D)^C)]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
21	-34.16	75.53	77.86	0.2413	Yes	1.266	3.16	0.3157	Non-Significant Lack of Fit

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.8915	N/A	37.01	112.2	2.702	NA
IC10	19.92	2.907	80.72	5.021	1.239	34.4
IC15 JAG 436.3 >100	436.3	6.019	1031	0.7338	0.09696	16.61
IC20	579.8 >100	0.1727	18720	0.1725	0.005342	579.1
IC25	4917 >100	N/A	264100	0.05216	0.0003786	NA
IC40	34210 >100	N/A	6.49E+14	0.002923	0.0000000	NA
IC50	184600 >100	N/A	N/A	0.0005417	NA	NA

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	37.3	1.345	34.66	39.93	27.74	<0.0001	Significant Parameter
C	0.2405	0.1927	-0.1371	0.6182	1.248	0.2256	Non-Significant Parameter
D	184600	1200000	-2168000	2537000	0.1538	0.8792	Non-Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	67.48803	67.48803	1	9.314	0.0061	Significant
Lack of Fit	26.52106	8.840354	3	1.266	0.3157	Non-Significant
Pure Error	125.644	6.980221	18			
Residual	152.165	7.245955	21			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	3.488	11.07	0.6251	Equal Variances
	Mod Levene Equality of Variance	0.3505	2.773	0.8752	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9441	0.9169	0.2009	Normal Distribution
	Anderson-Darling A2 Normality	0.363	2.492	0.4457	Normal Distribution

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	37.39	34.02	39.61	1.301	2.601	6.96%	0.0%
6.25		4	33.33	30.42	36.7	1.383	2.767	8.3%	10.85%
12.5		4	34	31.55	36.56	1.047	2.094	6.16%	9.05%
25		4	33.89	32.82	35.05	0.5749	1.15	3.39%	9.36%
50		4	34.56	31.21	40.08	1.918	3.836	11.1%	7.58%
100		4	30.64	28.06	34.32	1.326	2.653	8.66%	18.04%

Fish Survival Development Growth (w/Length) *JG*

Nautilus Environmental

Analysis ID: 01-5308-2778
 Analyzed: 08 Sep-15 12:53

Endpoint: Mean Dry Weight-mg
 Analysis: Nonlinear Regression

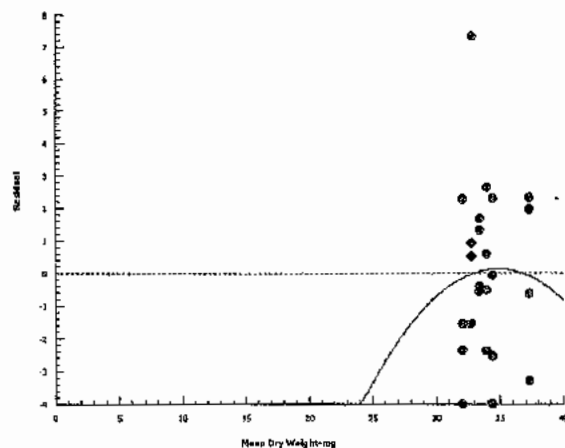
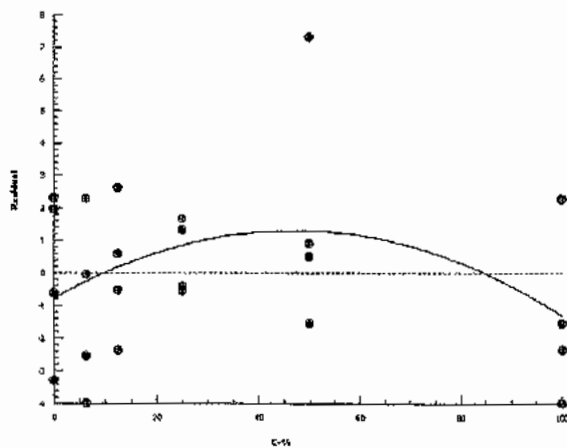
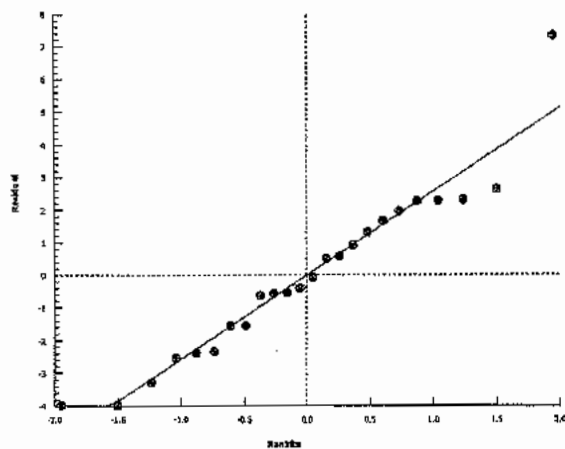
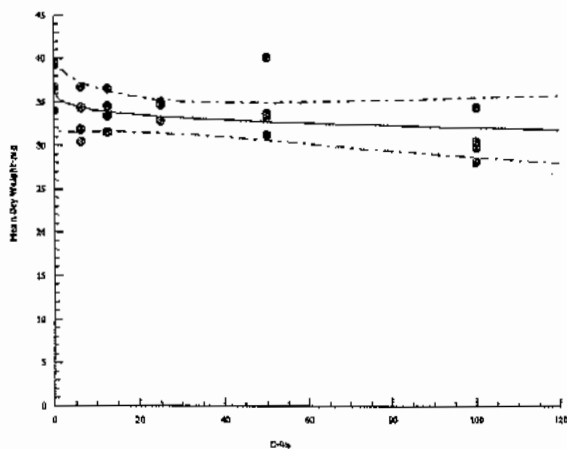
CETIS Version: CETISv1.8.7
 Official Results: Yes

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	39.26	34.02	36.67	39.61
6.25		30.42	36.7	31.87	34.35
12.5		36.56	31.55	33.4	34.51
25		32.82	35.05	34.7	32.98
50		33.26	40.08	31.21	33.68
100		30.5	34.32	28.06	29.7

Graphics

3P Log-Logistic EV [Y=A/(1+(X/D)^C)]



CETIS Analytical Report

Report Date: 08 Sep-15 12:54 (p 1 of 4)
 Test Code: 15656b | 12-9559-2327

Fish Survival Development Growth (w/Length) Job

Nautilus Environmental

Analysis ID: 09-7724-0750	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7
Analyzed: 08 Sep-15 12:53	Analysis: Nonlinear Regression	Official Results: Yes
Batch ID: 10-5104-0273	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 26 Aug-15 11:15	Protocol: Washington DOE (2008)+Lazorchak (2007)	Diluent: Mod-Hard Synthetic Water
Ending Date: 02 Sep-15 11:00	Species: Oncorhynchus mykiss	Brine:
Duration: 7d	Source: Aqua Farm	Age:
Sample ID: 18-3181-0298	Code: 6D2F34FA	Client: Mount Polley
Sample Date: 25 Aug-15 10:20	Material: Water Sample	Project:
Receive Date: 26 Aug-15 08:40	Source: Mount Polley (MT POLLEY)	
Sample Age: 25h (11.5 °C)	Station: QUL-55a-0m	

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Log-Logistic EV [Y=A/(1+(X/D)^C)]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
9	-37.36	81.91	84.25	0.2075	Yes	0.9977	3.16	0.4165	Non-Significant Lack of Fit

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.2625	N/A	64.5	381	1.55	NA
IC10	10.92	0.3229	101.4	9.159	0.9858	309.7
IC15	409.8 > 100	3.065	1163	0.9108	0.08602	32.62
IC20	624.1	0.002441	54520	0.1602	0.001834	40970
IC25	2622	N/A	1958000	0.03814	0.0000510	NA
IC40	83280	N/A	N/A	0.001201	NA	NA
IC50	629700	N/A	N/A	0.0001588	NA	NA

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	37.35	1.537	34.34	40.36	24.3	<0.0001	Significant Parameter
C	0.2004	0.1958	-0.1833	0.5841	1.024	0.3175	Non-Significant Parameter
D	629700	5830000	-1.1E+07	12060000	0.108	0.9150	Non-Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	75.84122	75.84122	1	8.021	0.0100	Significant
Lack of Fit	28.30813	9.436043	3	0.9977	0.4165	Non-Significant
Pure Error	170.2462	9.458122	18			
Residual	198.5543	9.454968	21			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	1.676	11.07	0.8919	Equal Variances
	Mod Levene Equality of Variance	0.1411	2.773	0.9803	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9698	0.9169	0.6629	Normal Distribution
	Anderson-Darling A2 Normality	0.3167	2.492	0.5638	Normal Distribution

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	37.39	34.02	39.61	1.301	2.601	6.96%	0.0%
6.25		4	33.33	30.42	36.7	1.383	2.767	8.3%	10.85%
12.5		4	34	31.55	36.56	1.047	2.094	6.16%	9.05%
25		4	32.24	26.38	35.05	2.012	4.024	12.48%	13.77%
50		4	34.56	31.21	40.08	1.918	3.836	11.1%	7.58%
100		4	30.64	28.06	34.32	1.326	2.653	8.66%	18.04%

Fish Survival Development Growth (w/Length) *sp*

Nautilus Environmental

Analysis ID: 09-7724-0750 Endpoint: Mean Dry Biomass-mg
 Analyzed: 08 Sep-15 12:53 Analysis: Nonlinear Regression

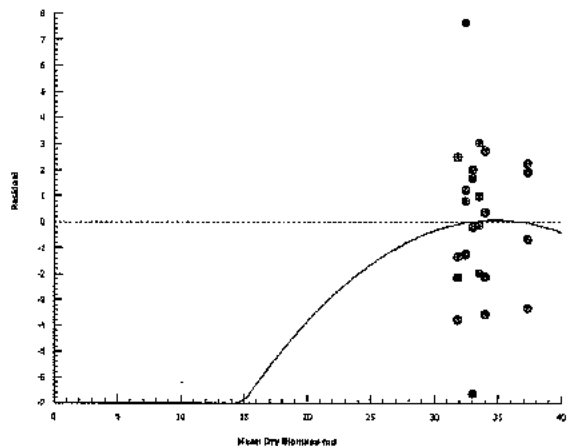
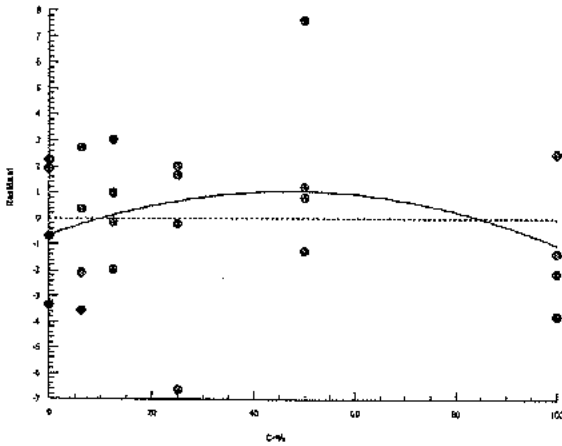
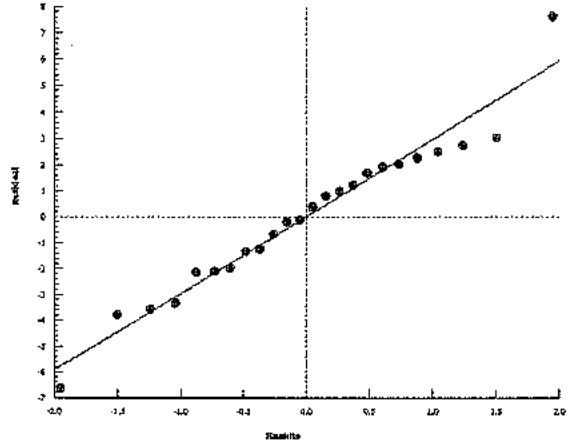
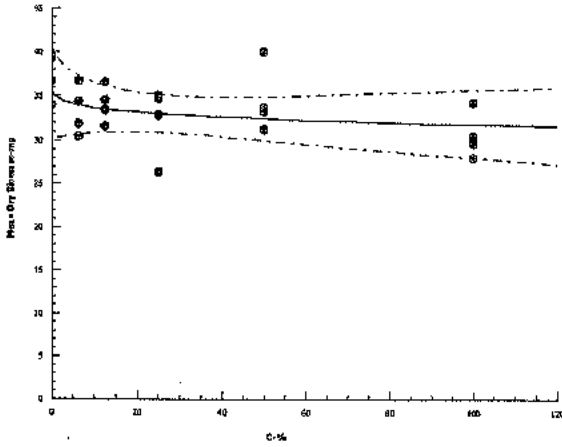
CETIS Version: CETISv1.8.7
 Official Results: Yes

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	39.26	34.02	36.67	39.61
6.25		30.42	36.7	31.87	34.35
12.5		36.56	31.55	33.4	34.51
25		32.82	35.05	34.7	26.38
50		33.26	40.08	31.21	33.68
100		30.5	34.32	28.06	29.7

Graphics

3P Log-Logistic EV [Y=A/(1+(X/D)^C)]



CETIS Analytical Report

Report Date: 08 Sep-15 12:54 (p 1 of 1)
 Test Code: 15656b | 12-9559-2327

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 04-1603-7194	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 08 Sep-15 12:54	Analysis: Parametric-Two Sample	Official Results: Yes
Batch ID: 10-5104-0273	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 26 Aug-15 11:15	Protocol: Washington DOE (2008)+Lazorchak (2007)	Diluent: Mod-Hard Synthetic Water
Ending Date: 02 Sep-15 11:00	Species: Oncorhynchus mykiss	Brine:
Duration: 7d	Source: Aqua Farm	Age:
Sample ID: 18-3181-0298	Code: 6D2F34FA	Client: Mount Polley
Sample Date: 25 Aug-15 10:20	Material: Water Sample	Project:
Receive Date: 26 Aug-15 08:40	Source: Mount Polley (MT POLLEY)	
Sample Age: 25h (11.5 °C)	Station: QUL-55a-0m	

Control Weight > 1.5X Time Zero Weight

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	7.28%	Fails mean dry weight-mg JAB

Equal Variance t Two-Sample Test

Control	vs Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	Time Zero	15.14	1.943	2.723	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	899.6014	899.6014	1	229.1	<0.0001	Significant Effect
Error	23.55873	3.926454	6			
Total	923.1601		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	6.225	47.47	0.1674	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9293	0.6451	0.5101	Normal Distribution

Mean Dry Weight-mg Summary

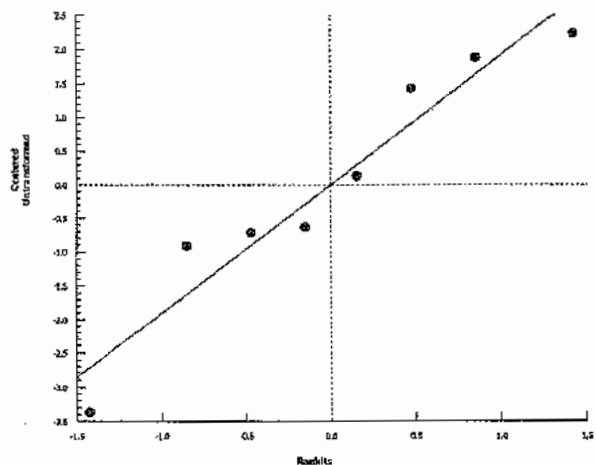
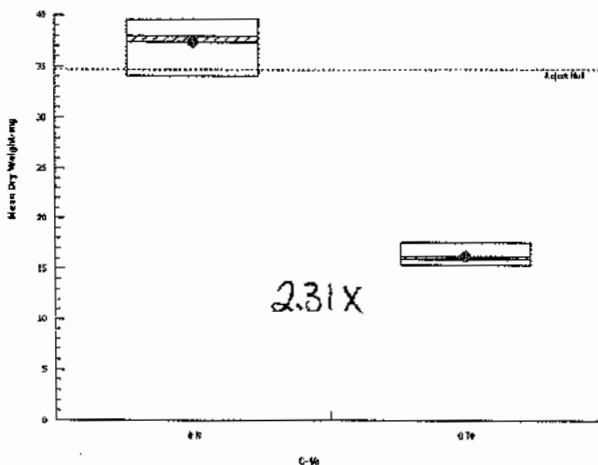
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Time Zero	4	16.18	14.52	17.84	15.93	15.27	17.6	0.5213	6.44%	0.0%
0	Negative Control	4	37.39	33.25	41.53	37.97	34.02	39.61	1.301	6.96%	-131.1%

Mean Dry Weight-mg Detail

Note: Control Weight 2.31X the initial weight

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	39.26	34.02	36.67	39.61
0	Time Zero	16.31	15.55	15.27	17.6

Graphics



Rainbow Trout Swimup Test Summary Sheet

Client: Mount Polley Start Date/Time: Aug 26/15 @ 1130h

Work Order No.: 15656 Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: P2-5
 Sample Date: Aug 25/15
 Date Received: Aug 26/15
 Sample Volume: 3 x 20L

Dilution Water:

Type: Moderately Hard Water (MHW)
 Hardness (mg/L CaCO₃): 96
 Alkalinity (mg/L CaCO₃): 78

Test Organism Information:

Batch No.: 082015
 Source: Aqua Farm (Langley, BC)
 Average Initial Dry Weight 15.7 (mg)

Copper Reference Toxicant Results:

Reference Toxicant ID: RTCL20
 Stock Solution ID: 15Cu03
 Date Initiated: Aug 26/15
 7-d LC50 (95% CL): 184.7 (163.1 - 209.0) µg/L Cu
 7-d IC50 (95% CL): 181.9 (160.1 - 1936.3) µg/L Cu

7-d LC50 Reference Toxicant Mean and Historical Range: 58.7 (26.4 - 130.2) µg/L Cu CV(%) 48.9
 7-d IC50 Reference Toxicant Mean and Historical Range: 57.9 (26.4 - 133.1) µg/L Cu CV(%) 51.1

Test Results:

	Survival	Biomass	Dry Weight
LC25 % (v/v) (95% CL)	> 100		
LC50 % (v/v) (95% CL)	> 100		
IC25 % (v/v) (95% CL)		> 100	> 100
IC50 % (v/v) (95% CL)		> 100	> 100

Reviewed by: JOU

Date reviewed: Sept - 29/15

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: 2-PS-2 P2-5
 Work Order #: 15656

Start Date & Time: Aug 26/15 @ 1130h
 Stop Date & Time: Sept 2/15 @ 1200h
 Test Species: Oncorhynchus mykiss

Concentration Control	Days														
	0		1		① 2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	15.0	14.0	15.0	14.5	15.0	14.5	14.5	14.5	14.5	15.0	15.0	15.0	15.0	15.0	
DO (mg/L)	9.5	7.1	9.6	6.8	9.7	9.9	9.8	9.8	9.8	8.9	9.8	8.8	9.7	8.5	
pH	8.0	7.5	7.9	7.3	7.9	8.0	8.0	7.4	7.9	7.7	8.1	7.6	8.0	7.8	
Cond. (µS/cm)	334	332		333		333		332		334		333		350	
Initials	SSD	SSD		SSD		A		A		SSD		SSD		SSD	

Concentration 6.25	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	15.0	14.0	15.0	14.5	15.0	14.5	14.5	14.5	14.5	15.0	15.0	15.0	15.0	15.0	
DO (mg/L)	9.6	6.9	9.3	6.2	9.5	9.8	9.9	6.8	9.8	8.5	9.3	8.7	9.6	8.7	
pH	8.0	7.4	8.0	7.3	7.9	8.0	8.0	7.4	8.0	7.8	8.0	7.7	7.9	7.9	
Cond. (µS/cm)	331	329		330		326		329		331		331		348	
Initials	SSD	SSD		SSD		A		A		SSD		SSD		SSD	

Concentration 12.5	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	15.0	14.0	15.0	14.5	15.0	14.5	14.5	14.5	14.5	15.0	15.0	15.0	15.0	15.0	
DO (mg/L)	9.7	7.0	9.3	5.9	9.5	9.9	9.8	6.5	9.9	8.9	9.5	8.8	9.7	8.7	
pH	8.0	7.4	8.1	7.3	8.0	8.0	8.0	7.4	8.0	7.8	8.0	7.8	7.9	7.8	
Cond. (µS/cm)	329	328		330		328		328		328		329		349	
Initials	SSD	SSD		SSD		A		A		SSD		SSD		SSD	

Concentration 25	Days														
	0		1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	15.3	14.0	15.0	14.5	15.0	14.5	14.5	14.5	14.5	15.0	15.0	15.0	15.0	15.0	
DO (mg/L)	9.7	7.0	9.4	5.9	9.4	9.9	9.7	6.5	9.8	8.6	9.5	8.9	9.7	8.8	
pH	8.0	7.4	8.1	7.3	8.0	8.1	8.0	7.4	8.0	7.8	8.0	7.7	7.9	7.8	
Cond. (µS/cm)	322	320		322		320		321		322		324		344	
Initials	SSD	SSD		SSD		A		A		SSD		SSD		SSD	

Thermometer: Temp-2 DO meter: DO-2 pH meter: pH-1 Conductivity meter: C-2

	Control	100	/	
Hardness*	96	134		
Alkalinity*	78	98		

* mg/L as CaCO₃

Analysts: SSD, ASD
 Reviewed by: JOC
 Date reviewed: Sept. 29/15

Sample Description: light yellow
 Comments: ① aeration initiated

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Palley
 Sample ID: KFS-2 P2-5
 Work Order #: 15656

Start Date & Time: Aug 26/10 1130h
 Stop Date & Time: Sept 2/10 1200h
 Test Species: Oncorhynchus mykiss

Concentration 50	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	15.0	14.0	15.0	14.5	15.0	14.5	14.5	14.5	14.5	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.8	7.1	9.4	5.9	9.4	9.9	9.8	6.4	9.8	8.5	9.6	9.0	9.7	8.8
pH	8.1	7.5	8.2	7.4	8.1	8.0	8.1	7.5	8.1	7.8	8.1	7.7	8.0	7.8
Cond. (µS/cm)	310	307		308		306		307		308		309		329
Initials	SSD	SSD		SSD		A		A		SSD		SSD		SSD

Concentration 100	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	15.0	14.0	15.0	14.5	15.0	14.5	14.6	14.5	14.5	15.0	15.0	15.0	15.0	15.0
DO (mg/L)	9.8	7.4	9.3	5.8	9.5	9.8	9.9	6.4	9.8	8.6	9.6	9.1	9.7	8.9
pH	8.3	7.6	8.2	7.4	8.2	8.1	8.2	7.5	8.2	7.8	8.3	7.8	8.1	8.0
Cond. (µS/cm)	282	281		283		282		282		283		284		295
Initials	SSD	SSD		SSD		A		A		SSD		SSD		SSD

Concentration	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)														
DO (mg/L)														
pH														
Cond. (µS/cm)														
Initials														

Concentration	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)														
DO (mg/L)														
pH														
Cond. (µS/cm)														
Initials														

Thermometer: Temp-2 DO meter: DO-2 pH meter: pH-1 Conductivity meter: C-2

	Control	100% (w/v)
Hardness*	96	134
Alkalinity*	78	98

* mg/L as CaCO3

Analysts: SSD, Aca
 Reviewed by: JGH
 Date reviewed: Sp-24/10

Sample Description: _____

Comments: _____

7-d Chronic Freshwater Toxicity Test Daily Mortality

Client: Mount Polley
 Sample ID: PO-2 P2-57
 Work Order #: 1565b

Start Date & Time: Aug 26/15 @ 1130h
 Stop Date & Time: Sept 2/15 @ 1700h
 Test Species: Oncorhynchus mykiss

Concentration % (1/1)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
Control	A	5	5	5	5	5	5	5	①
	B	5	5	5	5	5	5	5	
	C	5	5	5	5	5	5	5	
	D	5	5	5	5	5	5	5	
6.25	A	5	5	5	5	5	5	5	
	B	5	5	5	5	5	5	5	
	C	5	5	5	5	5	5	5	
	D	5	5	5	5	5	5	5	
12.5	A	5	5	5	5	5	5	5	
	B	5	5	5	5	5	5	5	
	C	5	5	5	5	5	5	5	
	D	5	5	5	5	5	5	5	
25	A	5	5	5	5	5	5	5	
	B	5	5	5	5	5	5	5	
	C	5	5	5	5	5	5	5	
	D	5	5	5	5	5	5	5	
50	A	5	5	5	5	5	5	5	
	B	5	5	5	5	5	5	5	
	C	5	5	5	5	5	5	5	
	D	5	5	5	5	5	5	5	
100	A	5	5	5	5	5	5	5	
	B	5	5	5	5	5	5	5	
	C	5	5	5	5	5	5	5	
	D	5	5	5	5	5	5	5	
Tech Initials	A	SSD	SSD	SSD	SSD	SSD	SSD	SSD	
	B	SSD	SSD	SSD	SSD	SSD	SSD	SSD	
	C	SSD	SSD	SSD	SSD	SSD	SSD	SSD	
	D	SSD	SSD	SSD	SSD	SSD	SSD	SSD	

Comments: ① fish do not appear stressed

Reviewed by: JGh

Date reviewed: Sept. 24/15

7d Chronic Freshwater Toxicity Test Data Sheet
Swim-up Survival and Dry Weight

Client: Mount Polley
 Sample ID: P2-S
 Work Order No.: 15656

Start Date: Aug 26/15 @ 1130h
 Termination Date: Sep 2/15 @ 1200h

Sample ID	Rep	Pan No.	No. Alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
P2-S control	A	1	5	KL	976.01	1172.076	5	KL
	B	2			991.10 ^{R3}	1180.55		
	C	3			993.80	1212.45		
	D	4			995.45	1192.59		
6.25	A	5			1000.45	1150.90		
	B	6			995.02	1153.86		
	C	7			995.64	1173.81		
	D	8			988.77	1152.54 ⁶		
12.5	A	9			992.90	1152.08		
	B	10			983.2 ⁴⁰	1158.82		
	C	11			987.93	1175.38		
	D	12			987.08	1156.48 ⁹		
25	A	13			988.48	1173.84		
	B	14			986.60	1156.68		
	C	15			986.64	1132.77		
	D	16			976.67	1169.87		
50	A	17			986.42	1156.14		
	B	18			963.84	1119.29		
	C	19			982.02	1137.94		
	D	20			978.09	1141.40		
100	A	21			971.81	1153.31		
	B	22			957.40	1106.76		
	C	23			981.63	1142.97		
	D	24	↓	↓	990.46	1149.14	↓	↓

Comments: #1: 10% re-weigh: 1171.70mg, #21: 1174.69mg

Reviewed by: JOL

Date Reviewed: Sept-29/15

CETIS Analytical Report

Report Date: 08 Sep-15 14:57 (p 1 of 6)
 Test Code: 15656c | 20-8624-4087

Fish Survival Development Growth (w/Length) AB

Nautilus Environmental

Analysis ID: 08-8322-3461	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 08 Sep-15 14:52	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 16-5214-8734	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 26 Aug-15 11:30	Protocol: Washington DOE (2008) + Lazorchak (2007)	Diluent: Mod-Hard Synthetic Water
Ending Date: 02 Sep-15 12:00	Species: Oncorhynchus mykiss	Brine:
Duration: 7d 1h	Source: Aqua Farm	Age:
Sample ID: 02-0908-1130	Code: C76532A	Client: Mount Polley
Sample Date: 25 Aug-15 14:35	Material: Water Sample	Project:
Receive Date: 26 Aug-15 08:40	Source: Mount Polley (MT POLLEY)	
Sample Age: 21h (12 °C)	Station: P2-S	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	505750	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	4	1	1	1	0	0	0.0%	0.0%	20	20
6.25		4	1	1	1	0	0	0.0%	0.0%	20	20
12.5		4	1	1	1	0	0	0.0%	0.0%	20	20
25		4	1	1	1	0	0	0.0%	0.0%	20	20
50		4	1	1	1	0	0	0.0%	0.0%	20	20
100		4	1	1	1	0	0	0.0%	0.0%	20	20

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1	1	1	1
6.25		1	1	1	1
12.5		1	1	1	1
25		1	1	1	1
50		1	1	1	1
100		1	1	1	1

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	5/5	5/5	5/5	5/5
0	Time Zero	5/5	5/5	5/5	5/5
6.25		5/5	5/5	5/5	5/5
12.5		5/5	5/5	5/5	5/5
25		5/5	5/5	5/5	5/5
50		5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5

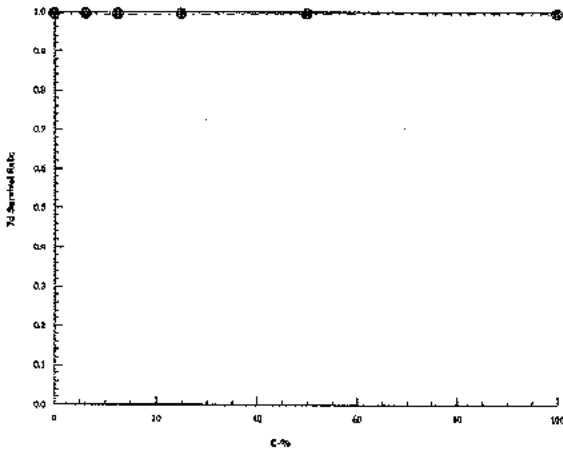
CETIS Analytical Report

Report Date: 08 Sep-15 14:57 (p 2 of 6)
Test Code: 15656c | 20-8624-4087

Fish Survival Development Growth ^{SAB} (all Length) Nautilus Environmental

Analysis ID: 08-8322-3461 Endpoint: 7d Survival Rate CETIS Version: CETISv1.8.7
Analyzed: 08 Sep-15 14:52 Analysis: Linear Interpolation (ICPIN) Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 08 Sep-15 14:57 (p 5 of 6)
 Test Code: 15656c | 20-8624-4087

Fish Survival Development Growth (w/Length) 146

Nautilus Environmental

Analysis ID: 07-5770-0569	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 08 Sep-15 14:55	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 16-5214-8734	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 26 Aug-15 11:30	Protocol: Washington DOE (2008)+Lazorchak (2007)	Diluent: Mod-Hard Synthetic Water
Ending Date: 02 Sep-15 12:00	Species: Oncorhynchus mykiss	Brine:
Duration: 7d 1h	Source: Aqua Farm	Age:
Sample ID: 02-0908-1130	Code: C76532A	Client: Mount Polley
Sample Date: 25 Aug-15 14:35	Material: Water Sample	Project:
Receive Date: 26 Aug-15 08:40	Source: Mount Polley (MT POLLEY)	
Sample Age: 21h (12 °C)	Station: P2-S	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1275903	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.9155	0.4532	3.218	109.2	31.08	220.6
IC10	2.669	1.032	44.28	37.46	2.258	96.92
IC15	6.029	1.669	N/A	16.59	NA	59.92
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	40.06	37.88	43.73	1.269	2.538	6.34%	0.0%
6.25		4	32.56	30.09	35.63	1.163	2.325	7.14%	18.72%
12.5		4	34.57	31.84	37.49	1.181	2.362	6.83%	13.7%
25		4	34.74	29.23	38.64	2.073	4.146	11.94%	13.29%
50		4	32.22	31.09	33.94	0.6781	1.356	4.21%	19.58%
100		4	32.54	29.87	36.3	1.353	2.707	8.32%	18.77%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	39.21	37.88	43.73	39.43
6.25		30.09	31.77	35.63	32.76
12.5		31.84	35.08	37.49	33.88
25		37.07	34.02	29.23	38.64
50		33.94	31.09	31.18	32.66
100		36.3	29.87	32.27	31.74

CETIS Analytical Report

Report Date: 08 Sep-15 14:57 (p 6 of 6)
Test Code: 15656c | 20-8624-4087

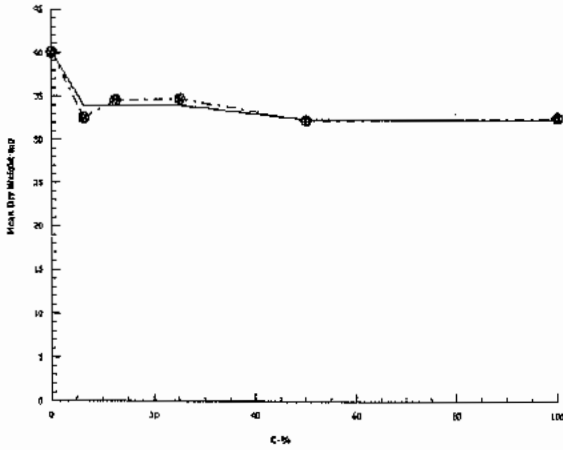
Fish Survival Development Growth (w/ ^{CKB} Length)

Nautilus Environmental

Analysis ID: 07-5770-0569 Endpoint: Mean Dry Weight-mg
Analyzed: 08 Sep-15 14:55 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 08 Sep-15 14:57 (p 3 of 6)
 Test Code: 15656c | 20-8624-4087

Fish Survival Development Growth (w/Length) ^{JAB}			Nautilus Environmental
Analysis ID: 04-4677-4578	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7	
Analyzed: 08 Sep-15 14:56	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes	
Batch ID: 16-5214-8734	Test Type: Growth-Survival (7d)	Analyst:	
Start Date: 26 Aug-15 11:30	Protocol: Washington DOE (2008)+Lazorchak (2007)	Diluent: Mod-Hard Synthetic Water	
Ending Date: 02 Sep-15 12:00	Species: Oncorhynchus mykiss	Brine:	
Duration: 7d 1h	Source: Aqua Farm	Age:	
Sample ID: 02-0908-1130	Code: C76532A	Client: Mount Polley	
Sample Date: 25 Aug-15 14:35	Material: Water Sample	Project:	
Receive Date: 26 Aug-15 08:40	Source: Mount Polley (MT POLLEY)		
Sample Age: 21h (12 °C)	Station: P2-S		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	637042	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	0.9155	0.4865	2.49	109.2	40.16	205.6
IC10	2.669	1.141	40.66	37.46	2.459	87.67
IC15	6.029	1.936	N/A	16.59	NA	51.65
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	40.06	37.88	43.73	1.269	2.538	6.34%	0.0%
6.25		4	32.56	30.09	35.63	1.163	2.325	7.14%	18.72%
12.5		4	34.57	31.84	37.49	1.181	2.362	6.83%	13.7%
25		4	34.74	29.23	38.64	2.073	4.146	11.94%	13.29%
50		4	32.22	31.09	33.94	0.6781	1.356	4.21%	19.58%
100		4	32.54	29.87	36.3	1.353	2.707	8.32%	18.77%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	39.21	37.88	43.73	39.43
6.25		30.09	31.77	35.63	32.76
12.5		31.84	35.08	37.49	33.88
25		37.07	34.02	29.23	38.64
50		33.94	31.09	31.18	32.66
100		36.3	29.87	32.27	31.74

CETIS Analytical Report

Report Date: 08 Sep-15 14:57 (p 4 of 6)
Test Code: 15656c | 20-8624-4087

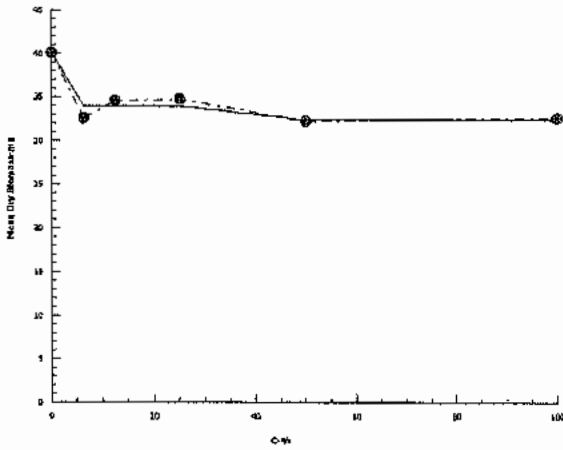
Fish Survival Development Growth (w/Length) ~~SP~~

Nautilus Environmental

Analysis ID: 04-4677-4578 Endpoint: Mean Dry Biomass-mg
Analyzed: 08 Sep-15 14:56 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 08 Sep-15 14:57 (p 1 of 1)
 Test Code: 15656c | 20-8624-4087

Fish Survival Development Growth (w/Length) JAB

Nautilus Environmental

Analysis ID: 03-8594-9744	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 08 Sep-15 14:56	Analysis: Parametric-Two Sample	Official Results: Yes
Batch ID: 16-5214-8734	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 26 Aug-15 11:30	Protocol: Washington DOE (2008)+Lazorchak (2007)	Diluent: Mod-Hard Synthetic Water
Ending Date: 02 Sep-15 12:00	Species: Oncorhynchus mykiss	Brine:
Duration: 7d 1h	Source: Aqua Farm	Age:
Sample ID: 02-0908-1130	Code: C76532A	Client: Mount Polley
Sample Date: 25 Aug-15 14:35	Material: Water Sample	Project:
Receive Date: 26 Aug-15 08:40	Source: Mount Polley (MT POLLEY)	
Sample Age: 21h (12 °C)	Station: P2-S	

Control weight > 1.5X Time Zero
 Test Result Weight
 Fails mean dry weight mg JAB

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD
Untransformed	NA	C > T	NA	NA	7.5%

Unequal Variance t Two-Sample Test

Control	vs Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	Time Zero	19.06	2.353	3.006	3	0.0002	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1186.186	1186.186	1	363.5	<0.0001	Significant Effect
Error	19.58196	3.26366	6			
Total	1205.768		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	75.4	47.47	0.0051	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8404	0.6451	0.0760	Normal Distribution

Mean Dry Weight-mg Summary

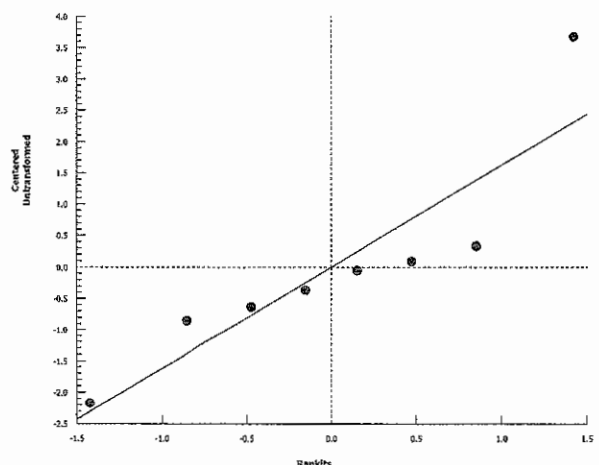
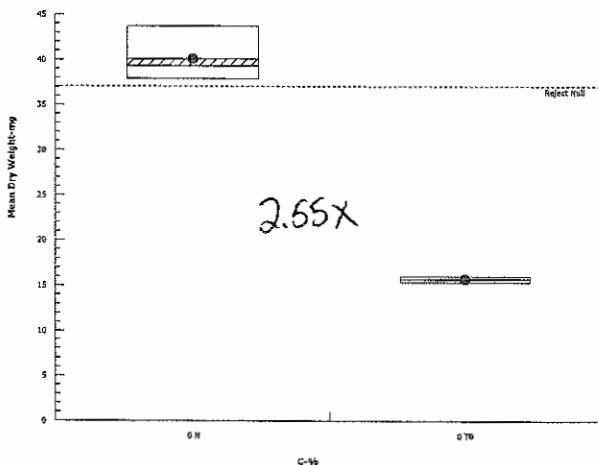
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Time Zero	4	15.71	15.24	16.17	15.73	15.34	16.04	0.1461	1.86%	0.0%
0	Negative Control	4	40.06	36.02	44.1	39.32	37.88	43.73	1.269	6.34%	-155.0%

Mean Dry Weight-mg Detail

Note: Control weight 2.55x initial weight

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	39.21	37.88	43.73	39.43
0	Time Zero	16.04	15.66	15.8	15.34

Graphics



7d Chronic Freshwater Toxicity Test Data Sheet

Swim-up Survival and Dry Weight

Client: MOUNT POLLEY
 Sample ID: Various
 Work Order No.: ~~15656~~ Various 15656

Start Date: Aug 26/15
 Termination Date: Sep 2/15

Sample ID	Rep	Pan No.	No. Alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
PK P2-S	A	T01	S	KC	985.45	1065.66	S	KC
↓	B	T02	↓	↓	984.09	1062.37	↓	↓
↓	C	T03	↓	↓	967.23	1046.22	↓	↓
↓	D	T04	↓	↓	985.20	1061.91	↓	↓
QUL-55A-Q	A	T01	↓	↓	974.04	1055.58	↓	↓
↓	B	T02	↓	↓	994.98	1072.71	↓	↓
↓	C	T03	↓	↓	972.72	1049.06	↓	↓
↓	D	T04	↓	↓	986.58	1074.57	↓	↓
QUR-1	A	T01	↓	↓	982.21	1069.90	↓	↓
↓	B	T02	↓	↓	987.19	1071.93	↓	↓
↓	C	T03	↓	↓	984.37	1069.32	↓	↓
↓	D	T04	↓	↓	993.65	1083.12	↓	↓
REL 20	A	T01	↓	↓	976.80	1057.78	↓	↓
↓	B	T02	↓	↓	978.56	1057.67	↓	↓
↓	C	T03	↓	↓	977.82	1058.68	↓	↓
↓	D	T04	↓	↓	975.73	1052.47	↓	↓
	A							
	B							
	C							
	D							
	A							
	B							
	C							
	D							

Comments: _____

Reviewed by: JCW

Date Reviewed: Sept. 24/15

Hardness and Alkalinity Datasheet

Alkalinity						Hardness			
Sample ID	Sample Date	Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	Technician
QUR-1	Aug 26/15	50	2.6	2.7	50	50	2.9	58	KL
P2-S	↓	↓	2.5	5.3	98	↓	2.67	134	↓
QUL-55a-0m	↓	↓	2.5	2.6	48	↓	3.3	66	↓
DB2015 A 2 B	Aug 21/15	50	4.0	4.1	78	50	4.8	96	SSD -

Notes: _____

Reviewed by: c/OU

Date Reviewed: Sep. 24/15

Client: In-house

W.O.#: N/A

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
MHW 091315	July 15 /15	50	3.5	3.7	66	50	5.0	100	KL
071915	July 20/15	50	3.5	3.6	68	50	5.0	100	KL
082015 ARB	Aug 21 /15	50	4.0	4.1	78	50	4.8	96	SSD

Notes: _____

Reviewed by: JKL

Date Reviewed: Sept. 24/15

APPENDIX C - Chain-of-Custody Form

British Columbia; 8664 Commerce Court, Burnaby, BC, V5A 4N7

Date: 24/08/2015 Page 1 of 1

Sample Collection By: Shauna Litke, Sky Freeman							ANALYSES REQUIRED										Receiving Temperature (°C)						
Report to:		Invoice to:					7 day RBT S&G	7 day C.Dubia S+R															
Company		Mount Polley Mining Corporation																					
Address		Box 12																					
City/Prov/Postal Code		Likely BC V0L 1N0																					
Contact		Colleen Hughes																					
Phone		(250) 790-2617																					
Email		chughes@mountpolley.com																					
	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS			COMMENTS														
1	QUR-1	24/08/2015	9:00	water	3x20L, 7x1L	10		X	X														
2																							
3																							
4																							
5																							
6																							
7																							
8																							
9																							
10																							
PROJECT INFORMATION			SAMPLE RECEIPT			RELIQUISHED BY (CLIENT)			RELIQUISHED BY (COURIER)														
Client: Mount Polley Mining Corporation			Total # Containers: 10			Signature: <i>[Signature]</i>			Signature:														
P.O. No.:			Good Condition? 4			Company: MPMC Time/Date: 25/08/15 15:30			Print:														
Shipped Via: Greyhound			Matches Schedule? 4			RECEIVED BY (COURIER)			RECEIVED BY (LABORATORY)														
SPECIAL INSTRUCTIONS/COMMENTS:						Signature:			Signature: <i>KL</i>														
						Print:			Print: <i>KL, Kaitia Lynn</i>														
						Company:			Company: Nautilus Environmental														
						Time/Date:			Time/Date: <i>Aug 26/15 @ 08:40</i>														

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

British Columbia: 8864 Commerce Court, Burnaby, BC, V5A 4N7

Date: 25/08/2015 Page 1 of 1

Sample Collection By: Alethea Andy, Valerie Holweck							ANALYSES REQUIRED										Receipt Temperature (°C)						
Report to:		Invoice to:					7-day RBT S&G	7 day C. Dubia S+R															
Company		Mount Polley Mining Corporation																					
Address		Box 12																					
City/Prov/Postal Code		Likely BC V0L 1N0																					
Contact		Colleen Hughes																					
Phone		(250) 790-2617																					
Email		chughes@mountpolley.com																					
	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS			COMMENTS														
1	QUL-55a-0m	25/08/2015	10:20	water	3x20L, 7x1L	10		X	X														
2																							
3																							
4																							
5																							
6																							
7																							
8																							
9																							
10																							
PROJECT INFORMATION			SAMPLE RECEIPT			RELIQUINSHED BY (CLIENT)				RELIQUINSHED BY (COURIER)													
Client: Mount Polley Mining Corporation			Total # Containers:		10	Signature:				Signature:													
P.O. No.:			Good Condition?		Y	Shauna Litke				Print:													
Shipped Via: Greyhound			Matches Schedule?		Y	Company: MPMC				Company:													
						Time/Date: 25/08/2015 15:30				Time/Date:													
SPECIAL INSTRUCTIONS/COMMENTS:						RECEIVED BY (COURIER)				RECEIVED BY (LABORATORY)													
						Signature:				Signature: <i>AK</i>													
						Print:				Print: <i>KE, Kania Lyne</i>													
						Company:				Company: <i>Nautilus Environmental</i>													
						Time/Date:				Time/Date: <i>Aug 26/15 @ 08:40</i>													

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

British Columbia: 8884 Commerce Court, Burnaby, BC, V5A 4N7

Date: 25/08/2015 Page 1 of 1

Sample Collection By: Alethea Andy, Valerie Holweck							ANALYSES REQUIRED										Receipt Temperature (°C)					
Report to:		invoice to:					7 day RBT S&G	7 day C.Dubia S+R														
Company	Mount Polley Mining Corporation	Mount Polley Mining Corporation																				
Address	Box 12	Box 12																				
City/Prov/Postal Code	Likely BC V0L 1N0	Likely BC V0L 1N0																				
Contact	Colleen Hughes	Colleen Hughes/																				
Phone	(250) 790-2617	(250) 790-2617																				
Email	chughes@mountpolley.com	chughes@mountpolley.com																				
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS																
1	P2-S	25/08/2015	14:35	water	3x20L, 7x1L	10		X	X													
2																						
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						
PROJECT INFORMATION			SAMPLE RECEIPT			RELIQUISHED BY (CLIENT)				RELIQUISHED BY (COURIER)												
Client: Mount Polley Mining Corporation			Total # Containers: 10			Signature:				Signature:												
P.O. No.:			Good Condition? Y			Shauna Litke				Print:												
Shipped Via: Greyhound			Matches Schedule? Y			Company: MPMC				Company:												
						Time/Date: 25/08/2015 15:30				Time/Date:												
SPECIAL INSTRUCTIONS/COMMENTS:						RECEIVED BY (COURIER)				RECEIVED BY (LABORATORY)												
						Signature:				Signature: <i>KL</i>												
						Print:				Print: <i>KL, Kania Lyne</i>												
						Company:				Company: <i>Nautilus Environmental</i>												
						Time/Date:				Time/Date: <i>Aug 26/15 @ 08:40</i>												

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.



**Toxicity testing on samples identified as QUR-1, P2-S
and HAC-12 on *Ceriodaphnia dubia* and rainbow trout
(swim-up)**

Samples collected November 11 and 12, 2015

Final Report

Report date: December 14, 2015

Submitted to:

Mount Polley Mining Corporation

Likely, BC

8664 Commerce Court
Burnaby, BC
V5A 4N7

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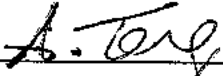
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- APPENDIX A – *Ceriodaphnia dubia* Toxicity Test Data
- APPENDIX B – Rainbow trout (*Oncorhynchus mykiss*) Toxicity Test Data
- APPENDIX C – Chain-of-Custody Forms

SIGNATURE PAGE



Jeslin Wijaya, B.Sc.
Laboratory Biologist



Armando Tang, R.P.Bio.
Laboratory Manager

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted toxicity tests for Mount Polley Mining Corporation on samples identified as QUR-1, P2-S and HAC-12. P2-S was collected on November 11, 2015 while QUR-1 and HAC-12 were collected on November 12, 2015. All samples were delivered to the laboratory in Burnaby, BC on November 13, 2015. Samples were transported in three 20-L plastic carboys and seven 1-L plastic bottles within coolers. The samples were received at a temperature between 5.0 and 6.5°C, and were stored in the dark at $4 \pm 2^\circ\text{C}$ prior to testing. The *Ceriodaphnia dubia* survival and reproduction test was performed on samples QUR-1, P2-S and HAC-12. The 7-d rainbow trout (*Oncorhynchus mykiss*) survival and growth test was performed on samples QUR-1 and P2-S.

This report describes the results of the *C. dubia* and swim-up rainbow trout toxicity tests. Copies of laboratory data sheets and printouts of statistical analyses for each test are provided in Appendices A and B. The chain-of-custody forms are provided in Appendix C.

2.0 METHODS

Methods for the toxicity tests are summarized in Tables 1 and 2. Testing was conducted according to procedures described by Environment Canada (2007 and 2011), Lazorchak and Smith (2007) and WDOE (2008). Statistical analyses for all tests were performed using CETIS (Tidepool Scientific Software, 2013).

Table 1. Summary of test conditions: *Ceriodaphnia dubia* survival and reproduction test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house culture
Test organism age	<24 hour old neonates within 12 hours of the same age
Test type	Static-renewal
Test duration	7 ± 1 day
Test vessel	20-mL glass test tube
Test volume	15 mL
Test concentrations	Seven concentrations plus laboratory control
Test replicates	10 test replicates per treatment
No. of organisms	1 per replicate
Control water	20% Perrier water and 80% deionized water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	25 ± 1°C
Feeding	Daily with <i>Pseudokirchneriella subcapitata</i> and YCT
Light intensity	100 to 600 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	Environment Canada (2007), EPS 1/RM/21
Statistical software	CETIS (2013)
Test endpoint	Survival and reproduction
Test acceptability criteria for controls	≥80% survival; ≥15 young per surviving control producing three broods; ≥60% of controls producing three or more broods; no ephippia present
Reference toxicant	Sodium chloride

Table 2. Summary of test conditions: rainbow trout (*Oncorhynchus mykiss*) survival and growth test.

Test organism	<i>Oncorhynchus mykiss</i>
Test organism source	Aqua Farms, Langley, BC
Test organism age	3 to 6 days post swim up
Test type	Static renewal
Test duration	7 days
Test vessel	1-L glass containers
Test volume	500 mL
Test replicates	4 per treatment
Number of organisms	5 per replicate
Control water	Moderately-hard water (hardness 80-100 mg/L CaCO ₃)
Test solution renewal	Daily
Test temperature	15 ± 1°C
Feeding	Twice a day with newly hatched brine shrimp (<i>Artemia nauplii</i>)
Light intensity	100 – 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	None
Test protocol	Lazorchak and Smith (2007), WDOE (2008)
Statistical software	CETIS (2013)
Test endpoint	Survival and biomass
Test acceptability criteria for controls	≥90% survival, ≥1.5 times test initiation dry weight
Reference toxicant	Copper chloride

3.0 RESULTS

Results of the toxicity tests conducted on samples QUR-1, P2-S and HAC-12 are provided in Tables 3 and 4. No adverse effects on *C. dubia* or rainbow trout survival were observed in the samples, resulting in LC50 values of >100%. No reduction in *C. dubia* reproduction was observed; the IC25 values were >100%. There were no adverse effects on rainbow trout biomass or dry weight; the IC25 values were >100%.

Table 3. Results: *Ceriodaphnia dubia* survival and reproduction test.

Concentration (% v/v)	QUR-1		P2-S		HAC-12	
	Survival (%)	Reproduction (mean ± SD)	Survival (%)	Reproduction (mean ± SD)	Survival (%)	Reproduction (mean ± SD)
Control	100	21.6 ± 1.3	100	22.5 ± 1.4	100	20.4 ± 1.3
1.56	100	21.4 ± 2.5	100	21.7 ± 4.1	100	22.5 ± 1.8
3.12	100	20.9 ± 1.4	90	19.9 ± 5.9	100	21.2 ± 1.5
6.25	100	20.8 ± 1.9	100	19.8 ± 6.5	100	20.1 ± 5.2
12.5	100	21.7 ± 1.6	100	22.5 ± 1.7	100	21.6 ± 3.2
25	100	21.3 ± 1.5	90	20.1 ± 5.8	90	19.0 ± 7.5
50	100	20.7 ± 3.4	100	21.5 ± 2.4	100	21.8 ± 4.5
100	100	22.6 ± 1.7	100	22.4 ± 1.4	100	19.2 ± 3.7
Test Endpoint						
(% v/v)						
LC50	>100	--	>100	--	>100	--
IC25	--	>100	--	>100	--	>100
IC50	--	>100	--	>100	--	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

Table 4. Results: rainbow trout (*Oncorhynchus mykiss*) survival and growth test.

Concentration (% v/v)	Mean ± SD					
	QUR-1			P2-S		
	Survival (%)	Biomass (mg)	Dry Weight (mg)	Survival (%)	Biomass (mg)	Dry Weight (mg)
Control	100.0 ± 0.0	38.2 ± 1.2	38.2 ± 1.2	100.0 ± 0.0	37.8 ± 2.5	37.8 ± 2.5
6.25	100.0 ± 0.0	34.9 ± 1.4	34.9 ± 1.4	100.0 ± 0.0	36.0 ± 0.9	36.0 ± 0.9
12.5	100.0 ± 0.0	37.0 ± 2.8	37.0 ± 2.8	100.0 ± 0.0	36.5 ± 0.9	36.5 ± 0.9
25	100.0 ± 0.0	35.7 ± 1.5	35.7 ± 1.5	100.0 ± 0.0	36.9 ± 2.4	36.9 ± 2.4
50	100.0 ± 0.0	36.4 ± 2.4	36.4 ± 2.4	100.0 ± 0.0	34.3 ± 0.6	34.3 ± 0.6
100	100.0 ± 0.0	36.2 ± 2.3	36.2 ± 2.3	100.0 ± 0.0	35.7 ± 2.2	35.7 ± 2.2
Test endpoint (% v/v)						
LC50	>100	--	--	>100	--	--
IC25	--	>100	>100	--	>100	>100
IC50	--	>100	>100	--	>100	>100

SD = Standard Deviation, LC = Lethal Concentration, IC = Inhibition Concentration.

4.0 QA/QC

The health history of the test organisms used in the exposures was acceptable and met the requirements of the protocols. The tests met all control acceptability criteria specified in the protocols throughout the tests. There were no deviations from the test methodologies. Uncertainty associated with these tests is best described by the standard deviation around the mean and/or the confidence limits around the point estimates.

The moderately-hard water control used in the 7-d rainbow trout survival and growth test had a measured hardness of 60 mg/L CaCO₃ which was below the range of 80 - 100 mg/L CaCO₃. However, the water was prepared using the correct amounts of reagent grade salts and water. Thus, the measured value of 60 mg/L CaCO₃ was likely due to a measurement error. Regardless, this discrepancy did not appear to affect the results of the test.

Results of the reference toxicant tests conducted during the testing program are summarized in Table 5. These tests were performed under the same conditions as the samples tested. Results for these tests fell within the range of organism performance of mean and two standard deviation range, based on historical results obtained by the laboratory with these tests. Thus, the sensitivity of the organisms used in these tests was appropriate.

Table 5. Reference toxicant results.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
<i>C. dubia</i>	Survival (LC50): 2.0 g/L NaCl	2.0 (1.8-2.2) g/L NaCl	5	November 3, 2015
	Reproduction (IC50): 1.4 g/L NaCl	1.5 (1.2-2.0) g/L NaCl	14	
<i>O. mykiss</i>	Survival (LC50): 56.4 µg/L Cu	62.4 (24.5-159.0) µg/L Cu	60	November 13, 2015
	Biomass (IC50): 56.0 µg/L Cu	61.4 (23.6-160.3) µg/L Cu	62	

SD = Standard Deviation, CV = Coefficient of Variation, IC = Inhibition Concentration, LC = Lethal Concentration.

5.0 REFERENCES

- Environment Canada. 2007. Biological test method: test of reproduction and survival using the cladoceran *Ceriodaphnia dubia*. Environmental Protection Series. Report EPS 1/RM/21, Second Edition, February 2007. Environment Canada, Method Development and Application Section, Environmental Science and Technology Centre, Science and Technology Branch, Ottawa, ON. 74 pp.
- Environment Canada. 2011. Biological test method: test of larval growth and survival using fathead minnows. Environmental Protection Series, Report EPS 1/RM/22. February 2011,. Environment Canada, Environmental Protection, Conservation and Protection, Ottawa, ON. 73 pp.
- Lazorchak, J.M. and Smith, M.E. 2007. Rainbow trout (*Oncorhynchus mykiss*) and brook trout (*Salvelinus fontinalis*) 7-day survival and growth test method. Arch. Environ. Contam. Toxicol. 53:397-405.
- WDOE. 2008. Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria. Washington State Department of Ecology. Water Quality Program. Publication number: WQ-R-95-80, Revised December 2008.
- Tidepool Scientific Software. 2013. CETIS comprehensive environmental toxicity information system, version 1.8.4.29 Tidepool Scientific Software, McKinleyville, CA. 222 pp.

APPENDIX A - *Ceriodaphnia dubia* Toxicity Test Data

Ceriodaphnia dubia Summary Sheet

Client: Mount Polley
 Work Order No.: 15927

Start Date/Time: Nov 13/15 @ 1300h
 Set up by: MLT

Sample Information:

Sample ID: DUR-1
 Sample Date: Nov 12/15
 Date Received: Nov 13/15
 Sample Volume: 7 x 1L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 110615B
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 26
 Mortality (%) in previous 7 d: 0
 Individual female # used ≥ 8 young on test day: 21, 22, 23, 24, 25, 27

NaCl Reference Toxicant Results:

Reference Toxicant ID: Cd136
 Stock Solution ID: 15NaCl
 Date Initiated: Nov 3/15

7-d LC50 (95% CL): 2.0 (1.7-2.3) g/L NaCl
 7-d IC50 (95% CL): 1.4 (1.1-1.7) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 2.0 (1.8-2.2) g/L NaCl CV (%): 5
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.5 (1.2-2.0) g/L NaCl CV (%): 14

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	>100	>100
IC25 % (v/v) (95% CL)	>100	>100
IC50 % (v/v) (95% CL)	>100	>100

Reviewed by: JOU

Date reviewed: Dec. 4/15

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: JS
UP Mount Pooley
 Sample ID: QUR-1
 Work Order #: 15927

Start Date & Time: Nov 13/15 @ 1300h
 Stop Date & Time: NOV 20/15 @ 1300h
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Control														
Temperature (°C)	24.0	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0
DO (mg/L)	8.0	7.7	8.1	7.7	8.1	7.5	8.0	7.6	8.2	7.6	8.1	7.5	8.0	7.4
pH	8.2	7.9	8.0	7.9	8.0	7.9	8.0	7.7	8.0	7.7	8.1	7.8	8.0	7.8
Cond. (µS/cm)	220	220		221		219		221		220		219		222
Initials	JS	EMM		KJL		MLT/KL		MLT		EMM		MLT		EMM

Concentration	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
(V/V) 1.56%														
Temperature (°C)	24.5	25.0	24.0	24.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	25.0	25.0
DO (mg/L)	7.8	7.7	7.9	7.7	8.1	7.6	8.0	7.6	8.0	7.5	8.1	7.5	8.0	7.4
pH	7.8	7.9	7.9	7.9	8.1	7.9	8.0	7.7	8.0	7.7	8.1	7.8	8.0	7.8
Cond. (µS/cm)	220	217		221		214		215		214		218		215
Initials	JS	EMM		KJL		MLT/KL		MLT		EMM		MLT		EMM

Concentration	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
(V/V) 12.5%														
Temperature (°C)	24.5	25.0	24.5	24.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	25.0	25.0
DO (mg/L)	7.8	7.7	7.9	7.7	8.2	7.5	8.0	7.6	8.0	7.5	8.1	7.6	8.0	7.5
pH	7.8	7.8	7.9	7.9	8.1	7.9	8.0	7.7	8.0	7.7	8.0	7.8	8.0	7.6
Cond. (µS/cm)	208	206		205		203		203		204		207		208
Initials	JS	EMM		KJL		MLT/KL		MLT		EMM		MLT		EMM

Concentration	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
(V/V) 100%														
Temperature (°C)	25.0	25.0	25.0	24.0	24.0	25.0	24.0	25.0	24.0	25.0	24.0	25.0	25.0	25.0
DO (mg/L)	7.7	7.7	7.6	7.7	8.1	7.5	8.0	7.6	8.1	7.5	8.2	7.5	8.1	7.5
pH	7.7	7.5	7.5	7.7	7.8	7.7	7.6	7.6	7.7	7.7	7.8	7.5	7.9	7.5
Cond. (µS/cm)	113	123		126		111		110		115		111		114
Initials	JS	EMM		KJL		MLT/KL		MLT		EMM		MLT		EMM

Thermometer: 4 DO meter: 1 pH meter: 1 Conductivity meter: 1

	Control	100% (V/V)
Hardness*	100	68
Alkalinity*	98	48

* mg/L as CaCO₃

Analysts: EMM, MCT, KJL, KL
 Reviewed by: JBL
 Date reviewed: Dec. 9/15

Sample Description: Clear

Comments: Broodboard Used: 110615B (#21-25, 27)

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mount Polley
 Sample ID: QR-1
 Work Order: 15927

Start Date & Time: Nov 13/15 @ 1300h
 Stop Date & Time: Nov 20/15 @ 1300h
 Set up by: MIT

Days	Concentration: <u>control</u>												Init	Concentration: <u>1.56</u>												Init	Concentration: <u>3.12</u>												Init
	A	B	C	D	E	F	G	H	I	J	A	B		C	D	E	F	G	H	I	J	A	B	C	D		E	F	G	H	I	J							
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓								
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓								
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓								
4	4	3	4	4	4	3	4	4	3	4	4	4	4	4	4	✓	5	4	3	3	4	2	4	3	4	4	4	3	4	5	3								
5	8	7	6	7	6	8	✓	8	7	✓	✓	✓	8	✓	7	6	✓	9	✓	✓	✓	6	✓	✓	7	8	8	✓	✓	8	✓								
6	11	12	11	✓	✓	✓	✓	12	✓	✓	✓	7	✓	6	✓	10	8	✓	7	8	6	✓	6	7	✓	✓	✓	7	6	✓	6								
7	✓	✓	✓	10	10	9	✓	11	✓	11	✓	10	11	11	12	✓	12	11	11	9	10	11	10	11	12	10	9	10	11	10	10								
8																																							
Total	23	22	21	21	20	20	22	24	21	22	22	20	23	21	23	16	25	24	21	20	20	19	20	21	23	22	21	20	21	23	19								

Days	Concentration: <u>6.25</u>												Init	Concentration: <u>12.5</u>												Init	Concentration: <u>25</u>												Init
	A	B	C	D	E	F	G	H	I	J	A	B		C	D	E	F	G	H	I	J	A	B	C	D		E	F	G	H	I	J							
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓								
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓								
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓								
4	4	4	5	4	4	4	3	4	4	4	4	3	3	✓	4	4	5	4	3	4	5	3	4	4	4	5	3	3	4	5	4								
5	✓	6	✓	✓	✓	✓	✓	✓	6	7	✓	✓	✓	7	8	8	✓	7	6	✓	✓	✓	✓	✓	6	✓	✓	✓	7	✓	8								
6	5	✓	6	6	5	6	6	6	✓	✓	✓	7	6	12	✓	✓	6	✓	7	7	7	7	7	6	✓	7	7	6	10	6	✓								
7	10	13	12	10	9	10	10	13	11	11	✓	12	11	✓	12	11	10	11	10	10	9	10	9	10	11	13	11	12	✓	11	10								
8																																							
Total	19	23	23	23	18	20	19	23	21	22	22	22	20	24	24	23	21	22	19	21	21	20	20	20	21	25	21	21	21	22	22								

Days	Concentration: <u>50</u>												Init	Concentration: <u>100</u>												Init
	A	B	C	D	E	F	G	H	I	J	A	B		C	D	E	F	G	H	I	J					
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
4	4	✓	3	4	5	3	3	3	4	4	4	4	3	4	4	4	3	4	6	4	4					
5	✓	6	✓	7	✓	6	7	8	✓	✓	✓	6	✓	8	✓	✓	✓	✓	✓	6	✓					
6	6	8	6	10	6	✓	13	✓	8	6	✓	✓	6	✓	8	7	8	8	6	✓	8					
7	10	✓	11	✓	13	10	✓	10	10	9	✓	10	12	11	12	12	10	10	13	12	13					
8																										
Total	20	14	20	21	24	19	27	21	22	19	22	20	21	23	24	23	21	22	25	23	25					

Notes: X = mortality.

Sample Description: CCOR
 Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JOU

Date reviewed: Dec. 9/15

CETIS Analytical Report

Report Date: 23 Nov-15 16:56 (p 1 of 2)
 Test Code: 15927 | 06-9930-7850

Ceriodaphnia 7-d Survival and Reproduction Test				Nautilus Environmental	
Analysis ID:	03-3942-8285	Endpoint:	7d Survival Rate	CETIS Version:	CETISv1.8.7
Analyzed:	23 Nov-15 16:55	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes
Batch ID:	13-5887-8021	Test Type:	Reproduction-Survival (7d)	Analyst:	Mimi Tran
Start Date:	13 Nov-15 13:00	Protocol:	EC/EPS 1/RM/21	Diluent:	20% Perrier Water
Ending Date:	20 Nov-15 13:00	Species:	Ceriodaphnia dubia	Brine:	
Duration:	7d 0h	Source:	In-House Culture	Age:	<24h
Sample ID:	10-1039-6763	Code:	3C396E5B	Client:	Mount Polley
Sample Date:	12 Nov-15 12:25	Material:	Water Sample	Project:	
Receive Date:	13 Nov-15 10:00	Source:	Mount Polley (MT POLLEY)		
Sample Age:	25h (5 °C)	Station:	QUR-1		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1024770	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

C-%	Control Type	Count	Calculated Variate(A/B)									
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B	
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10	
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10	
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10	
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10	
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10	
25		10	1	1	1	0	0	0.0%	0.0%	10	10	
50		10	1	1	1	0	0	0.0%	0.0%	10	10	
100		10	1	1	1	0	0	0.0%	0.0%	10	10	

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 23 Nov-15 16:56 (p 2 of 2)
 Test Code: 15927 | 06-9930-7850

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

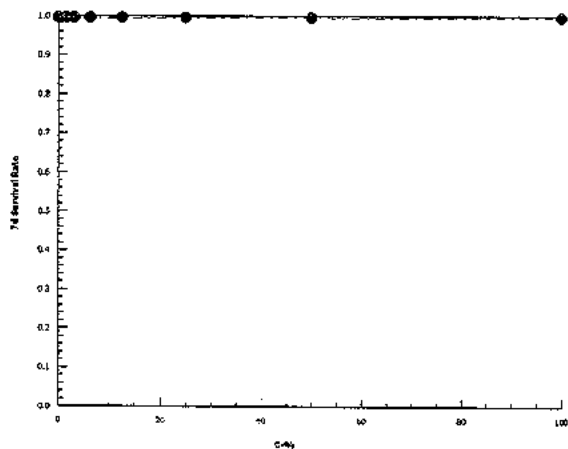
Analysis ID: 03-3942-8285 Endpoint: 7d Survival Rate
 Analyzed: 23 Nov-15 16:55 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 23 Nov-15 16:56 (p 1 of 2)
 Test Code: 15927 | 06-9930-7850

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 02-3656-9205 Endpoint: Reproduction CETIS Version: CETISv1.8.7
 Analyzed: 23 Nov-15 16:56 Analysis: Linear Interpolation (ICPIN) Official Results: Yes

Batch ID: 13-5887-8021 Test Type: Reproduction-Survival (7d) Analyst: Mimi Tran
 Start Date: 13 Nov-15 13:00 Protocol: EC/EPS 1/RM/21 Diluent: 20% Perrier Water
 Ending Date: 20 Nov-15 13:00 Species: Ceriodaphnia dubia Brine:
 Duration: 7d 0h Source: In-House Culture Age: <24h

Sample ID: 10-1039-6763 Code: 3C396E5B Client: Mount Polley
 Sample Date: 12 Nov-15 12:25 Material: Water Sample Project:
 Receive Date: 13 Nov-15 10:00 Source: Mount Polley (MT POLLEY)
 Sample Age: 25h (5 °C) Station: QUR-1

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1086354	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>100	N/A	N/A	<1	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	21.6	20	24	0.4	1.265	5.86%	0.0%
1.56		10	21.4	16	25	0.8055	2.547	11.9%	0.93%
3.12		10	20.9	19	23	0.4583	1.449	6.93%	3.24%
6.25		10	20.8	18	23	0.5925	1.874	9.01%	3.7%
12.5		10	21.7	19	24	0.5175	1.636	7.54%	-0.46%
25		10	21.3	20	25	0.4726	1.494	7.02%	1.39%
50		10	20.7	14	27	1.075	3.401	16.43%	4.17%
100		10	22.6	20	25	0.5416	1.713	7.58%	-4.63%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	23	22	21	21	20	20	22	24	21	22
1.56		21	23	21	23	16	25	24	21	20	20
3.12		19	20	21	23	22	21	20	21	23	19
6.25		19	23	23	20	18	20	19	23	21	22
12.5		22	20	24	24	23	21	22	19	21	21
25		20	20	20	21	25	21	21	21	22	22
50		20	14	20	21	24	19	27	21	22	19
100		20	21	23	24	23	21	22	25	22	25

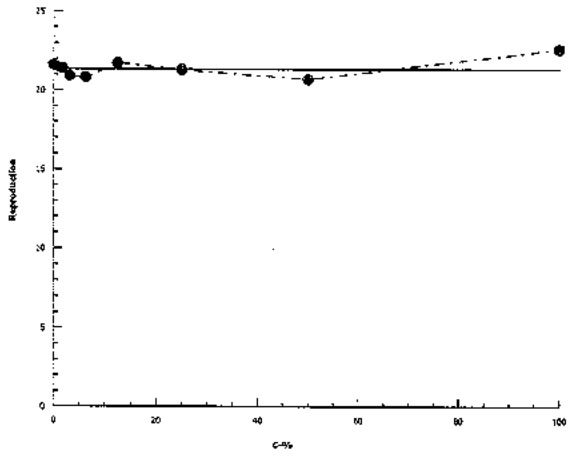
CETIS Analytical Report

Report Date: 23 Nov-15 16:56 (p 2 of 2)
Test Code: 15927 | 06-9930-7850

Ceriodaphnia 7-d Survival and Reproduction Test **Nautius Environmental**

Analysis ID: 02-3656-9205 **Endpoint:** Reproduction **CETIS Version:** CETISv1.8.7
Analyzed: 23 Nov-15 16:56 **Analysis:** Linear Interpolation (ICPIN) **Official Results:** Yes

Graphics



Client: Mount Pelley

W.O.#: 15927

Hardness and Alkalinity Datasheet

Alkalinity						Hardness			
Sample ID	Sample Date	Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	Technician
QUR-1	NOV 13/15	50	2.5	2.6	48	50	3.4	68	JS
20% permut	NOV 13/15	50	5.0	5.1	98	50	5.0	100	MT

Notes: _____

Reviewed by: JGU

Date Reviewed: Dec. 4/15

Ceriodaphnia dubia Summary Sheet

Client: Mount Polley
 Work Order No.: 15925

Start Date/Time: Nov 13/15 @ 1320h
 Set up by: MLT

Sample Information:

Sample ID: P2-S
 Sample Date: Nov 11/15
 Date Received: Nov 13/15
 Sample Volume: 7 x 1L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 110615B
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 34
 Mortality (%) in previous 7 d: 0
 Individual female # used ≥ 8 young on test day: 34, 35, 37, 38, 39, 40

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd136
 Stock Solution ID: 15NA03
 Date Initiated: Nov 3/15

7-d LC50 (95% CL): 2.0 (1.7-2.3) g/L NaCl
 7-d IC50 (95% CL): 1.4 (1.1-1.7) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 2.0 (1.8-2.2) g/L NaCl CV (%): 5
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.5 (1.2-2.0) g/L NaCl CV (%): 14

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	>100	>100
IC25 % (v/v) (95% CL)	>100	>100
IC50 % (v/v) (95% CL)	>100	>100

Reviewed by: JOK

Date reviewed: Dec 4/15

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Palox
 Sample ID: P2-5
 Work Order #: 15925

Start Date & Time: Nov 13/15 @ 1320h
 Stop Date & Time: Nov 19/15 @ 12m 1930h
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		Final 6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Control														
Temperature (°C)	24.0	25.0	24.0	24.5	24.0	24.5	24.0	25.0	24.0	24.5	24.0	25.0		
DO (mg/L)	8.0	7.8	8.1	7.5	8.1	7.7	8.0	7.6	8.2	7.5	8.1	7.4		
pH	8.0	7.8	8.0	7.6	8.0	7.9	8.0	7.7	8.0	7.7	8.0	8.0		
Cond. (µS/cm)	220	220		221		219		221		221		221		
Initials	JS	EMM		KJL		MLT		MLT		EMM		MLT		

Concentration	Days													
	0	1		2		3		4		5		Final 6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
(VIN) 1.56%														
Temperature (°C)	24.5	25.0	24.0	24.5	24.0	24.5	24.0	25.0	24.0	24.5	24.0	25.0		
DO (mg/L)	8.0	7.8	8.1	7.6	8.1	7.7	8.0	7.6	8.0	7.5	8.1	7.4		
pH	7.7	7.9	8.0	7.8	8.1	7.9	8.0	7.7	8.0	7.8	8.0	7.9		
Cond. (µS/cm)	222	221		220		218		223		220		220		
Initials	JS	EMM		KJL		MLT		MLT		EMM		MLT		

Concentration	Days													
	0	1		2		3		4		5		Final 6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
(VIN) 12.5%														
Temperature (°C)	24.5	25.0	24.0	24.5	24.0	24.5	24.0	25.0	25.0	24.5	24.0	25.0		
DO (mg/L)	8.0	7.8	8.1	7.6	8.1	7.7	8.0	7.6	8.0	7.5	8.1	7.4		
pH	7.8	7.8	8.0	7.8	8.2	7.9	8.0	7.8	8.0	7.8	8.0	7.9		
Cond. (µS/cm)	230	231		228		224		225		230		228		
Initials	JS	EMM		KJL		MLT		MLT		EMM		MLT		

Concentration	Days													
	0	1		2		3		4		5		Final 6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
(VIN) 100%														
Temperature (°C)	25.0	25.0	24.5	24.5	24.0	24.5	24.0	25.0	24.0	24.5	24.0	25.0		
DO (mg/L)	8.1	7.8	8.0	7.6	8.1	7.6	7.9	7.6	8.2	7.5	8.2	7.5		
pH	7.8	7.9	7.9	7.9	8.0	7.9	7.9	7.9	7.9	7.8	7.9	7.9		
Cond. (µS/cm)	213	294		286		285		284		289		288		
Initials	JS	EMM		KJL		MLT		MLT		EMM		MLT		

Thermometer: 4 DO meter: 1 pH meter: 1 Conductivity meter: 1

	Control	100% (VIN)
Hardness*	100	104
Alkalinity*	98	96

* mg/L as CaCO₃

Analysts: MLT, EMM, MLT, KJL, JS
 Reviewed by: JS
 Date reviewed: Dec-4/15

Sample Description: Clear - organisms present - sieved sample through 60µm filter
 Comments: Broodboard Used: 110615B (#34, 35, 37-40)

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: Mount Polley
 Sample ID: D2-5
 Work Order: 15925

Start Date & Time: Nov 13/15 @ 1300h
 Stop Date & Time: Nov 19/15 @ 1530h
 Set up by: MLT

0% (v/v)

Days	Concentration: <u>Control</u>											Init	Concentration: <u>1.56</u>											Init	Concentration: <u>3.12</u>											Init
	A	B	C	D	E	F	G	H	I	J	A		B	C	D	E	F	G	H	I	J	A	B		C	D	E	F	G	H	I	J				
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
3	3	4	4	3	4	✓	4	4	4	✓	MLT	4	4	4	4	3	✓	✓	✓	4	✓	MLT	3	3	✓	4x	✓	4	✓	4	4	✓	MLT			
4	✓	✓	✓	✓	✓	3	✓	✓	✓	3	MLT	✓	✓	✓	✓	✓	6	7	4	✓	4	MLT	✓	✓	6	1	4	✓	3	✓	✓	3	MLT			
5	6	7	6	7	7	8	8	8	7	6	MLT	6	7	6	8	8	✓	11	✓	8	7	MLT	8	7	✓	1	7	8	7	7	6	7	MLT			
6	12	11	11	12	12	13	13	11	12	12	MLT	13	11	14	13	14	12	✓	9	13	13	MLT	11	11	11	1	12	10	12	14	11	12	MLT			
7																																				
8																																				
Total	21	22	21	22	23	24	25	23	23	21	MLT	23	22	24	25	25	18	18	13	25	24	MLT	22	21	17	4x	23	22	22	25	21	22	MLT			

Days	Concentration: <u>6.25</u>											Init	Concentration: <u>12.5</u>											Init	Concentration: <u>25</u>											Init
	A	B	C	D	E	F	G	H	I	J	A		B	C	D	E	F	G	H	I	J	A	B		C	D	E	F	G	H	I	J				
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
3	4	✓	✓	4	3	✓	✓	✓	3	4	MLT	4	3	4	4	4	3	3	4	3	✓	MLT	3	3	4	3	✓	2	3	3	✓	3	MLT			
4	✓	4	4	✓	✓	4	4	3	✓	✓	MLT	✓	✓	✓	✓	✓	✓	✓	✓	✓	3	MLT	✓	✓	✓	✓	5x	✓	✓	✓	3	✓	MLT			
5	8	7	7	7	8	8	✓	✓	6	8	MLT	7	6	7	8	9	8	8	7	7	6	MLT	6	6	7	7	1	5	6	7	8	6	MLT			
6	13	10	10	11	11	12	11	✓	12	12	MLT	10	13	12	13	12	11	11	10	14	11	MLT	11	12	14	12	1	11	10	13	14	14	MLT			
7																																				
8																																				
Total	25	21	21	22	22	24	15	3	21	24	MLT	21	22	23	25	25	22	22	21	24	20	MLT	20	21	25	22	5x	18	19	23	25	23	MLT			

Days	Concentration: <u>50</u>											Init	Concentration: <u>150</u>											Init	Concentration:											Init
	A	B	C	D	E	F	G	H	I	J	A		B	C	D	E	F	G	H	I	J	A	B		C	D	E	F	G	H	I	J				
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓															
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓															
3	✓	✓	3	4	✓	3	✓	✓	4	3	MLT	2	3	✓	✓	✓	✓	✓	4	4	✓	MLT														
4	5	4	✓	✓	4	✓	4	4	✓	✓	MLT	✓	✓	3	4	5	4	3	✓	✓	5	MLT														
5	✓	6	7	7	6	7	6	7	8	7	MLT	6	7	6	6	7	7	8	7	8	8	MLT														
6	11	10	11	12	13	13	11	11	13	11	MLT	14	11	12	12	13	12	11	10	11	11	MLT														
7																																				
8																																				
Total	16	20	21	23	23	23	21	22	25	21	MLT	22	21	21	22	25	23	22	21	23	24	MLT														

Notes: X = mortality.

Sample Description: Clear / organisms present - sieved sample through 60µm Nitex mesh
 Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JOH

Date reviewed: Dec. 4/15

CETIS Analytical Report

Report Date: 23 Nov-15 16:53 (p 1 of 2)
 Test Code: 15925 | 05-3740-3885

Ceriodaphnia 7-d Survival and Reproduction Test				Nautilus Environmental			
Analysis ID:	17-2635-1432	Endpoint:	6d Survival Rate	CETIS Version:	CETISv1.8.7		
Analyzed:	23 Nov-15 16:52	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes		
Batch ID:	19-2346-0305	Test Type:	Reproduction-Survival (7d)	Analyst:	Mimi Tran		
Start Date:	13 Nov-15 13:20	Protocol:	EC/EPS 1/RM/21	Diluent:	20% Perrier Water		
Ending Date:	19 Nov-15 15:30	Species:	Ceriodaphnia dubia	Brine:			
Duration:	6d 2h	Source:	In-House Culture	Age:	<24h		
Sample ID:	18-0897-2408	Code:	6BD2BA78	Client:	Mount Polley		
Sample Date:	11 Nov-15 14:55	Material:	Water Sample	Project:			
Receive Date:	13 Nov-15 10:00	Source:	Mount Polley (MT POLLEY)				
Sample Age:	46h (5 °C)	Station:	P2-S				

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1279122	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

6d Survival Rate Summary

C-%	Control Type	Count	Calculated Variate(A/B)								
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

6d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	0	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	1	1	1	0	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

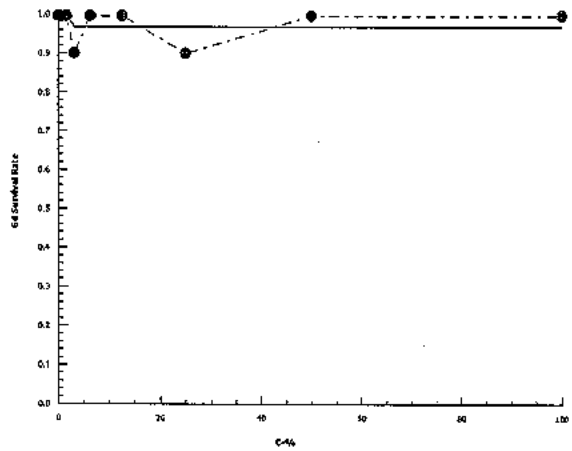
Report Date: 23 Nov-15 16:53 (p 2 of 2)
 Test Code: 15925 | 06-3740-3885

Ceriodaphnia 7-d Survival and Reproduction Test Nautilus Environmental

Analysis ID: 17-2635-1432 Endpoint: 6d Survival Rate CETIS Version: CETISv1.8.7
 Analyzed: 23 Nov-15 16:52 Analysis: Linear Interpolation (ICPIN) Official Results: Yes

6d Survival Rate Binomials											
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 23 Nov-15 16:53 (p 1 of 2)
 Test Code: 15925 | 06-3740-3885

Ceriodaphnia 7-d Survival and Reproduction Test

Nautlius Environmental

Analysis ID: 03-3374-2798	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 23 Nov-15 16:52	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 19-2346-0305	Test Type: Reproduction-Survival (7d)	Analyst: Mimi Tran
Start Date: 13 Nov-15 13:20	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 19 Nov-15 15:30	Species: Ceriodaphnia dubia	Brine:
Duration: 6d 2h	Source: In-House Culture	Age: <24h
Sample ID: 18-0897-2408	Code: 6BD2BA78	Client: Mount Polley
Sample Date: 11 Nov-15 14:55	Material: Water Sample	Project:
Receive Date: 13 Nov-15 10:00	Source: Mount Polley (MT POLLEY)	
Sample Age: 46h (5 °C)	Station: P2-S	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	135419	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	2.228	0.6416	N/A	44.88	NA	155.9
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	22.5	21	25	0.4282	1.354	6.02%	0.0%
1.56		10	21.7	13	25	1.283	4.057	18.69%	3.56%
3.12		10	19.9	4	25	1.876	5.934	29.82%	11.56%
6.25		10	19.8	3	25	2.059	6.512	32.89%	12.0%
12.5		10	22.5	20	25	0.5426	1.716	7.63%	0.0%
25		10	20.1	5	25	1.835	5.801	28.86%	10.67%
50		10	21.5	16	25	0.7638	2.415	11.23%	4.44%
100		10	22.4	21	25	0.4269	1.35	6.03%	0.44%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	21	22	21	22	23	24	25	23	23	21
1.56		23	22	24	25	25	18	18	13	25	24
3.12		22	21	17	4	23	22	22	25	21	22
6.25		25	21	21	22	22	24	15	3	21	24
12.5		21	22	23	25	25	22	22	21	24	20
25		20	21	25	22	5	18	19	23	25	23
50		16	20	21	23	23	23	21	22	25	21
100		22	21	21	22	25	23	22	21	23	24

CETIS Analytical Report

Report Date: 23 Nov-15 16:53 (p 2 of 2)
Test Code: 15925 | 06-3740-3885

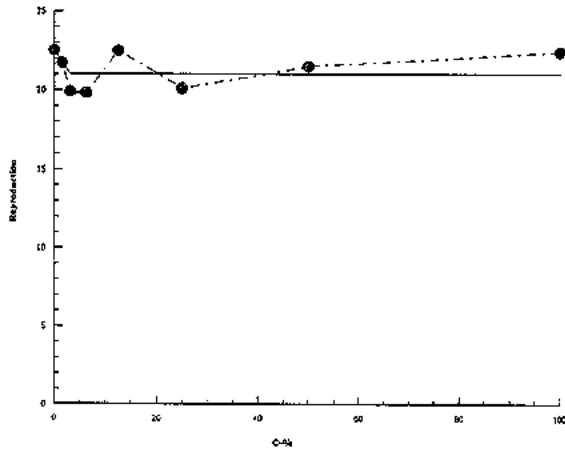
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 03-3374-2798 Endpoint: Reproduction
Analyzed: 23 Nov-15 16:52 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Client: Mount Polley

W.O.#: 15925

Hardness and Alkalinity Datasheet

Alkalinity						Hardness			
Sample ID	Sample Date	Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	Technician
P2-5	NOV 13/15	50	5.0	5.2	96	50	7.2	144	J5
20% polymer Ctl	NOV 13/15	50	5.0	5.1	98	50	5.0	100	MLT

Notes: _____

Reviewed by: JGM

Date Reviewed: Dec. 4/15

Ceriodaphnia dubia Summary Sheet

Client: Mount Polley
 Work Order No.: 15922

Start Date/Time: Nov 13/15 @ 13:0h
 Set up by: MLT

Sample Information:

Sample ID: HAC-12
 Sample Date: NOV 12/15
 Date Received: NOV 13/15
 Sample Volume: 7x1L

Test Validity Criteria:

- 1) Mean survival of first generation controls is $\geq 80\%$
- 2) At least 60% of controls have produced three broods within 8 days
- 3) An average of ≥ 15 live young produced per surviving female in the control solutions during the first three broods.
- 4) Invalid if ephippia observed in any control solution at any time.

WQ Ranges:

T ($^{\circ}$ C) = 25 ± 1 ; DO (mg/L) = 3.3 to 8.4 ; pH = 6.0 to 8.5

Test Organism Information:

Broodstock No.: 110615A
 Age of young (Day 0): <24-h (within 12-h)
 Avg No. young in first 3 broods of previous 7 d: 24
 Mortality (%) in previous 7 d: 10
 Individual female # used ≥ 8 young on test day: 13, 14, 15, 16, 17, 18, 19

NaCl Reference Toxicant Results:

Reference Toxicant ID: cd136
 Stock Solution ID: 15NaO3
 Date Initiated: Nov 3/15

7-d LC50 (95% CL): 2.0 (1.7-2.3) g/L NaCl
 7-d IC50 (95% CL): 1.4 (1.1-1.7) g/L NaCl

7-d LC50 Reference Toxicant Mean and Historical Range: 2.0 (1.8-2.2) g/L NaCl CV (%): 5
 7-d IC50 Reference Toxicant Mean and Historical Range: 1.5 (1.2-2.0) g/L NaCl CV (%): 14

Test Results:

	Survival	Reproduction
LC50 % (v/v) (95% CL)	<u>>100</u>	<u>>100</u>
IC25 % (v/v) (95% CL)	<u>>100</u>	<u>>100</u>
IC50 % (v/v) (95% CL)	<u>>100</u>	<u>>100</u>

Reviewed by: JOU

Date reviewed: Dec-7/15

Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Palley
 Sample ID: HAC-12
 Work Order #: 15922

Start Date & Time: Nov 13/15 @ 13:15h
 Stop Date & Time: Nov 15/15 @ 13:15h
 Test Species: Ceriodaphnia dubia

Concentration	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
Control														
Temperature (°C)	24.0	25.0	24.0	24.0	24.0	24.5	24.0	25.0	24.0	25.0	24.6	25.0	24.0	25.0
DO (mg/L)	8.0	7.7	8.1	7.7	8.1	7.7	8.0	7.6	8.2	7.5	8.1	7.4	8.0	7.9
pH	8.0	7.8	8.0	7.8	8.0	7.9	8.0	7.8	8.0	7.9	8.0	7.7	8.0	7.8
Cond. (µS/cm)	220	220		224		219		221		220		229		220
Initials	JS	FMM		KJL		ML		ML		FMM		ML		FMM

Concentration	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
(VIV) 1.56%														
Temperature (°C)	24.5	25.0	24.0	24.0	24.0	24.5	24.0	25.0	24.0	25.0	24.0	25.0	25.0	25.0
DO (mg/L)	7.8	7.7	8.1	7.7	8.1	7.6	8.0	7.6	8.0	7.5	8.2	7.4	8.0	7.9
pH	8.0	7.8	8.0	7.9	8.2	7.9	8.0	7.8	8.1	7.9	8.1	7.7	8.0	7.6
Cond. (µS/cm)	223	222		227		221		224		223		225		228
Initials	JS	FMM		KJL		ML		ML		FMM		ML		FMM

Concentration	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
(VIV) 12.5%														
Temperature (°C)	24.5	25.0	24.0	24.0	24.0	24.5	24.0	25.0	24.0	25.0	24.0	25.0	25.0	25.0
DO (mg/L)	7.8	7.7	8.1	7.7	8.1	7.6	8.0	7.6	8.0	7.5	8.2	7.5	8.0	7.9
pH	8.0	7.8	8.0	7.9	8.2	8.0	8.0	7.9	8.1	8.0	8.1	7.7	8.0	7.6
Cond. (µS/cm)	241	240		239		236		236		240		242		241
Initials	JS	FMM		KJL		ML		ML		FMM		ML		FMM

Concentration	Days													
	0	1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	final
(VIV) 100%														
Temperature (°C)	25.0	25.0	24.5	24.0	24.0	24.5	24.0	25.0	24.0	25.0	24.0	25.0	25.0	25.0
DO (mg/L)	7.9	7.8	8.0	7.7	8.1	7.6	8.0	7.5	8.1	7.5	8.1	7.5	8.0	7.5
pH	8.0	8.0	8.0	8.0	8.0	8.1	8.0	8.0	8.0	8.1	8.0	7.7	8.0	7.6
Cond. (µS/cm)	383	378		369		366		368		370		370		371
Initials	JS	FMM		KJL		ML		ML		FMM		ML		FMM

Thermometer: 4 DO meter: 1 pH meter: 1 Conductivity meter: 1

	Control	100% (VIV)
Hardness*	100	186
Alkalinity*	98	130

Analysts: ML, FMM, KJL
 Reviewed by: JS
 Date reviewed: Dec. 7/15

Sample Description: Clear

Comments: Broodboard Used: 110615A (#D-19)

**Chronic Freshwater Toxicity Test
C. dubia Reproduction Data**

Client: LJS Mount Palley
 Sample ID: HAC-12
 Work Order: 15922

Start Date & Time: Nov 13/15 @ 1310h
 Stop Date & Time: Nov 20/15 @ 1315h
 Set up by: MU

90 (VIV)

Days	Concentration: <u>control</u>												Concentration: <u>1.56</u>												Concentration: <u>3.12</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	
4	3	3	4	3	3	5	4	3	3	2	MM	4	3	4	2	3	3	4	3	3	3	3	MM	4	3	3	3	3	3	4	4	3	3	MM		
5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	✓	7	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	✓	✓	✓	7	✓	✓	✓	✓	✓	✓	7	MM	
6	6	7	7	6	7	7	7	7	8	7	MM	8	✓	8	7	8	7	9	6	12	8	8	MM	6	6	7	10	6	7	8	8	7	11	MM		
7	10	11	9	10	10	11	9	10	11	11	MM	10	14	12	11	12	12	13	12	✓	10	10	MM	12	11	11	✓	13	13	10	11	8	✓	MM		
8																																				
Total	19	21	20	19	20	23	20	20	22	20	MM	22	24	24	20	23	29	26	21	22	21	MM	22	20	21	20	22	23	22	23	18	21	MM			

Days	Concentration: <u>6.25</u>												Concentration: <u>12.5</u>												Concentration: <u>25</u>											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	
4	5	4	4	3	3	3	✓	3	3	✓	MM	3	3	7	5	4	4	4	✓	3	4	7	MM	4	X	4	5	3	3	✓	4	✓	5	7	MM	
5	7	✓	✓	6	✓	6	6	✓	✓	2	MM	✓	✓	✓	✓	✓	✓	✓	3	7	✓	MM	✓	1	✓	✓	6	✓	5	✓	5	7	MM			
6	✓	6	8	✓	✓	✓	10	8	8	✓	MM	8	6	8	7	8	7	8	11	✓	7	MM	7	1	6	8	10	6	8	9	9	13	MM			
7	10	13	10	10	14	12	✓	13	12	5	MM	12	10	12	10	13	11	10	✓	14	10	MM	11	12	10	✓	10	✓	10	10	✓	MM				
8																																				
Total	22	23	22	19	24	21	16	24	23	7	MM	23	19	24	22	25	22	22	14	24	21	MM	22	6	22	23	19	19	13	23	29	25	MM			

Days	Concentration: <u>50</u>												Concentration: <u>100</u>												Concentration:											
	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init	A	B	C	D	E	F	G	H	I	J	Init			
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM													
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM													
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM													
4	3	3	✓	4	✓	4	5	4	4	✓	MM	3	4	3	4	✓	3	3	5	✓	3	MM														
5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	MM													
6	8	7	9	6	✓	12	8	8	7	9	MM	8	7	6	7	✓	6	6	9	10	7	MM														
7	10	13	10	13	9	10	10	9	9	✓	MM	9	11	10	8	9	11	10	12	✓	10	MM														
8																																				
Total	21	23	24	23	11	19	22	23	20	22	MM	20	22	19	19	13	20	19	26	14	20	MM														

Notes: X = mortality.

Sample Description: CCOP

Comments: Total # Young only based on the first 3 Broods. Fourth and subsequent broods not included in total count.

Reviewed by: JG

Date reviewed: Dec. 4/15

CETIS Analytical Report

Report Date: 23 Nov-15 16:48 (p 1 of 2)
 Test Code: 15922 | 09-6923-4766

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 00-9092-5359	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 23 Nov-15 16:48	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 19-6547-9546	Test Type: Reproduction-Survival (7d)	Analyst: Mimi Tran
Start Date: 13 Nov-15 13:10	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 20 Nov-15 13:15	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 0h	Source: In-House Culture	Age: <24h
Sample ID: 10-9971-5175	Code: 418C5267	Client: Mount Polley
Sample Date: 12 Nov-15 10:17	Material: Water Sample	Project:
Receive Date: 13 Nov-15 10:00	Source: Mount Polley (MT POLLEY)	
Sample Age: 27h (5 °C)	Station: HAC-12	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1056966	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	10	1	1	1	0	0	0.0%	0.0%	10	10
1.56		10	1	1	1	0	0	0.0%	0.0%	10	10
3.12		10	1	1	1	0	0	0.0%	0.0%	10	10
6.25		10	1	1	1	0	0	0.0%	0.0%	10	10
12.5		10	1	1	1	0	0	0.0%	0.0%	10	10
25		10	0.9	0	1	0.1	0.3162	35.14%	10.0%	9	10
50		10	1	1	1	0	0	0.0%	0.0%	10	10
100		10	1	1	1	0	0	0.0%	0.0%	10	10

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1	1	1	1	1	1	1	1	1	1
1.56		1	1	1	1	1	1	1	1	1	1
3.12		1	1	1	1	1	1	1	1	1	1
6.25		1	1	1	1	1	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1	1	1
25		1	0	1	1	1	1	1	1	1	1
50		1	1	1	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 23 Nov-15 16:48 (p 2 of 2)
 Test Code: 15922 | 09-6923-4766

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

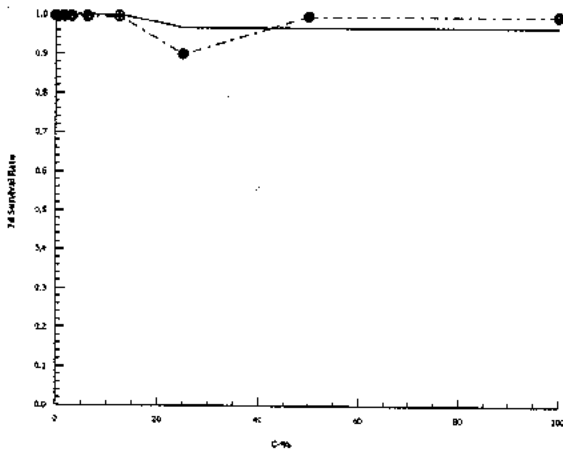
Analysis ID: 00-9092-5359 Endpoint: 7d Survival Rate
 Analyzed: 23 Nov-15 16:48 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
 Official Results: Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
1.56		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
3.12		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
6.25		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
12.5		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
25		1/1	0/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
50		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
100		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Graphics



CETIS Analytical Report

Report Date: 23 Nov-15 16:49 (p 1 of 2)
 Test Code: 15922 | 09-6923-4766

Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 19-1849-5154	Endpoint: Reproduction	CETIS Version: CETISv1.8.7
Analyzed: 23 Nov-15 16:48	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 19-6547-9546	Test Type: Reproduction-Survival (7d)	Analyst: Mimi Tran
Start Date: 13 Nov-15 13:10	Protocol: EC/EPS 1/RM/21	Diluent: 20% Perrier Water
Ending Date: 20 Nov-15 13:15	Species: Ceriodaphnia dubia	Brine:
Duration: 7d 0h	Source: In-House Culture	Age: <24h
Sample ID: 10-9971-5175	Code: 418C5267	Client: Mount Polley
Sample Date: 12 Nov-15 10:17	Material: Water Sample	Project:
Receive Date: 13 Nov-15 10:00	Source: Mount Polley (MT POLLEY)	
Sample Age: 27h (5 °C)	Station: HAC-12	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1418358	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	50.66	3.102	N/A	1.974	NA	32.24
IC10	94.14	16.09	N/A	1.062	NA	6.215
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Reproduction Summary

Calculated Variate

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	10	20.4	19	23	0.4	1.265	6.2%	0.0%
1.56		10	22.5	20	26	0.5627	1.78	7.91%	-10.29%
3.12		10	21.2	18	23	0.4899	1.549	7.31%	-3.92%
6.25		10	20.1	7	24	1.65	5.216	25.95%	1.47%
12.5		10	21.6	14	25	1.002	3.169	14.67%	-5.88%
25		10	19	0	25	2.376	7.513	39.54%	6.86%
50		10	21.8	11	29	1.42	4.492	20.61%	-6.86%
100		10	19.2	13	26	1.162	3.676	19.14%	5.88%

Reproduction Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Negative Control	19	21	20	19	20	23	20	20	22	20
1.56		22	24	24	20	23	22	26	21	22	21
3.12		22	20	21	20	22	23	22	23	18	21
6.25		22	23	22	19	24	21	16	24	23	7
12.5		23	19	24	22	25	22	22	14	24	21
25		22	0	22	23	19	19	13	23	24	25
50		21	23	24	23	11	29	22	23	20	22
100		20	22	19	19	13	20	19	26	14	20

CETIS Analytical Report

Report Date: 23 Nov-15 16:49 (p 2 of 2)
Test Code: 15922 | 09-6923-4766

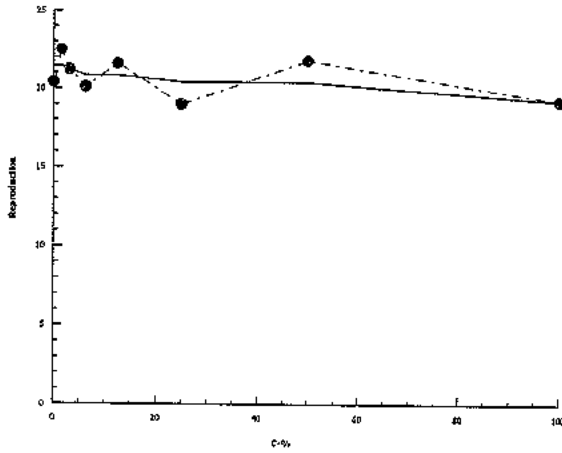
Ceriodaphnia 7-d Survival and Reproduction Test

Nautilus Environmental

Analysis ID: 19-1849-5154 Endpoint: Reproduction
Analyzed: 23 Nov-15 16:48 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



Client: Mount Polley

W.O.#: 15922

Hardness and Alkalinity Datasheet

Alkalinity						Hardness			Technician
Sample ID	Sample Date	Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
HAC-12	12/3/15	50	6.7	6.9	130	50	9.3	186	JS
20% permox	12/3/15	50	5.0	5.1	98	50	5.2	100	MT

Notes:

Reviewed by: Jon

Date Reviewed: Dec. 4/15

APPENDIX B - Rainbow trout (*Onchorynchus mykiss*) Toxicity Test Data

Rainbow Trout Swimup Test Summary Sheet

Client: Mount Polley

Start Date/Time: Nov 13/15 @ 1330h

Work Order No.: 15928

Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: QUR-1
 Sample Date: Nov 12/15
 Date Received: Nov 13/15
 Sample Volume: 3 x 20L

Dilution Water:

Type: Moderately Hard Water
 Hardness (mg/L CaCO₃): 60 | 68
 Alkalinity (mg/L CaCO₃): 66 | 52
 Batch: 11215 | 11715

Test Organism Information:

Batch No.: 110515
 Source: Aqua Farm
 Average Initial Dry Weight: 15.3 (mg)
 Age of test organism: 3-6 days post-swim-up

Copper Reference Toxicant Results:

Reference Toxicant ID: RTCL21
 Stock Solution ID: 15Cu04
 Date Initiated: Nov 13/15
 7-d LC50 (95% CL): 56.4 (51.1-64.7) µg/L Cu
 7-d IC50 (95% CL): ~~56.0 (50.8-65.0) µg/L Cu~~ JW 56.0 (50.4-62.6) µg/L Cu
~~-2 64.8 JW~~
 7-d LC50 Reference Toxicant Mean and Historical Range: 62.4 (24.5-159.0) µg/L Cu CV(%) 59.60%
 7-d IC50 Reference Toxicant Mean and Historical Range: 61.4 (23.6-160.3) µg/L Cu CV(%) 61.5%

Test Results:

	Survival	Biomass	Dry Weight
LC25 % (v/v) (95% CL)	>100		
LC50 % (v/v) (95% CL)	>100		
IC25 % (v/v) (95% CL)		>100	>100
IC50 % (v/v) (95% CL)		>100	>100

Reviewed by: JCH

Date reviewed: Dec 7/15

1/2

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
 Sample ID: OUR-1
 Work Order #: 15928

Start Date & Time: Nov 13 / 15 @ 1330h
 Stop Date & Time: Nov 20 / 15 @ 1330h
 Test Species: Oncorhynchus mykiss

Concentration (% v/v) Cl	Days													
	0	1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5	14.0	14.0	14.0	14.0
DO (mg/L)	9.9	7.7	9.8	7.6	9.8	10.2	10.0	9.9	10.0	10.1	10.0	9.9	10.0	9.7
pH	7.7	7.6	7.6	7.4	7.6	7.8	7.8	7.7	7.8	7.6	7.6	7.5	7.5	7.5
Cond. (µS/cm)	328	328		328		328		326		323		335		348
Initials	EC	A		A		EC		EC		EC		EC		EC

Concentration 6.2	Days													
	0	1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.5	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5	14.0	14.0	14.0	14.0
DO (mg/L)	10.0	7.6	9.9	6.3	9.9	10.2	10.0	9.9	9.8	10.0	10.0	9.9	10.0	9.8
pH	7.7	7.6	7.6	7.5	7.6	7.8	7.9	7.6	7.8	7.6	7.5	7.5	7.5	7.5
Cond. (µS/cm)	312	320		318		316		317		311		325		334
Initials	EC	A		A		EC		EC		EC		EC		EC

Concentration 12.5	Days													
	0	1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.5	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5	14.0	14.0	14.0	14.0
DO (mg/L)	10.0	7.5	9.8	6.2	9.8	10.0	10.2	9.8	9.9	10.0	10.1	9.9	10.0	9.8
pH	7.7	7.6	7.7	7.4	7.6	7.9	7.8	7.8	7.8	7.6	7.5	7.5	7.5	7.6
Cond. (µS/cm)	300	307		306		304		303		298		312		322
Initials	EC	A		A		EC		EC		EC		EC		EC

Concentration 25	Days													
	0	1		2		3		4		5		6		7
	init	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.5	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5	14.0	14.0	14.0	14.0
DO (mg/L)	10.0	7.6	9.9	6.2	9.8	10.0	10.2	9.9	9.9	10.0	10.1	9.9	10.0	9.7
pH	7.7	7.6	7.7	7.4	7.7	7.9	7.8	7.7	7.8	7.6	7.5	7.5	7.5	7.7
Cond. (µS/cm)	276	275		278		275		278		272		287		295
Initials	EC	A		A		EC		EC		EC		EC		EC

Thermometer: CER#2 DO meter: 2 pH meter: 1/3 Conductivity meter: 2

	Control	100 (% v/v)		
Hardness*	60	168	68	
Alkalinity*	66	52	52	

Analysts: JAB, AWD, EC
 Reviewed by: JAB
 Date reviewed: Dec. 4 / 15

* mg/L as CaCO3 Batch # 11215 / 111715

Sample Description: clear, colorless

Comments: ① description initiated @ 1740h. Control D.O (mg/L) = 6.7

2/2

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Rotty Polley
 Sample ID: QR-1
 Work Order #: 15929

Start Date & Time: Nov 13 / 15 @ 1330h
 Stop Date & Time: Nov 20 / 15 @ 1330h
 Test Species: Oncorhynchus mykiss

Concentration 50 (% v/v)	Days														
	0		1		2 (1)		3 (2)		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	14.5	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5	14.0	14.0	14.0	14.0
DO (mg/L)	10.0	7.5	9.8	6.2	9.8	10.0	10.2	10.0	9.9	10.1	10.1	9.9	10.0	9.8	
pH	7.7	7.5	7.7	7.5	7.7	7.9	8.2	7.7	7.8	7.6	7.5	7.5	7.5	7.7	
Cond. (µS/cm)	221		228		221		223		222		220		225	235	
Initials	EL		A		A		EL		EL		EL		EL	EL	

@ 221

Concentration 100	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	15.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5	14.0	14.0	14.0	14.0	
DO (mg/L)	10.0	7.4	9.9	6.1	9.8	10.0	10.1	10.0	10.0	10.0	10.1	9.9	10.0	9.8	
pH	7.7	7.6	7.7	7.5	7.8	7.9	8.2	7.6	7.8	7.6	7.5	7.5	7.5	7.7	
Cond. (µS/cm)	112		112		111		111		111		112		112	125	
Initials	EL		A		A		EL		EL		EL		EL	EL	

Concentration	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)															
DO (mg/L)															
pH															
Cond. (µS/cm)															
Initials															

Concentration	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)															
DO (mg/L)															
pH															
Cond. (µS/cm)															
Initials															

Thermometer: CER #2
 DO meter: DO-1/2 pH meter: pH-1/2/3 Conductivity meter: C-1/2

	Control	100% v/v		
Hardness*	60	68	EL 50	68
Alkalinity*	66	52	52	

* mg/L as CaCO3 Batch # 111715

Analysts: JAB, AWO, EL
 Reviewed by: JGK
 Date reviewed: Dec 4 / 15

Sample Description: Clear, Colorless
 Comments: See P. 1

7-d Chronic Freshwater Toxicity Test Daily Mortality

Client: Mount Polly
 Sample ID: GUR-1
 Work Order #: 15928

Start Date & Time: Nov 13 / 15 @ 1330h
 Stop Date & Time: Nov 20 / 15 @ 1330h
 Test Species: Oncorhynchus mykiss

Concentration (% v/v)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
(+1)	A	5	5	5	5	5	5	5	
	B								
	C								
	D								
6.2	A								
	B								
	C								
	D								
12.5	A								
	B	①							
	C								
	D								
25	A								
	B								
	C								
	D								
50	A								
	B								
	C								
	D								
100	A								
	B								
	C	↓	↓	↓	↓	↓	↓	↓	
	D	↓	↓	↓	↓	↓	↓	↓	
Tech Initials	A								
	B								
	C								
	D								
Tech Initials		EC	EC	EC	EC	EC	EC	EC	

Comments: ① 1 fish appears dark

Reviewed by: JGh

Date reviewed: Dec. 4/15

7d Chronic Freshwater Toxicity Test Data Sheet
Swim-up Survival and Dry Weight

Client: Mount Polley
Sample ID: OUR-1
Work Order No.: 15928

Start Date: Nov 13 115
Termination Date: Nov 20 115

Test Species: Oncorhynchus mykiss

Sample ID % V/V	Rep	Pan No.	No. Alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
71	A	1	5	EC	979.52	1170.77	5	EC
	B	2			988.49	1183.55		
	C	3			987.06	1169.18		
	D	4			994.58	1189.85		
6.2	A	5			977.76	1161.20		
	B	6			969.53	1146.77		
	C	7			980.55	1148.96		
	D	8			988.26	1157.43		
12.5	A	9			977.00	1151.67		
	B	10			976.80	1181.74		
	C	11			978.21	1154.19		
	D	12			966.20	1149.64		
25	A	13			998.16	1165.57		
	B	14			982.34	1165.99		
	C	15			976.07	1159.67		
	D	16			982.10	1161.58		
50	A	17			973.09	1155.66		
	B	18			978.18	1174.73		
	C	19			975.44	1157.97		
	D	20			977.39	1144.11		
100	A	21			973.55	1164.73		
	B	22			974.87	1140.35		
	C	23			987.20	1166.40		
	D	234			974.21	1163.26		

EC

Thermometer: CER #2 DO meter: 2 pH meter: 1

Comments: Reweighed on Pan # 1: 1173.77 mg, # 12: 1152.61 mg, # 14: 1169.06 mg

Reviewed by: JGU Date Reviewed: Dec. 4/15

7d Chronic Freshwater Toxicity Test Data Sheet
Swim-up Survival and Dry Weight

Client: Mount Polley
 Work Order No.: EC QUR-1 15928
 Sample ID: QUR-1

Start Date: Nov 13 / 15
 Termination Date: Nov 20 / 15
 Test Species: Oncorhynchus mykiss

Concentration	Rep	(Blue) Pan No.	No. Alive	Initials	Pan weight <small>in 1st mg</small>	Pan + organism <small>(g)</small>	No. weighed	Initials
<u>To</u> <u>(+)</u>	A	1	5	EC	960.64	1034.76	5	EC
	B	2	↓	↓	975.61	1050.90	4 ①	↓
	C	3	↓	↓	991.43	1070.80	5	↓
	D	4	↓	↓	973.99	1051.21	5	↓
	A							
	B							
	C							
	D							
	A							
	B							
	C							
	D							
	A							
	B							
	C							
	D							
	A							
	B							
	C							
	D							

Thermometer: CER# 2 DO meter: 2 pH meter: 1

Comments: Reweighed on Pan No. 1 : 1035.57 mg ① fish lost in transfer.
EC + Rep A

Reviewed by: JOE Date Reviewed: Dec. 4/15

CETIS Analytical Report

Report Date: 24 Nov-15 14:59 (p 1 of 6)
 Test Code: 15928 | 12-1963-7639

Fish Survival Development Growth (w/Length)				Nautilus Environmental
Analysis ID:	14-6965-9863	Endpoint:	7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed:	24 Nov-15 14:53	Analysis:	Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID:	18-4319-1215	Test Type:	Growth-Survival (7d)	Analyst: Eric Cheung
Start Date:	13 Nov-15 13:30	Protocol:	Washington DOE (2008) <i>HLA for chak 2007</i>	Diluent: Mod-Hard Synthetic Water
Ending Date:	20 Nov-15 13:30	Species:	Oncorhynchus mykiss	Brine:
Duration:	7d 0h	Source:	Aqua Farm	Age:
Sample ID:	10-1039-6763	Code:	3C396E5B	Client: Mount Polley
Sample Date:	12 Nov-15 12:25	Material:	Water Sample	Project:
Receive Date:	13 Nov-15 10:00	Source:	Mount Polley (MT POLLEY)	
Sample Age:	25h ^{6.5} (8°C)	Station:	QUR-1	

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	996087	200	Yes	Two-Point Interpolation

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	4	1	1	1	0	0	0.0%	0.0%	20	20
6.2		4	1	1	1	0	0	0.0%	0.0%	20	20
12.5		4	1	1	1	0	0	0.0%	0.0%	20	20
25		4	1	1	1	0	0	0.0%	0.0%	20	20
50		4	1	1	1	0	0	0.0%	0.0%	20	20
100		4	1	1	1	0	0	0.0%	0.0%	20	20

7d Survival Rate Detail					
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1	1	1	1
6.2		1	1	1	1
12.5		1	1	1	1
25		1	1	1	1
50		1	1	1	1
100		1	1	1	1

7d Survival Rate Binomials					
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	5/5	5/5	5/5	5/5
0	Time Zero	5/5	5/5	5/5	5/5
6.2		5/5	5/5	5/5	5/5
12.5		5/5	5/5	5/5	5/5
25		5/5	5/5	5/5	5/5
50		5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5

CETIS Analytical Report

Report Date: 24 Nov-15 14:59 (p 2 of 6)
Test Code: 15928 | 12-1963-7639

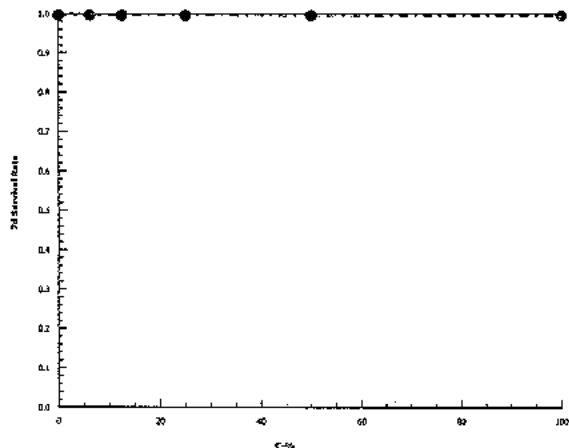
Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 14-6965-9863 Endpoint: 7d Survival Rate
Analyzed: 24 Nov-15 14:53 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 24 Nov-15 14:59 (p 3 of 6)
 Test Code: 15928 | 12-1963-7639

Fish Survival Development Growth (w/Length)			Nautilus Environmental		
Analysis ID:	12-8099-3719	Endpoint:	Mean Dry Biomass-mg	CETIS Version:	CETISv1.8.7
Analyzed:	24 Nov-15 14:53	Analysis:	Linear interpolation (ICPIN)	Official Results:	Yes
Batch ID:	18-4319-1215	Test Type:	Growth-Survival (7d)	Analyst:	Eric Cheung
Start Date:	13 Nov-15 13:30	Protocol:	Washington DOE (2008) + LAZOR check 2007	Diluent:	Mod-Hard Synthetic Water
Ending Date:	20 Nov-15 13:30	Species:	Oncorhynchus mykiss	Brine:	
Duration:	7d 0h	Source:	Aqua Farm	Age:	
Sample ID:	10-1039-6763	Code:	3C396E5B	Client:	Mount Polley
Sample Date:	12 Nov-15 12:25	Material:	Water Sample	Project:	
Receive Date:	13 Nov-15 10:00	Source:	Mount Polley (MT POLLEY)		
Sample Age:	25h (8°C)	Station:	QUR-1		

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1608355	200	Yes	Two-Point Interpolation

Point Estimates						
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	4.83	0.9221	N/A	20.71	NA	108.4
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	38.19	36.42	39.05	0.6154	1.231	3.22%	0.0%
6.2		4	34.91	33.68	36.69	0.7139	1.428	4.09%	8.57%
12.5		4	36.95	34.93	40.99	1.4	2.8	7.58%	3.23%
25		4	35.71	33.48	36.73	0.767	1.534	4.3%	6.49%
50		4	36.42	33.34	39.31	1.219	2.438	6.69%	4.63%
100		4	36.25	33.1	38.24	1.172	2.345	6.47%	5.08%

Mean Dry Biomass-mg Detail					
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	38.25	39.01	36.42	39.05
6.2		36.69	35.45	33.68	33.83
12.5		34.93	40.99	35.2	36.69
25		33.48	36.73	36.72	35.9
50		36.51	39.31	36.51	33.34
100		38.24	33.1	35.84	37.81

CETIS Analytical Report

Report Date: 24 Nov-15 14:59 (p 4 of 6)
Test Code: 15928 | 12-1963-7639

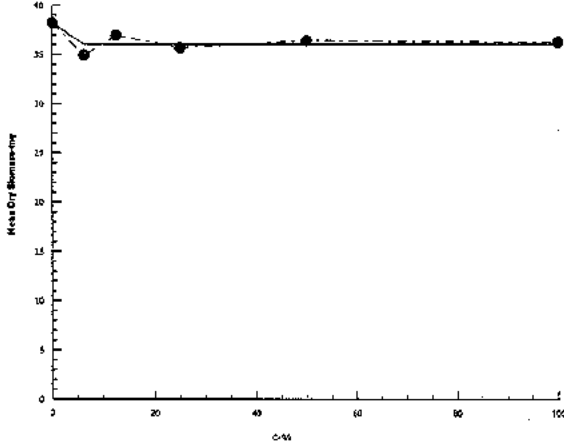
Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 12-8099-3719 Endpoint: Mean Dry Biomass-mg
Analyzed: 24 Nov-15 14:53 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 24 Nov-15 14:59 (p 5 of 6)
 Test Code: 15928 | 12-1963-7639

Fish Survival Development Growth (w/Length)			Nautilus Environmental
Analysis ID: 12-8177-3071	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7	
Analyzed: 24 Nov-15 14:53	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes	
Batch ID: 18-4319-1215	Test Type: Growth-Survival (7d)	Analyst: Eric Cheung	
Start Date: 13 Nov-15 13:30	Protocol: Washington DOE (2008) <i>+ Labordock 2007</i>	Diluent: Mod-Hard Synthetic Water	
Ending Date: 20 Nov-15 13:30	Species: Oncorhynchus mykiss	Brine:	
Duration: 7d 0h	Source: Aqua Farm	Age:	
Sample ID: 10-1039-6763	Code: 3C396E5B	Client: Mount Polley	
Sample Date: 12 Nov-15 12:25	Material: Water Sample	Project:	
Receive Date: 13 Nov-15 10:00	Source: Mount Polley (MT POLLEY)		
Sample Age: 25h (5°C)	Station: QUR-1		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	336424	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	4.83	0.7215	N/A	20.71	NA	138.6
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	38.19	36.42	39.05	0.6154	1.231	3.22%	0.0%
6.2		4	34.91	33.68	36.69	0.7139	1.428	4.09%	8.57%
12.5		4	36.95	34.93	40.99	1.4	2.8	7.58%	3.23%
25		4	35.71	33.48	36.73	0.767	1.534	4.3%	6.49%
50		4	36.42	33.34	39.31	1.219	2.438	6.69%	4.63%
100		4	36.25	33.1	38.24	1.172	2.345	6.47%	5.08%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	38.25	39.01	36.42	39.05
6.2		36.69	35.45	33.68	33.83
12.5		34.93	40.99	35.2	36.69
25		33.48	36.73	36.72	35.9
50		36.51	39.31	36.51	33.34
100		38.24	33.1	35.84	37.81

CETIS Analytical Report

Report Date: 24 Nov-15 14:59 (p 6 of 6)
Test Code: 15928 | 12-1963-7639

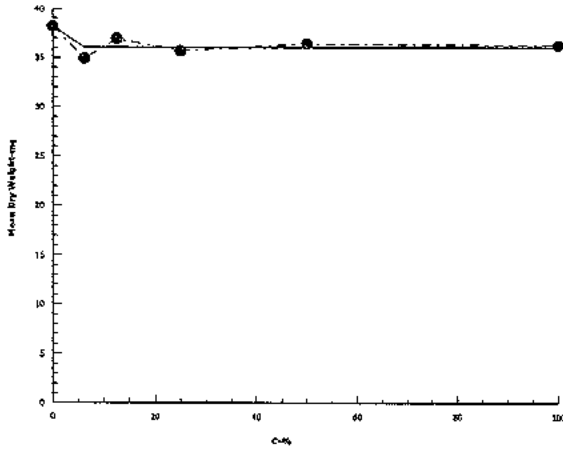
Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 12-8177-3071 Endpoint: Mean Dry Weight-mg
Analyzed: 24 Nov-15 14:53 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 07 Dec-15 15:17 (p 1 of 1)
 Test Code: 15928 | 12-1963-7639

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 11-0671-9531	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 07 Dec-15 15:16	Analysis: Parametric-Two Sample	Official Results: Yes
Batch ID: 18-4319-1215	Test Type: Growth-Survival (7d)	Analyst: Eric Cheung
Start Date: 13 Nov-15 13:30	Protocol: Washington DOE (2008)+ LAZORCHAK JW	Diluent: Mod-Hard Synthetic Water
Ending Date: 20 Nov-15 13:30	Species: Oncorhynchus mykiss (2007)	Brine:
Duration: 7d 0h	Source: Aqua Farm	Age:
Sample ID: 10-1039-6763	Code: 3C396E5B	Client: Mount Polley
Sample Date: 12 Nov-15 12:25	Material: Water Sample	Project:
Receive Date: 13 Nov-15 10:00	Source: Mount Polley (MT POLLEY)	
Sample Age: 25h 45°C 6.5 °C JW	Station: QUR-1	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	5.49%	Fails mean dry weight-mg

Equal Variance t Two-Sample Test

Control	vs Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	Time Zero	20.33	1.943	2.098	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	963.0673	963.0673	1	413.1	<0.0001	Significant Effect
Error	13.98639	2.331064	6			
Total	977.0537		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.078	47.47	0.5634	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9574	0.6451	0.7850	Normal Distribution

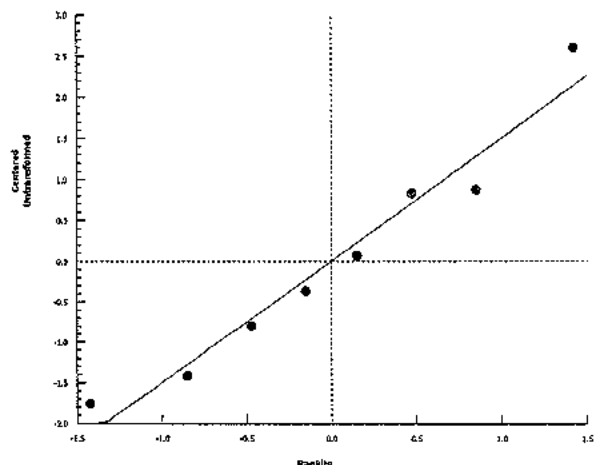
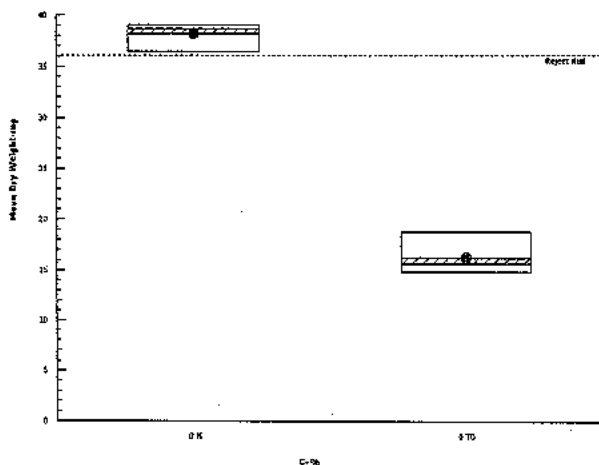
Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Time Zero	4	16.24	13.42	19.06	15.66	14.82	18.82	0.887	10.92%	0.0%
0	Negative Control	4	38.19	36.23	40.14	38.63	36.42	39.05	0.6154	3.22%	-135.1%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	38.25	39.01	36.42	39.05
0	Time Zero	14.82	18.82	15.87	15.44

Graphics



Client: Mount Polley
 Work Order No: 15928

Hardness and Alkalinity Datasheet

Alkalinity						Hardness			
Sample ID	Sample Date	Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	Technician
QUR-1	Nov 18/15	50	2.7	2.8	52	50	2.5 ^{ml} 3.4	50 ^{ml} 68	EC
Control MHW									
Batch #: 110515	Nov 6/15	50	3.6	3.7	70	50	3.4	68	EC
111215	Nov 13/15	↓	3.4	3.5	66	↓	3.0	60	↓
111715	Nov 18/15	↓	2.8	3.0	52	↓	3.4	68	↓

Notes:

Reviewed by: Joh

Date Reviewed: Dec. 4/15

Rainbow Trout Swimup Test Summary Sheet

Client: Mount Polley

Start Date/Time: Nov 13/15 @ 1330h

Work Order No.: 15926

Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID: PZ-5
 Sample Date: Nov 11/15
 Date Received: Nov 13/15
 Sample Volume: 3 x 20L

Dilution Water:

Type: Moderately Hard Water
 Hardness (mg/L CaCO₃): 60 | 68
 Alkalinity (mg/L CaCO₃): 66 | 52
 Batch # 111215 | 111715

Test Organism Information:

Batch No.: 110515
 Source: Aqua Farm
 Average Initial Dry Weight: 15.8 (mg)
 Age of test organism: 3-6 days post-swim-up

Copper Reference Toxicant Results:

Reference Toxicant ID: RTCL21
 Stock Solution ID: 15Cu04
 Date Initiated: Nov 13/15
 7-d LC50 (95% CL): 56.4 (51.1 - 64.7) µg/L Cu
 7-d IC50 (95% CL): ~~55.0 (50.7 - 65.0) µg/L Cu~~ 56.0 (50.4 - 62.6) µg/L Cu
30 20 2 64.8 20
 7-d LC50 Reference Toxicant Mean and Historical Range: 62.4 (24.5-159) µg/L Cu CV(%) 59.6%
 7-d IC50 Reference Toxicant Mean and Historical Range: 61.4 (23.6-160.3) µg/L Cu CV(%) 61.5%

Test Results:

	Survival	Biomass	Dry Weight
LC25 % (v/v) (95% CL)	>100		
LC50 % (v/v) (95% CL)	>100		
IC25 % (v/v) (95% CL)		>100	>100
IC50 % (v/v) (95% CL)		>100	>100

Reviewed by: JG

Date reviewed: Dec. 7/15

1/2

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polley
Sample ID: # P0L2 P25
Work Order #: 15926

Start Date & Time: Nov 13/15 @ 1330h
Stop Date & Time: Nov 20/15 @ 1330h
Test Species: Oncorhynchus mykiss

Concentration (%v/v) 41	Days														
	0		1		2 ①		3 ②		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5	14.0	14.0	14.0
DO (mg/L)	9.9	7.2	9.9	6.3	9.8	10.3	10.0	9.8	10.0	9.7	10.0	9.7	10.0	9.7	9.7
pH	7.7	7.6	7.6	7.5	7.6	7.8	7.8	7.7	7.8	7.6	7.6	7.4	7.5	7.5	7.7
Cond. (µS/cm)	328		328		328		327		328		323		335		348
Initials	EL		A		A		EL		EL		EL		EL		EL

Concentration 6.2	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	14.5	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5	14.0	14.0	14.0	14.0	
DO (mg/L)	9.7	7.5	9.8	6.3	9.8	10.3	10.0	9.8	9.8	9.7	10.0	9.7	9.9	9.8	
pH	7.5	7.6	7.6	7.5	7.6	7.8	7.8	7.7	7.8	7.5	7.5	7.4	7.4	7.6	
Cond. (µS/cm)	323		327		327		326		327		324		336		
Initials	EL/AWD		A		A		EL		EL		EL		EL		

① 7.6

Concentration 12.5	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	14.5	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5	14.0	14.0	14.0	14.0	
DO (mg/L)	9.7	7.5	9.9	6.2	9.9	10.3	9.9	9.8	9.9	9.8	10.0	9.8	9.9	9.7	
pH	7.6	7.7	7.6	7.5	7.6	7.8	7.8	7.8	7.8	7.6	7.5	7.5	7.4	7.7	
Cond. (µS/cm)	322		324		323		323		323		319		332		
Initials	EL		A		A		EL		EL		EL		EL		

Concentration 25	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	14.5	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5	14.0	14.0	14.0	14.0	
DO (mg/L)	9.8	7.4	9.9	6.3	9.9	10.3	10.0	9.9	10.0	9.7	10.0	9.7	9.9	9.7	
pH	7.6	7.7	7.6	7.5	7.6	7.9	7.8	7.8	7.8	7.7	7.5	7.5	7.4	7.7	
Cond. (µS/cm)	316		319		316		318		319		314		327		
Initials	EL		A		A		EL		EL		EL		EL		

Thermometer: CER#2 DO meter: 2 pH meter: 1/3 Conductivity meter: 2

	Control	100 (%v/v)
Hardness*	60	68
Alkalinity*	66	52

Analysts: JAB, AWD, EL
Reviewed by: JAB
Date reviewed: Dec. 3/15

* mg/L as CaCO3 Batch #14251 11/15

Sample Description: Slight yellow, Clear

Comments: ① aerator initiated @ 1240h: Control D.O (mg/L), 6.78
② pH checked w/ pH 8 meter 3

2/2

7-d Chronic Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Mount Polly
 Sample ID: FC-2 P2-5
 Work Order #: 15926

Start Date & Time: Nov 13 / 15 @ 1330h
 Stop Date & Time: Nov 20 / 15 @ 1330h
 Test Species: Oncorhynchus mykiss

Concentration 50 (% v/v)	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.5	14.0	14.0	14.0	14.0	14.0
DO (mg/L)	9.8	7.6	10.0	6.2	10.0	10.0	10.0	10.0	9.9	9.7	10.1	9.7	10.0	9.8	9.8
pH	7.6	7.7	7.7	7.5	7.6	7.9	7.8	7.8	7.8	7.7	7.5	7.5	7.4	7.7	7.7
Cond. (µS/cm)	308		310		312		308		310		305		312		321
Initials	EL		A		M		EL		EL		EL		EL		EL

Concentration 100	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	14.0	14.5	14.5	14.5	14.5	14.0	14.0	14.0	14.0	14.5	14.0	14.0	14.0	14.0	14.0
DO (mg/L)	9.7	7.4	10.0	6.2	10.0	10.0	9.7	10.0	10.0	9.7	10.1	9.9	9.9	9.8	9.8
pH	7.5	7.6	7.7	7.5	7.6	7.9	7.8	7.9	7.7	7.8	7.5	7.6	7.7	7.3	7.3
Cond. (µS/cm)	291		292		292		291		292		292		291		305
Initials	EL		A		A		EL		EL		EL		EL		EL

Concentration	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)															
DO (mg/L)															
pH															
Cond. (µS/cm)															
Initials															

Concentration	Days														
	0		1		2		3		4		5		6		7
	init.	old	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)															
DO (mg/L)															
pH															
Cond. (µS/cm)															
Initials															

Thermometer: CER#2
 DO meter: DO-1/2 pH meter: pH-1/2/3 Conductivity meter: C-1/2

	Control	100 (% v/v)	
Hardness*	70	68	EC 50 144
Alkalinity*	66	52	94

* mg/L as CaCO3 Batch# 111215 / 111715

Analysts: JAB, AWD, EL
 Reviewed by: JAB
 Date reviewed: Dec 7/15

Sample Description: Slight yellow, Clear
 Comments: _____

7-d Chronic Freshwater Toxicity Test Daily Mortality

Client: Mount Polly
 Sample ID: P2-2 P2-50
 Work Order #: 15926

Start Date & Time: NOV 13 / 15 @ 1330h
 Stop Date & Time: Nov 20 / 15 @ 1330h
 Test Species: Oncorhynchus mykiss

Concentration (% v/v)	Rep	Day of Test - No. of Survivors							Comments
		1	2	3	4	5	6	7	
(+1)	A	5	5	5	5	5	5	5	
	B								
	C								
	D								
6.2	A								
	B								
	C								
	D								
12.5	A								
	B								
	C								
	D								
25	A								
	B								
	C								
	D								
50	A								
	B								
	C								
	D								
100	A								
	B								
	C								
	D								
Tech Initials	A	A	N	EC	EC	EC	EC	EC	
	B								
	C								
	D								

Comments: _____

Reviewed by: JOU

Date reviewed: Dec. 3/15

7d Chronic Freshwater Toxicity Test Data Sheet

Swim-up Survival and Dry Weight

Client: Mount Polley
 Sample ID: ~~EC-POL-2~~ P2-S
 Work Order No.: 15926

Start Date: Nov 13 /15
 Termination Date: Nov 20 /15

Test Species: Ancorhynchus mykiss

Sample ID % V/V	Rep	Pan No.	No. Alive	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
C+1	A	1	5	EC	955.45	1149.50	5	EC
	B	2	1		981.33	1157.36	1	
	C	3			990.83	1172.55		
	D	4			971.21	1175.35		
6.2	A	5			985.66	1165.88		
	B	6			971.97	1147.82		
	C	7			991.48	1177.67		
	D	8			977.56	1155.56		
12.5	A	9			1001.83	1181.30		
	B	10			996.01	1179.24		
	C	11			995.21	1183.95		
	D	12			1002.49	1180.77		
25	A	13			980.77	1181.11		
	B	14			981.66	1161.36		
	C	15			975.60	1161.25		
	D	16			977.19	1148.88		
50	A	17			983.08	1150.22		
	B	18			989.93	1164.99		
	C	19			972.78	1144.95		
	D	20			968.36	1140.00		
100	A	21			968.28	1135.22		
	B	22			981.63	1164.62		
	C	23			985.52	1176.92		
	D	24	↓	↓	977.86	1150.35	↓	↓

Thermometers: CER #2 DO meter: 2 pH meter: 1
 Comments: Reweighed on Pan # 6: 1150.44 mg, Pan # 16: 1151.33 mg, Pan # 21: 1137.398 mg
 Reviewed by: Joh Date Reviewed: Dec. 4/15

7d Chronic Freshwater Toxicity Test Data Sheet
Swim-up Survival and Dry Weight

Client: Mount Polley
Work Order No.: 15926
Sample ID: EC POT 2 P2-S

Start Date: Nov 13 / 15
Termination Date: Nov 20 / 15
Test Species: Oncorhynchus mykiss

Concentration	Rep	^(Green Brown) Pan No.	No. Alive	Initials	Pan weight _{sub (g) mg}	Pan + organism ^g _{mg}	No. weighed	Initials
To	A	1	5	EC	949.75	1024.87 ⁰	5	EC
C1	B	2	↓	↓	992.58	1071.51	↓	↓
	C	3	↓	↓	975.26	1054.51	↓	↓
	D	4	↓	↓	989.97	1073.41	↓	↓
	A							
	B							
	C							
	D							
	A							
	B							
	C							
	D							
	A							
	B							
	C							
	D							
	A							
	B							
	C							
	D							

Thermometer: CER#2 DO meter: 2 pH meter: 1

Comments: Reweighed on Pan No. 2: 1072.42 mg

Reviewed by: JOB Date Reviewed: Dec-4/15

CETIS Analytical Report

Report Date: 24 Nov-15 14:59 (p 1 of 6)
 Test Code: 15926 | 03-2763-7323

Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 18-4202-2729	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 24 Nov-15 14:54	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 18-9190-6816	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 13 Nov-15 13:30	Protocol: Washington DOE (2008) + Lazovich 2007	Diluent: Mod-Hard Synthetic Water
Ending Date: 20 Nov-15 13:30	Species: Oncorhynchus mykiss	Brine:
Duration: 7d 0h	Source: Aqua Farm	Age:
Sample ID: 18-0897-2408	Code: 6BD2BA78	Client: Mount Polley
Sample Date: 11 Nov-15 14:55	Material: Water Sample	Project:
Receive Date: 13 Nov-15 10:00	Source: Mount Polley (MT POLLEY)	
Sample Age: 47h (6°C)	Station: P2-S	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	372133	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>100	N/A	N/A	<1	NA	NA
EC10	>100	N/A	N/A	<1	NA	NA
EC15	>100	N/A	N/A	<1	NA	NA
EC20	>100	N/A	N/A	<1	NA	NA
EC25	>100	N/A	N/A	<1	NA	NA
EC40	>100	N/A	N/A	<1	NA	NA
EC50	>100	N/A	N/A	<1	NA	NA

7d Survival Rate Summary

Calculated Variate(A/B)

C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	4	1	1	1	0	0	0.0%	0.0%	20	20
6.2		4	1	1	1	0	0	0.0%	0.0%	20	20
12.5		4	1	1	1	0	0	0.0%	0.0%	20	20
25		4	1	1	1	0	0	0.0%	0.0%	20	20
50		4	1	1	1	0	0	0.0%	0.0%	20	20
100		4	1	1	1	0	0	0.0%	0.0%	20	20

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1	1	1	1
6.2		1	1	1	1
12.5		1	1	1	1
25		1	1	1	1
50		1	1	1	1
100		1	1	1	1

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	5/5	5/5	5/5	5/5
0	Time Zero	5/5	5/5	5/5	5/5
6.2		5/5	5/5	5/5	5/5
12.5		5/5	5/5	5/5	5/5
25		5/5	5/5	5/5	5/5
50		5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5

CETIS Analytical Report

Report Date: 24 Nov-15 14:59 (p 2 of 6)
Test Code: 15926 | 03-2763-7323

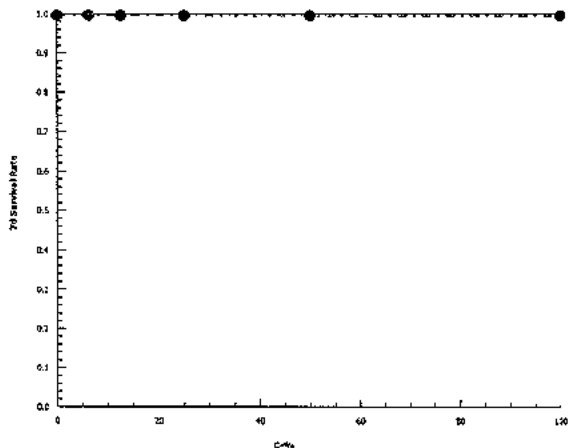
Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 18-4202-2729 Endpoint: 7d Survival Rate
Analyzed: 24 Nov-15 14:54 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 24 Nov-15 14:59 (p 3 of 6)
 Test Code: 15926 | 03-2763-7323

Fish Survival Development Growth (w/Length)			Nautilus Environmental
Analysis ID: 01-2307-9178	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.8.7	
Analyzed: 24 Nov-15 14:54	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes	
Batch ID: 18-9190-6816	Test Type: Growth-Survival (7d)	Analyst:	
Start Date: 13 Nov-15 13:30	Protocol: Washington DOE (2008) + <i>Lazurhat 2007</i>	Diluent: Mod-Hard Synthetic Water	
Ending Date: 20 Nov-15 13:30	Species: Oncorhynchus mykiss	Brine:	
Duration: 7d 0h	Source: Aqua Farm	Age:	
Sample ID: 18-0897-2408	Code: 6BD2BA78	Client: Mount Polley	
Sample Date: 11 Nov-15 14:55	Material: Water Sample	Project:	
Receive Date: 13 Nov-15 10:00	Source: Mount Polley (MT POLLEY)		
Sample Age: 47h (5°C)	Station: P2-S		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	918590	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	32.49	N/A	N/A	3.078	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Biomass-mg Summary			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	37.8	35.21	40.83	1.26	2.519	6.67%	0.0%
6.2		4	36.01	35.17	37.24	0.4456	0.8912	2.48%	4.72%
12.5		4	36.49	35.66	37.75	0.4706	0.9412	2.58%	3.47%
25		4	36.87	34.34	40.07	1.21	2.42	6.56%	2.46%
50		4	34.3	33.43	35.01	0.3274	0.6548	1.91%	9.25%
100		4	35.69	33.39	38.28	1.09	2.18	6.11%	5.57%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	38.81	35.21	36.34	40.83
6.2		36.04	35.17	37.24	35.6
12.5		35.89	36.65	37.75	35.66
25		40.07	35.94	37.13	34.34
50		33.43	35.01	34.43	34.33
100		33.39	36.6	38.28	34.5

CETIS Analytical Report

Report Date: 24 Nov-15 14:59 (p 4 of 6)
Test Code: 15926 | 03-2763-7323

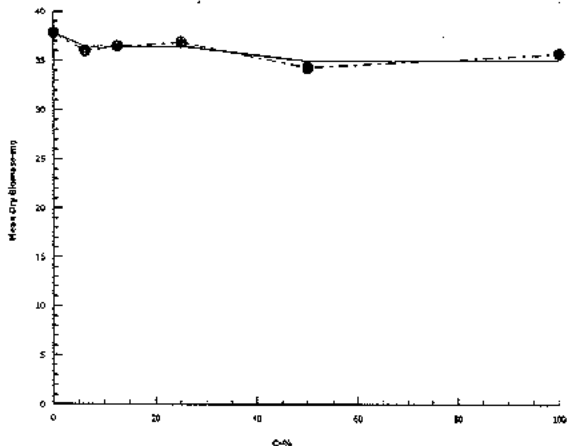
Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 01-2307-9178 Endpoint: Mean Dry Biomass-mg
Analyzed: 24 Nov-15 14:54 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 24 Nov-15 14:59 (p 5 of 6)
 Test Code: 15926 | 03-2763-7323

Fish Survival Development Growth (w/Length)			Nautilus Environmental
Analysis ID: 03-8996-5466	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7	
Analyzed: 24 Nov-15 14:55	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes	
Batch ID: 18-9190-6816	Test Type: Growth-Survival (7d)	Analyst:	
Start Date: 13 Nov-15 13:30	Protocol: Washington DOE (2008) + <i>Lazerdhal 2007</i>	Diluent: Mod-Hard Synthetic Water	
Ending Date: 20 Nov-15 13:30	Species: Oncorhynchus mykiss	Brine:	
Duration: 7d 0h	Source: Aqua Farm	Age:	
Sample ID: 18-0897-2408	Code: 6BD2BA78	Client: Mount Polley	
Sample Date: 11 Nov-15 14:55	Material: Water Sample	Project:	
Receive Date: 13 Nov-15 10:00	Source: Mount Polley (MT POLLEY)		
Sample Age: 47h (5 ¹⁶ C) <i>6.5</i>	Station: P2-S		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1133553	200	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	32.49	N/A	N/A	3.078	NA	NA
IC10	>100	N/A	N/A	<1	NA	NA
IC15	>100	N/A	N/A	<1	NA	NA
IC20	>100	N/A	N/A	<1	NA	NA
IC25	>100	N/A	N/A	<1	NA	NA
IC40	>100	N/A	N/A	<1	NA	NA
IC50	>100	N/A	N/A	<1	NA	NA

Mean Dry Weight-mg Summary

C-%	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	37.8	35.21	40.83	1.26	2.519	6.67%	0.0%
6.2		4	36.01	35.17	37.24	0.4456	0.8912	2.48%	4.72%
12.5		4	36.49	35.66	37.75	0.4706	0.9412	2.58%	3.47%
25		4	36.87	34.34	40.07	1.21	2.42	6.56%	2.46%
50		4	34.3	33.43	35.01	0.3274	0.6548	1.91%	9.25%
100		4	35.69	33.39	38.28	1.09	2.18	6.11%	5.57%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	38.81	35.21	36.34	40.83
6.2		36.04	35.17	37.24	35.6
12.5		35.89	36.65	37.75	35.66
25		40.07	35.94	37.13	34.34
50		33.43	35.01	34.43	34.33
100		33.39	36.6	38.28	34.5

CETIS Analytical Report

Report Date: 24 Nov-15 14:59 (p 6 of 6)
Test Code: 15926 | 03-2763-7323

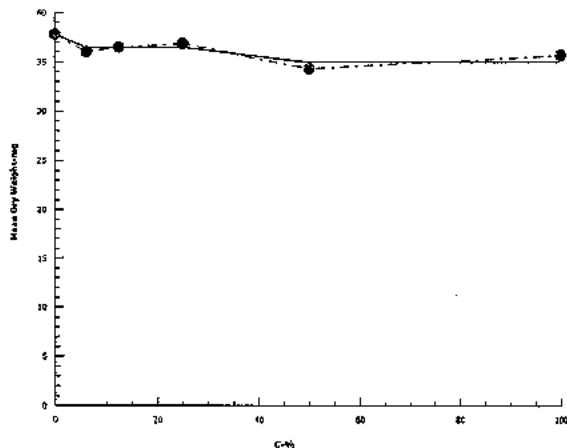
Fish Survival Development Growth (w/Length)

Nautilus Environmental

Analysis ID: 03-8996-5466 Endpoint: Mean Dry Weight-mg
Analyzed: 24 Nov-15 14:55 Analysis: Linear Interpolation (ICPIN)

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 24 Nov-15 14:59 (p 1 of 1)
 Test Code: 15926 | 03-2763-7323

Fish Survival Development Growth (w/Length) Nautilus Environmental

Analysis ID: 13-5819-1804	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.8.7
Analyzed: 24 Nov-15 14:55	Analysis: Parametric-Two Sample	Official Results: Yes
Batch ID: 18-9190-6816	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 13 Nov-15 13:30	Protocol: Washington DOE (2008) + <i>Lazer chab 2007</i>	Diluent: Mod-Hard Synthetic Water
Ending Date: 20 Nov-15 13:30	Species: Oncorhynchus mykiss	Brine:
Duration: 7d 0h	Source: Aqua Fam	Age:
Sample ID: 18-0897-2408	Code: 6BD2BA78	Client: Mount Polley
Sample Date: 11 Nov-15 14:55	Material: Water Sample	Project:
Receive Date: 13 Nov-15 10:00	Source: Mount Polley (MT POLLEY)	
Sample Age: 47h (5°C) <i>6.5</i>	Station: P2-S	

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	6.71%	Fails mean dry weight-mg

Equal Variance t Two-Sample Test

Control	vs Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	Time Zero	16.83	1.943	2.535	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	964.4827	964.4827	1	283.3	<0.0001	Significant Effect
Error	20.42554	3.404257	6			
Total	984.9083		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	13.72	47.47	0.0589	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9811	0.6451	0.9683	Normal Distribution

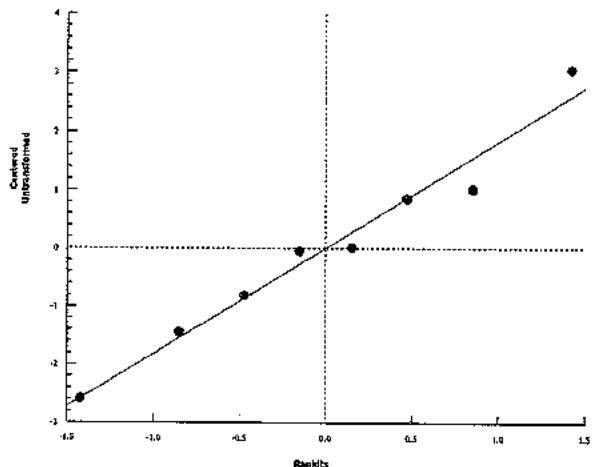
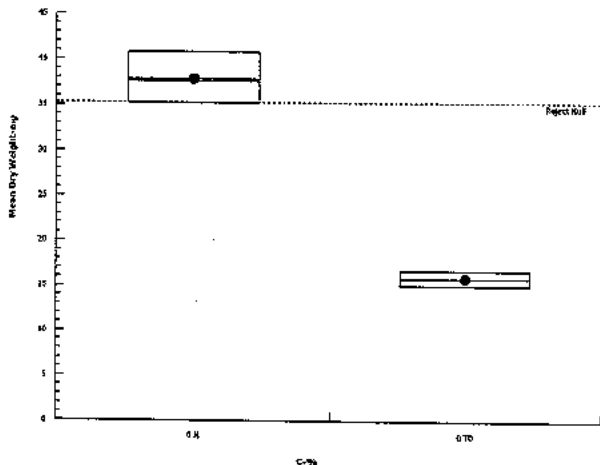
Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Time Zero	4	15.84	14.75	16.92	15.82	15.02	16.69	0.3401	4.3%	0.0%
0	Negative Control	4	37.8	33.79	41.81	37.58	35.21	40.83	1.26	6.67%	-138.7%

Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	38.81	35.21	36.34	40.83
0	Time Zero	15.02	15.79	15.85	16.69

Graphics



Client: Mount Polley

W.O. #: 15926

Hardness and Alkalinity Datasheet

Sample ID	Sample Date	Alkalinity				Hardness			Technician
		Sample Volume (mL)	(mL) 0.02N HCL/H ₂ SO ₄ used to pH 4.5	(mL) of 0.02N HCL/H ₂ SO ₄ used to pH 4.2	Total Alkalinity (mg/L CaCO ₃)	Sample Volume (mL)	Volume of 0.01M EDTA Used (mL)	Total Hardness (mg/L CaCO ₃)	
206-26	Nov 12/15								EC
P25	↓	50	4.9	5.1	94	50	2.9 7.2	58 144	↓
Control MHW									
Batch #: 110515	Nov 6/15	50	3.6	3.7	70	50	3.4	68	EC
111215	Nov 13/15	↓	3.4	3.5	66	↓	3.0	60	↓
111715	Nov 18/15	↓	2.8	3.0	52	↓	3.4	68	↓

Notes:

Reviewed by:

JGh

Date Reviewed:

Dec. 7/15

APPENDIX C - Chain-of-Custody Forms

Nautilus Environmental

Chain of Custody (electronic)

British Columbia: 8864 Commerce Court, Burnaby, BC, V5A 4N7

WO# 15927
15928

12/11/2015 Page 1 of 1

Sample Collection By: GH, TS, SF							ANALYSES REQUIRED													
Report to:		Invoice to:					7 Day Ceriodaphnia dubia surv / rep	7 Day RBT survival and growth												Receipt Temperature (°C)
Company		Mount Polley Mining Corporation																		
Address		Box 12																		
City/Prov/Postal Code		Likely BC V0L 1N0																		
Contact		Colleen Hughes																		
Phone		(250) 790-2617																		
Email		chughes@mountpolley.com																		
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS														
1	QUR-1	12/11/2015	12:25	water	20L	3	60L total	.	X										6.5	
2	QUR-1	12/11/2015	12:25	water	1L	7	7L Total	X											5.0	
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
PROJECT INFORMATION				SAMPLE RECEIPT			RELIQUISHED BY (CLIENT)				RELIQUISHED BY (COURIER)									
Client: Mount Polley Mining Corporation				Total # Containers:	10	Signature:				Signature:										
P.O. No.:				Good Condition?	Y	Print: Gabriel Holmes				Print:										
Shipped Via: Greyhound				Matches Schedule?	Y	Company: MPMC				Company:										
						12/11/2015 15:30				Time/Date:										
SPECIAL INSTRUCTIONS/COMMENTS:						RECEIVED BY (COURIER)				RECEIVED BY (LABORATORY)										
						Signature:				Signature: NY										
						Print:				Print: Nari Yamamoto										
						Company:				Company: Nautilus										
						Time/Date:				Time/Date: Nov 13/15 @ 10:00										

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

Nautilus Environmental

Chain of Custody (electronic)

British Columbia: 8664 Commerce Court, Burnaby, BC, V5A 4N7

wo #
15925
15926

06/01/2015 Page 1 of 1

Sample Collection By: GH, TS							ANALYSES REQUIRED											
Report to:				Invoice to:			7 Day Ceriodaphnia dubia	7 day RBT survival and growth										Receipt Temperature (°C)
Company: Mount Polley Mining Corporation				Mount Polley Mining Corporation														
Address: Box 12				Box 12														
City/Prov/Postal Code: Likely BC V0L 1N0				Likely BC V0L 1N0														
Contact: Colleen Hughes				Colleen Hughes/														
Phone: (250) 790-2617				(250) 790-2617														
Email: chughes@mountpolley.com				chughes@mountpolley.com														
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS												
1	P2-S	11/11/2015	14:55	water	20L	3	60L total		X									6.5
2	P2-S	11/11/2015	14:55	water	1L	7	7L Total	X										5.0
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
PROJECT INFORMATION				SAMPLE RECEIPT		RELIQUISHED BY (CLIENT)				RELIQUISHED BY (COURIER)								
Client: Mount Polley Mining Corporation				Total # Containers: 10		Signature:				Signature:								
P.O. No.:				Good Condition? Y		Print: Gabriel Holmes				Print:								
Shipped Via: Greyhound				Matches Schedule? Y		Company: MPMC				Company:								
						Time/Date: 12/11/2015 15:30:00				Time/Date:								
SPECIAL INSTRUCTIONS/COMMENTS:						RECEIVED BY (COURIER)				RECEIVED BY (LABORATORY)								
						Signature:				Signature: NY								
						Print:				Print: Navi Yamamoto								
						Company:				Company: Nautilus								
						Time/Date:				Time/Date: Nov 13/15 @ 10:00								

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

Nautilus Environmental

Chain of Custody (electronic)

British Columbia: 8884 Commerce Court, Burnaby, BC, V5A 4N7

w.o.#
15922
15923
15924

12/11/2015 Page 1 of 1

Sample Collection By: GH, TS, SF							ANALYSES REQUIRED																
Report to:			Invoice to:				7 Day Ceriodaphnia dubia surv / rep	96 hr LC50 RBT	48 hr LC50 Daphnia magna														
Company: Mount Polley Mining Corporation			Mount Polley Mining Corporation																				
Address: Box 12			Box 12																				
City/Prov/Postal Code: Likely BC V0L 1N0			Likely BC V0L 1N0																				
Contact: Colleen Hughes			Colleen Hughes/																				
Phone: (250) 790-2817			(250) 790-2817																				
Email: chughes@mountpolley.com			chughes@mountpolley.com																				
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	# OF CONTAINERS	COMMENTS														Receipt Temperature (°C)			
1	HAC-12	12/11/2015	10:17	water	20L	3	60L total		X	X										5.0			
2	HAC-12	12/11/2015	10:17	water	1L	7	7L Total	X												5.0			
3																							
4																							
5																							
6																							
7																							
8																							
9																							
10																							
PROJECT INFORMATION			SAMPLE RECEIPT			RELIQUISHED BY (CLIENT)				RELIQUISHED BY (COURIER)													
Client: Mount Polley Mining Corporation			Total # Containers:	10		Signature:				Signature:													
P.O. No.:			Good Condition?	Y		Print: Gabriel Holmes				Print:													
Shipped Via: Greyhound			Matches Schedule?	Y		Company: MPMC				Company:													
						12/11/2015 15:30				Time/Date:													
SPECIAL INSTRUCTIONS/COMMENTS:						RECEIVED BY (COURIER)				RECEIVED BY (LABORATORY)													
						Signature:				Signature: NY													
						Print:				Print: Nari Yamamoto													
						Company:				Company: Nautilus													
				Time/Date:				Time/Date: NOV 13/15 @ 10:00															

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.



APPENDIX G

Lake Productivity and Lower Trophic Tissue Metal Analysis

Chemical Analysis of Benthic Invertebrates Collected in the Vicinity of the Mount Polley Mine – August 2015.

Prepared by:

Pierre Stecko, M.Sc., EP, R.P.Bio. and Katharina Batchelar

Minnow Environmental Inc.

Quesnel and Polley Lakes 2015 Plankton Update Report

Prepared by:

Suzanne Earle, M.Sc., R.P.Bio. and Barbara Wernick, M.Sc., R.P.Bio.

Golder Associates Ltd.

Mount Polley Mine – Update of Quesnel and Polley Lakes Productivity Assessment.

Prepared by:

Barbara Wernick, M.Sc., R.P.Bio. and Adrian deBruyn, Ph.D., R.P.Bio.

Golder Associates Ltd.

Memorandum



Date: May 27, 2015

To: Dale Reimer, Mount Polley Mining Corporation

From: Pierre Stecko, Katharina Batchelar, Minnow Environmental Inc.

Cc: Colleen Hughes, Katie McMahan, Mount Polley Mining Corporation
'Lyn Anglin, Imperial Metals Corporation

Re: Chemical Analysis of Benthic Invertebrates Collected in the Vicinity of the Mount Polley Mine - August 2015

Chemical analysis of benthic invertebrates was conducted as part of the ongoing assessment of potential impacts to aquatic environmental health following the failure of the Mount Polley tailings dam in August 2014. The chemistry of sediment (i.e., Minnow 2015a; Minnow 2015b; SRK 2015a; SRK 2015b) and water (Golder 2015) has been characterized within the impacted waterbodies, and results have indicated that the mobility of tailings-associated metals in mine-influenced sediment is low (e.g., Minnow 2015a; SRK 2015a; SRK 2015b; Minnow 2016). Measurement of benthic invertebrate chemistry can characterize the quality of food available to higher trophic levels and help to characterize the bioavailability of metals.

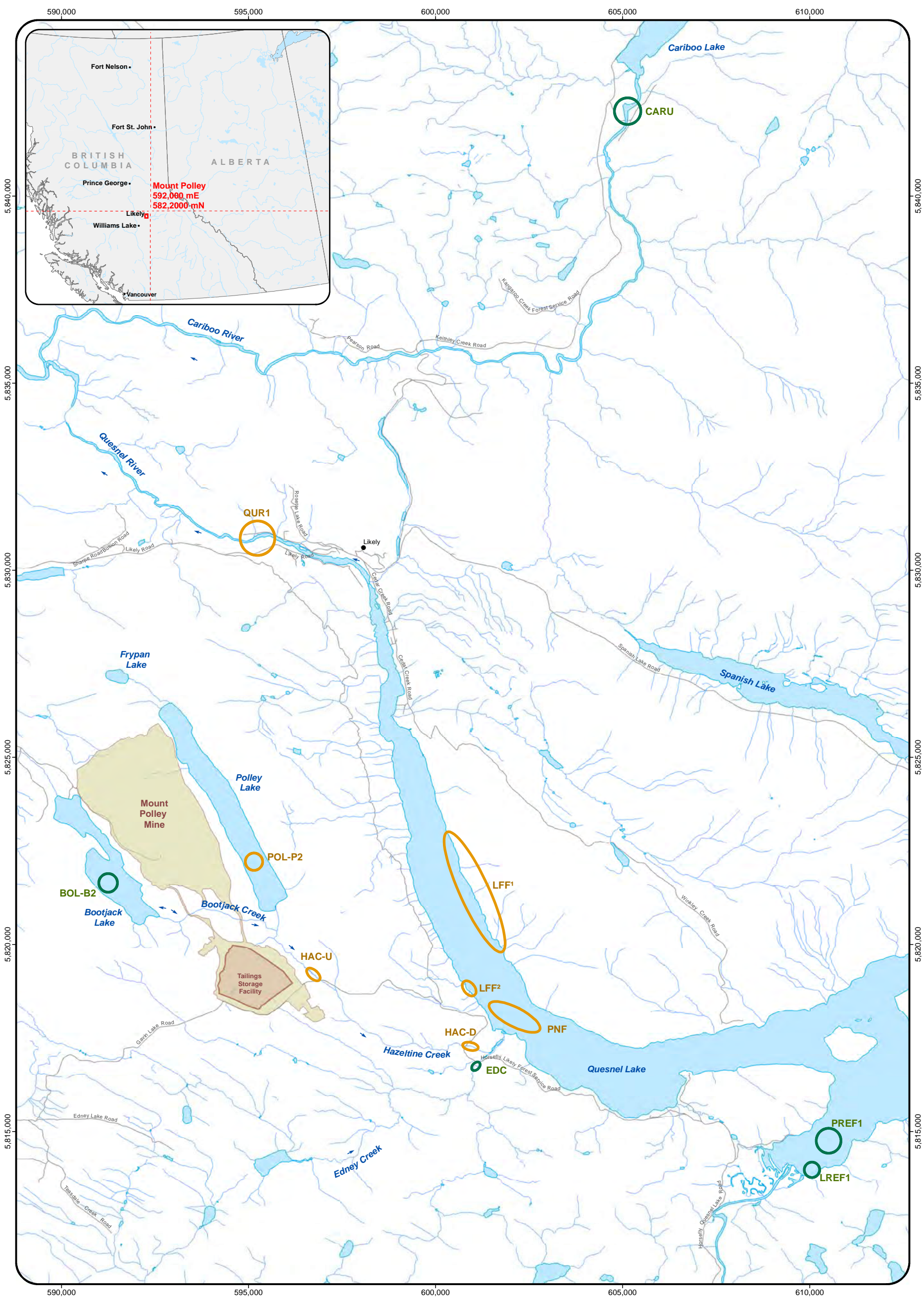
Metal concentrations in benthic invertebrates residing in waterbodies impacted by the tailings dam failure have previously been characterized in the Quesnel River (Minnow 2015a). This characterization was expanded in 2015 to include benthic invertebrates residing in Polley Lake, Quesnel Lake, Hazeltine Creek, Quesnel River, and corresponding reference areas. This memorandum provides a brief summary and interpretation of the associated data.

Methods

Benthic invertebrate samples were collected between August 13th and 26th 2015 from depositional environments (Polley Lake, Quesnel Lake), from erosional environments (Hazeltine Creek, Quesnel River), and from corresponding reference areas (Figure 1; Appendix Table A.1).

Sampling

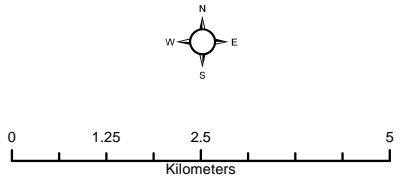
Benthic invertebrate samples were collected from six depositional sampling areas: Polley Lake (POL-P2) and reference (BOL-B2, Bootjack Lake), Quesnel Lake littoral far-field (LFF) and reference (LREF1), and Quesnel Lake profundal near-field (PNF) and reference (PREF; Figure 1;



Benthic Invertebrate Chemistry Monitoring Area

- Exposed
- Reference
- Tailings Storage Facility
- Active Mine Operation
- Waterbody
- Watercourse
- Road
- Water Flow Direction
- Towns

LFF¹ - 3 Stations present
LFF² - 2 Stations present



Datum: NAD 83 Map Projection: UTM Zone 10U
Data Source: Reproduced under licence from Her Majesty the Queen in Right of Canada, Department of Natural Resources Canada. All rights reserved.
Creation Date: May 2016
Project No.: 2574

Figure 1: Benthic Invertebrate Chemistry Monitoring Areas, August 2015.



Appendix Table A.1). Samples were collected using a stainless steel petite ponar (15.2 cm x 15.2 cm; 0.023 m² sampling area) or standard ponar (22.9 cm x 22.9 cm; 0.052 m² sampling area) in accordance with technical guidance for benthic fauna sampling outlined in the British Columbia Field Sampling Manual (BCWLAP 2003). Grab samples from profundal areas of Quesnel Lake (mean depth approximately 100 meters) were collected with the assistance of a commercial line hauler (Ace Line Hauler Brutus Plus 40™). Once collected, each grab was placed into a sieve bag (either 250 or 500 µm mesh size) and sieved free of as much material as possible. The mesh size of the sieve bag differed among sampling areas, with 250 µm mesh used for deeper lake samples and 500 µm mesh used for shallow lake samples in order to optimize retention of benthic invertebrates while minimizing debris retention. Grabs were composited within the sieve bag (Appendix Table A.1) until the approximate sample weight required for laboratory analysis was obtained (0.2 g wet weight). In some cases, this required returning to a sampling area after measuring the initial sample weight at the field laboratory. After sieving, the retained material (sample) was carefully transferred into a labelled 1 or 2 liter wide mouth plastic jar, or into one or more labelled Ziploc™ bags. Due to low benthic invertebrate abundance at sampling areas POL-P2 (Polley Lake) and PNF (Quesnel profundal near-field), the minimum sample weight could not be obtained despite substantial sampling effort (Appendix Table A.1). Collected samples were stored in a cooler with ice packs then transferred to a refrigerator at the field laboratory prior to further processing. Benthic invertebrate samples were collected concurrent with sediment samples for chemical analysis (reported in Minnow 2015b). Additional supporting information collected at each sampling station included GPS (Geographic Positioning System) coordinates, sampling depth, field meter measurements of temperature, specific conductance, dissolved oxygen and pH (using a YSI EXO™ handheld portable field meter equipped with YSI EXO2™ Sonde), notes on the presence or absence of aquatic vegetation, and other physical observations (Appendix Tables A.1 and A.2)

Benthic invertebrate samples were collected from five erosional sampling areas: upper Hazeltine Creek (HAC-U), lower Hazeltine Creek (HAC-D), a creek reference area (EDC; lower Edney Creek upstream of the area impacted by the tailings dam failure), Quesnel River exposed area (QUR1), and a river reference area (CARU; the Cariboo River downstream of Cariboo Lake; Figure 1; Appendix Table A.1). Samples were collected using a combination of kick and sweep and hand picking methods. The kick and sweep method involved a field technician moving upstream and across the stream channel (in a zig-zag pattern) while holding a kick net (a net with a triangular opening and a 400 µm mesh bag) immediately downstream, and disturbing the substrate with his or her feet to dislodge benthic organisms into the net. The net was then rinsed with water to move all debris and invertebrates to the collection cup at the bottom of the net, the collection cup was removed, contents poured into a white plastic bin, and invertebrates picked

free of debris. Hand picking of benthic invertebrate samples entailed overturning rocks in the streambed and collecting any organisms observed. One or both of these methods (Appendix Table A.1) was employed at each sampling station to collect benthic invertebrate samples, and sampling continued until the minimum required sample weight (0.2 g wet weight) was obtained. Depending on the amount of debris present in the collected kick and sweep sample, benthic invertebrates were either picked free of debris in the field and placed into a labelled Whirl-Pak bag, or samples were placed into a small plastic jar or Ziploc™ bag for further separation at the field laboratory. All sampling equipment was rinsed thoroughly between sampling stations. All samples were stored in a cooler with ice packs until being refrigerated prior to further processing (or until being frozen if samples were processed in the field). Supporting information was collected at each sampling station (or at each area for Quesnel and Cariboo rivers), and included those parameters listed above for depositional environments (Appendix Tables A.1 and A.2), as well as water velocity (using a Marsh-McBirney Flowmate Model 2000 portable velocity meter), stream / river width (using a Bushnell Yardace Pro Sport 450 range finder or tape measure), substrate characteristics, and site photographs.

Supporting water quality samples were collected by Minnow from erosional sampling areas that are not part of the Mount Polley routine water quality monitoring program. All water samples were collected in accordance with the British Columbia Field Sampling Manual (BCWLAP 2003), preserved as required, and shipped to the analytical laboratory (ALS Environmental, Burnaby, BC) within 1-2 days of collection. The water samples collected by Minnow and the routine monitoring water quality samples collected by the Mount Polley Mining Corporation (MPMC) were collected and analysed using the same methods, and are considered herein as part of the same data set for interpretation. All water quality data were obtained from MPMC electronically in MSEXcel format and were subjected to MPMC quality control checks.

Benthic invertebrate samples that required additional debris removal were processed at a field laboratory. Samples were sieved as necessary using site water, and organisms were isolated using stainless steel forceps and placed in small plastic jars or Whirl-Pak bags, weighed to the nearest milligram in the field laboratory using a Scout Pro SPE-123 balance, and frozen. Effort was made to sort as much of the collected sample as reasonable, to ensure that any bias towards larger, mobile organisms was reduced. Split duplicates were collected for 10% of samples. Frozen benthic invertebrate samples were shipped on ice to the Saskatchewan Research Council Analytical Laboratories (SRC). However, a number of samples did not meet SRC's minimum sample weight for analysis (i.e., samples from areas POL-P2 and PNF). As a result, all frozen samples were forwarded to the University of Missouri Research Reactor (MURR, Columbia, MO),

which has the capacity to analyze small sample sizes. A chain of custody (COC) was included with all samples during shipment.

Laboratory Analysis

Upon receipt of the benthic invertebrate samples at MURR, samples were removed from the coolers and logged. Samples were then freeze dried prior to analysis of metals by high-resolution inductively coupled plasma mass spectrometry (HR-ICP-MS). Upon completion of the analyses, a data report was provided by MURR to Minnow electronically in Adobe Acrobat Portable Document Format (PDF; Appendix B) and in MSExcel.

Data Analysis

Upon receipt of benthic invertebrate chemistry data, a Data Quality Assessment (DQA) was completed, including an examination of data completeness, method detection limits achieved, laboratory precision, laboratory accuracy, and field precision. Following the completion of the DQA, chemical data were summarized by area by calculating mean, median, standard deviation, standard error, 95% confidence limits, and minimum and maximum. Values reported as below the method detection limit (MDL) were used at the reported MDL for all calculations of summary statistics and for statistical analyses.

The biomass of benthic invertebrates present at each depositional sampling station was estimated on an area basis (g/m^2) using the surface area of sediment sampled as well as the sample weights determined in the field and at the SRC and MURR analytical laboratories. For sampling areas where the abundance of benthic invertebrates was low (i.e., POL-P2 in Polley Lake and PNF in Quesnel Lake), all organisms present in each sample were collected and weighed, and an approximate benthic invertebrate biomass was determined for each station. For all other depositional samples, the number of available benthic invertebrates exceeded the amount required for laboratory analysis, and the biomass estimates for these samples represent a subsample only. Approximate biomass results were compared between exposed and reference depositional areas to characterize differences in benthic invertebrate abundance.

Analysis of benthic invertebrate chemistry focused on analytes previously identified as Parameters of Interest (POIs) or Indicator Parameters (IPs) in sediment (Minnow 2015a). The POIs included arsenic, copper, iron, manganese, nickel and zinc, and the IPs included barium, calcium, cobalt, molybdenum, phosphorus, selenium, silver, sodium, strontium, tin, titanium, and vanadium (Minnow 2015a). Principal Components Analysis (PCA) was used as a supporting tool to determine if the previously identified POIs and IPs were indeed the parameters that best explained similarities and differences in benthic invertebrate tissue chemistry among stations. PCA was performed using the program PC-ORD[®] version 6 (McCune and Mefford 2011). Benthic

invertebrate concentrations of POIs and IPs were contrasted between exposed and reference areas using the Student's T-test and the non-parametric Mann-Whitney U test. Because some of the data did not satisfy the assumptions of normality of the parametric Student's T-test, the results of the non-parametric test (Mann-Whitney U) were used for data interpretation when the two approaches did not yield the same result. This is consistent with recommendations for approach when the assumptions of the parametric testing cannot be definitively demonstrated (i.e., Sawilowsky 2005). For Hazeltine Creek, some pre-event data were available (from 2010), and additional statistical contrasts of data collected in 2015 versus 2010 were completed.

Concentrations of the POIs and IPs in benthic invertebrates were also evaluated relative to concentrations in sediment (in depositional areas) and relative to concentrations in water (in erosional areas). Ratios of these concentrations are referred to as Biota Sediment Accumulation Factors (BSAFs; [benthic invertebrate sample]/[sediment]) and Bioconcentration Factors (BCFs; [benthic invertebrate sample]/[water]), respectively. BSAFs are often used to describe the accumulation of sediment-associated analytes in tissues of ecological receptors (i.e., Burkhard 2009). BSAFs were calculated using benthic invertebrate and sediment metal concentrations (dry weight) from each sampling area. However, benthic invertebrates were not depurated (i.e., allowed to evacuate their gut contents or with gut contents mechanically removed) prior to chemical analysis. Thus, although the associated concentrations (organisms with gut contents) accurately represent concentrations associated with food for higher trophic level organisms that consume benthic invertebrates, they do not accurately represent metal concentrations in the tissues of benthic organisms. Potential biological effects of metals in organisms (including benthic invertebrates) are usually attributed only to metal concentrations in body tissues (not to the metal concentrations in sediment that may be present in the gut due to ingestion). Benthic invertebrate gut content can significantly affect benthic invertebrate metal concentrations, and as such, must be taken into consideration when assessing the accumulation of metals and the potential for biological effects (Chapman 1985; 2016). The effect of gut content on the measured total metal body burden in invertebrates varies from metal to metal as well as for the same metal in different sediments (Chapman 1985; Amyot et al. 1996). For example, Neumann et al. (1999) found that gut content contributed to a 4.4 fold overestimation of metal body burdens in *Hyalella azteca*, while Gillis et al. (2005) reported that gut content could have contributed to a 5.6 fold overestimation of copper body burden in *Daphnia magna*. Depuration of gut content in fresh water prior to the measurement of metal concentration can be used to correct for the overestimation of tissue burden of metals, but several factors including depuration duration (Mount et al. 1999; Neumann et al. 1999; Gillis et al. 2005) and feeding during depuration (Neumann et al. 1999; Gillis et al. 2005) may influence the effectiveness of depuration. Overall, the substantial influence that gut content can have on tissue metal concentrations must be

considered in the interpretation of benthic invertebrate chemistry results. BCFs are often used to describe the extent to which an analyte is taken up by an organism from the surrounding environment through exposure routes other than diet (i.e., Arnot 2006) and are applicable to erosional areas where sediment is generally not present. BCFs were calculated using benthic invertebrate concentrations (dry weight) and mean dissolved metal concentrations in water from each sampling area. Mean water concentrations were calculated from 2015 water quality data available for each sampling area prior to the benthic invertebrate sampling occurred in August (i.e., January to August 2015). Calculated BSAFs and BCFs were then compared among exposed and reference areas to characterize potential differences in the uptake of metals by organisms in areas impacted by the tailings dam failure. For key analytes, this included a graphical evaluation of relationships between BSAF and sediment chemistry and between BCF and water chemistry, supported by trendlines and 95% prediction limits for the general relationships (i.e., for all stations, by data type [BSAF versus sediment chemistry and BCF versus water chemistry, respectively]).

Results

The reported benthic invertebrate chemistry results were of acceptable quality as characterized by: 1) good detectability of the majority of analytes (Appendix Table C.1); 2) analyte concentrations generally below MDLs in laboratory method blank samples; and 3) good laboratory accuracy, with all certified reference materials and standards results meeting data quality objectives (Appendix Tables C.4 and C.5). Data precision, as measured by laboratory and field duplicate results, indicated some sample heterogeneity and high natural variability, respectively (Appendix Tables C.2 and C.3). As such, the observed variability in laboratory and field precision was considered during data interpretation. Additional details regarding the data quality assessment are presented in Appendix C.

Depositional Environments

Polley Lake

The approximate biomass of benthic invertebrates retrieved from the south basin of Polley Lake was much lower than the biomass collected from the corresponding reference area in Bootjack Lake (exposed area mean <0.17 g/m² wet weight; reference area mean >0.85 g/m² wet weight; Appendix Table A.1). Samples collected from Polley Lake and Bootjack Lake were composed mainly of chironomids (midge larvae) and oligochaetes.

Mean concentrations of the POIs copper and manganese, as well as the IPs molybdenum, selenium, tin, and titanium in benthic invertebrates from Polley Lake were significantly higher than those in the corresponding reference area (Bootjack Lake; Table 1; Appendix Tables D.1 and

Table 1: Summary whole benthic invertebrate and sediment chemistry results from lake sampling areas in the vicinity of the Mount Polley Mine, 2015¹.

Parameter	Units	Polley Lake											Quesnel Lake																			
		Reference						Exposed					Littoral							Profundal												
		Bootjack Lake (BOL-B2)						Polley Lake (POL-P2)					LREF1				Far-field (LFF)			PREF1				Near-field (PNF)								
		Benthic Invertebrate Tissue		Sediment		BSAF ²	Benthic Invertebrate Tissue		Sediment		BSAF ²	Benthic Invertebrate Tissue		Sediment		BSAF ²	Benthic Invertebrate Tissue		Sediment		BSAF ²	Benthic Invertebrate Tissue		Sediment		BSAF ²	Benthic Invertebrate Tissue		Sediment		BSAF ²	
		Mean	t*SE	Mean	t*SE		Mean	t*SE	Mean	t*SE		Mean	t*SE	Mean	t*SE		Mean	t*SE	Mean	t*SE		Mean	t*SE	Mean	t*SE		Mean	t*SE	Mean	t*SE		Mean
Parameters of Interest (POIs)	Arsenic	mg/kg	0.76	0.44	7.72	1.65	0.10	2.36	2.90	14.0	0.95	0.17	1.84	1.23	4.5	1.94	0.40	2.20	0.86	4.04	2.21	0.55	12.5	4.76	8.88	0.52	1.41	4.55	6.08	15.4	1.90	0.30
	Copper	mg/kg	16.7	4.4	382	59.3	0.04	97.4	84.0	823	57.2	0.12	13.6	6.6	32	8.0	0.43	26.8	11.6	65.7	51.7	0.41	54.9	17.7	55.1	11.8	1.00	178	118	859	378	0.21
	Iron	mg/kg	1,114	701	30,067	7,512	0.04	3,793	4,115	29,760	2,270	0.13	1,964	1,852	23,200	4,245	0.08	2,880	1,606	27,280	8,966	0.11	7,636	5,945	31,300	5,187	0.24	8,742	8,031	40,620	6,727	0.22
	Manganese	mg/kg	25.4	8.2	3,327	1,207	0.01	585	635	2,574	787	0.23	96.6	84.4	322	103	0.30	130	22.4	308	88.3	0.42	140	73.3	491	54.6	0.29	187	145	1,033	329	0.18
	Nickel	mg/kg	0.42	0.05	33.3	3.25	0.01	3.09	2.77	22.0	3.64	0.14	3.77	3.66	30.7	6.81	0.12	4.99	2.76	26.2	5.70	0.19	8.53	4.64	39.1	6.67	0.22	17.1	32.4	20.2	6.84	0.85
	Zinc	mg/kg	68.2	14.0	82.8	9.4	0.82	61.0	29.2	86.4	6.5	0.71	129	143	62.3	11.0	2.08	123	32.5	49.1	9.8	2.51	96.8	8.3	79.8	17.8	1.21	233	169	96.0	41.2	2.43
Indicator Parameters (IPs)	Barium	mg/kg	16.8	15.3	289	46.8	0.06	50.1	50.8	329	22.2	0.15	22.5	14.8	115	19.0	0.20	25.8	17.9	68.6	25.1	0.38	86.8	39.0	147	9.9	0.59	50.5	52.3	255	72.1	0.20
	Calcium	mg/kg	1,055	350	8,417	1,571	0.13	3,706	3,050	24,500	4,099	0.15	82,818	198,333	7,483	1,498	11.07	9,818	16,263	10,622	2,157	0.92	2,996	1,253	8,747	283	0.34	4,032	3,375	31,160	3,467	0.13
	Cobalt	mg/kg	0.23	0.09	13.3	1.65	0.02	2.47	2.61	23.1	2.66	0.11	2.03	1.96	10.8	2.30	0.19	2.89	0.20	10.9	3.43	0.27	3.57	1.80	14.5	2.45	0.25	4.81	5.68	25.5	10.6	0.19
	Molybdenum	mg/kg	0.49	0.21	4.32	1.22	0.11	2.74	3.04	10.1	1.56	0.27	0.38	0.27	0.83	0.37	0.46	0.46	0.47	0.67	0.35	0.69	0.83	0.25	1.08	0.27	0.77	1.31	0.97	4.05	0.89	0.32
	Phosphorus	mg/kg	7,902	129	2,537	2,182	3.12	7,250	4,167	1,200	86	6.04	6,031	5,387	1,143	103	5.27	5,504	1,848	971	343	5.67	7,388	1,238	1,180	65.7	6.26	11,274	5,234	1,352	297	8.34
	Selenium	mg/kg	2.31	0.56	2.75	0.40	0.84	7.31	2.82	4.43	1.07	1.65	3.24	2.75	0.64	0.23	5.09	3.46	0.43	0.52	0.37	6.65	8.12	1.10	0.97	0.29	8.37	4.59	3.16	1.23	0.46	3.74
	Silver	mg/kg	0.029	0.005	0.377	0.031	0.08	0.051	0.041	0.348	0.013	0.15	0.047	0.012	0.148	0.030	0.32	0.033	0.018	0.099	0.025	0.34	0.191	0.079	0.214	0.061	0.89	0.191	0.270	0.369	0.106	0.52
	Sodium	mg/kg	5,642	487	900	418	6.27	4,424	3,681	1,828	127	2.42	1,854	648	460	50	4.03	1,850	1,228	386	219	4.79	3,634	810	497	62.5	7.32	5,922	2,623	1,396	411	4.24
	Strontium	mg/kg	5.38	1.89	99.4	14.5	0.05	38.0	36.7	289	18.7	0.13	149	255	69	15.7	2.16	61.3	88.5	79.3	34.6	0.77	30.1	12.3	85.1	8.7	0.35	43.2	39.5	212	45.2	0.20
	Tin	mg/kg	0.038	0.016	0.697	0.183	0.06	0.225	0.236	2.10	0.199	0.11	0.016	0.011	0.38	0.025	0.04	0.022	0.017	0.440	0.178	0.05	0.056	0.051	0.453	0.100	0.12	0.225	0.344	1.99	0.528	0.11
	Titanium	mg/kg	6.86	1.93	461	157	0.01	224	264	1,832	238	0.12	28.2	24.8	936	86.8	0.03	53.3	68.0	1,085	387	0.05	143	178	1,130	197	0.13	218	230	1,996	509	0.11
	Vanadium	mg/kg	1.34	0.43	80.3	10.5	0.02	20.9	25.1	115	7.5	0.18	5.94	8.06	57	9.3	0.10	12.1	5.95	85.3	46.6	0.14	17.0	9.67	70.1	11.2	0.24	24.4	18.9	142	32.6	0.17

¹ Summary statistics were calculated using method detection limit (MDL) values if data were below the MDL. Means are shown with a < symbol if all data used in their calculation were < MDL. If MDLs were variable, means were reported as < the maximum MDL.

² BSAF = Biota Sediment Accumulation Factor; [Mean concentration of analyte in benthic tissue (mg/kg dw)] / [Mean concentration of analyte in sediment (mg/kg dw)]

Mean analyte concentration in benthic invertebrates was significantly higher than in the associated reference area, p < 0.05 (using a non-parametric Mann-Whitney U test).

Mean analyte concentration in benthic invertebrates was significantly lower than in the associated reference area, p < 0.05 (using a non-parametric Mann-Whitney U test).

D.4). Principal Components Analysis (PCA) supported these observations (Appendix Figure D.1; Appendix Tables D.2 – D.3). Mean benthic invertebrate copper concentrations in Polley Lake were approximately six times higher than in the reference area, but also exhibited higher variability (Table 1; Figure 2; Appendix Table D.1), which is consistent with the variability observed in sediment copper concentrations in 2014 (Minnow 2015a) and with the heterogeneous composition of sediment observed during field collections. Elevated benthic invertebrate copper concentrations in Polley Lake relative to reference are not unexpected given the presence of elevated sediment copper concentrations relative to reference (approximately 2x higher; Table 1; Minnow 2015b) and given the known influence of gut content on the determinations of metal concentrations in invertebrates previously discussed (i.e., Chapman 1985; 2016).

BSAFs for Polley Lake were higher than those for the reference area (Bootjack Lake; Table 1). Because BSAFs are ratios, they are generally expected to be higher at lower sediment concentrations than at higher sediment concentrations (Figure 3). Although relationships between sediment concentrations and BSAFs should be interpreted very cautiously due to the fact that benthic invertebrate concentrations include gut content, the fact that BSAFs were higher in Polley Lake even at higher sediment concentrations, suggests that additional investigation is warranted (including examination using depurated organisms).

Quesnel Lake Littoral

The approximate biomass of benthic invertebrate subsamples retrieved from exposed and reference littoral areas of Quesnel Lake were similar (Appendix Table A.1). Quesnel Lake littoral benthic invertebrate samples were composed mainly of chironomids, mayflies, leeches, amphipods, and pea clams.

Mean concentrations of POIs and IPs in benthic invertebrates from the littoral far-field area of Quesnel Lake did not differ from the reference area (Table 1; Appendix Tables D.4 and D.5), including copper (Figure 2). PCA results supported this finding, with very little distinction between the exposed and reference area results (Appendix Figure D.2; Appendix Tables D.6 and D.7).

BSAFs for the Quesnel Lake littoral exposed area (Quesnel Lake LFF) were generally similar to those at the reference area (Table 1). As for Polley Lake, there is some evidence of greater BSAF at some exposed area stations than at the reference area stations at similar sediment copper concentrations (Figure 3). Subject to the same caution as outlined above regarding interpretation of these data, this suggests that additional investigation is warranted (including examination using depurated organisms).

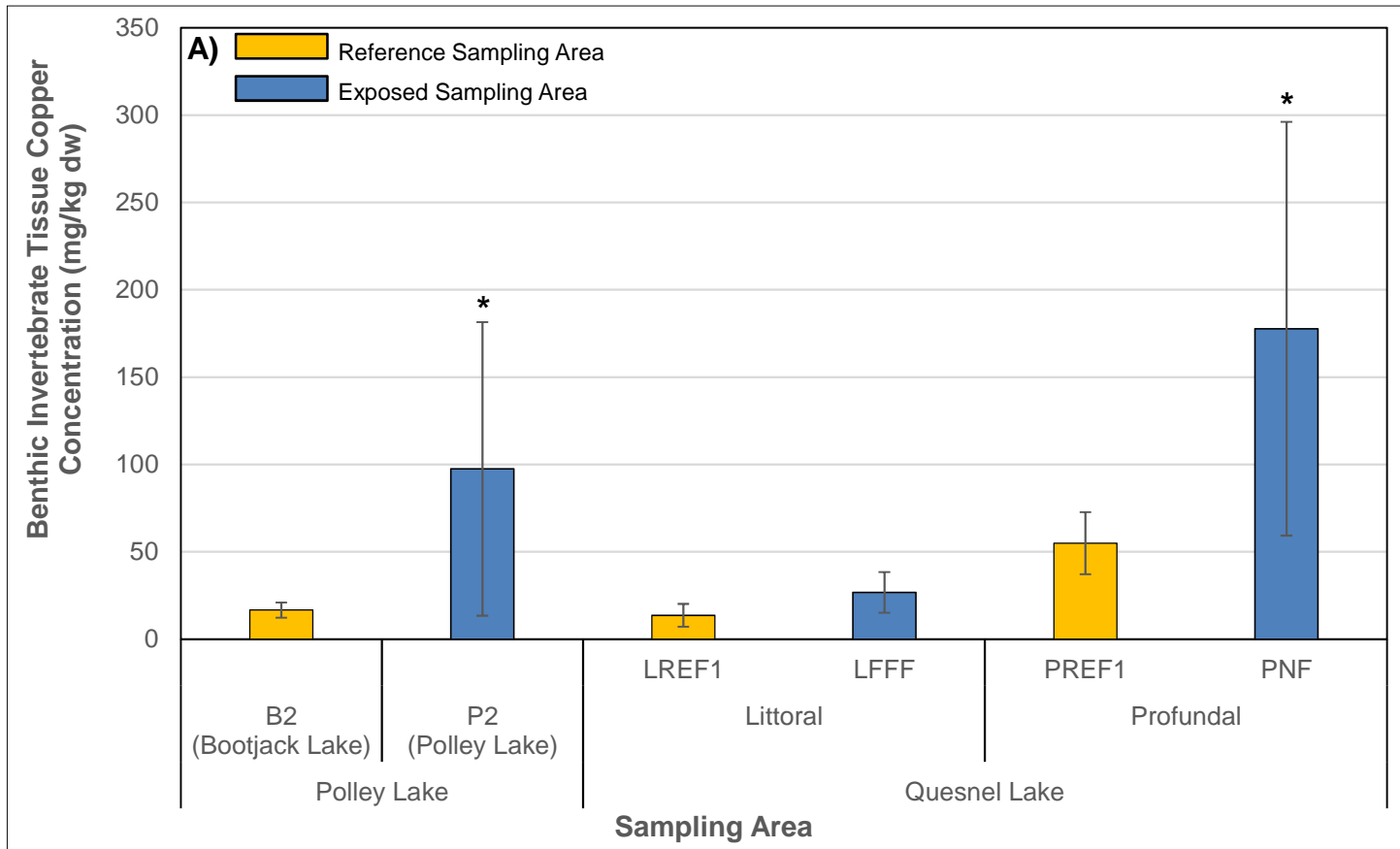


Figure 2: Mean copper concentrations ($\pm t^*SE$) in benthic invertebrate tissue collected in lakes in the vicinity of the Mount Polley Mine, 2015 ¹.

¹ Copper concentrations in exposed sampling areas represented with a * symbol differ significantly from those in the associated reference area, $p < 0.05$ (using a non-parametric Mann-Whitney U test).

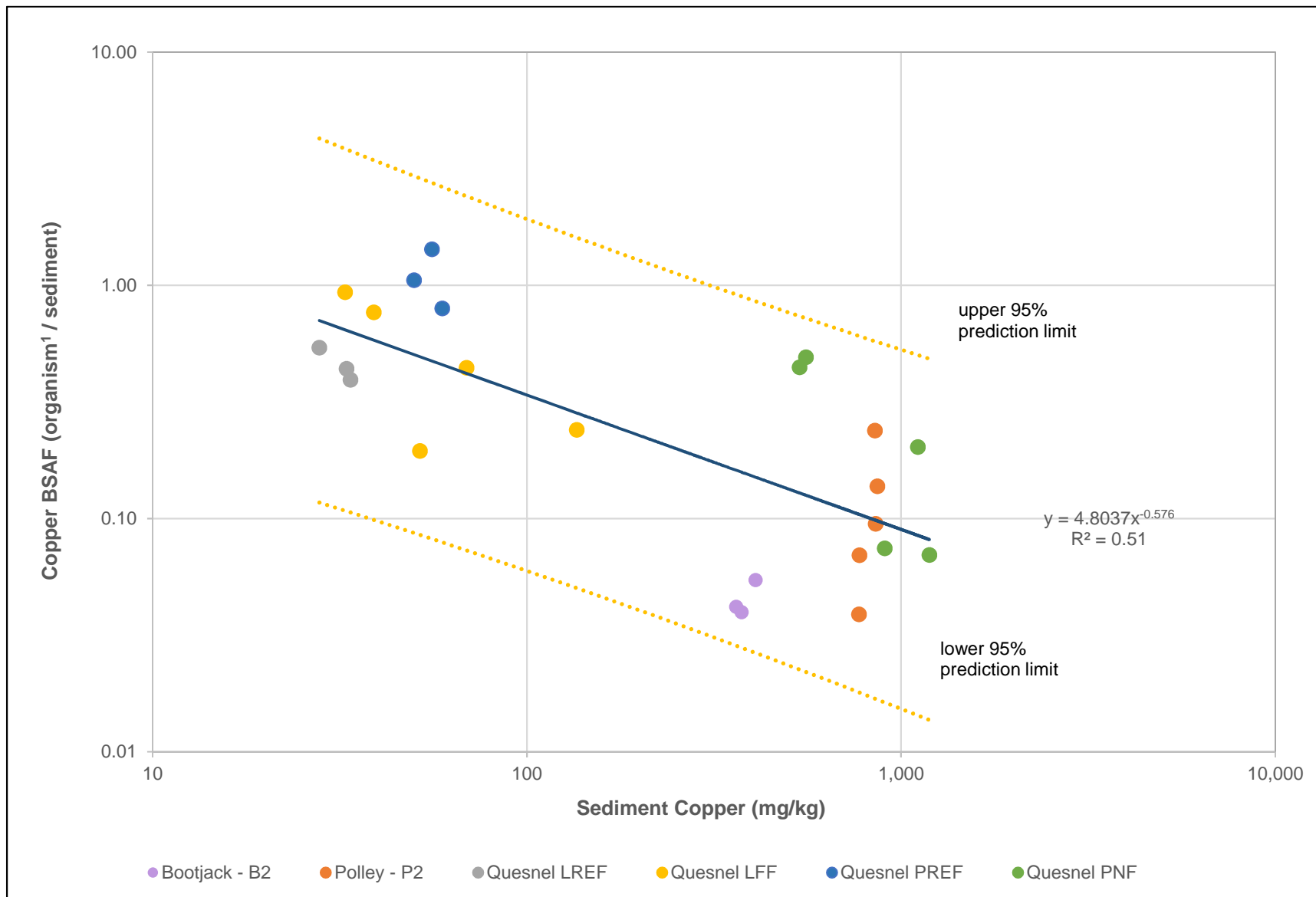


Figure 3: Copper BSAF versus sediment copper concentrations. BSAF is the ratio of copper concentration in whole benthic invertebrate samples divided by sediment concentrations.

Quesnel Lake Profundal

The approximate biomass of benthic invertebrates retrieved from the profundal exposed area of Quesnel Lake was much lower than the approximate biomass of benthic invertebrate subsamples retrieved from the corresponding profundal reference area (exposed mean <0.09 g/m² wet weight; reference mean >0.34 g/m² wet weight; Appendix Table A.1). Samples collected from both profundal areas of Quesnel Lake were composed mainly of chironomids.

Copper was the only POI or IP with a mean benthic invertebrate concentration in the profundal near-field area of Quesnel Lake that was significantly greater than the reference area mean (Table 1; Appendix Tables D.4 and D.8). PCA demonstrated a separation between the near-field and reference samples, but copper was not a dominant component (Appendix Figure D.3, Appendix Table D.9 and D.10). The concentration of copper in benthic invertebrates collected from the near-field exposed area exceeded reference by approximately three times (Table 1; Figure 2; Appendix Table D.8). However, as discussed previously, the elevation of copper in benthic invertebrate tissues at the exposed area relative to reference is expected based on the elevated sediment copper concentrations observed in the near-field area (approximately 16x higher than reference sediment; Table 1; Minnow 2015b), and the known confounding influence of gut content on the determinations of tissue metal concentrations in invertebrates (i.e., Chapman 1985; 2016).

BSAFs for copper in the Quesnel Lake profundal near-field area were lower than those observed in the reference area (Table 1), and these lower BSAFs were generally consistent with the overall relationship between BSAFs and sediment concentrations (Figure 3).

Erosional Environments

Hazeltine Creek

Benthic invertebrate samples collected from upper Hazeltine Creek were dominated by a high abundance of black fly larvae, while a more diverse benthic invertebrate assemblage, composed mainly of caddisflies and mayflies, was evident at the lower Hazeltine Creek sampling area. Benthic invertebrate samples collected from Edney Creek were composed of a diverse mix of organisms, including mayflies, stoneflies and caddisflies.

The mean concentrations of all analytes identified as POIs (arsenic, copper, iron, manganese, nickel, and zinc) and most of the IPs (barium, calcium, cobalt, selenium, silver, sodium, strontium, titanium, and vanadium) by Minnow (2015a) were significantly higher in benthic invertebrates from both upper and lower sampling areas of Hazeltine Creek than those in the corresponding reference area (Edney Creek; Table 2; Appendix Tables D.4 and D.12). PCA results confirmed the distinction between the two exposed areas and reference (Appendix Figure D.4; Appendix Tables D.14 – D.15). Mean benthic invertebrate copper concentrations in Hazeltine Creek

Table 2: Summary whole benthic invertebrate and water chemistry (dissolved metals) results from creek and river sampling areas in the vicinity of the Mount Polley Mine, 2015 ¹.

Parameter	Units	Hazeltine Creek																									
		Reference						Pre-event (2010)									Exposed (2015)										
		Edney Creek (EDC-1)						Upper Hazeltine (W7)			Lower Hazeltine (W11)						Upper Hazeltine (HAC-U)			Lower Hazeltine (HAC-D)							
		Benthic Invertebrate Tissue		Water		BCF ²	Benthic Invertebrate Tissue	Water		BCF ²	Benthic Invertebrate Tissue		Water ³		BCF ²	Benthic Invertebrate Tissue		Water		BCF ²	Benthic Invertebrate Tissue		Water		BCF ²		
Mean	t*SE	Mean	t*SE	Mean	t*SE			Mean	t*SE		Mean	t*SE	Mean	t*SE		Mean	t*SE	Mean	t*SE		Mean	t*SE	Mean	t*SE		Mean	t*SE
Parameters of Interest (POIs)	Arsenic	mg/kg	1.47	0.43	0.00054	0.00016	2,710	2.62	1.07	0.00042	0.00032	6,323	3.94	2.64	0.00051	-	7,729	2.56	0.20	0.00090	0.00008	2,842	2.29	0.46	0.00117	0.00009	1,957
	Copper	mg/kg	15.9	3.0	0.0050	0.0015	3,198	49.8	5.2	0.0021	0.0003	24,000	26.2	7.8	0.0028	-	9,432	176	13.2	0.014	0.005	12,215	204	56.0	0.034	0.008	6,054
	Iron	mg/kg	384	453	0.15	0.04	2,573	-	-	<0.03	0	-	-	-	0.094	-	-	6,502	2,902	0.079	0.046	82,144	7,720	4,103	0.243	0.227	31,749
	Manganese	mg/kg	73.8	43.2	0.0060	0.0022	12,385	2,018	275	0.0043	0.0105	468,757	1,146	477	0.0036	-	321,120	590	66.2	0.46	0.34	1,271	204	27.5	0.17	0.07	1,169
	Nickel	mg/kg	0.42	0.23	0.0011	0.0001	382	13.54	8.18	<0.0005	0	27,088	26.8	31.1	0.00070	-	38,334	8.44	2.46	0.00094	0.00038	9,016	3.14	1.01	0.0016	0.0005	1,941
	Zinc	mg/kg	74.9	5.8	<0.003	0	24,953	220	27.5	<0.001	0	219,800	101	13.5	0.0010	-	100,740	91.9	10.8	0.0034	0.0008	27,091	110	8.4	0.0033	0.0004	33,887
Indicator Parameters (IPs)	Barium	mg/kg	6.7	2.8	0.014	0.006	478	65.0	14.4	0.0079	0.0067	8,262	69.5	33.0	0.0102	-	6,818	97.9	26.0	0.031	0.009	3,118	69.8	13.7	0.032	0.004	2,200
	Calcium	mg/kg	1,477	555	22.1	7.6	67	4,276	5,999	36.1	12.7	118	2,568	1,186	21.8	-	118	7,416	2,017	62.5	14.2	119	4,202	1,300	42.5	3.4	99.0
	Cobalt	mg/kg	0.19	0.12	0.00011	0.00001	1,825	2.51	0.70	<0.0001	0	25,120	3.47	2.24	<0.0001	-	34,660	4.22	1.10	0.00064	0.00045	6,602	3.95	2.21	0.00038	0.00016	10,272
	Molybdenum	mg/kg	5.01	2.11	0.0013	0.0012	3,790	4.08	0.80	0.0020	0.0013	2,018	5.14	2.88	0.00094	-	5,481	1.47	0.25	0.012	0.001	123	1.26	0.27	0.0084	0.0014	150
	Phosphorus	mg/kg	7,408	804	0.0084	0.0014	878,419	-	-	-	-	-	-	-	-	-	-	3,940	1,341	0.0080	0.0048	492,500	2,914	993	0.0082	0.0018	354,910
	Selenium	mg/kg	1.51	0.84	0.00033	0.00011	4,519	10.9	0.82	0.001	0	10,900	3.51	0.24	<0.001	-	3,508	4.91	0.79	0.00083	0.00016	5,921	2.72	0.26	0.00090	0.00011	3,019
	Silver	mg/kg	0.023	0.022	<0.00001	0	2,259	-	-	<0.00001	0	-	-	-	<0.00001	-	-	0.080	0.024	0.000015	0.000008	5,308	0.126	0.068	0.000013	0.000002	9,787
	Sodium	mg/kg	1,972	179	3.83	1.99	514	-	-	4.50	3.81	-	-	-	3.28	-	-	3,432	671	13.9	2.9	247	1,199	311	9.55	0.95	126
	Strontium	mg/kg	10.8	3.73	0.135	0.053	80	22.5	9.87	0.23	0.17	100	20.7	8.83	0.136	-	152	60.4	7.16	0.485	0.102	125	28.4	6.85	0.350	0.033	81
	Tin	mg/kg	0.148	0.080	<0.0001	0	1,479	<0.20	0	<0.0001	0	2,000	0.24	0.10	<0.0001	-	2,420	0.031	0.015	0.00013	0.00007	235	0.026	0.019	0.00013	0.00002	208
	Titanium	mg/kg	3.90	1.78	<0.01	0	390	-	-	<0.01	0	-	-	-	<0.01	-	-	51.3	27.3	0.0102	0.0003	5,056	48.2	26.0	0.018	0.013	2,624
Vanadium	mg/kg	0.85	1.20	0.00086	0.00010	992	6.60	2.87	<0.001	0	6,602	11.0	6.16	<0.001	-	11,024	28.9	9.39	0.0013	0.0007	21,405	44.2	18.4	0.0017	0.0005	25,464	

¹ Summary statistics were calculated using maximum method detection limit (MDL) values if data were below the MDL. Means are shown as < the maximum reported MDL if all data used in their calculation were < MDL. If MDLs were variable, means were reported as < the maximum MDL.

² BCF = Bioconcentration Factor; [Mean concentration of analyte in benthic tissue (mg/kg dw)] / [Mean dissolved concentration of analyte in water (mg/L)]. Mean water concentrations calculated using all available data from January to August 2015 for Quesnel and Cariboo Rivers, and all available data from January to June 2010 for Hazeltine Creek Pre-event data.

³ Results are based on a single sampling event, therefore data from this single sample are displayed.

	Mean analyte concentration in benthic invertebrates was significantly higher than in the associated reference area (2015), p < 0.05 (using a non-parametric Mann-Whitney U test).
	Mean analyte concentration in benthic invertebrates was significantly higher than in the associated reference area (2015) and pre-event data for the same creek area (2010, if available), p < 0.05 (using a non-parametric Mann-Whitney U test).
	Mean analyte concentration in benthic invertebrates was significantly higher than in the associated reference area (2015), but significantly lower than the pre-event data for the same creek area (2010, if available), p < 0.05 (using a non-parametric Mann-Whitney U test).
	Mean analyte concentration in benthic invertebrates was significantly lower than in the associated reference area (2015) and significantly lower than pre-event data for the same creek area (2010, if available), p < 0.05 (using a non-parametric Mann-Whitney U test).

Table 2: Summary whole benthic invertebrate and water chemistry (dissolved metals) results from creek and river sampling areas in the vicinity of the Mount Polley Mine, 2015 ¹.

Parameter	Units	Quesnel River										
		Reference					Exposed					
		Cariboo River (CARU)					Quesnel River (QUR1)					
		Benthic Invertebrate Tissue		Water ³		BCF ²	Benthic Invertebrate Tissue		Water		BCF ²	
Mean	t*SE	Mean	t*SE	Mean	t*SE		Mean	t*SE				
Parameters of Interest (POIs)	Arsenic	mg/kg	0.68	0.50	<0.00010	-	6,834	1.04	0.63	0.00018	0.00002	5,858
	Copper	mg/kg	22.5	6.6	<0.00050	-	45,080	30.1	22.5	0.00114	0.00013	26,414
	Iron	mg/kg	1,056	1,499	<0.030	-	35,200	1,074	819	<0.030	0	35,787
	Manganese	mg/kg	100	111	0.00069	-	145,159	86.6	29.5	0.00049	0.00006	176,941
	Nickel	mg/kg	2.77	2.55	<0.00050	-	5,544	2.37	0.88	<0.0005	0	4,736
	Zinc	mg/kg	221	76.0	<0.0030	-	73,600	153	164	<0.003	0	51,020
Indicator Parameters (IPs)	Barium	mg/kg	25.9	33.1	0.00493	-	5,262	23.3	18.9	0.00596	0.00023	3,904
	Calcium	mg/kg	1,718	1,539	20.4	-	84	112,792	191,297	19.0	0.3	5,939
	Cobalt	mg/kg	1.68	0.97	<0.00010	-	16,792	1.13	0.80	<0.0001	0	11,334
	Molybdenum	mg/kg	0.24	0.11	0.00010	-	2,307	0.26	0.13	0.00077	0.00013	335
	Phosphorus	mg/kg	7,164	1,491	<0.0020	-	3,582,000	5,438	4,393	0.00201	0.00001	2,709,656
	Selenium	mg/kg	2.23	0.33	<0.000050	-	44,680	2.07	1.62	0.00029	0.00007	7,208
	Silver	mg/kg	0.162	0.081	<0.000010	-	16,200	0.081	0.047	<0.00001	0	8,104
	Sodium	mg/kg	4,020	1,794	0.395	-	10,177	2,744	2,059	1.21	0.07	2,266
	Strontium	mg/kg	9.19	7.20	0.127	-	72	231	379	0.136	0.003	1,704
	Tin	mg/kg	0.023	0.014	<0.00010	-	230	0.019	0.010	<0.0001	0	191
	Titanium	mg/kg	6.96	4.21	<0.010	-	696	19.6	18.4	<0.01	0	1,961
Vanadium	mg/kg	1.28	1.22	<0.00050	-	2,564	2.78	2.49	<0.001	0.0001	2,776	

¹ Summary statistics were calculated using maximum method detection limit (MDL) values if data were below the MDL. Means are shown as < the maximum reported MDL if all data used in their calculation were < MDL. If MDLs were variable, means were reported as < the maximum MDL.

² BCF = Bioconcentration Factor; [Mean concentration of analyte in benthic tissue (mg/kg dw)] / [Mean dissolved concentration of analyte in water (mg/L)]. Mean water concentrations calculated using all available data from January to August 2015 for Quesnel and Cariboo Rivers, and all available data from January to June 2010 for Hazeltine Creek Pre-event data.

³ Results are based on a single sampling event, therefore data from this single sample are displayed.

	Mean analyte concentration in benthic invertebrates was significantly higher than in the associated reference area (2015), p < 0.05 (using a non-parametric Mann-Whitney U test).
	Mean analyte concentration in benthic invertebrates was significantly higher than in the associated reference area (2015) and pre-event data for the same creek area (2010, if available), p < 0.05 (using a non-parametric Mann-Whitney U test).
	Mean analyte concentration in benthic invertebrates was significantly higher than in the associated reference area (2015), but significantly lower than the pre-event data for the same creek area (2010, if available), p < 0.05 (using a non-parametric Mann-Whitney U test).
	Mean analyte concentration in benthic invertebrates was significantly lower than in the associated reference area (2015) and significantly lower than pre-event data for the same creek area (2010, if available), p < 0.05 (using a non-parametric Mann-Whitney U test).

exceeded reference by approximately 11 and 13 times in upper and lower Hazeltine Creek areas, respectively (Table 2; Figure 4; Appendix Table D.12). This difference is not unexpected given the higher mean dissolved copper concentrations observed at the exposed areas (approximately 3 and 7 times higher for upper and lower areas respectively; Table 2; Appendix Table D.12). Prior to the failure, however, mean concentrations of all measured POIs (arsenic, copper, manganese, nickel, and zinc) as well as six of the IPs (barium, calcium, cobalt, selenium, strontium, and vanadium) were higher in upper and lower areas of Hazeltine Creek than in the reference area in 2015 (Table 2; Appendix Table D.16). Comparison of benthic invertebrate chemistry results for Hazeltine Creek to those collected prior to the dam failure indicated that mean concentrations of five analytes (copper, barium, cobalt, strontium, and vanadium) increased in the upper Hazeltine Creek, while the mean concentrations of three analytes (copper, calcium, and vanadium) increased in lower Hazeltine Creek (Table 2; Appendix Table D.17). In particular, mean benthic invertebrate copper concentrations were approximately 3.5 and 8 times higher than observed in these sections of the creek prior to the failure (Figure 4; Table 2; Appendix Table D.17). As discussed above, this temporal increase is not unexpected given that mean dissolved copper concentrations observed in 2015 at these areas were approximately 7 and 12 times higher than those measured during pre-failure sampling at upper and lower creek areas respectively; Table 2).

BCFs for copper in Hazeltine Creek observed in 2015 generally exceeded those observed in the reference area (Table 2), however, this was also true for the BCFs from samples collected prior to the tailings dam failure (2010). Examination of relationships between copper BCFs for pre-event (2010) and post-event sampling within Hazeltine Creek indicated that BCFs were higher in upper Hazeltine Creek relative to the lower sampling area both prior to and following the tailings dam failure (Table 2; Figure 5). When BCFs are considered relative to aqueous copper concentrations in Hazeltine Creek, the BCFs within the upper and lower areas of the creek were similar before and after the dam failure, with the relationship for upper Hazeltine Creek following the overall trend between BCFs and water concentrations and the relationship for lower Hazeltine Creek deviating only slightly from the overall trend (Figure 5). This suggests little difference in the current bioavailability of copper to benthic invertebrates in Hazeltine Creek relative to conditions prior to the failure.

Quesnel River

Benthic invertebrate samples collected from the Quesnel River and the corresponding reference area (Cariboo River) were more diverse than those collected from Hazeltine Creek, and were composed mainly of stoneflies, mayflies, caddisflies, and snails.

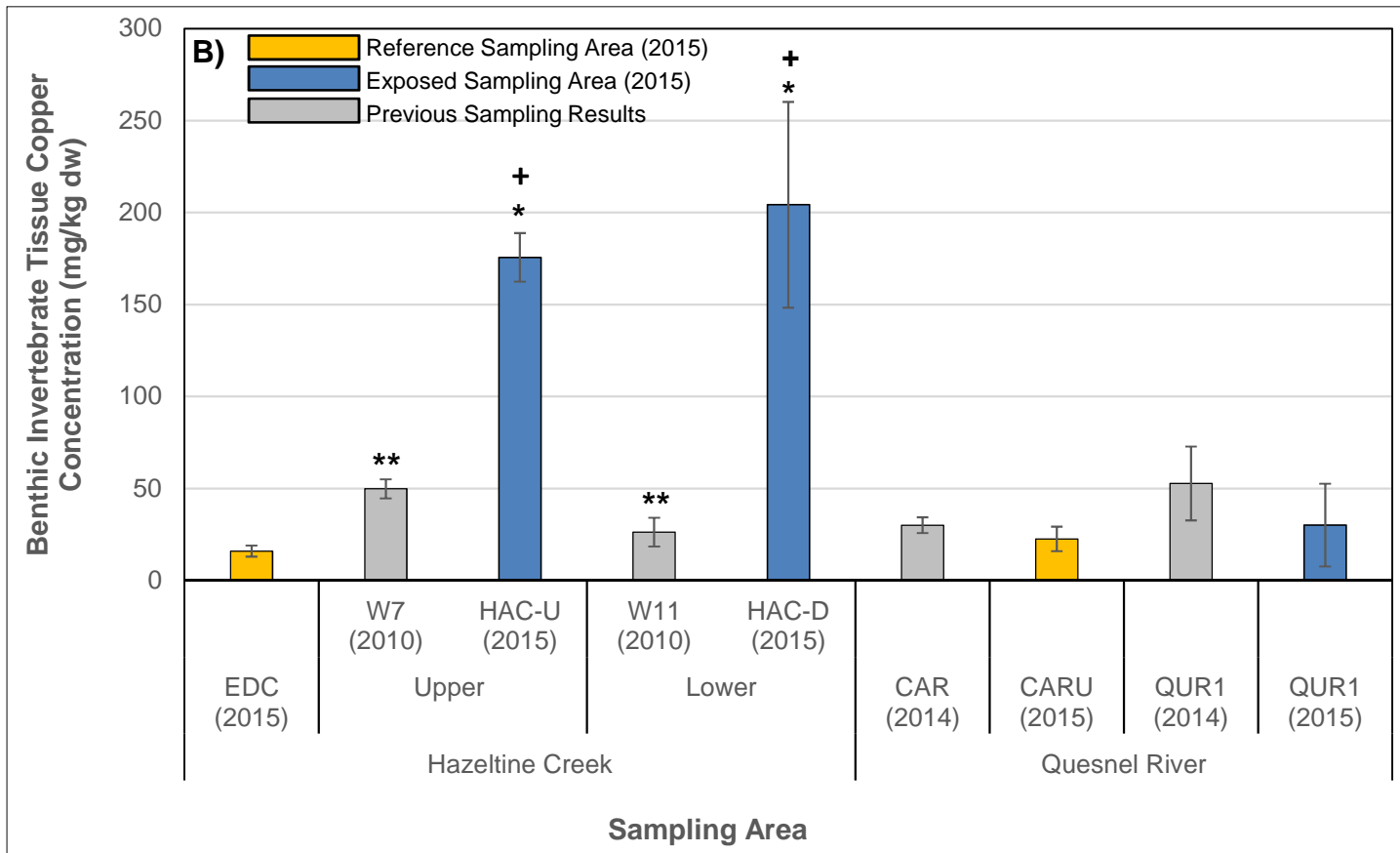


Figure 4: Mean copper concentrations ($\pm t^*SE$) in benthic invertebrate tissue collected in creeks and rivers in the vicinity of the Mount Polley Mine, 2015^{1,2}.

¹ EDC-1 = Edney Creek (reference); W7 and HAC-U = Upper Hazeltine Creek; W11 and HAC-D = Lower Hazeltine Creek;

CAR = Cariboo River; (reference); CARU = Upper Cariboo River (reference); QUR1 = Quesnel River

² Mean concentrations in exposed sampling areas (2015 only) represented with a * symbol differed significantly from those in the associated reference area (EDC), and those represented with a + symbol differed significantly from pre-event concentrations (2010) within the creek area (upper and lower, respectively), $p < 0.05$ (using a non-parametric Mann-Whitney U test).

³ Mean concentrations in pre-event areas (2010) represented with a ** symbol differed significantly from those in the reference area (EDC, 2015), $p < 0.05$ (using a non-parametric Mann-Whitney U test).

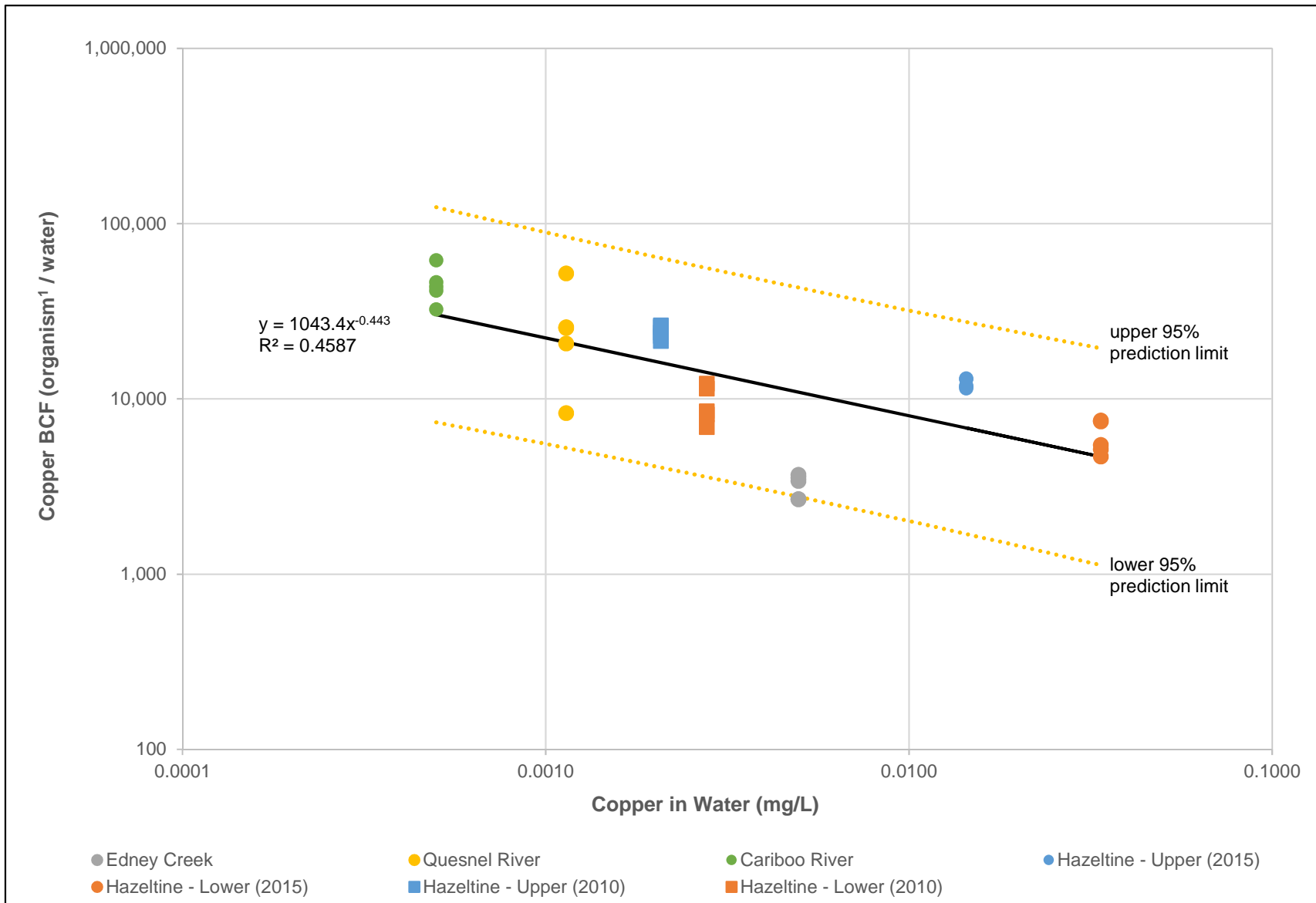


Figure 5: Copper BCF versus dissolved copper concentrations. BCF is the ratio of copper concentration in whole benthic invertebrate samples divided by water concentrations.

Benthic invertebrates from the Quesnel River did not have significantly higher mean concentrations of any of the POIs and IPs (listed above; Minnow 2015a) than those from the reference river (upper Cariboo River; Table 2, Appendix Tables D.4 and D.20). PCA results supported this finding, with very little to no distinction present between the exposed and reference area results (Appendix Figure D.6; Appendix Tables D.21 and D.22). Mean benthic invertebrate copper concentrations and BCFs were generally similar between Quesnel River and the reference river (Table 2; Figure 4; Figure 5; Appendix Table D.20), however greater variability was observed in exposed benthic invertebrate copper concentrations and therefore BCFs (Table 2; Figure 5). The finding of similar exposed area and reference area concentrations is in contrast to the significant difference in copper concentrations observed in benthic invertebrates from this sampling site (QUR1) and reference areas in 2014 (Minnow 2015a). Comparison with results from 2014 (Minnow 2015a) indicated a slight, but statistically non-significant, decrease in benthic invertebrate copper concentrations from 2014 to 2015 (Figure 1). The results of PCA generally support this observation (Appendix Figure D.7; Appendix Tables D.23 – D.24). Relationships between copper BCF and aqueous copper concentrations indicated that BCFs for the two areas were similarly consistent with the overall trend between BCFs and water concentrations (Figure 5). This suggests similar bioavailability in the two rivers.

Summary and Recommendations

The approximate biomass of benthic invertebrates retrieved from two exposed depositional areas (Polley Lake and the profundal near-field area of Quesnel Lake) was much lower than in the corresponding reference areas, and the retrieval of an adequate mass of benthic invertebrates for laboratory analysis required substantial sampling effort. Additional sampling effort in these exposed areas is suggested for future benthic invertebrate chemistry monitoring to obtain larger samples.

The concentrations of metals measured in benthic invertebrates from depositional environments are influenced by gut content and potentially also by adhered sediments. Accordingly, the benthic invertebrate concentrations reported herein for lakes accurately reflect concentrations as food to higher trophic levels, but do not accurately represent metals in the tissues of benthic organisms. Therefore, conclusions regarding differences in observed tissue chemistry results between exposed and reference areas, and any inferences to bioavailability must consider this. Nonetheless, comparison of BSAFs in depositional sampling areas indicated that the uptake and accumulation of copper by biota may be higher than reference for organisms in Polley Lake, slightly higher than reference at a subset of stations in the littoral exposed area of Quesnel Lake, and lower than reference in the profundal exposed area of Quesnel Lake, respectively. Within the erosional areas, comparison of BCFs indicated that uptake of copper by invertebrates was

higher in Hazeltine Creek than reference (Edney Creek), but was similar to the pre-failure condition in Hazeltine Creek. Lastly, BCFs in the Quesnel River were similar to reference.

Due to influence of organism gut content on whole benthic invertebrate metal concentrations, it is suggested that future benthic invertebrate sampling from depositional areas include gut depuration of the sampled organisms.



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APPENDIX A

**SAMPLE LOCATIONS
AND SUPPORTING DATA**

Table A.1: Benthic invertebrate chemistry sampling locations, sample weights, and estimated sample biomass, Mount Polley Mine, August 2015.

Waterbody	Location	Area Code	Type	Replicate	GPS Coordinates		Sampling Method	Grabs / Effort per Composite	Surface Area Sampled (m ²)	Sample Weight ^a					Approximate Biomass				Mean Approximate Biomass				
					Easting	Northing				Field Laboratory	SRC	MURR			Field Laboratory	SRC	MURR		Field Laboratory	SRC	MURR		
										Wet Weight (g)	Wet Weight (g)	Wet Weight (g)	Dry Weight (g)	% Dry Matter	Wet Weight (g/m ²)	Wet Weight (g/m ²)	Wet Weight (g/m ²)	Dry Weight (g/m ²)	Wet Weight (g/m ²)	Wet Weight (g/m ²)	Wet Weight (g/m ²)	Dry Weight (g/m ²)	
Depositional	Polley Lake	South Basin	POL-P2	Exposed	1	595166	5822178	petite ponar	20 grabs	0.465	0.051	0.0056	samples too small ^c			0.11	0.01	-	-	0.17	0.02	-	-
					2	595137	5822146	petite ponar	20 grabs	0.465	0.090	0.0042	samples too small ^c			0.19	0.01	-	-				
					3	595191	5822207	petite ponar	20 grabs	0.465	0.094	0.0220	samples too small ^c			0.20	0.05	-	-				
					4	595158	5822228	petite ponar	20 grabs	0.465	0.034	0.0038	samples too small ^c			0.07	0.01	-	-				
					5	595134	5822204	petite ponar	10 grabs	0.581	0.150	0.0005	samples too small ^c			0.26	0.001	-	-				
	Bootjack Lake	South Basin	BOL-B2	Reference	1	591265	5821636	petite ponar	5 grabs	0.116	>0.669	>0.2306	>0.1222	>0.0194	16%	>5.76	>1.98	>1.05	>0.16	>3.41	>1.47	>0.85	>0.13
					2	591300	5821652	petite ponar	5 grabs	0.116	>0.530	>0.3628	>0.1663	>0.0234	14%	>4.56	>3.12	>1.43	>0.20				
					3 ^b	591241	5821684	petite ponar	20 grabs	0.465	>1.135	>0.3222	>0.1959	>0.0431	22%	>2.44	>0.69	>0.42	>0.09				
					4	591287	5821593	petite ponar	10 grabs	0.232	>0.495	>0.2272	>0.1129	>0.0142	13%	>2.13	>0.97	>0.48	>0.06				
					5	591213	5821639	petite ponar	10 grabs	0.232	>0.500	>0.1335	samples too small ^c			>2.15	>0.57	-	-				
	Quesnel Lake	Littoral Far-Field	LFF	Exposed	1	601680	5820049	petite ponar	7 grabs	0.163	>0.750	>0.5971	>0.4646	>0.0642	14%	>4.61	>3.67	>2.85	>0.39	>4.33	>2.85	>2.08	>0.41
					2	600441	5822695	petite ponar	7 grabs	0.163	>1.119	>0.7535	>0.5611	>0.1227	22%	>6.88	>4.63	>3.45	>0.75				
					3	600932	5818778	petite ponar	5 grabs	0.116	>0.652	>0.3995	>0.2623	>0.0604	23%	>5.61	>3.44	>2.25	>0.52				
					4	600861	5818809	petite ponar	6 grabs	0.139	>0.350	>0.1598	>0.1210	>0.0295	24%	>2.51	>1.14	>0.86	>0.21				
					5	601035	5821268	petite ponar	7 grabs	0.163	>0.327	>0.2177	>0.1533	>0.0257	17%	>2.01	>1.33	>0.94	>0.15				
		Littoral Reference	LREF1	Reference	1	610136	5813949	petite ponar	5 grabs	0.116	>0.438	>0.2175	>0.1295	>0.0311	24%	>3.77	>1.87	>1.11	>0.26	>4.71	>2.19	>1.75	>0.47
					2	610003	5813958	petite ponar	11 grabs	0.255	>0.265	>0.1901	samples too small ^c			>1.03	>0.74	-	-				
					3	610097	5813939	petite ponar	5 grabs	0.116	>1.236	>0.4853	>0.3490	>0.0654	19%	>10.6	>4.17	>3.00	>0.56				
					4 ^b	610164	5813960	petite ponar	10 grabs	0.232	>1.114	>0.6132	>0.4211	>0.0937	22%	>4.79	>2.64	>1.81	>0.40				
					5	610031	5813948	petite ponar	7 grabs	0.163	>0.536	>0.2448	>0.1765	>0.1059	60%	>3.29	>1.50	>1.08	>0.65				
	Profundal Near-Field	PNF	Exposed	1	601814	5818205	standard ponar	15 grabs	0.784	0.075	0.0065	samples too small ^c			0.10	0.01	-	-	0.09	0.01	-	-	
				2	601672	5818297	petite ponar	15 grabs	0.348	0.035	0.0053	samples too small ^c			0.10	0.02	-	-					
				3	601914	5818113	standard ponar	10 grabs	0.523	0.012	0.0010	samples too small ^c			0.02	0.002	-	-					
				4	602623	5817818	standard ponar	10 grabs	0.523	0.065	0.0008	samples too small ^c			0.12	0.002	-	-					
				5	602272	5817946	standard ponar	10 grabs	0.523	0.051	0.0030	samples too small ^c			0.10	0.01	-	-					
Profundal Reference	PREF1	Reference	1	610434	5814754	standard ponar	3 grabs	0.157	>0.455	>0.2273	>0.0481	>0.0092	19%	>2.90	>1.44	>0.30	>0.05	>2.45	>0.75	>0.34	>0.07		
			2 ^b	610294	5814639	standard ponar	6 grabs	0.314	>0.300	0.0594	samples too small ^c			>0.95	>0.18	-	-						
			3	610613	5814885	standard ponar	5 grabs	0.261	>0.400	>0.0551	>0.0332	>0.0119	36%	>1.53	>0.21	>0.12	>0.04						
			4	610526	5814608	standard ponar	3 grabs	0.157	>0.481	>0.1522	>0.0839	>0.0196	23%	>3.06	>0.97	>0.53	>0.12						
			5	610714	5814799	standard ponar	4 grabs	0.209	>0.788	>0.1985	>0.0786	>0.0128	16%	>3.76	>0.94	>0.37	>0.06						
Erosional	Hazeltime Creek	Upper Creek	HAC-U	Exposed	1	596646	5819278	Hand picking, Kick and Sweep	N/A	N/A	N/A	0.4836	0.3600	0.0566	16%	-	-	-	-	-	-	-	-
					2	596722	5819200	Hand picking, Kick and Sweep	N/A	N/A	N/A	1.015	0.5753	0.0944	16%	-	-	-	-				
					3	596788	5819153	Hand picking, Kick and Sweep	N/A	N/A	N/A	0.5060	0.3654	0.0590	16%	-	-	-	-				
					4	596806	5819124	Hand picking, Kick and Sweep	N/A	N/A	N/A	0.4114	0.2666	0.0418	16%	-	-	-	-				
					5	596847	5819097	Hand picking, Kick and Sweep	N/A	N/A	N/A	0.6468	0.3108	0.0503	16%	-	-	-	-				
	Lower Creek	HAC-D	Exposed	1	600812	5817294	Hand picking, Kick and Sweep	N/A	N/A	N/A	0.4187	0.2436	0.0496	20%	-	-	-	-	-	-	-	-	
				2	600858	5817290	Hand picking, Kick and Sweep	N/A	N/A	N/A	0.1487	0.0886	0.0146	16%	-	-	-	-					
				3	600905	5817293	Hand picking, Kick and Sweep	N/A	N/A	N/A	0.2980	0.1278	0.0251	20%	-	-	-	-					
				4	600977	5817272	Hand picking, Kick and Sweep	N/A	N/A	N/A	0.2052	0.1675	0.0371	22%	-	-	-	-					
				5	601036	5817243	Hand picking, Kick and Sweep	N/A	N/A	N/A	0.1720	0.1193	0.0278	23%	-	-	-	-					
	Edney Creek	Upstream of Tailings-Dam Breach Impacted area	EDC-D	Reference	1 ^b	601024	5816750	Hand picking, Kick and Sweep	N/A	N/A	N/A	4.092	3.430	0.8337	24%	-	-	-	-	-	-	-	-
					2	601060	5816766	Hand picking, Kick and Sweep	N/A	N/A	N/A	2.541	2.387	0.5761	24%	-	-	-	-				
					3	601100	5816771	Hand picking, Kick and Sweep	N/A	N/A	N/A	0.9885	0.8456	0.2355	28%	-	-	-	-				
					4	601110	5816748	Hand picking, Kick and Sweep	N/A	N/A	N/A	1.745	1.504	0.3938	26%	-	-	-	-				
					5	601129	5816745	Hand picking, Kick and Sweep	N/A	N/A	N/A	1.666	1.436	0.4140	29%	-	-	-	-				
	Quesnel River	Near Quesnel River Research Center	QUR1	Exposed	1	595169	5830814	Hand picking, Kick and Sweep	2 minutes	N/A	0.6	0.8902	0.6632	0.2620	40%	-	-	-	-	-	-	-	-
					2 ^b	595129	5830791	Hand picking, Kick and Sweep	4 minutes	N/A	1.0	1.225	1.027	0.4227	41%	-	-	-	-				
					3	595054	5830770	Hand picking, Kick and Sweep	2 minutes	N/A	0.5	0.2954	0.2296	0.0495	22%	-	-	-	-				
					4	595203	5830844	Hand picking, Kick and Sweep	2 minutes	N/A	0.4	0.5406	0.4094	0.0937	23%	-	-	-	-				
					5	595409	5830889	Hand picking, Kick and Sweep	2 minutes	N/A	0.3	0.3189	0.2383	0.0509	21%	-	-	-	-				
Cariboo River	Upper River	CARU	Reference	1	605119	5842108	Hand picking, Kick and Sweep	2 minutes	N/A	0.5	0.3981	0.3176	0.0723	23%	-	-	-	-	-	-	-	-	
				2 ^b	605117	5842138	Hand picking, Kick and Sweep	2 minutes	N/A	0.9	0.9580	0.6383	0.0992	16%	-	-	-	-					
				3	605079	5842243	Hand picking, Kick and Sweep	2 minutes	N/A	0.4	0.3155	0.2106	0.0531	25%	-	-	-	-					
				4	605105	5842338	Hand picking, Kick and Sweep	2 minutes	N/A	0.4	0.4550	0.3630	0.0968	27%	-	-	-	-					
				5	605212	5842399	Hand picking, Kick and Sweep	3 minutes	N/A	0.6	0.9425	0.8307	0.2156	26%	-	-	-	-					

^a Sample weight was evaluated by three separate methods: 1) Approximation of wet weight at the field laboratory; 2) Measurement of wet weight at Saskatchewan Research Council (SRC) laboratory; 3) Measurement of wet and dry weight at the University of Missouri Research Reactor (MURR). Weights and biomass estimates are represented with a ">" symbol if sorting of the entire grab sample was not required, and a subsample of benthic invertebrates was collected and weighed. All other depositional grab samples were sorted in their entirety to obtain the displayed sample weights.

^b Additional grabs/ effort per composite to achieve volume for quality control duplicate. Displayed sample weights include the weight of quality control duplicates that were collected.

^c Samples were too small to accurately determine % dry matter, therefore wet and dry weights were not reported by the laboratory.

Table A.2: Benthic invertebrate tissue quality supporting measures, Mount Polley Mine, August 2015.

Waterbody	Location	Area Code	Type	Replicate	Sampling Date ¹	Station Depth (m)	Secchi Depth (m)	Surface						Bottom						
								Temp. °C	DO mg/L	DO %	SpC µS/cm	pH	ORP mV	Temp. °C	DO mg/L	DO %	SpC µS/cm	pH	ORP mV	
Depositional	Polley Lake	South Basin	POL-P2	Exposed	1	13-Aug-15	28	7.18	19.9	8.17	282	8.03	150	6.0	3.00	24.1	288	7.14	157	
					2	14-Aug-15	28	6.36	19.4	8.16	88.6	282	8.28	147	5.9	3.12	24.9	288	7.22	162
					3	14-Aug-15	29	6.34	19.4	8.17	88.8	282	7.94	170	5.9	3.10	24.7	288	7.08	168
					4	14-Aug-15	28	6.23	19.4	8.17	88.8	282	8.32	152	5.9	3.03	24.4	288	7.22	165
					5	15-Aug-15	28	6.96	19.4	8.22	89.4	282	8.21	160	5.9	3.26	25.4	288	7.18	173
	Bootjack Lake	South Basin	BOL-B2	Reference	1	15-Aug-15	18	6.84	19.6	8.53	93.1	97	7.73	156	8.6	0.16	1.4	102	6.71	154
					2	16-Aug-15	16	7.15	19.1	8.43	91.1	97	7.59	179	8.5	0.15	1.3	103	6.54	84.6
					3	16-Aug-15	17	7.53	19.6	8.43	91.9	97	7.62	172	8.6	0.37	3.2	101	6.67	175
					4	16-Aug-15	15	7.27	19.7	8.40	91.7	97	7.75	169	8.7	0.24	2.2	101	6.67	175
					5	16-Aug-15	17	6.47	20.0	8.39	92.0	97	7.82	163	8.7	0.30	2.7	101	6.67	175
	Quesnel Lake	Littoral Far-Field	LFF	Exposed	1	25-Aug-15	1.5	> depth	17.4	9.47	99.2	108	8.16	227	17.8	9.46	99.6	109	8.20	225
					2	25-Aug-15	1.3	> depth	17.2	9.31	96.7	108	8.19	255	17.2	9.30	96.6	108	8.21	255
					3	26-Aug-15	1.6	> depth	17.9	9.10	95.8	109	8.03	206	17.7	9.15	95.9	108	8.03	205
					4	26-Aug-15	1.3	> depth	18.2	9.46	100	108	8.16	190	17.8	9.29	97.7	108	8.10	198
					5	25-Aug-15	1.5	> depth	16.9	9.47	98.1	108	8.20	240	17.4	9.39	97.7	108	8.22	239
		Littoral Reference	LREF1	Reference	1	24-Aug-15	1.4	> depth	18.5	10.5	112	108	8.77	144	18.7	10.6	113	108	8.81	148
					2	25-Aug-15	1.1	> depth	20.0	11.9	131	105	8.95	197	19.9	13.2	145	104	9.08	195
					3	25-Aug-15	1.2	> depth	19.7	10.9	119	105	8.31	205	19.4	10.9	119	105	8.31	204
					4	25-Aug-15	1.3	> depth	20.1	9.28	102	107	8.54	201	19.4	11.6	125	105	9.27	186
					5	25-Aug-15	1.4	> depth	19.6	10.7	116	106	8.69	209	19.4	15.5	168	103	9.30	193
		Profundal Near-Field	PNF	Exposed	1	17-Aug-15	112	9.10	19.0	8.83	95.1	105	7.79	159	4.4	11.0	83.4	115	7.46	173
					2	14-Aug-15	111	9.32	17.9	8.80	92.8	137	7.82	140	4.4	10.3	79.4	146	7.41	166
					3	15-Aug-15	104	9.96	17.9	8.78	92.6	138	7.93	141	4.3	10.3	79.1	146	7.46	145
					4	15-Aug-15	97	8.54	17.9	8.79	92.8	138	7.95	154	4.3	10.1	77.8	147	7.51	148
					5	16-Aug-15	106	10.8	19.6	8.70	95.0	141	8.20	147	4.3	10.2	78.2	151	7.57	148
Profundal Reference	PREF1	Reference	1	18-Aug-15	115	7.85	19.0	8.90	95.1	106	8.04	160	3.8	11.1	84.5	110	7.51	176		
			2	18-Aug-15	103	7.02	19.2	8.93	96.7	108	7.66	169	3.8	11.0	83.4	110	7.35	169		
			3	19-Aug-15	120	9.94	18.2	9.10	96.5	118	8.09	188	4.5	10.4	81.0	110	7.50	215		
			4	24-Aug-15	102	11.3	18.7	9.16	98.0	111	8.21	206	4.1	10.3	80.0	113	7.66	227		
			5	24-Aug-15	103	11.1	18.7	9.07	97.2	109	8.18	232	4.3	10.4	79.8	112	7.40	251		
Erosional	Hazeltine Creek	Upper Creek	HAC-U	Exposed	1	18-Aug-15	0.19	N/A	18.3	8.56	91.2	323	8.56	153	-	-	-	-	-	
					2	17-Aug-15	0.15	N/A	18.5	8.67	92.5	323	8.59	149	-	-	-	-	-	-
					3	17-Aug-15	0.17	N/A	18.5	8.66	92.6	323	8.60	145	-	-	-	-	-	-
					4	17-Aug-15	0.17	N/A	18.6	8.69	93.1	325	8.59	137	-	-	-	-	-	-
					5	17-Aug-15	0.21	N/A	18.7	8.71	93.4	326	8.52	157	-	-	-	-	-	-
	Lower Creek	HAC-D	Exposed	1	19-Aug-15	0.10	N/A	16.9	8.52	87.9	376	8.12	164	-	-	-	-	-	-	
				2	19-Aug-15	0.08	N/A	17.1	8.56	88.9	376	8.31	160	-	-	-	-	-	-	
				3	19-Aug-15	0.10	N/A	17.4	8.55	89.2	376	8.21	161	-	-	-	-	-	-	
				4	19-Aug-15	0.10	N/A	17.8	8.60	90.5	377	8.31	154	-	-	-	-	-	-	
				5	19-Aug-15	0.11	N/A	17.8	8.35	88.0	382	8.12	162	-	-	-	-	-	-	
	Edney Creek	Upstream of Tailings-Dam Breach Impacted area	EDC-D	Reference	1	20-Aug-15	0.14	N/A	12.8	9.51	90.0	423	8.20	152	-	-	-	-	-	
					2	20-Aug-15	0.12	N/A	12.8	9.43	89.2	423	8.10	153	-	-	-	-	-	-
					3	20-Aug-15	0.11	N/A	12.9	9.64	91.4	423	8.09	160	-	-	-	-	-	-
					4	20-Aug-15	0.11	N/A	13.1	9.68	92.3	428	8.11	158	-	-	-	-	-	-
					5	20-Aug-15	0.10	N/A	13.6	9.86	94.8	420	8.08	163	-	-	-	-	-	-
Quesnel River	Near Quesnel River Research Center	QUR1	Exposed	1	24-Aug-15	0.21	N/A	16.89	9.24	95.4	105.4	7.99	-	-	-	-	-	-	-	
				2	24-Aug-15	0.20	N/A													
				3	24-Aug-15	0.32	N/A													
				4	24-Aug-15	0.30	N/A													
				5	24-Aug-15	0.22	N/A													
Cariboo River	Upper River	CARU	Reference	1	24-Aug-15	0.28	N/A	16.64	8.91	91.5	112	7.8	-	-	-	-	-	-	-	
				2	24-Aug-15	0.30	N/A													
				3	24-Aug-15	0.34	N/A													
				4	24-Aug-15	0.34	N/A													
				5	24-Aug-15	0.25	N/A													

¹ For stations where sampling was conducted on multiple days, the initial sampling date is displayed. This date corresponds with the date of collection of supporting water quality measures.

APPENDIX B

ANALYTICAL REPORTS



**University of Missouri-Columbia
Research Reactor Center**

Analytical Chemistry Group
1513 Research Park Dr.
Columbia, MO 65211
Mark Beary, Manager

Analysis of Benthic Invertebrate Samples by ICP-MS

Pierre Stecko
Senior Aquatic Scientist / Principal
Minnow Environmental Inc.
101 - 1025 Hillside Ave.
Victoria, BC
V8T 2A2

Date: February 1, 2016

MURR Project # 2205 Set 29
Minnow Project # 2574

Results and limits of detection given in accompanying spreadsheet.

Analysis Notes:

Drying

1. Pre-cleaned 50 mL centrifuge tubes were supplied for sample collection.
2. Upon receipt, samples were held in a -20°C freezer until the freeze-drying process was initiated.
3. Samples were freeze-dried to a constant mass at less than 1 torr (typically ~20 millitorr) and at a trap temperature of -50°C. In this way, sample moisture was removed by sublimation as intended.
4. Freeze-dried samples were homogenized within their freeze drying vessels using a combination of pre-cleaned plastic lab spatulas and glass stir rods which were cleaned with ultrapure water and dried with Kim-wipes between each sample.
5. Some samples were so small that an accurate dry mass % could not be measured. These samples are identified in the spreadsheet table.

Digestion – Large (>100 mg dry) samples

6. Portions of dried samples, or entire samples, were digested for ICP-MS analysis. Samples (up to approx. 200 mg as available) were weighed directly into Teflon digestion vessels. Fisher brand Optima nitric acid was added (2.2 mL). The vessels were sealed and heated to 190°C in a microwave digester. After cooling, the vessels were opened and the contents transferred to pre-cleaned, pre-weighed 50 mL polypropylene centrifuge tubes with rinsing (ultrapure water). The total volume was 50 mL.



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7. Replicate digestions of several samples were prepared. The third replicate of one of these samples was spiked with ~3 ppm of two multi-element solutions (together containing many, but not all, analytes). Unspiked replicates for this sample are given as “rep 1”, “rep 2”, etc. in the table.
8. Two QC materials were used: NIST SRM 1577 Bovine Liver and NRC CRM DOLT-5. Literature values for SRM 1577 are given in the table, as well as certificate/reference/information values for the DOLT-5.
9. One or more vessel blanks (empty vessels microwaved with digestion acid) were prepared alongside each group of ~20 samples.
10. The exact mass of digested solution was determined in order to calculate an accurate gravimetric dilution factor. The spike was done gravimetrically as well so that the exact level of fortification could be calculated.

Digestion – Small (<100 mg dry) samples

11. Portions of dried samples, or entire samples, were weighed into pre-cleaned PFA scintillation vials. Fisher brand Optima grade nitric acid (HNO₃, 0.3 mL) was added and the vial was placed into a Teflon digestion vessel. Water (10 mL) was added into the vessel but outside the vial, to act as a microwave heating medium. The vessels were sealed and heated to 190°C in a microwave digester.
12. After the vessels cooled, they were opened and the vials retrieved. (The “microwave absorber” water in the vessel was discarded.) The digested sample was transferred with rinsing into a pre-cleaned, pre-weighed polypropylene centrifuge tube and diluted to 10 mL with ultrapure water.
13. This method allows for the digestion of a maximum 20 mg (dry mass) sample size. Previous testing has shown that above this sample mass, there is a danger of losing part of the sample into the “microwave absorber” water. This is because the reaction with nitric acid becomes too vigorous and splattering occurs. Thus even when more sample was available, the sample portions used were limited to 20 mg. Despite this limitation, for samples with <100 mg dry mass, this “small sample” method provides more sensitivity (less dilution) than the “large sample” method.
14. Several samples were digested and analyzed in duplicate; these duplicates are given in the table as “rep 1” and “rep 2”.
15. Two QC materials were used: NIST SRM 1577 Bovine Liver and NRC CRM DOLT-5. Literature values for SRM 1577 are given in the table, as well as certificate/ reference/ information values for the DOLT-5.
16. One or more vessel blanks (empty vials microwaved with digestion acid) were prepared alongside each group of samples.



**University of Missouri-Columbia
Research Reactor Center**

Analytical Chemistry Group
1513 Research Park Dr.
Columbia, MO 65211
Mark Beary, Manager

17. The exact mass of digested solution was determined in order to calculate an accurate gravimetric dilution factor.

Preparation of standards and samples

18. Instrument calibration standards were prepared from commercially purchased single- and multi- elemental solutions. Standards were prepared gravimetrically, with weighing at every step, in order to accurately calculate exact concentration values. Four standard series, each with three or four different concentrations, were prepared to calibrate the instrument for all elements of interest.
19. Internal standards Sc and In were added to all standards and digested samples. Internal standards are used to correct for matrix effects in the instrument.

Instrumental analysis

20. The digested samples were analyzed using a PerkinElmer NexION dynamic reaction cell (DRC) ICP-MS. The NexION was run in Kinetic Energy Discrimination (KED) mode which reduces the level of polyatomic interferences relative to the analytes. Helium is used as the collision gas. The NexION exhibits high sensitivity via extremely low backgrounds.
21. The NexION also allows the analysis of high-concentration elements such as Na, Mg, Al, P, K, Ca, Mn, and Fe without having to further dilute the sample. Use of two levels of collision gas flow in KED mode is used to reduce the instrument response for these particular analytes while maintaining high sensitivity for lower-concentration elements.
22. The instrument was calibrated using a four- or five-point curve (zero point standard plus three or four standards per series) for all measured elements. Standards were re-analyzed repeatedly during the multiple analytical runs to ensure continuous correct instrument response.
23. Results are reported in units of ppm, or parts per million by weight ($\mu\text{g/g}$ or mg/kg), relative to the dry weight of the samples.
24. The vessel blanks were found to be generally free of detectable levels of the analytes. When any relatively small background levels were found to be significant and consistent, the results were appropriately corrected.
25. The sample limits of detection (LOD's) are listed in blue font in a separate table below the results table. These limits of detection for each element and sample are the product of the instrument LOD for that element and the total dilution factor of the sample. The instrument LOD's are calculated individually for each element as three times the standard deviation of the elemental concentration measured in 10 runs of the zero point standard (blank 3% HNO_3 with internal standards).
The total sample dilution factor is the mass of digested solution divided by the sample mass.



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Research Reactor Center**

Analytical Chemistry Group
1513 Research Park Dr.
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Mark Beary, Manager

The sample LOD's vary according to the individual dilution factor for each sample and the instrument background on the day of analysis.

26. Literature values for NIST SRM 1577 are taken from I. Roelandts and E.S. Gladney, "Consensus values for NIST biological and environmental Standard Reference Materials", *Fresenius J Anal Chem* (1998) 360: 327-338. Values for some elements in this SRM are unknown or scarcely published.
27. The certificate of analysis for NRC DOLT-5 is available by request from the National Research Council Canada. The certificate does not provide information for all elements of interest.
28. Spike recovery data for some elements are omitted because the high or variable level of element present in the unspiked sample precluded accurate measurement of percent recovery.

APPENDIX C
DATA QUALITY ASSESSMENT

APPENDIX C: DATA QUALITY ASSESSMENT

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C1.0 INTRODUCTION

A Data Quality Assessment (DQA) was conducted on data collected as part of the Mount Polley Mining Corporation Benthic Invertebrate Chemistry Report, 2015. The objective of the DQA is to define the overall quality of the data presented in the report, and, by extension, the confidence with which the data can be used to derive conclusions.

C1.1 Background

A variety of factors can influence the chemical and biological measurements made in an environmental study and thus affect the accuracy and/or precision of the data. Inconsistencies in sampling or laboratory methods, use of instruments that are inadequately calibrated or which cannot measure to the desired level of accuracy or precision, and contamination of samples in the field or laboratory are just some of the potential factors that can lead to the reporting of data that do not accurately reflect actual environmental conditions. Depending on the magnitude of the problem, inaccuracy or imprecision have the potential to affect the reliability of any conclusions made from the data. Therefore, it is important to ensure that monitoring programs incorporate appropriate steps to control the non-natural sources of data variability (i.e., minimize the variability that does not reflect natural spatial and temporal variability in the environment) and thus assure the quality of the data.

Data quality as a concept is meaningful only when it relates to the intended use of the data. That is, one must know the context in which the data will be interpreted in order to establish a relevant basis for judging whether or not the data set is adequate. DQA involves comparison of actual field and laboratory measurement performance to data quality objectives (DQOs) established for a particular study, such as evaluation of method detection limits, blank sample data, data precision (based on field and laboratory duplicate samples), and data accuracy (based on matrix spike recoveries and/or analysis of standards or certified reference materials).

DQOs were established at the outset of the field program that reflect reasonable and achievable performance expectations. Programs involving a large amount of samples and analytes usually have some results that exceed the DQOs. This is particularly so for multi-element scans (e.g., ICP scans for metals) since the analytical conditions are not necessarily optimal for every element included in the scan. Generally, scan results may be considered acceptable if no more than 20% of the analytes fail to meet the DQO. Overall, the intent of comparing data to DQOs was not to reject any measurement that did not meet the DQO, but to ensure any questionable data received more scrutiny to

determine what effect, if any, this had on interpretation of results within the context of this project.

C1.2 Types of Quality Control Samples

Several types of quality control (QC) samples were assessed as part of laboratory analysis. These samples, and a description of each, include the following:

- **Laboratory Blanks** are samples of de-ionized water and/or appropriate reagent(s) that are handled and analyzed the same way as regular samples. These samples will reflect any contamination of samples occurring in the laboratory (laboratory or method blanks). Concentrations of analytes should not be detectable, although a DQO of twice the method detection limit allows for slight “noise” around the detection limit.
- **Laboratory Duplicates** are replicate sub-samples created in the laboratory from randomly selected field samples which are sub-sampled and then analyzed independently using identical analytical methods. The laboratory duplicate sample results reflect any variability introduced during laboratory sample handling and analysis and thus provide a measure of laboratory precision.
- **Field Duplicates** are replicate samples collected from a randomly selected field station using identical collection and handling methods that are then analyzed separately in the laboratory. The duplicate samples are handled and analyzed in an identical manner in the laboratory. The data from field duplicate samples reflect natural variability, as well as the variability associated with sample collection methods, and therefore provide a measure of field precision.
- **Matrix Spike Recovery Samples** are created in the laboratory by adding a known amount/concentration of a given analyte (or mixture of analytes) to a randomly selected test sample previously divided to create two sub-samples. The spiked and regular sub-samples are then analyzed in an identical manner. The spike recovery represents the difference between the measured spike amount (total amount in spiked sample minus amount in original sample) relative to the known spike amount (as a percentage). The analysis of spiked samples provides an indication of the accuracy of analytical results.
- **Certified Reference Materials** are samples containing known chemical concentrations that are processed and analyzed along with batches of environmental samples. The sample results are then compared to target results

to provide a measure of analytical accuracy. The results are reported as the percent of the known amount that was recovered in the analysis.

C2.0 BENTHIC INVERTEBRATE SAMPLES

Whole benthic invertebrate samples were analyzed by University of Missouri-Columbia Research Reactor Center (MURR), in Columbia, MO. The laboratory report provided is presented in Appendix B.

C2.1 Method Detection Limits

Method detection limits (MDLs) achieved by MURR for whole benthic invertebrate samples were examined and assessed only in cases where sample results were reported as less than the MDL. The achieved MDLs were sufficiently low to produce detectable results for all except eight analytes (Table C.1). For analytes with an available guideline value for the protection of aquatic life, and which is applicable to benthic invertebrates, the MDL should be lower than the guideline value. All reported MDLs were lower than the applicable guideline value (selenium, Table C.1), and were therefore of good quality for effective data interpretation.

C2.2 Laboratory Blank Sample Analysis

One or more laboratory blank samples (empty vials microwaved with digestion acid) were prepared and analysed alongside each group of samples. Analyte concentrations were generally at or below the MDL for the laboratory blank samples, however, sample results were appropriately corrected if relatively small background levels were found to be significant and consistent (Appendix B).


C2.3 Data Precision

Laboratory Duplicate Samples

Replicate digests of benthic invertebrate samples (n=6) were prepared for analysis of laboratory precision (Appendix B). Most elements met the DQO of < 30% RPD within four of the laboratory duplicate samples analysed (Table C.2), with < 18% of elements exceeding the DQO. Multi-element scans usually have some results that exceed the DQOs, but are generally considered acceptable if no more than 20% of the analytes fail to meet the DQO. The DQO was exceeded for a substantial number of elements for two of the duplicate samples (CARU-04 and EDC-D1), suggesting that sample heterogeneity may have played a role in the observed variability, particularly if homogenization was not complete (i.e., crushing and mixing with pre-cleaned plastic lab spatulas and glass stir rods may not have produced a homogeneous powder). As such, laboratory precision

Table C.1: Laboratory method detection limit (MDL) evaluation for whole benthic invertebrate chemistry analysis. Only analytes with < MDL values are reported.

Parameter	Units	British Columbia Water Quality Guideline ^a	Maximum Method Detection Limit Achieved
Antimony	mg/kg	-	0.031
Beryllium	mg/kg	-	0.14
Bismuth	mg/kg	-	0.00036
Boron	mg/kg	-	12
Rhenium	mg/kg	-	0.0055
Selenium	mg/kg	4	3.5
Thallium	mg/kg	-	0.0018
Tin	mg/kg	-	0.048

 Maximum achieved method detection limit exceeds the benthic invertebrate tissue concentration in the BC Water Quality Guideline.

^a British Columbia Approved Water Quality Guidelines (BCMOE 2016); Guideline value for benthic invertebrate tissue concentration displayed.

Table C.2: Laboratory duplicate results for whole benthic invertebrate chemistry analyses. Highlighted values did not meet the data quality objective of ≤ 30% Relative Percent Difference (RPD) ¹.

Parameter	Units	HAC-U2 rep 1	HAC-U2 rep 2	RPD (%) ^a	EDC-D2 rep 1	EDC-D2 rep 2	RPD (%) ^a	EDC-D4 rep 1	EDC-D4 rep 2	RPD (%) ^a	EDC-D5 rep 1	EDC-D5 rep 2	RPD (%) ^a	CARU-04 rep 1	CARU-04 rep 2	RPD (%) ^a	EDC-D1X rep 1	EDC-D1X rep 2	RPD (%) ^a
Aluminum	mg/kg	5,560	4,920	12.2	56	105	61.5	106	106	0	57	46	20.6	924	1,630	55.3	44	2,010	191
Antimony	mg/kg	0.0096	0.0204	72.0	0.0039	0.0048	20.7	0.0054	0.00622	14.1	0.00423	0.00445	5.1	0.0131	0.0124	5.5	0.002	0.0028	33.3
Arsenic	mg/kg	2.32	2.15	7.6	1.24	1.16	6.7	1.87	2.04	8.7	1.03	1.06	2.9	0.433	0.925	72.5	1.29	1.61	22.1
Barium	mg/kg	93.0	87.7	5.9	4.53	4.53	0	9.81	12.9	27.2	4.45	4.74	6.3	19.6	38.0	63.9	3.99	15.5	118
Beryllium	mg/kg	0.133	0.122	8.6	<0.0053	<0.0048	9.9	<0.0035	0.0042	18.2	<0.0032	<0.0027	16.9	0.0393	0.0596	41.1	<0.0047	0.0327	149.7
Bismuth	mg/kg	0.0219	0.0209	4.7	0.0008	0.0016	66.7	0.0024	0.0026	8.8	0.0010	0.0011	16.4	0.0106	0.0165	43.5	0.0007	0.0022	104.2
Boron	mg/kg	2.62	2.14	20.2	<0.45	<0.40	11.8	0.52	0.45	14.4	<0.27	<0.23	16.0	0.42	0.76	57.6	<0.40	0.9	76.9
Cadmium	mg/kg	0.333	0.360	7.8	0.025	0.024	3.6	0.132	0.190	36.0	0.100	0.073	30.3	0.472	0.588	21.9	0.022	0.025	14.5
Calcium	mg/kg	7,010	6,940	1.0	1,620	1,570	3.1	764	753	1.5	1,980	2,150	8.2	2,080	3,280	44.8	1,300	2,410	59.8
Cesium	mg/kg	0.603	0.537	11.6	0.012	0.014	14.6	0.018	0.022	19.4	0.016	0.015	6.5	0.079	0.132	50.8	0.012	0.044	116
Chromium	mg/kg	7.16	6.53	9.2	0.388	0.356	8.6	0.342	0.350	2.3	0.241	0.245	1.6	1.53	2.52	48.9	0.205	1.76	158
Cobalt	mg/kg	4.23	4.00	5.6	0.075	0.087	14.9	0.275	0.329	17.9	0.137	0.113	19.2	0.835	1.12	29.2	0.054	0.838	176
Copper	mg/kg	171	157	8.5	13.3	13.2	0.8	13.3	16.3	20.3	17.6	15.6	12.0	21.8	22.5	3.2	11.2	9.6	15.0
Gallium	mg/kg	2.18	1.96	10.6	0.040	0.043	6.2	0.055	0.047	14.8	0.029	0.025	14.8	0.278	0.533	62.9	0.020	0.889	191
Iron	mg/kg	3,540	4,370	21.0	148	233	44.6	268	241	10.6	147	136	7.8	769	1,840	82.1	115	3,900	189
Lead	mg/kg	2.15	2.10	2.4	0.057	0.061	7.1	0.070	0.078	10.2	0.041	0.041	0.7	0.527	1.34	87.1	0.028	0.276	163
Lithium	mg/kg	3.88	3.62	6.9	0.059	0.103	53.9	0.076	0.084	10.5	0.085	0.072	15.8	0.938	1.75	60.4	0.062	0.688	167
Magnesium	mg/kg	3,780	3,570	5.7	1,020	1,030	1.0	1,010	1,080	6.7	1,130	1,100	2.7	1,280	1,650	25.3	957	1,320	31.9
Manganese	mg/kg	577	569	1.4	32.0	30.8	3.8	127	123	3.2	72.2	62.6	14.2	92.0	110	17.8	30.2	101	108
Molybdenum	mg/kg	1.29	1.36	5.3	7.57	7.72	2.0	3.39	2.61	26.0	4.69	5.18	9.9	0.18	0.18	2.8	5.97	4.22	34.3
Nickel	mg/kg	8.80	8.44	4.2	0.17	0.21	23.9	0.51	0.64	21.6	0.28	0.23	18.3	2.41	3.45	35.5	0.14	1.17	156
Phosphorus	mg/kg	2,880	3,890	29.8	8,190	7,910	3.5	6,550	7,030	7.1	7,900	7,970	0.9	7,940	8,380	5.4	7,570	5,220	36.7
Potassium	mg/kg	7,390	7,460	0.9	6,290	5,900	6.4	6,510	7,200	10.1	5,580	5,490	1.6	5,110	5,390	5.3	5,580	3,830	37.2
Rhenium	mg/kg	0.00658	0.00625	5.1	<0.000074	<0.000066	11.4	<0.000049	0.000071	36.7	<0.000044	<0.000037	17.3	<0.000020	<0.000019	5.1	<0.000065	0.000019	96.8
Rubidium	mg/kg	4.71	4.10	13.8	1.37	1.32	3.7	1.27	1.39	9.0	1.23	1.20	2.5	2.27	3.17	33.1	1.19	1.13	5.2
Selenium	mg/kg	4.49	4.11	8.8	1.12	1.00	11.3	1.36	1.59	15.6	1.12	1.05	6.5	2.50	2.29	8.8	1.21	1.03	16.1
Silver	mg/kg	0.068	0.065	4.2	0.007	0.008	10.5	0.013	0.016	26.2	0.051	0.039	28.2	0.117	0.153	26.7	0.008	0.009	12.4
Sodium	mg/kg	3,320	3,430	3.3	2,070	1,960	5.5	1,790	2,040	13.1	2,080	2,190	5.2	2,230	2,300	3.1	1,920	1,280	40.0
Strontium	mg/kg	57.1	61.1	6.8	13.2	11.7	12.0	6.0	5.4	10.5	11.2	12.2	8.5	11.5	16.9	38.0	9.6	15.4	46.1
Thallium	mg/kg	0.0225	0.0205	9.3	0.0022	0.0024	10.8	0.0027	0.0031	13.6	0.0025	0.0023	8.0	0.0102	0.0156	41.9	0.0023	0.0034	39.4
Thorium	mg/kg	0.555	0.539	2.9	0.025	0.013	64.6	0.021	0.027	22.1	0.013	0.010	21.5	0.241	0.561	79.8	0.005	0.070	172
Tin	mg/kg	0.027	0.071	89.3	0.081	0.065	22.9	0.243	0.291	18.0	0.125	0.126	0.8	0.026	0.038	37.2	0.084	0.038	76.2
Titanium	mg/kg	28.9	104	113	2.77	3.26	16.3	4.63	4.73	2.14	2.06	1.94	6.00	6.19	10.0	47.1	1.36	22.8	177
Uranium	mg/kg	0.180	0.175	2.8	0.009	0.004	65.2	0.015	0.021	33.2	0.006	0.006	11.2	0.060	0.116	63.9	0.004	0.026	152
Vanadium	mg/kg	23.3	20.4	13.3	0.27	0.33	17.8	0.61	0.40	42.8	0.25	0.22	14.2	1.22	2.04	50.3	0.18	5.79	188
Yttrium	mg/kg	2.40	2.37	1.3	0.068	0.086	23.5	0.080	0.099	20.8	0.059	0.059	0.2	0.206	0.567	93.4	0.030	0.892	187
Zinc	mg/kg	94.6	101	6.5	68.8	65.8	4.5	80.1	86.9	8.1	78.8	77.4	1.8	285	311	8.7	63.7	48.2	27.7
Zirconium	mg/kg	0.683	1.79	89.5	0.051	0.088	52.9	0.124	0.181	37.4	0.053	0.045	17.1	0.241	0.639	90.5	0.040	0.474	169

¹ The method detection limit (MDL) value was used in instances where values less than the MDL were reported. RPD calculation: $=(\text{Absolute}(\text{Replicate 1} - \text{Replicate 2}))/\text{Average}(\text{Replicate 1}, \text{Replicate 2}) * 100$.

associated with analysis of benthic invertebrate samples was considered acceptable, but potential impacts of laboratory precision on data interpretation should be considered.

Field Duplicate Samples

Six duplicate whole benthic invertebrate samples were collected in the field for analysis of field precision. One of the duplicates (LREF1-04) showed acceptable precision, with 87% of the elements included in the ICP-MS scan meeting the DQO of 30% RPD (Table C.3). For the remainder of the duplicate samples, >32% of the metal results for each sample exceeded the DQO (Table C.3). As discussed above, multi-element scans usually have some results that exceed the DQOs, but are generally considered acceptable if no more than 20% of the analytes fail to meet the DQO. This criteria was exceeded in the majority of the field duplicates. The low field precision demonstrated likely due to natural variability, which cannot be controlled through consistent sampling methods.

Overall, the field duplicates sampling results indicate that good field precision was likely not achieved due to naturally variability, and this high field variability should be considered in the data interpretation process.

C2.4 Data Accuracy

Certified Reference Materials

Accuracy of elemental concentration data was determined by analyzing certified reference materials (NIST SRM 1577 bovine liver and NRC CRM DOLT-5 dogfish liver) and comparing achieved values to a DQO recovery of 70 – 130% of the certified value. Some elements listed on the certificates of analysis are lower-confidence values or unconfirmed results presented for informational purposes, rather than certified values (i.e., the value may not necessarily be correct, and may be subject to significant statistical error). These values were not used to judge acceptability of data values and were provided for comparison purposes only (Table C.4).

All metals were recovered at concentrations within the acceptable range of certified CRM values (Table C.4). These results indicate acceptable analytical accuracy associated with analysis of whole benthic invertebrate samples.

Laboratory Matrix Spike Samples

Analyte recoveries for matrix spike samples varied, but were generally within the DQO of 70 – 130% recovery. Many of the analytes could not be included in the analysis, or could not be recovered because the spike concentrations were less than 50% of the average

Table C.3: Field duplicate results for whole benthic invertebrate chemistry analyses. Highlighted values did not meet the data quality objective of ≤ 30% Relative Percent Difference (RPD) ¹.

Sample ID	Units	BOL-B2-3	BOL-BX	RPD (%) ^a	EDC-D1	EDC-D1X rep 1	RPD (%) ^a	QUR1-02	QUR1-0X	RPD (%) ^a	CARU-02	CARU-0X	RPD (%) ^a	LREF1-04	LREF1-04X	RPD (%) ^a	PREF1-02	PREF1-02X	RPD (%) ^a
Aluminum	mg/kg	59	127	72.8	440	44	164	539	359	40.1	389	1,500	118	4,280	4,110	4.1	2,900	5,680	64.8
Antimony	mg/kg	0.0456	0.0829	58.1	0.0064	0.0020	105	0.0388	0.0130	99.6	0.0047	0.0172	114	0.0083	0.0083	0	0.0629	0.0848	29.7
Arsenic	mg/kg	0.51	0.53	3.9	1.76	1.29	30.8	0.73	1.03	34.2	0.40	0.78	63.1	2.32	2.09	10.4	8.83	13.60	42.5
Barium	mg/kg	14.9	21.2	34.9	7.1	4.0	56.2	31.7	24.8	24.4	7.2	58.5	156	35.5	38.4	7.8	51.7	131	86.8
Beryllium	mg/kg	0.010	0.015	39.4	0.007	<0.0047	36.5	0.013	0.006	73.2	0.014	0.046	107	0.104	0.102	1.9	0.105	0.148	34.0
Bismuth	mg/kg	0.0248	0.0253	2.0	0.0027	0.0007	119	0.0020	0.0020	4.0	0.0170	0.0332	64.5	0.0483	0.0440	9.3	0.0734	0.174	81.3
Boron	mg/kg	0.66	1.28	63.9	0.61	<0.40	41.6	0.43	0.55	24.5	0.21	0.96	128	1.48	1.54	4.0	1.78	2.58	36.7
Cadmium	mg/kg	0.06	0.05	5.8	0.04	0.02	65.2	0.17	0.33	63.0	2.47	3.07	21.7	0.66	0.71	8.2	2.80	1.91	37.8
Calcium	mg/kg	930	850	9.0	1,600	1,300	20.7	317,000	266,000	17.5	681	1,190	54.4	4,530	8,490	60.8	2,410	3,870	46.5
Cesium	mg/kg	0.006	0.010	47.6	0.025	0.012	72.8	0.036	0.030	19.5	0.033	0.123	115	0.344	0.369	7.0	0.259	0.483	60.4
Chromium	mg/kg	0.34	3.08	161	0.71	0.21	110	0.93	0.71	27.5	0.71	2.64	115	12.2	12.5	2.4	9.12	17.0	60.3
Cobalt	mg/kg	0.159	0.188	16.7	0.301	0.054	139	0.473	0.483	2.1	1.65	1.88	13.0	3.37	3.40	0.9	3.44	5.79	50.9
Copper	mg/kg	15.2	20.3	28.7	16.9	11.2	40.6	9.4	10.3	8.8	20.7	16.6	22.0	14.5	15.2	4.7	43.7	61.6	34.0
Gallium	mg/kg	0.040	0.070	53.2	0.217	0.020	167	0.200	0.200	0.0	0.135	0.459	109	1.59	1.47	7.8	1.23	2.34	62.2
Iron	mg/kg	843	931	9.9	1,020	115	159	775	526	38.3	313	1,330	124	3,210	2,160	39.1	8,160	13,100	46.5
Lead	mg/kg	0.520	0.457	12.9	0.173	0.028	144	0.198	0.141	33.6	0.247	0.977	119	1.74	1.70	2.3	1.88	3.70	65.2
Lithium	mg/kg	0.073	0.116	45.6	0.529	0.062	158	0.349	0.221	44.9	0.480	2.09	125	3.16	3.07	2.9	2.35	4.49	62.6
Magnesium	mg/kg	831	923	10.5	1,280	957	28.9	470	482	2.5	766	1,100	35.8	2,550	2,580	1.2	2,020	2,930	36.8
Manganese	mg/kg	20.5	19.9	3.0	58.6	30.2	64.0	69.2	61.7	11.5	41.9	143	109	177	170	4.0	118	223	61.6
Molybdenum	mg/kg	0.428	0.470	9.4	5.72	5.97	4.3	0.092	0.139	40.5	0.221	0.258	15.4	0.592	0.411	36.1	0.711	1.03	36.6
Nickel	mg/kg	0.383	0.471	20.6	0.612	0.144	124	1.86	1.83	1.6	1.40	3.09	75.3	7.61	7.90	3.7	8.22	12.6	42.1
Phosphorus	mg/kg	7,980	8,130	1.9	7,190	7,570	5.1	1,190	2,070	54.0	5,740	7,060	20.6	3,480	3,970	13.2	8,340	8,510	2.0
Potassium	mg/kg	5,080	4,360	15.3	5,140	5,580	8.2	1,020	2,060	67.5	4,770	6,330	28.1	4,480	4,270	4.8	5,750	5,240	9.3
Rhenium	mg/kg	0.0100	0.0125	22.6	0.0001	<0.000065	68.0	<0.000044	0.0001	73.4	<0.00019	<0.00018	5.4	0.0009	0.0004	67.7	0.0010	0.0021	69.7
Rubidium	mg/kg	2.21	2.05	7.5	1.20	1.19	0.8	1.36	1.99	37.6	1.84	3.22	54.5	10.1	9.75	3.5	8.27	10.4	22.8
Selenium	mg/kg	2.07	2.31	11.0	1.24	1.21	2.4	0.55	1.01	59.0	1.86	2.00	7.3	3.07	2.81	8.8	6.77	8.68	24.7
Silver	mg/kg	0.027	0.031	13.3	0.026	0.008	104	0.032	0.040	20.9	0.142	0.096	38.5	0.051	0.057	12.2	0.114	0.171	40.0
Sodium	mg/kg	5,630	5,960	5.7	2,080	1,920	8.0	1,520	1,750	14.1	4,380	6,110	33.0	1,650	1,520	8.2	4,650	3,240	35.7
Strontium	mg/kg	5.1	4.4	15.4	13.4	9.6	32.7	625	536	15.3	3.5	6.2	54.4	39.5	64.6	48.2	22.4	44.8	66.7
Thallium	mg/kg	0.0021	0.0033	43.4	0.0057	0.0023	84.6	0.0080	0.0067	18.0	0.0073	0.0217	99.3	0.0493	0.0554	11.7	0.0565	0.0926	48.4
Thorium	mg/kg	0.027	0.032	17.8	0.070	0.005	173	0.063	0.240	117	0.128	0.386	100	1.16	1.17	0.9	0.904	1.87	69.6
Tin	mg/kg	0.046	0.048	3.6	0.110	0.084	26.9	0.010	0.021	74.6	0.013	0.059	128	0.017	0.019	12.4	0.082	0.340	122
Titanium	mg/kg	5.1	12.0	80.4	5.5	1.4	121	21.2	15.5	31.1	3.3	12.0	114	30.5	28.9	5.4	149.0	338	77.6
Uranium	mg/kg	0.049	0.052	5.1	0.024	0.004	148	0.084	0.086	2.0	0.047	0.140	99.9	0.389	0.359	8.0	0.346	0.621	56.9
Vanadium	mg/kg	1.15	1.72	39.7	2.55	0.18	174	2.49	1.56	45.9	0.53	2.15	120	15.7	15.6	0.6	13.0	24.5	61.3
Yttrium	mg/kg	0.203	0.237	15.5	0.235	0.030	155	0.453	0.421	7.3	0.125	0.445	112	2.68	2.79	4.0	2.40	4.37	58.2
Zinc	mg/kg	57.4	70.1	19.9	72.0	63.7	12.2	12.9	35.2	92.7	201	183	9.4	125	123	1.6	91.8	111	18.9
Zirconium	mg/kg	0.414	0.446	7.4	0.125	0.040	103	0.255	0.219	15.2	0.127	0.462	114	1.19	1.10	7.9	2.82	5.94	71.2

¹ The method detection limit (MDL) value was used in instances where values less than the MDL were reported. RPD calculation: $=(\text{Absolute}(\text{Replicate 1} - \text{Replicate 2}))/\text{Average}(\text{Replicate 1}, \text{Replicate 2}) * 100$

Table C.4: Laboratory analyses of certified reference materials associated with whole benthic invertebrate samples. Highlighted values did not achieve the data quality objective of recovery between 70% and 130% of certified values¹.

Analyte	Units	Certified Reference Material					Reference Material
		Certified Value	Informational Value	Measured	% Recovery Relative to Certified Value	% Recovery Relative to Informational Value	
Aluminum (Al)	µg/g dw	-	1.2 (0.7 - 1.7)	1.54	-	128%	01B SRM 1577
		-	1.2 (0.7 - 1.7)	1.21	-	101%	03B SRM 1577
		-	31.7 (27.5 - 35.9)	13.5	-	43%	02B CRM DOLT-5
Antimony (Sb)	µg/g dw	-	0.009 (0.004 - 0.014)	0.0060	-	67%	01B SRM 1577
		-	0.009 (0.004 - 0.014)	0.0086	-	96%	03B SRM 1577
		-	0.013	0.0131	-	101%	02B CRM DOLT-5
Arsenic (As)	µg/g dw	0.055 (0.050 - 0.060)	0.054 (0.048 - 0.060)	0.0572	104%	106%	01B SRM 1577
		0.055 (0.050 - 0.060)	0.054 (0.048 - 0.060)	0.0620	113%	115%	03B SRM 1577
		34.6 (32.2 - 37.0)	-	38.1	110%	-	02B CRM DOLT-5
Barium (Ba)	µg/g dw	-	0.8 (0 - 1.6)	0.068	-	9%	01B SRM 1577
		-	0.8 (0 - 1.6)	0.067	-	8%	03B SRM 1577
		-	-	0.115	-	-	02B CRM DOLT-5
Beryllium (Be)	µg/g dw	-	0.004	<0.0035	-	88%	01B SRM 1577
		-	0.004	<0.0046	-	115%	03B SRM 1577
		-	-	<0.0070	-	-	02B CRM DOLT-5
Bismuth (Bi)	µg/g dw	-	0.15	0.0002	-	0%	01B SRM 1577
		-	0.15	<0.0004	-	0%	03B SRM 1577
		-	-	0.0266	-	-	02B CRM DOLT-5
Boron (B)	µg/g dw	-	2.0 (1.0 - 3.0)	0.46	-	23%	01B SRM 1577
		-	2.0 (1.0 - 3.0)	0.45	-	23%	03B SRM 1577
		-	-	0.87	-	-	02B CRM DOLT-5
Cadmium (Cd)	µg/g dw	0.27 (0.23 - 0.31)	0.283 (0.260 - 0.306)	0.289	107%	102%	01B SRM 1577
		0.27 (0.23 - 0.31)	0.283 (0.260 - 0.306)	0.316	117%	112%	03B SRM 1577
		14.5 (13.9 - 15.1)	-	15.1	104%	-	02B CRM DOLT-5
Calcium (Ca)	µg/g dw	124 (118 - 130)	121 (107 - 135)	125	101%	103%	01B SRM 1577
		124 (118 - 130)	121 (107 - 135)	115	93%	95%	03B SRM 1577
		550 (470 - 630)	-	572	104%	-	02B CRM DOLT-5
Cesium (Cs)	µg/g dw	-	0.015 (0.011 - 0.019)	0.0120	-	80%	01B SRM 1577
		-	0.015 (0.011 - 0.019)	0.0132	-	88%	03B SRM 1577
		-	-	0.0755	-	-	02B CRM DOLT-5
Chromium (Cr)	µg/g dw	0.088 (0.076 - 0.10)	0.11 (0.06 - 0.16)	0.114	130%	104%	01B SRM 1577
		0.088 (0.076 - 0.10)	0.11 (0.06 - 0.16)	0.106	120%	96%	03B SRM 1577
		-	2.35 (1.77 - 2.93)	2.52	-	107%	02B CRM DOLT-5
Cobalt (Co)	µg/g dw	-	0.22 (0.18 - 0.26)	0.224	-	102%	01B SRM 1577
		-	0.22 (0.18 - 0.26)	0.250	-	125%	03B SRM 1577
		0.267 (0.241 - 0.293)	-	0.292	109%	-	02B CRM DOLT-5
Copper (Cu)	µg/g dw	193 (183 - 203)	190 (180 - 200)	162	84%	85%	01B SRM 1577
		193 (183 - 203)	190 (180 - 200)	184	95%	97%	03B SRM 1577
		35.0 (32.6 - 37.4)	-	31.9	91%	-	02B CRM DOLT-5
Gallium (Ga)	µg/g dw	-	0.004	0.0099	-	248%	01B SRM 1577
		-	0.004	0.0080	-	200%	03B SRM 1577
		-	-	0.0171	-	-	02B CRM DOLT-5
Iron (Fe)	µg/g dw	268 (260 - 276)	263 (241 - 285)	254	95%	97%	01B SRM 1577
		268 (260 - 276)	263 (241 - 285)	262	98%	100%	03B SRM 1577
		1,070 (990 - 1,150)	-	1,090	102%	-	02B CRM DOLT-5
Lead (Pb)	µg/g dw	0.34 (0.26 - 0.42)	0.34 (0.30 - 0.38)	0.363	107%	107%	01B SRM 1577
		0.34 (0.26 - 0.42)	0.34 (0.30 - 0.38)	0.341	100%	100%	03B SRM 1577
		0.162 (0.130 - 0.194)	-	0.152	94%	-	02B CRM DOLT-5
Lithium (Li)	µg/g dw	-	0.23 (0.09 - 0.37)	0.110	-	48%	01B SRM 1577
		-	0.23 (0.09 - 0.37)	0.117	-	51%	03B SRM 1577
		-	-	0.072	-	-	02B CRM DOLT-5
Magnesium (Mg)	µg/g dw	604 (595 - 613)	608 (577 - 639)	567	94%	93%	01B SRM 1577
		604 (595 - 613)	608 (577 - 639)	618	102%	102%	03B SRM 1577
		940 (840 - 1,140)	-	933	99%	-	02B CRM DOLT-5
Manganese (Mn)	µg/g dw	10.3 (9.3 - 11.3)	10.2 (9.5 - 10.9)	10.1	98%	99%	01B SRM 1577
		10.3 (9.3 - 11.3)	10.2 (9.5 - 10.9)	10.1	98%	99%	03B SRM 1577
		-	8.91 (8.21 - 9.61)	9.33	-	105%	02B CRM DOLT-5
Molybdenum (Mo)	µg/g dw	-	3.2 (2.8 - 3.6)	3.69	-	113%	01B SRM 1577
		-	3.2 (2.8 - 3.6)	3.59	-	112%	03B SRM 1577
		1.41 (1.19 - 1.63)	-	1.53	109%	-	02B CRM DOLT-5
Nickel (Ni)	µg/g dw	-	0.18 (0.10 - 0.26)	0.031	-	17%	01B SRM 1577
		-	0.18 (0.10 - 0.26)	0.032	-	18%	03B SRM 1577
		-	1.71 (1.15 - 2.27)	1.77	-	104%	02B CRM DOLT-5
Phosphorus (P)	µg/g dw	-	11,200 (10,100 - 12,300)	11,400	-	102%	01B SRM 1577
		-	11,200 (10,100 - 12,300)	12,500	-	112%	03B SRM 1577
		-	11,500	12,800	-	111%	02B CRM DOLT-5
Potassium (K)	µg/g dw	9,700 (9,100 - 10,300)	9,700 (9,100 - 10,300)	10,400	107%	107%	01B SRM 1577
		9,700 (9,100 - 10,300)	9,700 (9,100 - 10,300)	9,970	103%	103%	03B SRM 1577
		14,400 (11,400 - 17,400)	-	16,300	113%	-	02B CRM DOLT-5
Rubidium (Rb)	µg/g dw	18.3 (17.3 - 19.3)	18.2 (16.9 - 19.5)	19.6	107%	108%	01B SRM 1577
		18.3 (17.3 - 19.3)	18.2 (16.9 - 19.5)	18.7	102%	103%	03B SRM 1577
		-	-	5.39	-	-	02B CRM DOLT-5
Selenium (Se)	µg/g dw	1.1 (1.0 - 1.2)	1.09 (1.02 - 1.16)	1.10	100%	101%	01B SRM 1577
		1.1 (1.0 - 1.2)	1.09 (1.02 - 1.16)	1.30	118%	119%	03B SRM 1577
		8.3 (6.5 - 10.1)	-	9.28	112%	-	02B CRM DOLT-5
Silver (Ag)	µg/g dw	-	0.062 (0.051 - 0.073)	0.061	-	98%	01B SRM 1577
		-	0.062 (0.051 - 0.073)	0.059	-	95%	03B SRM 1577
		2.05 (1.97 - 2.13)	-	2.07	101%	-	02B CRM DOLT-5
Sodium (Na)	µg/g dw	2,430 (2,300 - 2,560)	2,390 (2,230 - 2,550)	1,880	77%	79%	01B SRM 1577
		2,430 (2,300 - 2,560)	2,390 (2,230 - 2,550)	2,170	89%	91%	03B SRM 1577
		9,900 (8,300 - 11,500)	-	9,570	97%	-	02B CRM DOLT-5
Strontium (Sr)	µg/g dw	-	0.16 (0.13 - 0.19)	0.155	-	97%	01B SRM 1577
		-	0.16 (0.13 - 0.19)	0.151	-	94%	03B SRM 1577
		3.73 (3.47 - 3.99)	-	3.83	103%	-	02B CRM DOLT-5
Thallium (Tl)	µg/g dw	-	0.003	0.0020	-	66%	01B SRM 1577
		-	0.003	0.0022	-	73%	03B SRM 1577
		-	0.013	0.0127	-	98%	02B CRM DOLT-5
Thorium (Th)	µg/g dw	-	0.005	0.00126	-	25%	01B SRM 1577
		-	0.005	0.00038	-	8%	03B SRM 1577
		-	-	0.00225	-	-	02B CRM DOLT-5
Tin (Sn)	µg/g dw	-	0.016 (0.012 - 0.020)	0.011	-	68%	01B SRM 1577
		-	0.016 (0.012 - 0.020)	0.009	-	56%	03B SRM 1577
		0.069 (0.033 - 0.105)	-	0.059	85%	-	02B CRM DOLT-5
Titanium (Ti)	µg/g dw	-	2.7 (1.2 - 4.2)	0.144	-	90%	01B SRM 1577
		-	2.7 (1.2 - 4.2)	0.156	-	98%	03B SRM 1577
		-	-	0.447	-	-	02B CRM DOLT-5
Uranium (U)	µg/g dw	-	0.001 (0.00099 - 0.00101)	0.0008	-	75%	01B SRM 1577
		-	0.001 (0.00099 - 0.00101)	0.0008	-	76%	03B SRM 1577
		-	0.082	0.0928	-	113%	02B CRM DOLT-5
Vanadium (V)	µg/g dw	-	0.058 (0.052 - 0.064)	0.059	-	102%	01B SRM 1577
		-	0.058 (0.052 - 0.064)	0.060	-	103%	03B SRM 1577
		0.51 (0.45 - 0.57)	-	0.491	96%	-	02B CRM DOLT-5
Yttrium (Y)	µg/g dw	-	<1	0.0018	-	0%	01B SRM 1577
		-	<1	0.0019	-	0%	03B SRM 1577
		-	-	0.0157	-	-	02B CRM DOLT-5
Zinc (Zn)	µg/g dw	130 (117 - 143)	131 (123 - 139)	120	92%	92%	01B SRM 1577
		130 (117 - 143)	131 (123 - 139)	154	118%	118%	03B SRM 1577
		105.3 (99.9 - 110.7)	-	112	106%	-	02B CRM DOLT-5
Zirconium (Zr)	µg/g dw	-	3.0 (2.0 - 4.0)	0.0088	-	0%	01B SRM 1577
		-	3.0 (2.0 - 4.0)	0.0196	-	1%	03B SRM 1577
		-	-	0.0653	-	-	02B CRM DOLT-5

¹ The method detection limit (MDL) value was used in instances where values less than the MDL were reported.

original concentration measured in the replicates. The percent recovery of one analyte was slightly below the DQO (zirconium, Table C.5), however zirconium is not considered an element of concern in this study. As such, the results of laboratory matrix spike analyses indicated acceptable accuracy for the purposes of this study.

Table C.5: Laboratory matrix spike recoveries associated with whole benthic invertebrate samples. Highlighted values did not meet the data quality objective of 70 - 130% recovery.

Analyte	Units	Matrix Spike (% Recovery)
		EDC-D2
Aluminum	µg/g dw	†
Antimony	µg/g dw	88%
Arsenic	µg/g dw	98%
Barium	µg/g dw	109%
Beryllium	µg/g dw	80%
Bismuth	µg/g dw	91%
Boron	µg/g dw	87%
Cadmium	µg/g dw	94%
Calcium	µg/g dw	*
Cesium	µg/g dw	*
Chromium	µg/g dw	88%
Cobalt	µg/g dw	90%
Copper	µg/g dw	†
Gallium	µg/g dw	*
Iron	µg/g dw	†
Lead	µg/g dw	91%
Lithium	µg/g dw	84%
Magnesium	µg/g dw	†
Manganese	µg/g dw	†
Molybdenum	µg/g dw	104%
Nickel	µg/g dw	90%
Phosphorus	µg/g dw	†
Potassium	µg/g dw	*
Rhenium	µg/g dw	94%
Rubidium	µg/g dw	*
Selenium	µg/g dw	92%
Silver	µg/g dw	99%
Sodium	µg/g dw	†
Strontium	µg/g dw	†
Thallium	µg/g dw	92%
Thorium	µg/g dw	89%
Tin	µg/g dw	*
Titanium	µg/g dw	73%
Uranium	µg/g dw	98%
Vanadium	µg/g dw	92%
Yttrium	µg/g dw	*
Zinc	µg/g dw	†
Zirconium	µg/g dw	66%

* Not spiked. (The element was not included in the multi-element spike solution.)

† Spike too small. (The concentration of the element spiked into sample was less than 50% of the average concentration measured in the replicates.)

C3.0 DATA QUALITY STATEMENT

Overall, the quality of the data collected for this project was considered acceptable to serve the project objectives. However, the variability displayed in laboratory and field precision samples should be considered in the interpretation of benthic invertebrate chemistry results.

C4.0 REFERENCES

BCMOE (British Columbia Ministry of Environment). 2016. Approved Water Quality Guidelines for British Columbia (2016). http://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/waterqualityguidesobjis/approved-wat-qual-guides/final_approved_wqg_summary_march_2016.pdf

APPENDIX D

WHOLE BENTHIC INVERTEBRATE QUALITY DATA

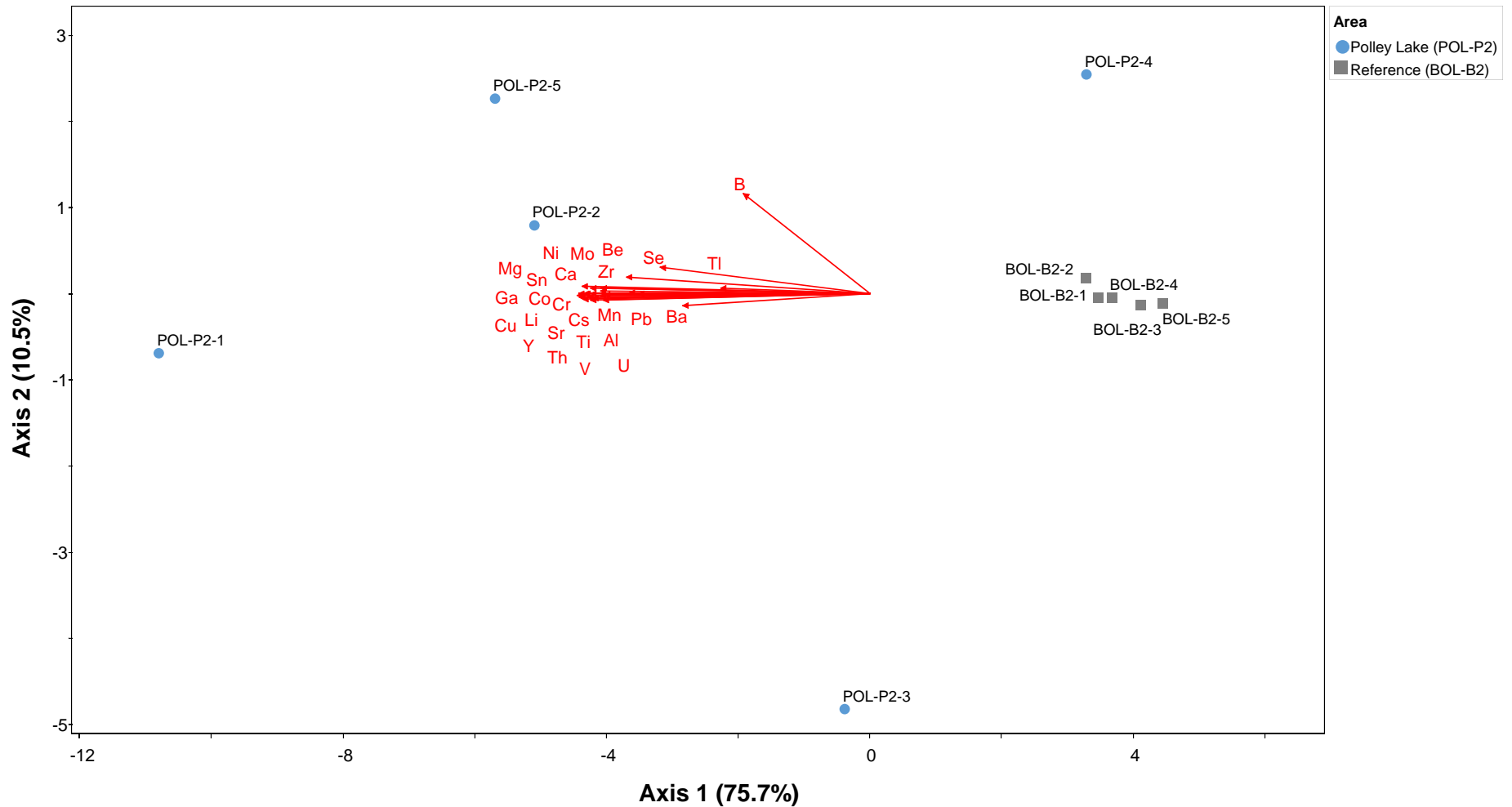


Figure D.1: Biplot of principal component analysis (PCA) of metal concentrations in whole benthic invertebrates from Polley Lake and an associated reference area (Bootjack Lake), Mount Polley Mine, 2015. Vector length is proportional to the magnitude of direct correlation of metals (solid red vector lines) with PCA values of each axis. Only metals with significant (p -value < 0.010) Spearman's correlation and r -values > 0.7 with Axis 1 are displayed. Axis 2 is displayed, but was not statistically significant (Monte Carlo $p = 1.00$).

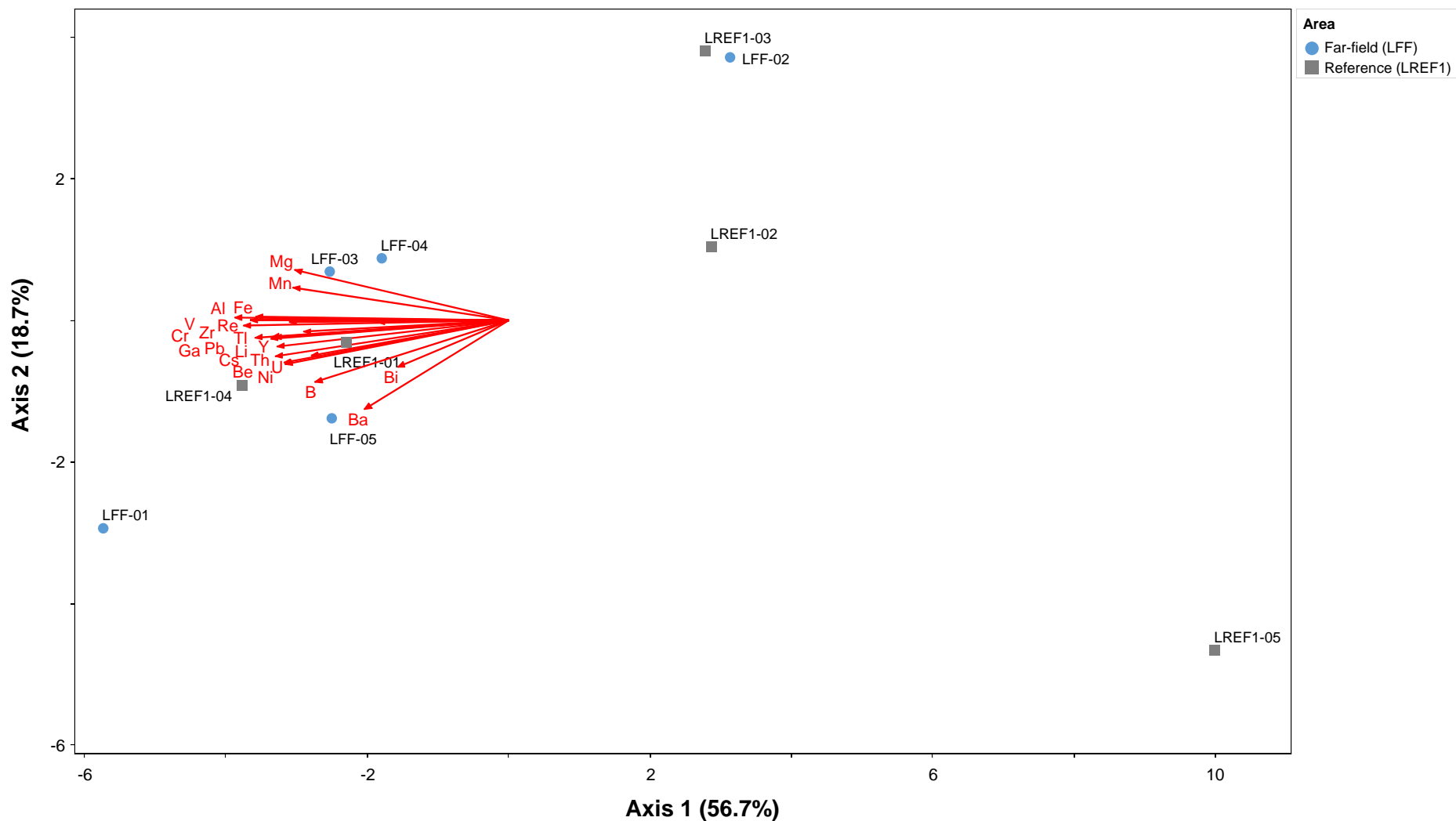


Figure D.2: Biplot of principal component analysis (PCA) of metal concentrations in whole benthic invertebrates from Quesnel Lake littoral sampling areas, Mount Polley Mine, 2015. Vector length is proportional to the magnitude of direct correlation of metals (solid red vector lines) with PCA values of each axis. Only metals with significant (p -value < 0.010) Spearman's correlation and r -values > 0.7 with Axis 1 are displayed. Axis 2 is displayed, but was not statistically significant (Monte Carlo $p = 0.055$).

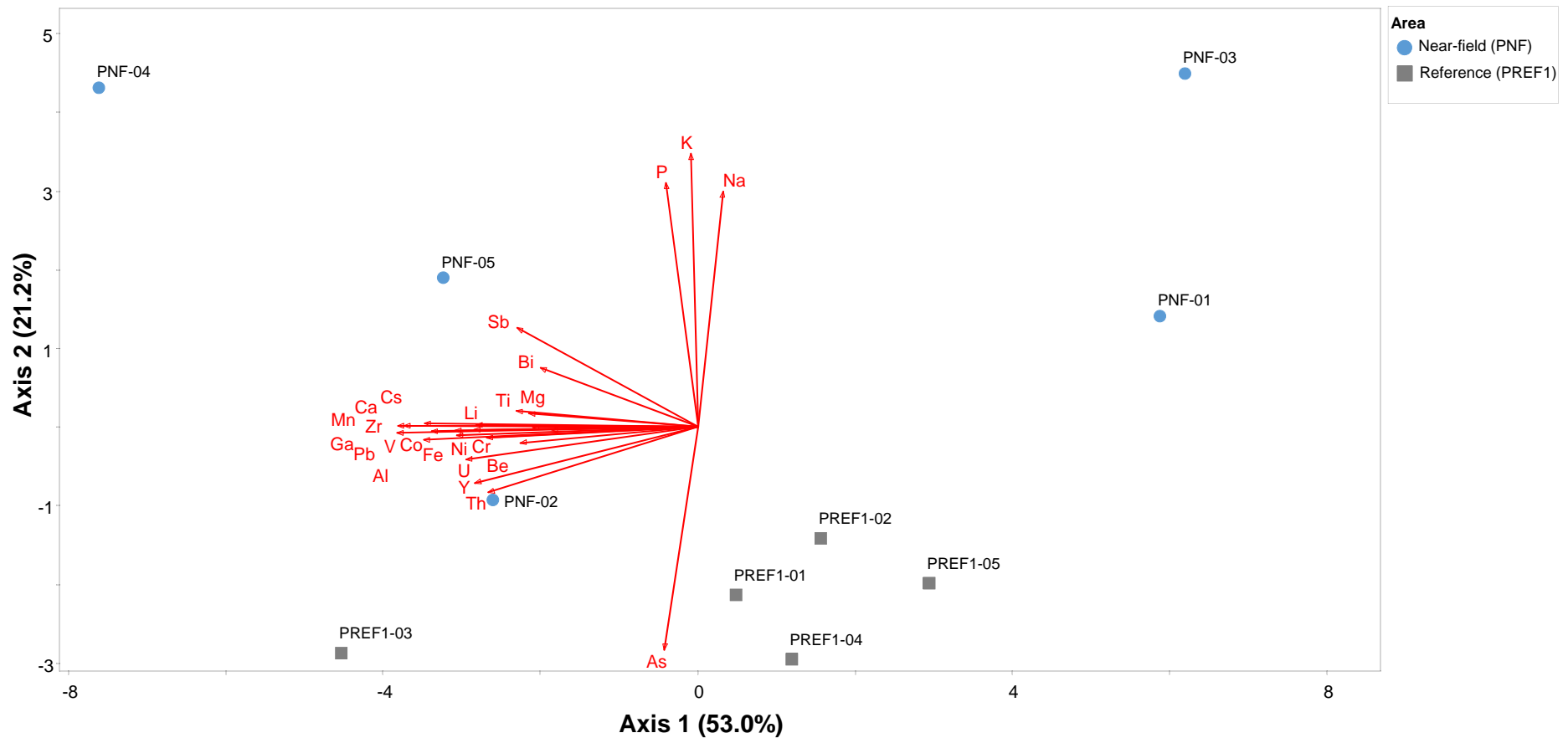


Figure D.3: Biplot of principal component analysis (PCA) of metal concentrations in whole benthic invertebrates from Quesnel Lake profundal sampling areas, Mount Polley Mine, 2015. Vector length is proportional to the magnitude of direct correlation of metals (solid red vector lines) with PCA values of each axis. Only metals with significant (p -value < 0.010) Spearman's correlation and r -values > 0.7 with either axis are displayed. Both displayed axes were significant (Monte Carlo $p < 0.05$).

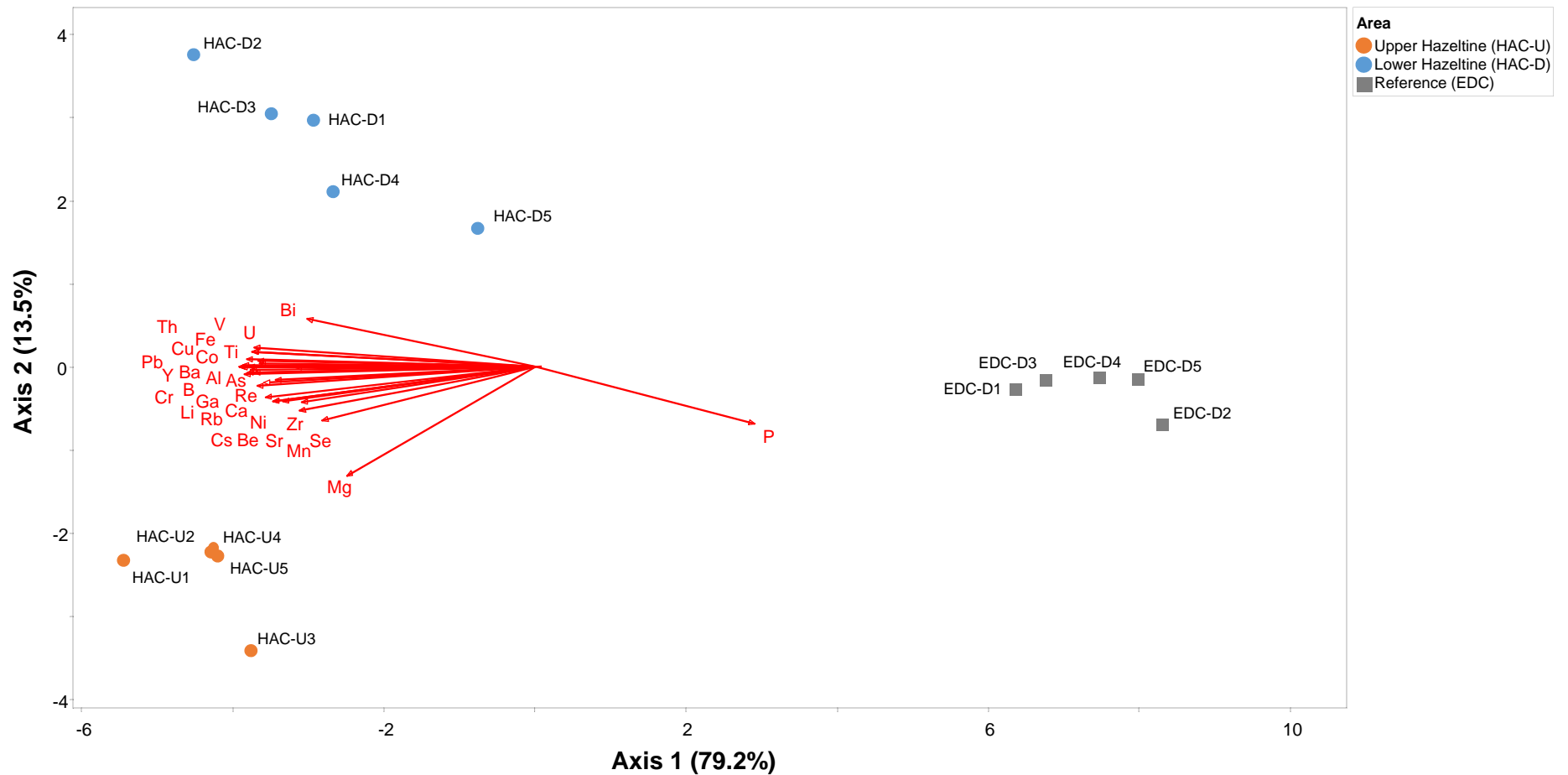


Figure D.4: Biplot of principal component analysis (PCA) of metal concentrations in whole benthic invertebrates from upper and lower areas of Hazeltine Creek and an associated reference area (Edney Creek), Mount Polley Mine, 2015. Vector length is proportional to the magnitude of direct correlation of metals (solid red vector lines) with PCA values of each axis. Only metals with significant (p -value < 0.010) Spearman's correlation and r -values > 0.7 with Axis 1 are displayed. Axis 2 is displayed, but was not statistically significant (Monte Carlo $p = 0.356$).

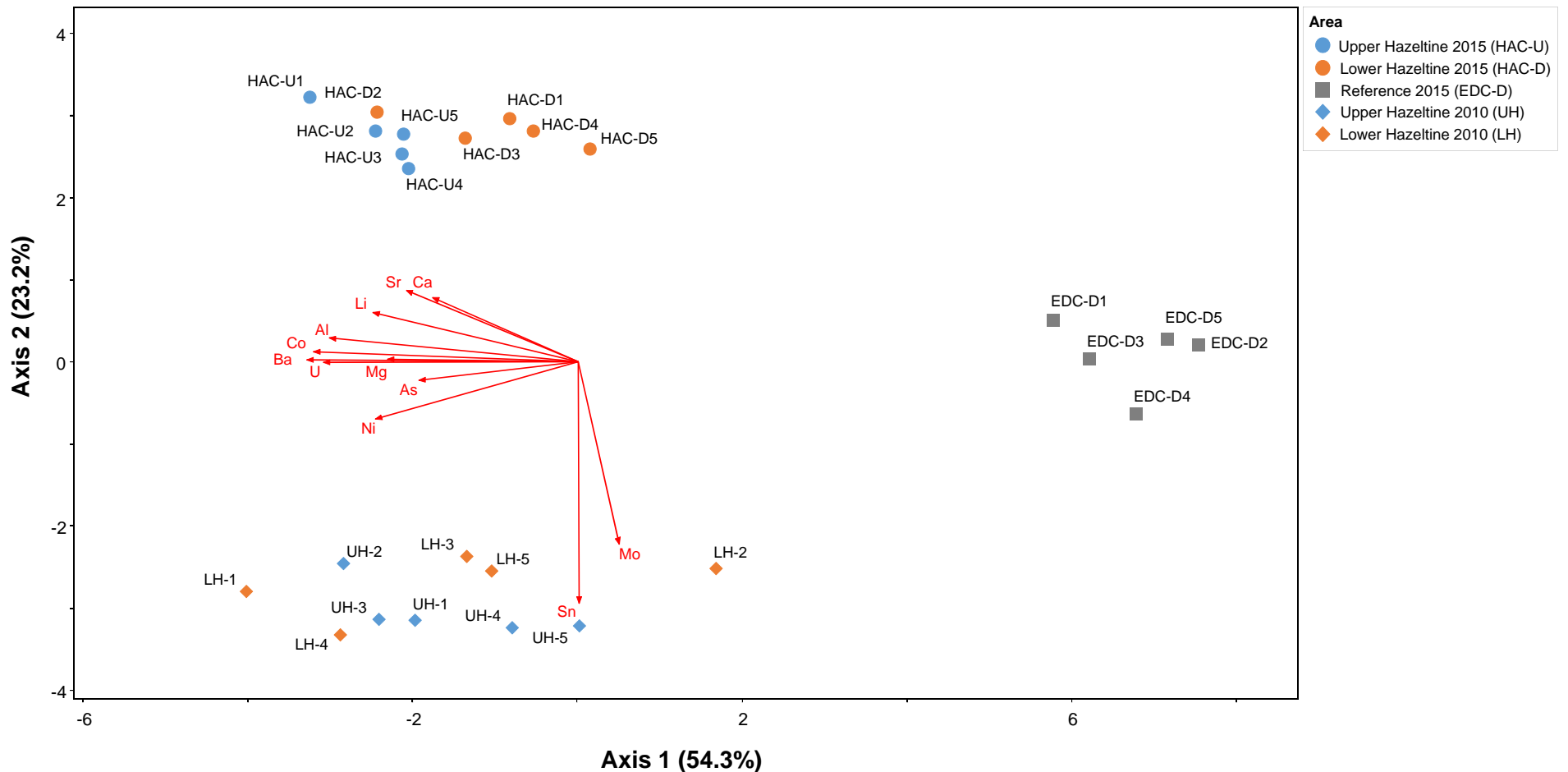


Figure D.5: Biplot of principal component analysis (PCA) of metal concentrations in whole benthic invertebrates from upper and lower areas of Hazeltine Creek in 2010 and 2015, and an associated reference area (Edney Creek) in 2015, Mount Polley Mine 1. Vector length is proportional to the magnitude of direct correlation of metals (solid red vector lines) with PCA values of each axis. Only metals with significant (p -value < 0.010) Spearman's correlation and r -values > 0.7 with either axis are displayed. Both displayed axes were significant (Monte Carlo $p < 0.05$).

¹ A reduced set of analytes was used for this analysis due to the inclusion of data from 2010 which reported results for fewer analytes than reported in 2015. Metals omitted were: B, Cs, Ga, Fe, P, K, Re, Rb, Ag, Na, Th, Ti, Y, Zr.

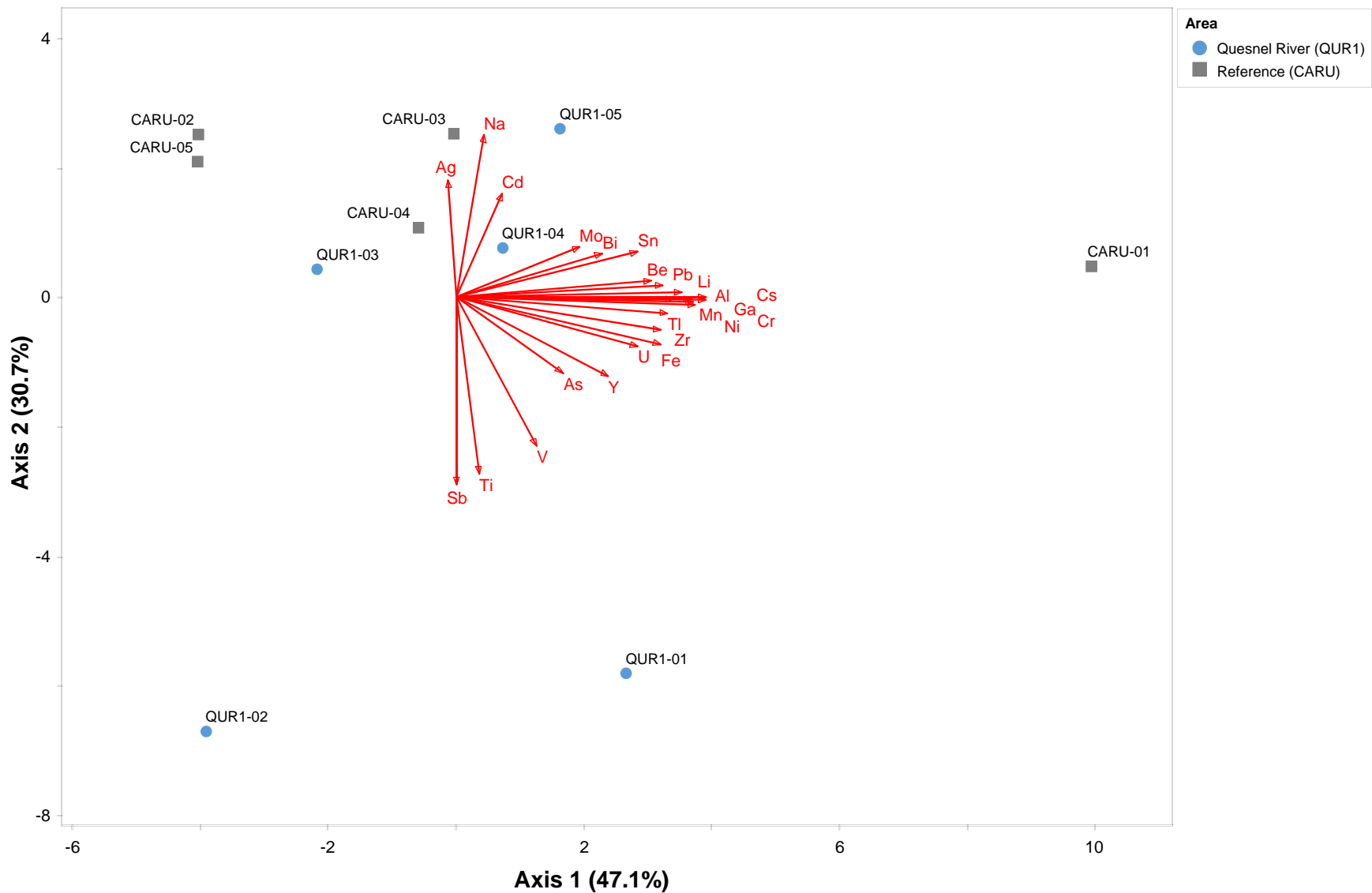


Figure D.6: Biplot of principal component analysis (PCA) of metal concentrations in whole benthic invertebrates from the Quesnel River and an associated reference area (Cariboo River), Mount Polley Mine, 2015. Vector length is proportional to the magnitude of direct correlation of metals (solid red vector lines) with PCA values of each axis. Only metals with significant (p -value < 0.010) Spearman's correlation and r -values > 0.7 with either axis are displayed. Both displayed axes were significant (Monte Carlo $p < 0.05$).

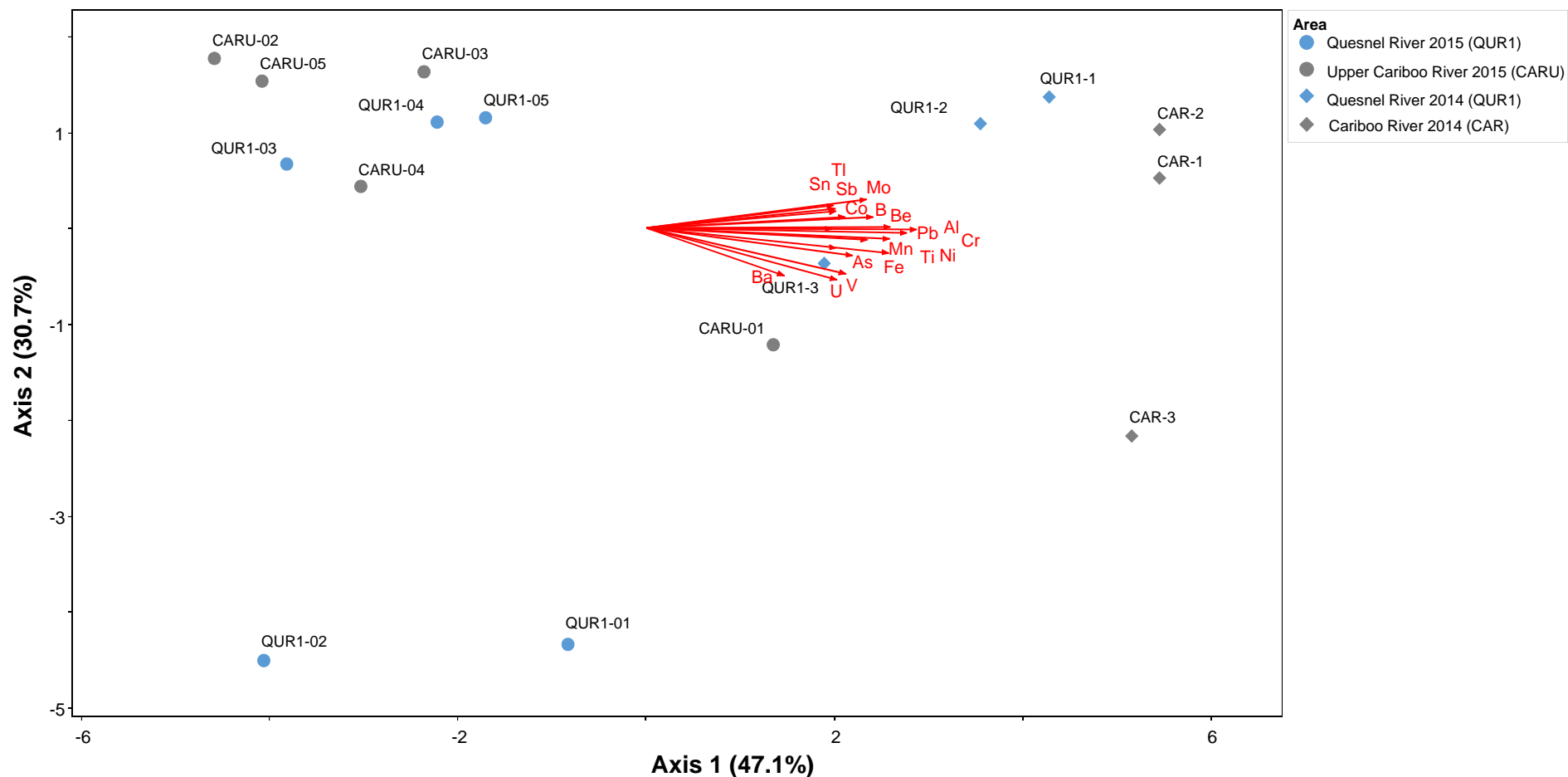


Figure D.7: Biplot of principal component analysis (PCA) of metal concentrations in whole benthic invertebrates from the Quesnel River and an associated reference area (Cariboo River) in 2014 and 2015, Mount Polley Mine¹. Vector length is proportional to the magnitude of direct correlation of metals (solid red vector lines) with PCA values of each axis. Only metals with significant (p -value < 0.010) Spearman's correlation and r -values > 0.7 with either axis are displayed. Both displayed axes were significant (Monte Carlo $p < 0.05$).

¹ A reduced set of analytes was used for this analysis due to the inclusion of data from 2014 which reported results for fewer analytes than reported in 2015. Metals omitted were: Bi, Ca, Cs, Ga, Li, Mg, P, K, Re, Rb, Na, Th, Y, Zr.

Table D.2: PCA results displaying eigen value, percent variance explained, Monte Carlo randomization p-values of axis significance, and station scores for whole benthic invertebrate metal concentrations from Polley Lake and associated reference (Bootjack Lake) sampling stations, Mount Polley Mine, 2015. Data were Log (X+1) transformed prior to analysis.

		PCA Axis 1
Eigenvalue		28.8
% Variance explained		75.7
Monte Carlo p		0.0001
Polley Lake (South Basin)	POL-P2-1	-10.8
	POL-P2-2	-5.1
	POL-P2-3	-0.4
	POL-P2-4	3.3
	POL-P2-5	-5.7
Bootjack Lake (South Basin)	BOL-B2-1	3.4
	BOL-B2-2	3.3
	BOL-B2-3	4.1
	BOL-B2-4	3.6
	BOL-B2-5	4.4

Table D.3: PCA axis scores Spearman correlation with metal concentrations of whole benthic invertebrates from Polley Lake and associated reference (Bootjack Lake) sampling areas, Mount Polley Mine, 2015. Data were Log10 (X+1) transformed prior to analysis.

Metal	Spearman Correlation Coefficient ^a	P-Value ^b
	PCA Axis-1 (75.7%)	PCA Axis-1 (75.7%)
Aluminum	-0.964	0.000
Antimony	-0.648	0.043
Arsenic	-0.552	0.098
Barium	-0.733	0.016
Beryllium	-0.855	0.002
Bismuth	-0.624	0.054
Boron	-0.855	0.002
Cadmium	-0.697	0.025
Calcium	-0.939	0.000
Cesium	-0.903	0.000
Chromium	-0.939	0.000
Cobalt	-0.806	0.005
Copper	-0.952	0.000
Gallium	-0.964	0.000
Iron	-0.636	0.048
Lead	-0.806	0.005
Lithium	-0.855	0.002
Magnesium	-0.915	0.000
Manganese	-0.915	0.000
Molybdenum	-0.879	0.001
Nickel	-0.721	0.019
Phosphorus	0.442	0.200
Potassium	0.115	0.751
Rhenium	-0.345	0.328
Rubidium	-0.636	0.048
Selenium	-0.782	0.008
Silver	-0.650	0.042
Sodium	0.358	0.310
Strontium	-0.903	0.000
Thallium	-0.758	0.011
Thorium	-0.915	0.000
Tin	-0.952	0.000
Titanium	-0.976	0.000
Uranium	-0.867	0.001
Vanadium	-0.867	0.001
Yttrium	-0.903	0.000
Zinc	-0.430	0.214
Zirconium	-0.952	0.000

^a Highlighted cells indicate Spearman correlation coefficient > 0.7 or < -0.7.

^b Highlighted cells indicate Spearman correlation with p value < 0.1.

Table D.5: Raw whole benthic invertebrate chemistry results from littoral areas of Quesnel Lake, Mount Polley Mine, 2015¹.

Parameter	Units	Reference 95th Percentile	Reference (Horsefly Bay)													Exposed (Far-field)												
			LREF1-01	LREF1-02	LREF1-03	LREF1-04	LREF1-05	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum	Lower 95th Confidence limit	Upper 95th Confidence Limit	LFF-01	LFF-02	LFF-03	LFF-04	LFF-05	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum	Lower 95th Confidence limit	Upper 95th Confidence Limit
Aluminum	mg/kg	3,990	2,830	493	606	4,280	49	1,652	606	1,824	816	49	4,280	-612	3,915	4,540	691	2,790	2,820	3,680	2,904	2,820	1,431	640	691	4,540	1,127	4,681
Antimony	mg/kg	0.0148	0.0150	0.0141	0.0111	0.0083	0.0093	0.0116	0.0111	0.0029	0.0013	0.0083	0.0150	0.0079	0.0152	0.0379	0.0150	0.0162	0.0072	0.0021	0.0157	0.0150	0.0137	0.0061	0.0021	0.0379	-0.0013	0.0327
Arsenic	mg/kg	2.72	2.44	1.23	2.79	2.32	0.41	1.84	2.32	0.99	0.44	0.41	2.79	0.61	3.07	1.43	2.15	2.44	3.23	1.76	2.20	2.15	0.69	0.31	1.43	3.23	1.34	3.06
Barium	mg/kg	35.1	33.7	21.6	9.0	35.5	12.9	22.5	21.6	11.9	5.3	9.0	35.5	7.7	37.4	37.9	6.1	21.6	21.4	42.0	25.8	21.6	14.4	6.5	6.1	42.0	7.9	43.7
Beryllium	mg/kg	0.0950	0.0589	0.0107	0.0140	0.104	<0.0057	0.0387	0.0140	0.0423	0.0189	<0.0057	0.104	-0.0138	0.0912	0.130	0.0090	0.0719	0.0781	0.0982	0.0774	0.0781	0.0445	0.0199	0.0090	0.130	0.0222	0.133
Bismuth	mg/kg	0.0460	0.0250	0.0370	0.0198	0.0483	0.0196	0.0299	0.0250	0.0125	0.0056	0.0196	0.0483	0.0145	0.0454	0.0422	0.0081	0.0268	0.0350	0.0316	0.0287	0.0316	0.0128	0.0057	0.0081	0.0422	0.0128	0.0447
Boron	mg/kg	1.41	1.14	1.03	0.33	1.48	<0.48	0.89	1.03	0.48	0.21	0.33	1.48	0.30	1.48	2.78	<0.44	1.42	1.30	1.92	1.57	1.42	0.86	0.38	<0.44	2.78	0.50	2.64
Cadmium	mg/kg	1.32	0.78	1.45	0.75	0.66	0.15	0.76	0.75	0.46	0.21	0.15	1.45	0.18	1.33	0.46	0.59	0.68	0.52	1.26	0.70	0.59	0.32	0.14	0.46	1.26	0.30	1.10
Calcium	mg/kg	300,200	9,390	29,000	3,170	4,530	368,000	82,818	9,390	159,757	71,446	3,170	368,000	-115,515	281,151	6,190	1,980	3,880	3,940	33,100	9,818	3,940	13,100	5,859	1,980	33,100	-6,445	26,081
Cesium	mg/kg	0.319	0.217	0.048	0.054	0.344	0.005	0.134	0.054	0.143	0.064	0.005	0.344	-0.044	0.311	0.505	0.052	0.272	0.258	0.388	0.295	0.272	0.169	0.075	0.052	0.505	0.086	0.504
Chromium	mg/kg	11.1	6.56	1.63	1.87	12.2	0.19	4.49	1.87	4.93	2.21	0.19	12.2	-1.63	10.6	10.1	1.43	5.96	4.36	7.49	5.87	5.96	3.26	1.46	1.43	10.1	1.82	9.92
Cobalt	mg/kg	3.34	2.93	0.54	3.21	3.37	0.10	2.03	2.93	1.58	0.71	0.10	3.37	0.07	3.99	3.02	2.89	3.07	2.74	2.72	2.89	2.89	0.16	0.07	2.72	3.07	2.69	3.08
Copper	mg/kg	18.9	13.3	19.9	15.1	14.5	5.3	13.6	14.5	5.3	2.4	5.3	19.9	7.1	20.2	29.9	10.1	30.6	32.7	30.6	26.8	30.6	9.4	4.2	10.1	32.7	15.1	38.4
Gallium	mg/kg	1.50	1.16	0.18	0.24	1.59	0.02	0.64	0.24	0.69	0.31	0.02	1.59	-0.22	1.50	1.78	0.31	1.05	1.14	1.26	1.11	1.14	0.53	0.24	0.31	1.78	0.45	1.76
Iron	mg/kg	3,698	3,820	888	1,540	3,210	361	1,964	1,540	1,492	667	361	3,820	112	3,816	4,980	1,810	2,980	1,820	2,810	2,880	2,810	1,294	579	1,810	4,980	1,274	4,486
Lead	mg/kg	1.56	0.84	0.15	0.37	1.74	0.04	0.63	0.37	0.69	0.31	0.04	1.74	-0.23	1.49	2.54	0.35	1.80	1.03	1.86	1.52	1.80	0.84	0.38	0.35	2.54	0.47	2.56
Lithium	mg/kg	4.26	4.53	0.30	0.45	3.16	0.04	1.70	0.45	2.03	0.91	0.04	4.53	-0.82	4.21	3.90	0.40	2.41	2.35	3.09	2.43	2.41	1.29	0.58	0.40	3.90	0.82	4.04
Magnesium	mg/kg	2,422	1,910	1,730	1,220	2,550	84	1,499	1,730	923	413	83.8	2,550	353	2,645	2,130	1,140	2,040	2,000	2,040	1,870	2,040	411	184	1,140	2,130	1,360	2,380
Manganese	mg/kg	168	133	117	49	177	7.2	97	117	68	30	7.2	177	12	181	148	104	134	119	143	130	134	18	8.1	104	148	107	152
Molybdenum	mg/kg	0.599	0.385	0.601	0.243	0.592	0.099	0.384	0.385	0.219	0.098	0.099	0.601	0.112	0.656	0.852	0.128	0.357	0.109	0.868	0.463	0.357	0.376	0.168	0.109	0.868	-0.003	0.929
Nickel	mg/kg	7.35	6.29	1.96	1.48	7.61	1.50	3.77	1.96	2.95	1.32	1.48	7.61	0.11	7.43	7.34	1.46	5.04	4.83	6.30	4.99	5.04	2.22	0.99	1.46	7.34	2.24	7.75
Phosphorus	mg/kg	11,186	5,800	11,900	8,330	3,480	643	6,031	5,800	4,339	1,941	643	11,900	643	11,418	3,770	7,520	5,370	4,490	6,370	5,504	5,370	1,489	666	3,770	7,520	3,656	7,352
Potassium	mg/kg	6,406	3,590	6,230	6,450	4,480	237	4,197	4,480	2,517	1,126	237	6,450	1,073	7,322	1,960	7,530	5,290	5,310	3,950	4,808	5,290	2,046	915	1,960	7,530	2,268	7,348
Rhenium	mg/kg	0.00082	0.00069	<0.00023	0.00032	0.00085	0.00022	0.00046	0.00032	0.00029	0.00013	0.00022	0.00085	0.00010	0.00082	0.00138	0.00046	0.00159	0.00148	0.00039	0.00106	0.00138	0.00059	0.00026	0.00039	0.00159	0.00033	0.00179
Rubidium	mg/kg	9.54	5.98	7.32	5.51	10.1	0.61	5.90	5.98	3.46	1.55	0.61	10.1	1.61	10.2	7.19	4.69	8.79	7.26	10.7	7.73	7.26	2.22	0.99	4.69	10.7	4.97	10.5
Selenium	mg/kg	5.98	3.48	2.59	6.60	3.07	0.45	3.24	3.07	2.21	0.99	0.45	6.60	0.49	5.98	3.36	4.07	3.32	3.31	3.23	3.46	3.32	0.35	0.15	3.23	4.07	3.03	3.89
Silver	mg/kg	0.0586	0.0370	0.0485	0.0606	0.0508	0.0390	0.0472	0.0485	0.0096	0.0043	0.0370	0.0606	0.0353	0.0590	0.0425	0.0170	0.0357	0.0205	0.0511	0.0334	0.0357	0.0145	0.0065	0.0170	0.0511	0.0154	0.0513
Sodium	mg/kg	2,518	1,670	2,070	2,630	1,650	1,250	1,854	1,670	522	233	1,250	2,630	1,206	2,502	349	1,920	2,390	2,990	1,600	1,850	1,920	989	442	349	2,990	622	3,077
Strontium	mg/kg	432	53	125	18	40	509	149	53	205	92	18	509	-106	404	39	9.2	38	33	187	61	38	71	32	9.2	187	-27	150
Thallium	mg/kg	0.0473	0.0395	0.0180	0.0190	0.0493	0.0038	0.0259	0.0190	0.0183	0.0082	0.0038	0.0493	0.0033	0.0486	0.0411	0.0149	0.0237	0.0219	0.0471	0.0297	0.0237	0.0137	0.0061	0.0149	0.0471	0.0128	0.0467
Thorium	mg/kg	1.06	0.67	0.12	0.15	1.16	0.02	0.42	0.15	0.48	0.22	0.02	1.16	-0.18	1.02	1.29	0.12	0.59	1.02	0.90	0.78	0.90	0.45	0.20	0.12	1.29	0.23	1.34
Tin	mg/kg	0.0247	0.0258	0.0201	0.0116	0.0167	0.0033	0.0155	0.0167	0.0086	0.0038	0.0033	0.0258	0.0049	0.0261	0.0403	0.0106	0.0304	0.0220	0.0076	0.0222	0.0220	0.0136	0.0061	0.0076	0.0403	0.0053	0.0391
Titanium	mg/kg	53.2	58.9	28.1	19.2	30.5	4.4	28.2	28.1	20.0	8.9	4.4	58.9	3.4	53.0	146	29.0	56.7	28.0	6.7	53.3	29.0	54.8	24.5	6.7	146	-14.7	121
Uranium	mg/kg	0.601	0.654	0.069	0.061	0.389	0.026	0.240	0.069	0.274	0.123	0.026	0.654	-0.101	0.580	0.588	0.078	0.263	0.245	0.422	0.319	0.263	0.194	0.087	0.078	0.588	0.079	0.559
Vanadium	mg/kg	14.5	9.45	1.82	2.38	15.7	0.35	5.94	2.38	6.49	2.90	0.35	15.70	-2.12	14.0	15.2	3.92	15.9	13.0	12.5	12.1	13.0	4.79	2.14	3.92	15.9	6.15	18.1
Yttrium	mg/kg	3.22	3.36	0.40	0.34	2.68	0.08	1.37	0.40	1.53	0.68	0.08	3.36	-0.52	3.27	3.04	0.45	1.70	1.85	2.20	1.85	1.85	0.94	0.42	0.45	3.04	0.69	3.01
Zinc	mg/kg	279	81	115	318	125	7.1	129	115	115	52	7.1	318	-14	272	142	157	116	109	92	123	116	26	12	92	157	91	156
Zirconium	mg/kg	1.21	1.21	0.358	0.485	1.19	0.080	0.665	0.485	0.510	0.228	0.080	1.210	0.031	1.30	2.16	0.446	1.55	1.42	0.531	1.22	1.42	0.726	0.325	0.446	2.16	0.321	2.12

Value in exposed area exceeds the Reference 95th Percentile for this parameter. Data from the Reference area was not included in this comparison.

¹ Summary statistics were calculated using method detection limit (MDL) values if data were below the MDL. Means are shown with a < symbol if all data used in their calculation were < MDL. If MDLs were variable, means were reported as < the maximum MDL and this value was used in 95% confidence limit calculations.

Table D.6: PCA results displaying eigen value, percent variance explained, Monte Carlo randomization p-values of axis significance, and station scores for whole benthic invertebrate metal concentrations from Quesnel Lake littoral sampling stations, Mount Polley Mine, 2015. Data were Log (X+1) transformed prior to analysis.

		PCA Axis 1
Eigenvalue		21.5
% Variance explained		56.7
Monte Carlo p		0.0001
Far-field	LFF-01	-5.7
	LFF-02	3.1
	LFF-03	-2.5
	LFF-04	-1.8
	LFF-05	-2.5
Reference	LREF1-01	-2.3
	LREF1-02	2.9
	LREF1-03	2.8
	LREF1-04	-3.8
	LREF1-05	10.0

Table D.7: PCA axis scores Spearman correlation with metal concentrations of whole benthic invertebrates from Quesnel Lake littoral sampling areas, Mount Polley Mine, 2015. Data were Log10 (X+1) transformed prior to analysis.

Metal	Spearman Correlation Coefficient ^a	P-Value ^b
	PCA Axis-1 (56.7%)	PCA Axis-1 (56.7%)
Aluminum	-0.891	0.001
Antimony	-0.188	0.602
Arsenic	-0.213	0.555
Barium	-0.790	0.007
Beryllium	-0.939	0.000
Bismuth	-0.709	0.022
Boron	-0.867	0.001
Cadmium	-0.042	0.907
Calcium	0.055	0.881
Cesium	-0.939	0.000
Chromium	-0.952	0.000
Cobalt	-0.624	0.054
Copper	-0.511	0.132
Gallium	-0.891	0.001
Iron	-0.891	0.001
Lead	-0.927	0.000
Lithium	-0.855	0.002
Magnesium	-0.960	0.000
Manganese	-0.939	0.000
Molybdenum	-0.648	0.043
Nickel	-0.891	0.001
Phosphorus	0.321	0.365
Potassium	0.333	0.347
Rhenium	-0.709	0.022
Rubidium	-0.661	0.038
Selenium	-0.103	0.777
Silver	-0.224	0.533
Sodium	0.248	0.489
Strontium	0.030	0.934
Thallium	-0.915	0.000
Thorium	-0.879	0.001
Tin	-0.636	0.048
Titanium	-0.636	0.048
Uranium	-0.794	0.006
Vanadium	-0.879	0.001
Yttrium	-0.782	0.008
Zinc	-0.188	0.603
Zirconium	-0.842	0.002

^a Highlighted cells indicate Spearman correlation coefficient > 0.7 or < -0.7.

^b Highlighted cells indicate Spearman correlation with p value < 0.1.

Table D.9: PCA results displaying eigen value, percent variance explained, Monte Carlo randomization p-values of axis significance, and station scores for whole benthic invertebrate metal concentrations from Quesnel Lake profundal sampling stations, Mount Polley Mine, 2015. Data were Log (X+1) transformed prior to analysis.

		PCA Axis 1	PCA Axis 2
Eigenvalue		20.2	8.07
% Variance explained		53.0	21.2
Monte Carlo p		0.0001	0.0003
Near-field	PNF-01	5.8	1.4
	PNF-02	-2.6	-0.9
	PNF-03	6.2	4.5
	PNF-04	-7.6	4.3
	PNF-05	-3.3	1.9
Reference	PREF1-01	0.5	-2.1
	PREF1-02	1.5	-1.4
	PREF1-03	-4.6	-2.9
	PREF1-04	1.2	-2.9
	PREF1-05	2.9	-2.0

Table D.10: PCA axis scores Spearman correlation with metal concentrations of whole benthic invertebrates from Quesnel Lake profundal sampling areas, Mount Polley Mine, 2015. Data were Log10 (X+1) transformed prior to analysis.

Metal	Spearman Correlation Coefficient ^a		P-Value ^b	
	PCA Axis-1 (53.0%)	PCA Axis-2 (21.2%)	PCA Axis-1 (53.0%)	PCA Axis-2 (21.2%)
Aluminum	-0.952	-0.079	0.000	0.829
Antimony	-0.745	0.406	0.013	0.244
Arsenic	-0.297	-0.758	0.405	0.011
Barium	-0.564	-0.673	0.090	0.033
Beryllium	-0.867	-0.212	0.001	0.556
Bismuth	-0.881	-0.134	0.001	0.713
Boron	-0.648	0.406	0.043	0.244
Cadmium	0.006	0.539	0.987	0.108
Calcium	-0.891	-0.079	0.001	0.829
Cesium	-0.939	-0.103	0.000	0.777
Chromium	-0.867	-0.212	0.001	0.556
Cobalt	-0.903	-0.091	0.000	0.803
Copper	-0.418	0.588	0.229	0.074
Gallium	-0.988	-0.139	0.000	0.701
Iron	-0.842	-0.018	0.002	0.960
Lead	-0.903	-0.273	0.000	0.446
Lithium	-0.952	-0.018	0.000	0.960
Magnesium	-0.927	0.055	0.000	0.881
Manganese	-0.964	0.042	0.000	0.907
Molybdenum	-0.479	0.600	0.162	0.067
Nickel	-0.842	-0.176	0.002	0.627
Phosphorus	-0.042	0.867	0.907	0.001
Potassium	-0.030	0.927	0.934	0.000
Rhenium	-0.503	0.345	0.138	0.328
Rubidium	-0.661	-0.285	0.038	0.425
Selenium	-0.430	-0.697	0.214	0.025
Silver	-0.600	-0.358	0.067	0.310
Sodium	0.309	0.855	0.385	0.002
Strontium	-0.588	-0.285	0.074	0.425
Thallium	-0.636	-0.467	0.048	0.174
Thorium	-0.806	-0.455	0.005	0.187
Tin	-0.576	0.624	0.082	0.054
Titanium	-0.855	0.200	0.002	0.580
Uranium	-0.867	-0.491	0.001	0.150
Vanadium	-0.915	0.042	0.000	0.907
Yttrium	-0.842	-0.382	0.002	0.276
Zinc	-0.564	0.515	0.090	0.128
Zirconium	-0.855	-0.273	0.002	0.446


^a Highlighted cells indicate Spearman correlation coefficient > 0.7 or < -0.7.

^b Highlighted cells indicate Spearman correlation with p value < 0.1.

Table D.11: Ratio of mean metal concentrations in whole benthic invertebrates relative to mean metal concentrations in sediment in the vicinity of the Mount Polley Mine, 2015 ^a.

Parameter	Units	Polley Lake		Quesnel Lake Littoral		Quesnel Lake Profundal	
		Reference (Bootjack Lake)	Exposed (Polley Lake)	Reference	Exposed	Reference	Exposed
		BOL-B2	POL-P2	LREF1	Far-field (LFF)	PREF1	Near-field (PNF)
Aluminum	mg/kg	0.01	0.14	0.13	0.22	0.24	0.19
Antimony	mg/kg	0.05	0.11	0.04	0.06	0.09	0.21
Arsenic	mg/kg	0.10	0.17	0.40	0.55	1.41	0.30
Barium	mg/kg	0.06	0.15	0.20	0.38	0.59	0.20
Beryllium	mg/kg	0.01	0.13	0.11	0.22	0.28	0.16
Bismuth	mg/kg	0.11	0.31	0.27	0.28	0.69	2.00
Boron	mg/kg	0.05	0.46	0.09	0.16	0.24	0.39
Cadmium	mg/kg	0.16	0.93	2.30	3.62	5.96	23.6
Calcium	mg/kg	0.13	0.15	11.1	0.92	0.34	0.13
Chromium	mg/kg	0.01	0.13	0.09	0.14	0.22	2.19
Cobalt	mg/kg	0.02	0.11	0.19	0.27	0.25	0.19
Copper	mg/kg	0.04	0.12	0.43	0.41	1.00	0.21
Iron	mg/kg	0.04	0.13	0.08	0.11	0.24	0.22
Lead	mg/kg	0.06	0.14	0.11	0.28	0.32	0.25
Lithium	mg/kg	0.01	0.09	0.15	0.20	0.21	0.20
Magnesium	mg/kg	0.16	0.15	0.23	0.28	0.28	0.30
Manganese	mg/kg	0.01	0.23	0.30	0.42	0.29	0.18
Molybdenum	mg/kg	0.11	0.27	0.46	0.69	0.77	0.32
Nickel	mg/kg	0.01	0.14	0.12	0.19	0.22	0.85
Phosphorus	mg/kg	3.12	6.04	5.27	5.67	6.26	8.34
Potassium	mg/kg	2.95	2.22	3.46	4.78	3.18	3.43
Selenium	mg/kg	0.84	1.65	5.09	6.65	8.37	3.74
Silver	mg/kg	0.08	0.15	0.32	0.34	0.89	0.52
Sodium	mg/kg	6.27	2.42	4.03	4.79	7.32	4.24
Strontium	mg/kg	0.05	0.13	2.16	0.77	0.35	0.20
Thallium	mg/kg	0.02	0.40	0.22	0.50	0.44	0.82
Tin	mg/kg	0.06	0.11	0.04	0.05	0.12	0.11
Titanium	mg/kg	0.01	0.12	0.03	0.05	0.13	0.11
Uranium	mg/kg	0.02	0.21	0.21	0.30	0.33	0.25
Vanadium	mg/kg	0.02	0.18	0.10	0.14	0.24	0.17
Zinc	mg/kg	0.82	0.71	2.08	2.51	1.21	2.43

 Indicates ratio in exposed area is more than 2x greater than that in the the associated reference area.

 Indicates ratio in reference area is more than 2x greater than that in the the associated exposed area.

^a Tissue and sediment chemistry results reported as < Method Detection Limit (MDL) were used at the MDL for calculations. Mean sediment chemistry results include data from all stations from within each sampling area (Minnow 2015b) sampled concurrently with benthic invertebrate tissue samples.

Table D.12: Raw whole benthic invertebrate chemistry results from Hazeltine Creek, and a reference area (Edney Creek), Mount Polley Mine, 2015.

Parameter	Units	95th Percentile Value			Exposed (Hazeltine Creek)												
		Reference Edney Creek (2015)	Historic Upper Hazeltine Creek (2010)	Historic Lower Hazeltine Creek (2010)	HAC-D1	HAC-D2	HAC-D3	HAC-D4	HAC-D5	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum	Lower 95th Confidence limit	Upper 95th Confidence Limit
Aluminum	mg/kg	387	1,842	2,816	2,330	2,800	2,460	2,310	2,250	2,430	2,330	221	99	2,250	2,800	2,156	2,704
Antimony	mg/kg	0.0062	0.0532	0.0678	0.0122	0.0151	0.0152	0.0167	0.0119	0.0142	0.0151	0.0021	0.0009	0.0119	0.0167	0.0116	0.0168
Arsenic	mg/kg	1.85	3.74	6.66	2.43	2.51	2.72	1.97	1.84	2.29	2.43	0.37	0.17	1.84	2.72	1.83	2.76
Barium	mg/kg	9.39	76.9	102	69.5	61.1	69.0	61.1	88.2	69.8	69.0	11.1	4.95	61.1	88.2	56.0	83.5
Beryllium	mg/kg	0.0066	<0.30	<0.30	0.066	0.091	0.063	0.090	0.054	0.073	0.066	0.017	0.008	0.054	0.091	0.052	0.094
Bismuth	mg/kg	0.012	<0.30	<0.30	0.028	0.031	0.028	0.027	0.016	0.026	0.028	0.0059	0.0026	0.016	0.031	0.019	0.033
Boron	mg/kg	0.59	-	-	1.74	2.00	2.30	2.33	1.73	2.02	2.00	0.29	0.13	1.73	2.33	1.66	2.38
Cadmium	mg/kg	0.22	0.48	0.47	0.90	1.33	0.99	0.59	0.76	0.92	0.90	0.28	0.12	0.59	1.33	0.57	1.26
Calcium	mg/kg	1,908	10,832	3,676	3,840	5,720	4,530	4,070	2,850	4,202	4,070	1,047	468	2,850	5,720	2,902	5,502
Cesium	mg/kg	0.025	-	-	0.269	0.347	0.298	0.350	0.251	0.303	0.298	0.045	0.020	0.251	0.350	0.247	0.359
Chromium	mg/kg	0.67	34	104	4.74	6.42	7.23	5.23	3.04	5.33	5.23	1.61	0.72	3.04	7.23	3.33	7.33
Cobalt	mg/kg	0.30	3.11	5.48	3.45	6.98	3.95	2.92	2.46	3.95	3.45	1.78	0.80	2.46	6.98	1.74	6.17
Copper	mg/kg	18.2	54.2	33.5	251	254	184	174	158	204	184	45.1	20.2	158	254	148	260
Gallium	mg/kg	0.19	-	-	1.33	1.85	1.60	1.37	0.98	1.43	1.37	0.33	0.15	0.98	1.85	1.02	1.83
Iron	mg/kg	884	-	-	8,460	10,200	10,300	7,420	2,220	7,720	8,460	3,305	1,478	2,220	10,300	3,617	11,823
Lead	mg/kg	0.15	0.75	1.46	1.47	2.03	1.84	1.70	1.19	1.65	1.70	0.33	0.15	1.19	2.03	1.24	2.05
Lithium	mg/kg	0.48	1.37	2.64	1.67	2.11	1.89	1.70	1.65	1.80	1.70	0.20	0.09	1.65	2.11	1.56	2.05
Magnesium	mg/kg	1,250	2,212	2,918	1,410	1,890	1,590	1,470	1,340	1,540	1,470	216	96.6	1,340	1,890	1,272	1,808
Manganese	mg/kg	117	2,268	1,632	188	242	201	189	199	204	199	22.1	9.90	188	242	176	231
Molybdenum	mg/kg	7.20	4.81	8.30	1.18	1.37	1.38	0.92	1.47	1.26	1.37	0.22	0.10	0.92	1.47	0.99	1.54
Nickel	mg/kg	0.59	20.6	61.0	2.66	4.43	3.41	2.81	2.40	3.14	2.81	0.81	0.36	2.40	4.43	2.14	4.15
Phosphorus	mg/kg	8,132	-	-	2,840	1,940	2,990	2,650	4,150	2,914	2,840	800	358	1,940	4,150	1,921	3,907
Potassium	mg/kg	6,466	-	-	4,390	3,250	3,590	4,400	4,950	4,116	4,390	685	306	3,250	4,950	3,265	4,967
Rhenium	mg/kg	0.00012	-	-	0.0043	0.0057	0.0050	0.0044	0.0034	0.0045	0.0044	0.00087	0.00039	0.0034	0.0057	0.0035	0.0056
Rubidium	mg/kg	1.41	-	-	3.27	3.29	2.95	3.15	3.54	3.24	3.27	0.22	0.10	2.95	3.54	2.97	3.51
Selenium	mg/kg	2.43	11.7	3.7	2.55	2.76	3.02	2.49	2.77	2.72	2.76	0.21	0.09	2.49	3.02	2.46	2.98
Silver	mg/kg	0.046	-	-	0.214	0.125	0.126	0.098	0.068	0.126	0.125	0.054	0.024	0.068	0.214	0.059	0.194
Sodium	mg/kg	2,080	-	-	1,300	834	1,050	1,410	1,400	1,199	1,300	250	112	834	1,410	888	1,510
Strontium	mg/kg	13.4	33.1	28.5	26.5	37.6	26.6	28.3	22.9	28.4	26.6	5.52	2.47	22.9	37.6	21.5	35.2
Thallium	mg/kg	0.0054	<0.030	0.0348	0.0271	0.0342	0.0263	0.0256	0.0234	0.0273	0.0263	0.0041	0.0018	0.0234	0.0342	0.0222	0.0324
Thorium	mg/kg	0.07	-	-	0.597	0.673	0.684	0.488	0.442	0.577	0.597	0.109	0.049	0.442	0.684	0.442	0.712
Tin	mg/kg	0.23	<0.20	0.34	0.015	0.042	0.043	0.022	0.011	0.026	0.022	0.015	0.0067	0.011	0.043	0.0077	0.045
Titanium	mg/kg	5.34	-	-	50.0	60.4	62.8	56.0	11.8	48.2	56.0	20.9	9.36	11.8	62.8	22.2	74.2
Uranium	mg/kg	0.023	0.279	0.322	0.215	0.262	0.240	0.200	0.185	0.220	0.215	0.031	0.014	0.185	0.262	0.182	0.259
Vanadium	mg/kg	2.16	8.8	16.8	46.4	60.2	51.7	41.9	20.6	44.2	46.4	14.8	6.63	20.6	60.2	25.8	62.6
Yttrium	mg/kg	0.21	-	-	1.84	2.21	2.27	1.86	1.43	1.92	1.86	0.34	0.15	1.43	2.27	1.50	2.34
Zinc	mg/kg	79.8	244	113	110	120	111	101	110	110	110	6.73	3.01	101	120	102	119
Zirconium	mg/kg	0.12	-	-	0.60	0.70	0.74	0.58	0.25	0.57	0.60	0.19	0.09	0.25	0.74	0.33	0.81

Value in exposed area exceeds all available 95th Percentile values (Reference and Historic) for this parameter. Data from the Reference area was not included in this comparison.

¹ Summary statistics were calculated using method detection limit (MDL) values if data were below the MDL. Means are shown with a < symbol if all data used in their calculation were < MDL. If MDLs were variable, means were reported as < the maximum MDL and this value was used in 95% confidence limit calculations.

Table D.13: Raw historic whole benthic invertebrate chemistry results from Upper (W7) and Lower (W11) Hazeltine Creek sampling area, Mount Polley Mine, 2010¹.

Parameter	Units	Upper Hazeltine Creek (W7)													
		UH-1	UH-2	UH-3	UH-4	UH-5	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum	Lower 95th Confidence Limit	Upper 95th Confidence Limit	95th Percentile
Date Sampled	17-Jun-10	17-Jun-10	17-Jun-10	17-Jun-10	17-Jun-10										
Aluminum	mg/kg	1,610	1,730	1,870	1,020	811	1,408	1,610	465	208	811	1,870	831	1,985	1,842
Antimony	mg/kg	<0.050	0.054	<0.050	<0.050	<0.050	0.051	<0.050	0.002	0.001	<0.050	0.054	0.049	0.053	0.053
Arsenic	mg/kg	2.54	3.99	2.74	2.13	1.72	2.62	2.54	0.86	0.38	1.72	3.99	1.56	3.69	3.74
Barium	mg/kg	63.7	72.7	78.0	63.1	47.6	65.0	63.7	11.6	5.2	47.6	78.0	50.6	79.4	76.9
Beryllium	mg/kg	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	0	0	<0.30	<0.30	<0.30	<0.30	<0.30
Bismuth	mg/kg	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	0	0	<0.30	<0.30	<0.30	<0.30	<0.30
Cadmium	mg/kg	0.502	0.355	0.381	0.344	0.248	0.366	0.355	0.091	0.041	0.248	0.502	0.253	0.479	0.478
Calcium	mg/kg	2,320	12,900	2,560	1,730	1,870	4,276	2,320	4,833	2,161	1,730	12,900	-1,723	10,275	10,832
Chromium	mg/kg	34.3	22.4	32.9	12.0	9.43	22.2	22.4	11.5	5.14	9.43	34.3	7.94	36.5	34.0
Cobalt	mg/kg	2.78	2.69	3.19	2.14	1.76	2.51	2.69	0.56	0.25	1.76	3.19	1.81	3.21	3.11
Copper	mg/kg	49.6	53.3	54.4	47.4	44.3	49.8	49.6	4.2	1.9	44.3	54.4	44.6	55.0	54.2
Lead	mg/kg	0.63	0.71	0.76	0.48	0.37	0.59	0.63	0.16	0.07	0.37	0.76	0.39	0.79	0.75
Lithium	mg/kg	1.13	1.25	1.40	0.67	0.52	0.99	1.13	0.38	0.17	0.52	1.40	0.52	1.47	1.37
Magnesium	mg/kg	2,060	2,060	2,250	1,930	1,810	2,022	2,060	165	74	1,810	2,250	1,818	2,226	2,212
Manganese	mg/kg	1,970	2,040	2,320	2,060	1,700	2,018	2,040	222	99	1,700	2,320	1,743	2,293	2,268
Mercury	mg/kg	0.0522	0.0484	0.0478	0.0537	0.0530	0.0510	0.0522	0.0027	0.0012	0.0478	0.0537	0.0476	0.0544	0.0536
Molybdenum	mg/kg	4.67	3.81	4.84	3.67	3.39	4.08	3.81	0.64	0.29	3.39	4.84	3.28	4.87	4.81
Nickel	mg/kg	20.8	13.1	19.6	7.97	6.25	13.5	13.1	6.59	2.95	6.25	20.8	5.36	21.7	20.6
Selenium	mg/kg	10.8	10.0	10.7	11.2	11.8	10.9	10.8	0.66	0.30	10.0	11.8	10.1	11.7	11.7
Strontium	mg/kg	21.0	35.7	22.8	18.4	14.8	22.5	21.0	7.9	3.6	14.8	35.7	12.7	32.4	33.1
Thallium	mg/kg	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0	0	<0.030	<0.030	<0.030	<0.030	<0.030
Tin	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0	0	<0.20	<0.20	<0.20	<0.20	<0.20
Uranium	mg/kg	0.248	0.282	0.266	0.193	0.153	0.228	0.248	0.054	0.024	0.153	0.282	0.162	0.295	0.279
Vanadium	mg/kg	7.89	7.78	9.04	4.58	3.72	6.60	7.78	2.31	1.03	3.72	9.04	3.73	9.47	8.81
Zinc	mg/kg	206	203	244	244	202	220	206	22	10	202	244	192	247	244

¹ Summary statistics were calculated using method detection limit (MDL) values if data were below the MDL. Means are shown with a < symbol if all data used in their calculation were < MDL.

Table D.13: Raw historic whole benthic invertebrate chemistry results from Upper (W7) and Lower (W11) Hazeltine Creek sampling area, Mount Polley Mine, 2010¹.

Parameter	Units	Lower Hazeltine Creek (W11)													
		LH-1	LH-2	LH-3	LH-4	LH-5	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum	Lower 95th Confidence Limit	Upper 95th Confidence Limit	95th Percentile
Date Sampled	23-Jun-10	23-Jun-10	23-Jun-10	23-Jun-10	23-Jun-10										
Aluminum	mg/kg	2,980	586	1,960	2,160	1,540	1,845	1,960	877	392	586	2,980	756	2,934	2,816
Antimony	mg/kg	0.063	<0.050	<0.050	0.069	<0.050	0.056	<0.050	0.009	0.004	<0.050	0.069	0.045	0.068	0.068
Arsenic	mg/kg	7.33	1.46	3.63	3.97	3.32	3.94	3.63	2.13	0.95	1.46	7.33	1.30	6.58	6.66
Barium	mg/kg	110	35.3	66.6	69.8	66.0	69.5	66.6	26.6	11.9	35.3	110	36.5	103	102
Beryllium	mg/kg	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	0	0	<0.30	<0.30	<0.30	<0.30	<0.30
Bismuth	mg/kg	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	0	0	<0.30	<0.30	<0.30	<0.30	<0.30
Cadmium	mg/kg	0.495	0.214	0.339	0.369	0.312	0.346	0.339	0.102	0.045	0.214	0.495	0.220	0.472	0.470
Calcium	mg/kg	3,260	1,360	2,180	3,780	2,260	2,568	2,260	956	427	1,360	3,780	1,382	3,754	3,676
Chromium	mg/kg	38.7	7.80	23.9	120	25.7	43.2	25.7	44.3	19.8	7.80	120	-11.8	98.2	104
Cobalt	mg/kg	5.68	0.98	2.96	4.70	3.01	3.47	3.01	1.81	0.81	0.98	5.68	1.22	5.71	5.48
Copper	mg/kg	31.8	19.2	23.6	33.9	22.6	26.2	23.6	6.3	2.8	19.2	33.9	18.4	34.1	33.5
Lead	mg/kg	1.48	1.40	0.70	1.20	0.78	1.11	1.20	0.36	0.16	0.70	1.48	0.67	1.55	1.46
Lithium	mg/kg	2.75	<0.50	2.22	1.98	1.34	1.76	1.98	0.87	0.39	<0.50	2.75	0.68	2.83	2.64
Magnesium	mg/kg	3,030	1,410	2,470	2,460	2,000	2,274	2,460	605	271	1,410	3,030	1,522	3,026	2,918
Manganese	mg/kg	1,710	701	981	1,020	1,320	1,146	1,020	384	172	701	1,710	670	1,623	1,632
Mercury	mg/kg	0.0525	0.0347	0.0431	0.0598	0.0369	0.0454	0.0431	0.0106	0.0047	0.0347	0.0598	0.0322	0.0586	0.0583
Molybdenum	mg/kg	3.88	3.74	4.49	9.25	4.32	5.14	4.32	2.32	1.04	3.74	9.25	2.26	8.02	8.30
Nickel	mg/kg	27.8	5.17	15.8	69.3	16.1	26.8	16.1	25.1	11.2	5.17	69.3	-4.27	57.9	61.0
Selenium	mg/kg	3.49	3.55	3.67	3.19	3.64	3.51	3.55	0.19	0.09	3.19	3.67	3.27	3.75	3.66
Strontium	mg/kg	29.5	10.3	19.8	24.5	19.5	20.7	19.8	7.1	3.2	10.3	29.5	11.9	29.5	28.5
Thallium	mg/kg	0.036	<0.030	<0.030	<0.030	<0.030	0.031	<0.030	0.003	0.001	<0.030	0.036	0.028	0.035	0.035
Tin	mg/kg	0.36	<0.20	<0.20	0.25	<0.20	0.24	<0.20	0.07	0.03	<0.20	0.36	0.16	0.33	0.34
Uranium	mg/kg	0.334	0.055	0.172	0.272	0.183	0.203	0.183	0.106	0.048	0.055	0.334	0.071	0.335	0.322
Vanadium	mg/kg	17.8	4.21	11.4	12.6	9.11	11.0	11.4	4.97	2.22	4.21	17.8	4.86	17.2	16.8
Zinc	mg/kg	112	91	96	113	92	101	96	11	5	91	113	87	114	113

¹ Summary statistics were calculated using method detection limit (MDL) values if data were below the MDL. Means are shown with a < symbol if all data used in their calculation were < MDL.

Table D.14: PCA results displaying eigen value, percent variance explained, Monte Carlo randomization p-values of axis significance, and station scores for whole benthic invertebrate metal concentrations from Upper and Lower Hazeltine Creek and associated reference (Edney Creek) sampling stations, Mount Polley Mine, 2015. Data were Log (X+1) transformed prior to analysis.

		PCA Axis 1
Eigenvalue		30.1
% Variance explained		79.2
Monte Carlo p		0.0001
Upper Hazeltine Creek (HAC-U)	HAC-U1	-5.5
	HAC-U2	-4.3
	HAC-U3	-3.8
	HAC-U4	-4.3
	HAC-U5	-4.2
Lower Hazeltine Creek (HAC-D)	HAC-D1	-3.0
	HAC-D2	-4.6
	HAC-D3	-3.5
	HAC-D4	-2.7
	HAC-D5	-0.8
Edney Creek (Reference)	EDC-D1	6.3
	EDC-D2	8.3
	EDC-D3	6.7
	EDC-D4	7.4
	EDC-D5	7.9

Table D.15: PCA axis scores Spearman correlation with metal concentrations of whole benthic invertebrates from Upper and Lower Hazeltine Creek and associated reference (Edney Creek) sampling areas, Mount Polley Mine, 2015. Data were Log10 (X+1) transformed prior to analysis.

Metal	Spearman Correlation Coefficient ^a	P-Value ^b
	PCA Axis-1 (79.2%)	PCA Axis-1 (79.2%)
Aluminum	-0.954	0.000
Antimony	-0.657	0.008
Arsenic	-0.815	0.000
Barium	-0.795	0.000
Beryllium	-0.936	0.000
Bismuth	-0.764	0.001
Boron	-0.860	0.000
Cadmium	-0.579	0.024
Calcium	-0.896	0.000
Cesium	-0.918	0.000
Chromium	-0.896	0.000
Cobalt	-0.957	0.000
Copper	-0.808	0.000
Gallium	-0.946	0.000
Iron	-0.779	0.001
Lead	-0.925	0.000
Lithium	-0.946	0.000
Magnesium	-0.918	0.000
Manganese	-0.907	0.000
Molybdenum	0.654	0.008
Nickel	-0.921	0.000
Phosphorus	0.714	0.003
Potassium	-0.139	0.621
Rhenium	-0.918	0.000
Rubidium	-0.782	0.001
Selenium	-0.795	0.000
Silver	-0.654	0.008
Sodium	-0.216	0.439
Strontium	-0.893	0.000
Thallium	-0.596	0.019
Thorium	-0.775	0.001
Tin	0.475	0.074
Titanium	-0.846	0.000
Uranium	-0.750	0.001
Vanadium	-0.750	0.001
Yttrium	-0.918	0.000
Zinc	-0.540	0.038
Zirconium	-0.907	0.000

^a Highlighted cells indicate Spearman correlation coefficient > 0.7 or < -0.7.

^b Highlighted cells indicate Spearman correlation with p value < 0.1.

Table D.16: Summary of statistical comparisons of whole benthic invertebrate chemistry between pre-event Hazeltine Creek (2010) and Edney Creek (EDC) reference sampling areas in the vicinity of the Mount Polley Mine, 2015.

Area	Endpoint	Data Evaluation			Significant Difference Between Areas? ^a	Test Type			2-group ANOVA for Estimation of Effect Size						
		p-value				T-test (equal variance)	T-test (unequal variance)	Mann-U	Ref Mean (EDC 2015)	Pre-event Mean (Hazeltine Creek 2010)	Ref Standard Deviation	Magnitude of Difference ^b (# of Area1 SDs)	MSE	Minimum Detectable Effect Size ^c (# of Area1 SDs)	Power
		Variance	Normality												
			Ref (EDC 2015)	Pre-event (Hazeltine Creek 2010)											
Upper Hazeltine Creek	Arsenic	0.246	0.760	0.598	Yes	0.024	0.037	0.032	1.47	2.62	0.35	3.3	0.43	-	0.682
	Barium	0.074	0.462	0.707	Yes	0.000	0.000	0.008	6.72	65.0	2.27	25.7	69.6	-	1.000
	Calcium	0.043	0.509	0.001	Yes	0.233	0.266	0.032	1,477	4,276	447	6.3	11,776,891	-	0.207
	Cobalt	0.012	0.700	0.832	Yes	0.000	0.001	0.008	0.19	2.51	0.094	24.6	0.16	-	1.000
	Copper	0.260	0.119	0.760	Yes	0.000	0.000	0.008	15.9	49.8	2.4	14.1	11.6	-	1.000
	Manganese	0.107	0.794	0.779	Yes	0.000	0.000	0.008	73.8	2,018	34.8	55.9	25,215	-	1.000
	Molybdenum	0.090	0.558	0.328	No	0.286	0.304	0.548	5.0	4.1	1.7	-	1.7	1.8	0.172
	Nickel	0.004	0.388	0.387	Yes	0.002	0.011	0.008	0.42	13.5	0.19	69.6	21.7	-	0.972
	Selenium	0.990	0.005	0.962	Yes	0.000	0.000	0.008	1.51	10.9	0.67	13.9	0.4	-	1.000
	Strontium	0.233	0.365	0.332	Yes	0.015	0.026	0.008	10.8	22.5	3.00	3.9	36.1	-	0.774
	Tin	0.005	0.658	N/A	No	0.107	0.143	0.151	0.148	0.200	0.674	-	0.002	0.2	0.360
	Vanadium	0.016	0.009	0.303	Yes	0.001	0.003	0.008	0.852	6.60	0.964	6.0	3.138	-	0.994
	Zinc	0.000	0.753	0.019	Yes	0.000	0.000	0.008	74.9	220	4.69	30.9	256	-	1.000
Lower Hazeltine Creek	Arsenic	0.140	0.760	0.460	Yes	0.034	0.060	0.056	1.47	3.94	0.35	7.0	2.33	-	0.613
	Barium	0.134	0.462	0.428	Yes	0.001	0.006	0.008	6.72	69.5	2.27	27.6	356	-	0.995
	Calcium	0.086	0.509	0.783	Yes	0.049	0.063	0.095	1,477	2,568	447	2.4	556,586	-	0.529
	Cobalt	0.015	0.700	0.815	Yes	0.004	0.015	0.008	0.19	3.47	0.094	34.7	1.64	-	0.941
	Copper	0.013	0.119	0.422	Yes	0.009	0.018	0.008	15.9	26.2	2.4	4.3	22.8	-	0.849
	Manganese	0.015	0.794	0.811	Yes	0.000	0.003	0.008	73.8	1,146	34.8	30.8	74,292	-	1.000
	Molybdenum	0.664	0.558	0.005	No	0.922	0.922	1.000	5.01	5.14	1.70	-	4.14	2.8	0.051
	Nickel	0.041	0.388	0.128	Yes	0.046	0.078	0.008	0.42	26.8	0.19	140	314	-	0.545
	Selenium	0.112	0.005	0.225	Yes	0.000	0.002	0.008	1.51	3.51	0.67	3.0	0.25	-	1.000
	Strontium	0.215	0.365	0.839	Yes	0.020	0.032	0.056	10.8	20.7	3.00	3.3	29.8	-	0.715
	Tin	0.112	0.658	0.018	No	0.057	0.057	0.056	0.148	0.24	0.064	-	0.004	2.4	0.499
	Vanadium	0.079	0.009	0.975	Yes	0.002	0.009	0.008	0.852	11.0	0.964	10.6	12.8	-	0.975
	Zinc	0.007	0.753	0.072	Yes	0.001	0.004	0.008	74.9	101	4.69	5.5	70	-	0.989

^a Difference between areas considered to be significant if the result of the non-parametric test (Mann-Whitney U) was $p < 0.05$.

^b Magnitude calculated by comparing the difference between the reference area and pre-event area means to the reference area standard deviation (SD) [(pre-event mean - reference mean) / standard deviation of the reference mean].

^c Minimum effect size detectable calculated based on variance as square root of MSE from ANOVA and $\alpha = \beta = 0.10$. Minimum effect size reported as the minimum number of standard deviations detectable based on reference area standard deviation.

N/A = Not Applicable or unable to be calculated due to a lack of variability in data (all values were the same).

Highlighted values indicate significance at the $p < 0.5$ level.

Table D.17: Summary of statistical comparisons of whole benthic invertebrate chemistry between exposed (2015) and pre-event (2010) sampling areas in Hazeltine Creek, Mount Polley Mine.

Area	Endpoint	Data Evaluation			Significant Difference Between Areas? ^a	Test Type			2-group ANOVA for Estimation of Effect Size						
		p-value				T-test (equal variance)	p-value ^a		Historic Mean	2015 Mean	Historic Standard Deviation	Magnitude of Difference ^b (# of Area1 SDs)	MSE	Minimum Detectable Effect Size ^c (# of Area1 SDs)	Power
		Variance	Normality				T-test (unequal variance)	Mann-U							
	Historic (2010)		2015												
Upper Hazeltine Creek	Arsenic	0.084	0.598	0.564	No	0.882	0.885	0.690	2.62	2.56	0.86	-	0.38	-	0.052
	Barium	0.345	0.707	0.009	Yes	0.015	0.021	0.008	65.0	97.9	11.6	2.84	287	-	0.768
	Calcium	0.130	0.001	0.094	No	0.206	0.228	0.151	4,276	7,416	4,833	-	12,996,930	1.7	0.229
	Cobalt	0.572	0.832	0.063	Yes	0.007	0.009	0.008	2.51	4.22	0.56	3.03	0.55	-	0.889
	Copper	0.007	0.760	0.196	Yes	0.000	0.000	0.008	50	176	4.2	30.2	65.3	-	1.000
	Manganese	0.149	0.779	0.068	Yes	0.000	0.000	0.008	2,018	590	222	-6.44	26,030	-	1.000
	Molybdenum	0.005	0.328	0.547	Yes	0.000	0.000	0.008	4.08	1.47	0.64	-4.07	0.22	-	1.000
	Nickel	0.022	0.387	0.913	No	0.136	0.162	0.310	13.5	8.44	6.59	-	23.7	1.7	0.309
	Selenium	0.898	0.962	0.631	Yes	0.000	0.000	0.008	10.9	4.91	0.66	-9.04	0.42	-	1.000
	Strontium	0.745	0.332	0.967	Yes	0.000	0.000	0.008	22.5	60.4	7.9	4.76	48.2	-	1.000
	Tin	0.074	N/A	0.420	Yes	0.000	0.000	0.008	0.200	0.031	0	N/A	0.0001	-	1.000
	Vanadium	0.012	0.303	0.216	Yes	0.000	0.002	0.008	6.60	28.9	2.3	9.64	31.3	-	1.000
Zinc	0.003	0.019	0.887	Yes	0.000	0.000	0.008	220	91.9	22.1	-5.78	283	-	1.000	
Lower Hazeltine Creek	Arsenic	0.152	0.460	0.512	No	0.127	0.159	0.151	3.94	2.29	2.13	-	2.34	1.7	0.324
	Barium	0.365	0.428	0.114	No	0.986	0.986	1.000	69.5	69.8	26.6	-	415	1.8	0.050
	Calcium	0.948	0.783	0.936	Yes	0.033	0.033	0.032	2,568	4,202	956	1.71	1,005,095	-	0.619
	Cobalt	0.808	0.815	0.145	No	0.680	0.680	1.000	3.47	3.95	1.81	-	3.22	2.3	0.067
	Copper	0.000	0.422	0.153	Yes	0.000	0.001	0.008	26	204	6	28.2	1,036	-	1.000
	Manganese	0.013	0.811	0.043	Yes	0.001	0.005	0.008	1,146	204	384	-2.46	73,932	-	0.997
	Molybdenum	0.048	0.005	0.361	Yes	0.006	0.020	0.008	5.14	1.26	2.32	-1.67	2.72	-	0.900
	Nickel	0.046	0.128	0.369	Yes	0.068	0.102	0.008	26.8	3.14	25.1	-0.95	314	-	0.460
	Selenium	0.751	0.225	0.626	Yes	0.000	0.000	0.008	3.51	2.72	0.19	-4.12	0.04	-	1.000
	Strontium	0.614	0.839	0.212	No	0.094	0.096	0.151	20.7	28.4	7.1	-	40.5	2.1	0.388
	Tin	0.073	0.018	0.176	Yes	0.000	0.002	0.008	0.242	0.026	0.069	-3.11	0.003	-	1.000
	Vanadium	0.157	0.975	0.636	Yes	0.001	0.005	0.008	11.0	44.2	5.0	6.67	122.2	-	0.985
Zinc	0.068	0.072	0.492	No	0.129	0.137	0.421	101	110	10.9	0.89	81.7	1.9	0.319	

^a Difference between areas considered to be significant if the result of the non-parametric test (Mann-Whitney U) was $p < 0.05$.

^b Magnitude calculated by comparing the difference between the pre-event and exposed area means to the pre-event area standard deviation (SD) [(exposed mean - pre-event mean) / standard deviation of the pre-event mean].

^c Minimum effect size detectable calculated based on variance as square root of MSE from ANOVA and $\alpha = \beta = 0.10$. Minimum effect size reported as the minimum number of standard deviations detectable based on pre-event standard deviation.

N/A = Not Applicable or unable to be calculated due to a lack of variability in data (all values were the same).

Highlighted values indicate significance at the $p < 0.05$ level.

Table D.18: PCA results displaying eigen value, percent variance explained, Monte Carlo randomization p-values of axis significance, and station scores for whole benthic invertebrate metal concentrations from Upper and Lower Hazeltine Creek sampling areas in 2010 (Historical) and 2015, and an associated 2015 reference (Edney Creek), Mount Polley Mine. Data were Log (X+1) transformed prior to analysis^a.

		PCA Axis 1	PCA Axis 2	
Eigenvalue		13.0	6.8	
% Variance explained		54.3	28.2	
Monte Carlo p		0.0001	0.0001	
2015	Upper Hazeltine	HAC-U1	-3.3	3.2
		HAC-U2	-2.5	2.8
		HAC-U3	-2.2	2.6
		HAC-U4	-2.1	2.4
		HAC-U5	-2.1	2.8
	Lower Hazeltine	HAC-D1	-0.9	3.0
		HAC-D2	-2.5	3.1
		HAC-D3	-1.4	2.7
		HAC-D4	-0.6	2.8
		HAC-D5	0.1	2.6
	Reference (Edney Creek)	EDC-D1	5.7	0.5
		EDC-D2	7.5	0.2
		EDC-D3	6.2	0.1
		EDC-D4	6.7	-0.6
		EDC-D5	7.1	0.3
2010 (Historic)	Upper Hazeltine (W7)	UH-1	-2.0	-3.1
		UH-2	-2.9	-2.4
		UH-3	-2.4	-3.1
		UH-4	-0.8	-3.2
		UH-5	0.0	-3.2
	Lower Hazeltine (W11)	LH-1	-4.1	-2.8
		LH-2	1.6	-2.5
		LH-3	-1.4	-2.3
		LH-4	-2.9	-3.3
		LH-5	-1.1	-2.5

^a A reduced set of analytes was used for this analysis due to the inclusion of data from 2010 which reported results for fewer analytes than reported in 2015. Metals omitted were: B, Cs, Ga, Fe, P, K, Re, Rb, Ag, Na, Th, Ti, Y, Zr.

Table D.19: PCA axis scores Spearman correlation with metal concentrations of whole benthic invertebrates from Upper and Lower Hazeltine Creek sampling areas in 2010 (Historical) and 2015, and an associated 2015 reference (Edney Creek), Mount Polley Mine. Data were Log10 (X+1) transformed prior to analysis.

Metal ^a	Spearman Correlation Coefficient ^b		P-Value ^c	
	PCA Axis-1 (54.3%)	PCA Axis-2 (28.2%)	PCA Axis-1 (54.3%)	PCA Axis-2 (28.2%)
Aluminum	-0.782	0.534	0.000	0.006
Antimony	-0.533	-0.580	0.006	0.002
Arsenic	-0.829	-0.130	0.000	0.534
Barium	-0.811	0.230	0.000	0.268
Beryllium	-0.586	-0.581	0.002	0.002
Bismuth	-0.502	-0.554	0.011	0.004
Cadmium	-0.517	0.161	0.008	0.441
Calcium	-0.778	0.518	0.000	0.008
Chromium	-0.675	-0.583	0.000	0.002
Cobalt	-0.887	0.332	0.000	0.105
Copper	-0.591	0.609	0.002	0.001
Lead	-0.684	0.586	0.000	0.002
Lithium	-0.801	0.455	0.000	0.022
Magnesium	-0.870	0.046	0.000	0.827
Manganese	-0.609	-0.595	0.001	0.002
Molybdenum	0.173	-0.743	0.407	0.000
Nickel	-0.793	-0.452	0.000	0.023
Selenium	-0.520	-0.384	0.008	0.058
Strontium	-0.805	0.516	0.000	0.008
Thallium	-0.513	-0.442	0.009	0.027
Tin	-0.044	-0.868	0.834	0.000
Uranium	-0.809	-0.050	0.000	0.812
Vanadium	-0.612	0.618	0.001	0.001
Zinc	-0.491	-0.395	0.013	0.051

^a A reduced set of analytes was used for this analysis due to the inclusion of data from 2010 which reported results for fewer analytes than reported in 2015. Metals omitted were: B, Cs, Ga, Fe, P, K, Re, Rb, Ag, Na, Th, Ti, Y, Zr.

^b Highlighted cells indicate Spearman correlation coefficient > 0.7 or < -0.7.

^c Highlighted cells indicate Spearman correlation with p value < 0.1.

Table D.21: PCA results displaying eigen value, percent variance explained, Monte Carlo randomization p-values of axis significance, and station scores for whole benthic invertebrate metal concentrations from Quesnel River and associated reference (Cariboo River) sampling stations, Mount Polley Mine, 2015. Data were Log (X+1) transformed prior to analysis.

		PCA Axis 1	PCA Axis 2
Eigenvalue		17.9	11.6
% Variance explained		47.1	30.7
Monte Carlo p		0.0001	0.0001
Quesnel River	QUR1-01	2.7	-5.8
	QUR1-02	-3.9	-6.7
	QUR1-03	-2.2	0.4
	QUR1-04	0.7	0.8
	QUR1-05	1.6	2.6
Cariboo River (Reference)	CARU-01	9.9	0.5
	CARU-02	-4.0	2.5
	CARU-03	0.0	2.5
	CARU-04	-0.6	1.1
	CARU-05	-4.1	2.1

Table D.22: PCA axis scores Spearman correlation with metal concentrations of whole benthic invertebrates from Quesnel River and associated reference (Cariboo River) sampling areas, Mount Polley Mine, 2015. Data were Log10 (X+1) transformed prior to analysis.

Metal	Spearman Correlation Coefficient ^a		P-Value ^b	
	PCA Axis-1 (47.1%)	PCA Axis-2 (30.7%)	PCA Axis-1 (47.1%)	PCA Axis-2 (30.7%)
Aluminum	0.927	0.700	0.000	0.777
Antimony	0.450	-0.815	0.192	0.004
Arsenic	0.709	-0.636	0.022	0.048
Barium	0.673	-0.079	0.033	0.829
Beryllium	0.782	0.236	0.008	0.511
Bismuth	0.345	0.709	0.328	0.022
Boron	0.685	-0.539	0.029	0.108
Cadmium	0.297	0.721	0.405	0.019
Calcium	-0.055	-0.576	0.881	0.082
Cesium	0.927	-0.055	0.000	0.881
Chromium	0.973	-0.170	0.000	0.638
Cobalt	0.588	0.539	0.074	0.108
Copper	-0.018	0.127	0.960	0.726
Gallium	0.927	-0.103	0.000	0.777
Iron	0.903	-0.321	0.000	0.365
Lead	0.770	0.321	0.009	0.365
Lithium	0.794	0.345	0.006	0.328
Magnesium	0.442	0.164	0.200	0.651
Manganese	0.867	-0.224	0.001	0.533
Molybdenum	0.709	0.164	0.022	0.651
Nickel	0.939	-0.152	0.000	0.676
Phosphorus	-0.055	0.515	0.881	0.128
Potassium	0.067	0.673	0.855	0.033
Rhenium	0.661	0.105	0.038	0.773
Rubidium	0.673	-0.067	0.033	0.855
Selenium	0.188	0.491	0.603	0.150
Silver	-0.248	0.867	0.489	0.001
Sodium	0.212	0.818	0.556	0.004
Strontium	0.115	-0.661	0.751	0.038
Thallium	0.964	-0.164	0.000	0.651
Thorium	0.636	0.527	0.048	0.117
Tin	0.721	0.358	0.019	0.310
Titanium	0.515	-0.806	0.128	0.005
Uranium	0.927	-0.273	0.000	0.446
Vanadium	0.733	-0.709	0.016	0.022
Yttrium	0.758	-0.648	0.011	0.043
Zinc	-0.127	0.612	0.726	0.060
Zirconium	0.818	-0.552	0.004	0.098

^a Highlighted cells indicate Spearman correlation coefficient > 0.7 or < -0.7.

^b Highlighted cells indicate Spearman correlation with p value < 0.1.

Table D.23: PCA results displaying eigen value, percent variance explained, Monte Carlo randomization p-values of axis significance, and station scores for whole benthic invertebrate metal concentrations from Quesnel River and associated reference (Cariboo River) sampling stations, Mount Polley Mine, 2014 and 2015. Data were Log (X+1) transformed prior to analysis^a.

		PCA Axis 1	PCA Axis 2	
Eigenvalue		14.3	4.1	
% Variance explained		59.4	17.0	
Monte Carlo p		0.0001	0.0143	
2015	Quesnel River	QUR1-01	-0.9	-4.3
		QUR1-02	-4.1	-4.5
		QUR1-03	-3.8	0.7
		QUR1-04	-2.2	1.1
		QUR1-05	-1.7	1.2
	Upper Cariboo River (Reference)	CARU-01	1.3	-1.2
		CARU-02	-4.6	1.8
		CARU-03	-2.4	1.7
		CARU-04	-3.1	0.5
		CARU-05	-4.1	1.6
2014	Quesnel River	QUR-1-R1	4.2	1.4
		QUR-1-R2	3.5	1.1
		QUR-1-R3	1.9	-0.3
	Cariboo River (Reference)	CAR-R1C	5.4	0.5
		CAR-R2C	5.4	1.0
		CAR-R3C	5.1	-2.1

^a A reduced set of analytes was used for this analysis due to the inclusion of data from 2014 which reported results for fewer analytes than reported in 2015. Metals omitted were: Bi, Ca, Cs, Ga, Li, Mg, P, K, Re, Rb, Na, Th, Y, Zr.

Table D.24: PCA axis scores Spearman correlation with metal concentrations of whole benthic invertebrates from Quesnel River and associated reference (Cariboo River) sampling areas, Mount Polley Mine, 2014 and 2015. Data were Log10 (X+1) transformed prior to analysis.

Metal ^a	Spearman Correlation Coefficient ^b		P-Value ^c	
	PCA Axis-1 (59.4%)	PCA Axis-2 (17.0%)	PCA Axis-1 (59.4%)	PCA Axis-2 (17.0%)
Aluminum	0.957	-0.405	0.000	0.120
Antimony	0.840	-0.408	0.000	0.117
Arsenic	0.868	-0.509	0.000	0.044
Barium	0.740	-0.444	0.001	0.085
Beryllium	0.916	-0.179	0.000	0.506
Boron	0.904	-0.244	0.000	0.362
Cadmium	0.385	0.468	0.141	0.068
Chromium	0.982	-0.350	0.000	0.184
Cobalt	0.809	0.053	0.000	0.846
Copper	0.500	0.165	0.048	0.542
Iron	0.924	-0.547	0.000	0.028
Lead	0.838	-0.162	0.000	0.549
Manganese	0.903	-0.506	0.000	0.046
Molybdenum	0.901	0.028	0.000	0.918
Nickel	0.952	-0.447	0.000	0.082
Selenium	0.212	0.385	0.431	0.141
Silver	0.490	0.463	0.054	0.071
Strontium	0.455	-0.583	0.077	0.018
Thallium	0.962	-0.191	0.000	0.478
Tin	0.909	-0.025	0.000	0.926
Titanium	0.806	-0.429	0.000	0.097
Uranium	0.856	-0.544	0.000	0.029
Vanadium	0.813	-0.594	0.000	0.015
Zinc	0.147	0.432	0.587	0.094

^a A reduced set of analytes was used for this analysis due to the inclusion of data from 2014 which reported results for fewer analytes than reported in 2015. Metals omitted were: Bi, Ca, Cs, Ga, Li, Mg, P, K, Re, Rb, Na, Th, Y, Zr.

^b Highlighted cells indicate Spearman correlation coefficient > 0.7 or < -0.7.

^c Highlighted cells indicate Spearman correlation with p value < 0.1.

Table D.25: Ratio of mean metal concentrations in whole benthic invertebrates (mg/kg dw) relative to mean metal concentrations in water (mg/L) in the vicinity of the Mount Polley Mine, 2015 ^{a,b}.

Parameter	Units	Hazeltine Creek			Quesnel River	
		Reference	Exposed		Reference	Exposed
		Edney Creek (EDC-1)	Upper Hazeltine (HAC-U)	Lower Hazeltine (HAC-D)	Cariboo River (CARU) *	Quesnel River (QUR1)
Aluminum	mg/kg	1,603	496,173	13,291	103,714	103,376
Antimony	mg/kg	47	60	75	91	189
Arsenic	mg/kg	2,710	2,842	1,957	6,834	5,858
Barium	mg/kg	478	3,118	2,200	5,262	3,904
Beryllium	mg/kg	50	983	576	330	215
Bismuth	mg/kg	18	52	70	399	45
Boron	mg/kg	36	94	91	49	71
Cadmium	mg/kg	12,892	17,590	49,201	444,520	143,453
Calcium	mg/kg	67	119	99	84	5,939
Chromium	mg/kg	628	13,600	7,958	3,451	3,061
Cobalt	mg/kg	1,825	6,602	10,272	16,792	11,334
Copper	mg/kg	3,198	12,215	6,054	45,080	26,414
Iron	mg/kg	2,573	82,144	31,749	35,200	35,787
Lead	mg/kg	1,619	27,485	11,381	11,871	8,312
Lithium	mg/kg	247	3,000	1,220	1,243	713
Magnesium	mg/kg	189	323	179	506	487
Manganese	mg/kg	12,385	1,271	1,169	145,159	176,941
Molybdenum	mg/kg	3,790	123	150	2,307	335
Nickel	mg/kg	382	9,016	1,941	5,544	4,736
Phosphorus	mg/kg	878,419	492,500	354,910	3,582,000	2,709,656
Potassium	mg/kg	8,213	4,565	3,000	39,176	7,701
Selenium	mg/kg	4,519	5,921	3,019	44,680	7,208
Silver	mg/kg	2,259	5,308	9,787	16,200	8,104
Sodium	mg/kg	514	247	126	10,177	2,266
Strontium	mg/kg	80	125	81	72	1,704
Thallium	mg/kg	349	1,351	2,145	1,168	1,246
Tin	mg/kg	1,479	235	208	230	191
Titanium	mg/kg	390	5,056	2,624	696	1,961
Uranium	mg/kg	75	250	269	541	648
Vanadium	mg/kg	992	21,405	25,464	2,564	3,834
Zinc	mg/kg	24,953	27,091	33,887	73,600	51,020



Indicates ratio in exposed area is more than 2x greater than that in the the associated reference area.



Indicates ratio in reference area is more than 2x greater than that in the the associated exposed area (maximum of HAC-U and HAC-D for Hazeltine Creek).

^a Calculation of mean water chemistry values was based on 2015 results prior to the benthic invertebrate tissue sampling in August 2015 (January to August results only).

^b Tissue and water chemistry results reported as < Method Detection Limit (MDL) were used at the MDL for calculations.

* Data available for a single sampling event only in 2015, therefore results for the single sample were used for calculations.

DATE 30 May 2016**REFERENCE No.** 1411734-156-TM-Rev0**TO** Ms. Colleen Hughes
Mount Polley Mining Corporation**FROM** Suzanne Earle
Barbara Wernick**EMAIL** suzanne_earle@golder.com;
Barbara_Wernick@golder.com**QUESNEL AND POLLEY LAKES 2015 PLANKTON UPDATE REPORT**

Golder Associates Ltd. (Golder) is pleased to provide Mount Polley Mining Corporation (MPMC) with the following update to the *Quesnel and Polley Lakes Aquatic Productivity Impact Assessment* that was submitted as part of the *Post-Event Environmental Impact Assessment Report* (PEEIAR) in June 2015 (MPMC 2015a, Appendix H). The 'event' refers to the tailings dam failure that occurred at the Mount Polley Mine on August 4, 2014, when the Tailings Storage Facility (TSF) Perimeter Embankment failed and there was a subsequent debris flow into the receiving environment. This update focuses primarily on data generated by post-event plankton sampling in Quesnel and Polley lakes undertaken by MPMC over the open-water period between May and September 2015.

1.0 INTRODUCTION

A conceptual ecological model was developed in the Lake Aquatic Productivity Impact Assessment to describe fish-habitat-food interactions. The habitat and food requirements of the lakes were grouped into three general assemblages: 1) littoral zone and benthic habitats; 2) open-water habitat and fish that feed on emerging insects; and 3) open-water habitat and fish that feed on crustacean zooplankton.

To characterize aquatic biota inhabiting the water column of the lakes, ongoing sampling of zooplankton communities and phytoplankton biomass (as chlorophyll *a*) was conducted during the 2015 open water period. This technical memorandum provides an update on plankton communities sampled in the open-water habitats of Quesnel and Polley lakes from May to September 2015.

This technical memorandum is intended to provide a follow up to the PEEIAR and to further characterize plankton communities relevant to the Detailed Site Investigation (DSI) and Human Health and Ecological Risk Assessment (HHERA). The DSI and HHERA are being undertaken as a requirement of the Pollution Abatement Order (107461) issued by the BC MOE in response to the tailings dam failure to satisfy the requirements of the Provincial *Environmental Management Act* and the *Contaminated Sites Regulation* (CSR).



1.1 Background

The term “plankton” is a general term referring to small, usually microscopic organisms that live suspended in the water. *Phytoplankton* are free-floating photosynthesizing algae and cyanobacteria, which fix large amounts of carbon and form the base of the food web for aquatic animals. *Zooplankton* are the free-floating animal constituent of the plankton, and consist of small crustaceans and rotifers. Phytoplankton and zooplankton community metrics can be useful indicators of environmental change because of their rapid response to changes in nutrients or other substances. However, the inherent variability within the plankton community poses a challenge and also limits their usefulness as a monitoring tool. Plankton abundance, biomass, and taxonomic composition vary vertically and horizontally within the open-water; therefore, estimates are sensitive to the number of stations, samples, and the depth of the water column sampled (Findlay and Kling 2001; Paterson 2002). Seasonal succession within the plankton community and natural year-to-year variation also contribute to the inherent variability of these communities (Wetzel 2001; Paterson 2002).

2.0 OBJECTIVES

The overall objective of the *Quesnel and Polley Lakes 2015 Plankton Update Report* is to provide a follow up to the PEEIAR (MPMC 2015a) and to further characterize plankton communities in Quesnel and Polley lakes. This report presents data collected for phytoplankton biomass (as chlorophyll *a*) in Quesnel and Polley lakes, zooplankton community structure, and zooplankton tissue chemistry.

Specifically, the objectives of this report were as follows:

- Provide an update on phytoplankton biomass (as chlorophyll *a*) in Quesnel and Polley lakes;
- Characterize current trophic status of Quesnel and Polley lakes (using chlorophyll *a*, Secchi depth, total phosphorus (TP), and total nitrogen (TN) concentrations);
- Provide an update on zooplankton community composition in Quesnel Lake and characterize community composition in Polley Lake in 2015 to inform future monitoring; and
- Characterize spatial and seasonal variability in zooplankton tissue chemistry in relation to lake water quality.

3.0 METHODS

Sampling was conducted by Mount Polley Mining Company (MPMC) staff following methods outlined in MPMC procedural documents by MPMC and summarized below. Where possible, sampling methods and locations remained consistent with previous sampling methods used in 2014 and for historical data collection. The sampling methods differed between Quesnel Lake and Polley Lake to be consistent with previous data collection methods and to allow comparisons between previous years' datasets. The MPMC sampling procedures for Quesnel Lake were consistent with those used in 2014 by the Quesnel River Research Centre (subcontracted by the Canadian Department of Fisheries and Oceans). For Polley Lake, the MPMC sampling procedures were consistent with those used in 2014 by the British Columbia Ministry of Environment (BC MOE).

3.1 Sampling Locations

Samples were collected from three stations in Quesnel Lake: one exposed station called Hazeltine (QUL-Zoo-1; in the West Arm west of Cariboo Island) and two reference stations, Horsefly (QUL-Zoo-7; near the Horsefly River) and Junction (QUL-Zoo-8; in the Main Basin where the east and north arms meet; Table 1; Figure 1). Samples were also collected from two stations in Polley Lake: P1 and P2 (Table 1; Figure 1).

Table 1: Sampling Locations in Quesnel Lake and Polley Lake, 2015

Lake	Station	Sample ID	Location			Depth (m)
			Zone	Easting	Northing	
Quesnel Lake	Hazeltine	QUL-Zoo-1	10U	601058	5819925	30
	Horsefly	QUL-Zoo-7	10U	612469	5816656	30
	Junction	QUL-Zoo-8	10U	630691	5821991	30
Polley Lake	P1	P1	10U	593708	5824693	28
	P2	P2	10U	595348	5821863	28

3.2 Timing of Sampling

Sampling occurred monthly during the 2015 open-water period between May and September in Quesnel Lake and Polley Lake (Table 2).

Table 2: Sample Collection in Quesnel Lake and Polley Lake, 2015

Lake	Sampling Date	Zooplankton Taxonomy	Zooplankton Tissue Chemistry
Quesnel Lake	20-May-2015	Y	Y
	24-June-2015	Y	Y
	8-July-2015	Y	Y
	20-August-2015	Y	Y
	10-September-2015	Y	Y
Polley Lake	14-May-2015	Y	Y
	11-June-2015	Y	N
	7-July-2015	Y	Y
	11-August-2015	Y	Y
	10-September- 2015	Y	Y

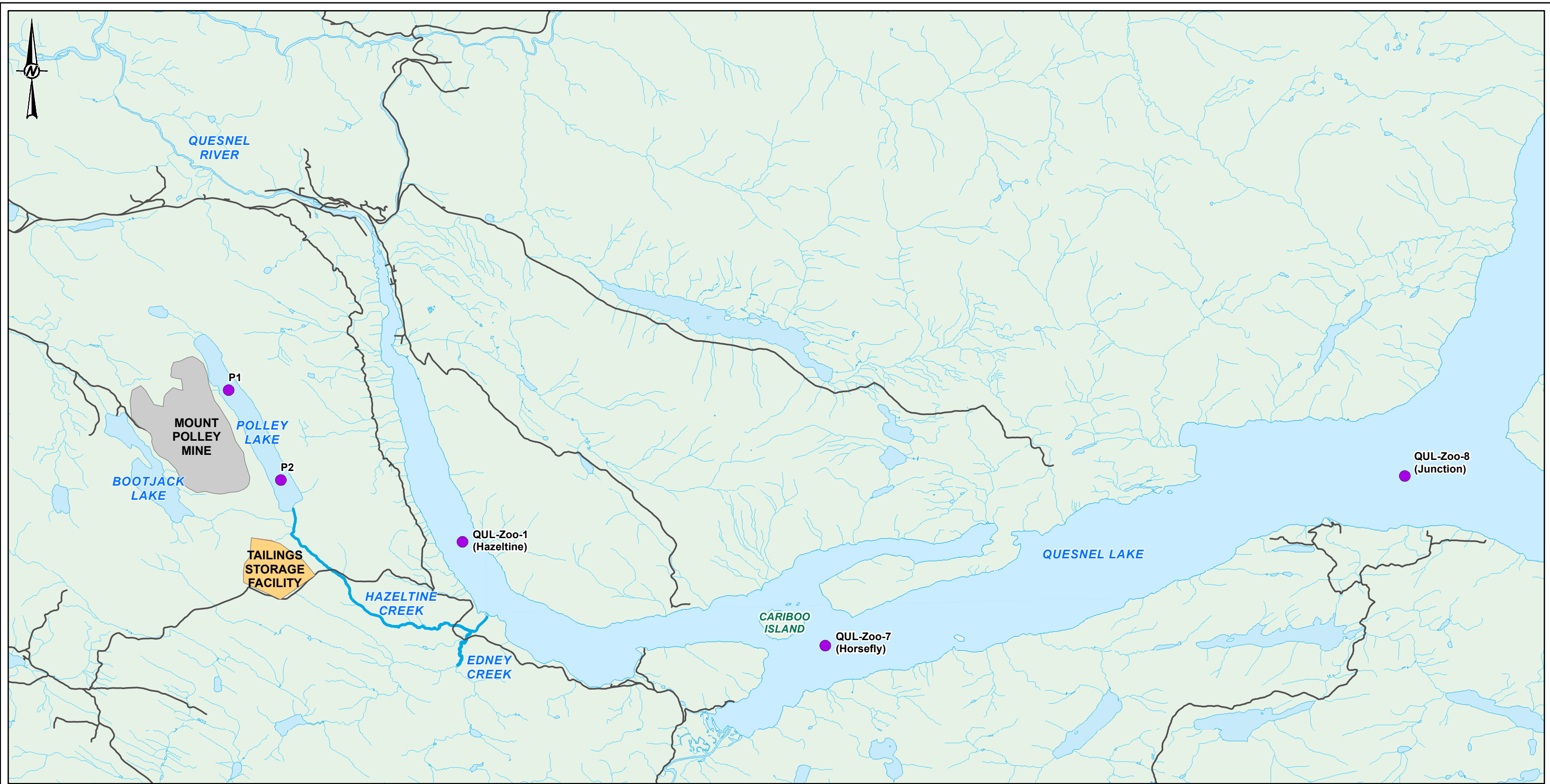
Notes:

Y = yes, sample was collected; N = no results are available due to a laboratory processing error where the sample was initially analysed as water and was discarded prior to the error being identified.

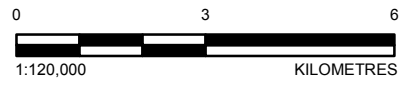
3.3 Field Methods

3.3.1 Nutrients and Phytoplankton Biomass (as chlorophyll *a*)

TN, TP, and chlorophyll *a* concentrations were measured as part of the water quality monitoring program conducted by MPMC. Water quality data was collected by MPMC following the Post TSF-Breach 2015 Monitoring Plan (MPMC 2015b). Detailed field methods for the collection of the nutrient and chlorophyll *a* samples are presented in the *Mount Polley Water Quality Impact Assessment Update* (Golder 2016). Secchi depths were also collected in conjunction with the water quality field program.



- LEGEND**
- ZOOPLANKTON SAMPLE LOCATION
 - TAILINGS STORAGE FACILITY
 - MOUNT POLLEY MINE SITE
 - BATHYMETRY
 - ROAD
 - WATERCOURSE
 - WATERBODY



- REFERENCES**
1. WATER MONITORING STATIONS OBTAINED FROM MOUNT POLLEY MINING CORPORATION.
 2. WATERCOURSE AND LAKE DATA OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
 3. PROJECTION: NAD 1983 UTM ZONE 10

CLIENT
**IMPERIAL METALS
 MOUNT POLLEY MINING CORPORATION**

PROJECT
**MOUNT POLLEY MINE
 2015 PLANKTON UPDATE**

CONSULTANT	YYYY-MM-DD	2016-05-27
Golder Associates	DESIGNED	SE
	PREPARED	RH
	REVIEWED	SE
	APPROVED	BW

TITLE			
ZOOPLANKTON SAMPLING LOCATIONS			
PROJECT NO.	CONTROL	REV.	FIGURE
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Nutrient water quality data were collected from the following stations:

- QUL-18 and QUL-55 in the vicinity of Hazeltine;
- QUL-2a and QUL-40a in the vicinity of Horsefly; and
- QUL-120a in the vicinity of Junction.

3.3.2 Zooplankton Sampling

3.3.2.1 Quesnel Lake

The 2015 zooplankton sample collection in Quesnel and Polley lakes followed methods outlined by the MPMC work order: MPMC-Work-021: Zooplankton Sampling. A single zooplankton sample was collected for taxonomic analysis at each station in Quesnel Lake during each sampling event (Table 2). Zooplankton taxonomy samples were collected using a 0.30 meter (m) diameter, Wisconsin 150 micrometer (μm) Nitex[®] mesh plankton net. The plankton net was lowered to a depth of 30 m and then towed vertically to the water surface at a rate of 0.5 to 1.0 meters per second (m/sec). The sample was then condensed in the cod end and transferred to a 250-milliliter (mL) white Nalgene bottle containing buffered formalin solution. Samples were kept at room temperature and sent to Mary-Jane Hudson (Nanaimo, BC) for analysis of taxonomic composition, abundance, and biomass.

Zooplankton tissue samples were collected using a 0.30 m diameter, 0.90 m length, 50 μm Nitex[®] mesh plankton net. Samples were collected at each station during each of the sampling events in 2015 (Table 2). The plankton net was lowered to a depth of 30 m and then towed vertically to the water surface at a rate of 0.5 m/sec. Multiple hauls were required to obtain sufficient sample for the tissue analysis (a minimum of 1.5 grams (g) of tissue). The samples from multiple hauls were combined into a 250 millilitre (mL) white Nalgene bottle. The tissue samples were then transferred to the freezer and frozen prior to shipment to ALS Environmental (Vancouver, BC).

3.3.2.2 Polley Lake

A single zooplankton sample was collected for taxonomic analysis at each station in Polley Lake during each sampling event (Table 2). Zooplankton taxonomy samples were collected using a 0.30 m diameter, 0.90 m length, 50 μm Nitex[®] mesh plankton net. The plankton net was lowered to a depth of 28 m and then towed vertically to the water surface at a rate of 0.5 m/sec. The sample was then condensed in the cod end and transferred to 1 L wide mouth Nalgene bottle. The samples were preserved with 85% ethanol (at a ratio of 1 to 1). Samples were kept at room temperature and sent to Fraser Environmental Services (Surrey, BC) for analysis of taxonomic composition and abundance.

Zooplankton tissue samples were collected using the same 50 μm Nitex[®] mesh plankton net (Table 2). The plankton net was lowered to a depth of 28 m and then towed vertically to the water surface at a rate of 0.5 m/sec. Multiple hauls were required to obtain sufficient sample for the tissue analysis (a minimum of 1.5 g of tissue). The samples from multiple hauls were combined into a 250 mL white Nalgene bottle. The tissue samples were then transferred to the freezer and frozen prior to shipment to ALS Environmental.

3.4 Laboratory Methods

3.4.1 Zooplankton Community

The taxonomic laboratories differed for Quesnel Lake and Polley Lake to be consistent with previous years' results and to allow comparisons to previous data. Due to differences in taxonomists as well as units¹, the zooplankton data from Quesnel and Polley lakes are not comparable. The raw taxonomic results are provided in Attachment 2.

3.4.1.1 Quesnel Lake

Samples were analyzed for the following: 150 zooplankton \leq 600 μ m which includes a maximum of 50 nauplii, 100 \geq 600 μ m and $<$ 1.2mm and 100 zooplankton \geq 1.2mm were enumerated. Copepoda and cladocera were identified to genus. Chironomids and nauplii were also identified. Body length of each animal was measured (excluding spines).

Taxonomic results were converted to density and biomass estimates by Dan Selbie (Fisheries and Oceans Canada). Biomass and density estimates were summarized by prevalent major taxonomic groups.

3.4.1.2 Polley Lake

The total volume of each sample collected from Polley Lake was measured and recorded. A 50 mL subsample was then removed from each sample and placed in a petri dish for identification of zooplankton taxa. Exact volumes of each sub-sample were dependent on the density of organisms in the sample. A smaller or diluted volume was used for densely populated samples or samples were concentrated by centrifugation or sedimentation for sparsely populated samples. Samples were scanned at increasing powers of magnification on a compound microscope to identify the cladocerans, cyclopoid copepods, calanoid copepods, and rotifers present in the sample.

Following identification, enumeration occurred on at least three 1-mL homogenized subsamples from each sample. If sufficient organisms were not enumerated with the three 1-mL subsamples, subsampling continued until at least 200 organisms were enumerated. The subsamples were first transferred to a Sedgwick-Rafter cell counter and allowed to settle for 15 minute prior to enumeration. The entire subsamples in the Sedgwick-Rafter counters were enumerated using the strip counting method on an inverted or stereoscopic microscope. In addition, 1/16 and 1/8 of the sample were enumerated. The total number of organisms per sample for each species was calculated by taking the average count of each species from all the subsamples counted and multiplying it by the total volume.

3.4.2 Zooplankton Tissue Chemistry

Mercury was analyzed by cold vapour atomic fluorescence spectroscopy (CVAFS) and other metals were analyzed by high resolution inductively coupled plasma spectrometry (HR-ICPMS). Analysis was conducted on dried samples and the analytical results were reported as mg/kg dry weight (dw). Information regarding analytical methods is provided in Attachment 3.

¹ Quesnel Lake data were reported in areal (value/m²) whereas Polley Lake data were reported in volumetric units (value/m³).

3.5 Data Analysis

3.5.1 Phytoplankton Biomass and Trophic Status

Spatial and temporal trends in phytoplankton biomass were qualitatively (visually) examined by plotting chlorophyll *a* concentrations measured from water samples collected near the lake surface.

Trophic status is a useful means of classifying lakes and can be used as an indicator to describe the productivity of a system. Trophic status of a waterbody can be evaluated by examining the concentrations of chlorophyll *a*, nutrients, and water transparency. Chlorophyll *a* is the primary photosynthetic pigment in phytoplankton, and is often used as a surrogate measure of phytoplankton biomass and production in lakes (Franklin et al. 2012). The essential nutrients necessary for phytoplankton growth are nitrogen, phosphorus, carbon, and for some groups (e.g., diatoms), silica. The primary nutrient that often limits phytoplankton growth in lakes is phosphorus (Schindler 1974); therefore, phosphorus is often used to establish the trophic status of lakes. Secchi depth (a measure of water transparency) can be used as a coarse surrogate of phytoplankton biomass because, in many waterbodies, Secchi depth is inversely related to phytoplankton biomass (Dodds and Whiles 2010); therefore, Secchi depth is also considered when evaluating trophic status.

The three main classes of trophic status are the following:

- oligotrophic (nutrient-poor, unproductive systems);
- mesotrophic (moderately productive systems); and
- eutrophic (nutrient-rich, highly productive systems).

The trophic status of Quesnel and Polley lakes was evaluated by examining the nutrient water quality data (TP and TN), chlorophyll *a*, and water transparency (Secchi depth) data. The trophic status was determined using the Vollenweider (1970) trophic classification scheme for lakes (using TP, TN, chlorophyll *a*, and Secchi depth; Table 3); CCME (2004; Table 4), and TSI (Table 5).

Table 3: General Trophic Classification of Lakes

Trophic Status	Total Phosphorus (µg/L)		Total Nitrogen (µg/L)		Chlorophyll <i>a</i> (µg/L)		Secchi Depth (m)	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Oligotrophic	8.0	3.0 to 17.7	661	307 to 1630	1.7	0.3 to 4.5	9.9	5.4 to 28.3
Mesotrophic	26.7	10.9 to 95.6	753	361 to 1367	4.7	3.0 to 11.0	4.2	1.5 to 8.1
Eutrophic	84.4	16 to 386	1875	393 to 6100	14.3	3.0 to 78.0	2.45	0.8 to 7.0

Source: Vollenweider (1970).

µg/L = micrograms per litre; m = metre.

Table 4: Trophic Classification of Canadian Lakes Based on Total Phosphorus Trigger Concentrations

Trophic Status	Total Phosphorus (mg/L)
Ultra-oligotrophic (very nutrient-poor)	<0.004
Oligotrophic (nutrient-poor)	0.004 to 0.01
Mesotrophic (containing a moderate level of nutrients)	0.01 to 0.02
Meso-eutrophic (containing moderate to high levels of nutrients)	0.02 to 0.035
Eutrophic (nutrient-rich)	0.035 to 0.1
Hyper-eutrophic (very nutrient-rich)	>0.1

Sources: CCME (2004); Environment Canada (2004).

mg/L = milligrams per litre; < = less than; > = greater than; n/a = not applicable.

The TSI is a numerical trophic state index for lakes that classifies lakes on a scale of 0 to 100 (Carlson 1977). The index number is calculated from Secchi depth, chlorophyll *a*, and TP using the following equations (Carlson 1977):

Equation 1

$$TSI (TP) = 10 \left(6 - \frac{\ln \frac{48}{TP}}{\ln 2} \right)$$

Equation 2

$$TSI (Chl) = 10 \left(6 - \frac{2.04 - 0.68 \ln Chl}{\ln 2} \right)$$

Equation 3

$$TSI (Secchi) = 10 \left(6 - \frac{\ln SD}{\ln 2} \right)$$

where:

- TSI = trophic state index;
- TP = total phosphorus;
- ln = the natural log;
- Chl = chlorophyll *a*; and
- Secchi = Secchi depth.

Values calculated using these equations are multiplied by 10 to give the scale a range of 0 to 100. The numerical scales for each of the trophic status indices are presented in Table 5.

Table 5: Comparison of Trophic State Index Classification and General Trophic Classification of Lakes

Trophic State Index	Total Phosphorus (mg/L)	Chlorophyll <i>a</i> (µg/L)	Secchi Depth (m)	General Trophic Classification
<30 to 40	0.0 to 0.012	0 to 2.6	>8.0 to 4	Oligotrophic
40 to 50	0.012 to 0.024	2.6 to 20	4 to 2	Mesotrophic
50 to 70	0.024 to 0.096	20 to 56	2 to 0.5	Eutrophic
70 to 100+	0.096 to 0.384+	56 to 155+	0.5 to <0.25	Hyper-eutrophic

Source: Carlson (1977).

mg/L – milligram per litre; µg/L = micrograms/litre; m = metre; < = less than; > = greater than;

Phosphorus is generally the limiting nutrient for primary production in most Canadian lakes (Schindler 1974). Lakes with a nitrogen to phosphorus molar ratio (N:P ratio) of greater than 23 are expected to be phosphorus limited, whereas nitrogen is more likely to be the limiting nutrient in lakes with an N:P ratio of less than 23 (Wetzel 2001). The N:P ratio was calculated for Quesnel and Polley lakes to evaluate nutrient limitation in the lakes.

3.5.2 Zooplankton Community

Spatial and temporal trends in total abundance and biomass of zooplankton were qualitatively examined by visually plotting the data. Relative abundance of major zooplankton groups was calculated using data from the following taxonomic groups: Cladocera (water fleas), Calanoida (calanoid copepods), Cyclopoida (cyclopoid copepods), and Rotifera (rotifers). The three types of crustaceans are considered separately because of taxonomic and ecological differences. In addition, cyclopoid and calanoid copepods are separated because calanoid copepods are typically herbivorous, feeding on phytoplankton (small free-floating plants), whereas cyclopoid copepods are typically omnivorous, feeding on phytoplankton and small zooplankton (Brönmark and Hansson 1998). Calanoid copepods are almost exclusively found in the open-water, while cyclopoid copepods are dominated by littoral species, although a few pelagic species of cyclopoid copepods can account for a major component of the planktonic community.

For Polley Lake, total abundance and the relative abundance of each major group were plotted by sampling period for each station in 2015. No 2014 community composition data were available for Polley Lake. For Quesnel Lake, both total abundance and biomass results were available. The 2015 data were plotted with results from fall of 2014 and a qualitative comparison was made.

3.5.3 Zooplankton Tissue Chemistry

Zooplankton tissue samples were analyzed for a suite of metals; however, only arsenic, copper, mercury, and selenium are evaluated further herein. Copper is evaluated because it was considered a parameter of concern based on water column concentrations; and selenium, mercury and arsenic are considered parameters of potential concern because their primary mode of toxicity is via dietary uptake versus direct toxicity from a water exposure, or can biomagnify (e.g., mercury) in the food chain. Zooplankton tissue concentrations of copper, selenium, mercury, and arsenic were plotted by sampling period for each station in Quesnel and Polley lakes in 2015. For Quesnel Lake the 2015 data were plotted with results from 2014 and a qualitative comparison was made. No 2014 results were available for Polley Lake. For the 2015 tissue concentrations of mercury, the method detection limit was raised for a particular station or sampling period as a result of comparable levels of the analyte in the method blank; therefore, a range of detection limits was reported for this parameter.

Aqueous concentrations of arsenic, copper, mercury, and selenium were plotted for samples collected at the closest water quality station to tissue collection for which water quality data exists for August 2014 to December 2015. Time-series plots were visually examined to assess similar trends in tissue and aqueous concentrations of these parameters.

3.6 Quality Assurance/Quality Control

3.6.1 Field

To examine variability introduced by field sampling procedures, taxonomic accuracy, and reproducibility of the processing and analysis methods, one field duplicate was collected for zooplankton taxonomy analysis at station P1 in Polley Lake during the September sampling program. The relative percent difference (RPD) was calculated, which compares abundances of each major group between duplicate samples.

RPDs for plankton community samples were calculated for discussion purposes rather than a comparison to a threshold because a high level of variability is expected and assigning a threshold is not appropriate for these types of samples.

3.6.2 Laboratory – Tissue Chemistry

Laboratory quality assurance/quality control (QA/QC) included the analysis of laboratory duplicates, spiked samples, and blanks to assess precision and accuracy of analyses. Laboratory QA/QC reports were reviewed upon receipt to confirm that the appropriate QA/QC information had been reported and that the laboratory data quality objectives (DQOs) had been met.

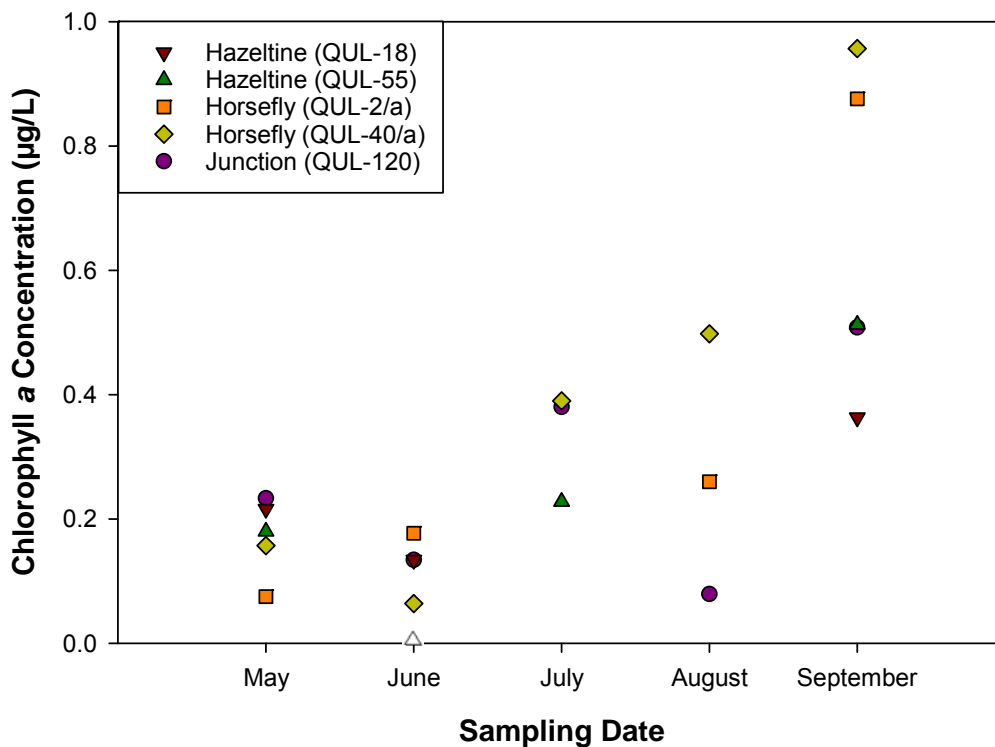
4.0 RESULTS

4.1 Quesnel Lake

4.1.1 Phytoplankton Biomass and Trophic Status

Summary tables of Secchi depth, chlorophyll *a*, TP, TN concentrations and N:P ratios in Quesnel Lake in the 2015 sampling program are provided in Attachment 1, Table A1-1. Results from the TSI calculations are provided in Attachment 1, Table A1-2.

Periphyton biomass (as chlorophyll *a*) in Quesnel Lake were variable but generally increased through the open water period from May to September 2015 (Figure 2). The highest concentration of 0.947 µg/L was observed in September at QUL-18. Secchi depth was also seasonally variable and ranged from 4.8 m (at QUL-18 in June) to 14.1 m (at QUL-2/a in August and QUL-18 in September). TP concentrations were below 3.5 µg/L at all locations and the majority of samples were below the detection limit of 2.0 µg/L. TN concentrations were below 200 µg/L with the exception of one value of 498 µg/L measured in September at QUL-120a. The N:P ratio ranged from 16 to 113 and was generally above 23 indicating that the lake is likely to be phosphorus limited.



Note: open symbol indicates sample was below detection limit

Figure 2: Mean Chlorophyll a Concentrations in Quesnel Lake, 2015

Based on the TSI calculations for TP, Secchi depths, and chlorophyll *a* from the open water-sampling period in Quesnel Lake, the trophic status of the lake was considered to be oligotrophic (Table 6). Quesnel Lake can also be classified as oligotrophic based on the classification systems of Vollenweider (1970) and CCME (2004) TP trigger ranges for Canadian lakes.

Table 6: Summary of Trophic Status Index in Quesnel Lake, 2015

Variable	May	June	July	August	September
TSI (TP)	17 ± 1	12 ± 3	4 ± 0	8 ± 4	8 ± 4
TSI (TChl)	22 ± 2	13 ± 6	29 ± 2	25 ± 5	35 ± 2
TSI (Secchi)	34 ± 0	32 ± 1	29 ± 1	25 ± 2	27 ± 2
Trophic Status Classification	Oligotrophic ^(a)				

Notes:

a) Oligotrophic system based on Carlson (1977).

TSI mean values plus/minus standard error presented. TSI=Trophic status index; TP = total phosphorus; TChl = total chlorophyll *a*; Secchi = Secchi Depth.

4.1.2 Zooplankton Community

Summary tables of zooplankton taxonomy results for Quesnel Lake are provided in Attachment 1, Tables A1-3, A1-4, and A1-5. Raw data and taxonomic methods are provided in Attachment 2.

Overall, total zooplankton biomass (Figure 3) and abundance (Figure 4) were generally lowest at Horsefly and highest at Junction both during the fall of 2014 and through the spring/summer of 2015. Both biomass and abundance decreased from September through November in 2014 and were higher again in the following spring. Through the open-water period of 2015, abundance increased initially and then decreased, depending on the station. In comparison, abundance was at its peak in May and then generally declined through to September. Both abundance and biomass were similar between September 2014 and 2015.

Zooplankton biomass in Quesnel Lake appeared to be dominated by either cyclopoid copepods or cladocerans with some seasonal variability between fall 2014 and the 2015 open water period of all three stations (Figure 5). Cyclopoid copepods were generally dominant in spring and early-summer and cladocerans dominant in late-summer and fall. Calanoid copepods were generally present in lower numbers compared to other taxa with the exception of May 2015 where up to 51% of the zooplankton biomass at Horsefly was composed of calanoid copepods.

In terms of zooplankton abundance, similar trends were observed compared to relative composition for zooplankton biomass. In fall of 2014, cyclopoid copepods were the dominant taxa at all stations (Figure 6). In 2015, zooplankton abundance was made up primarily of cyclopoid copepods in May, June and July followed by a shift to cladocerans representing the dominant taxa in August and September (Figure 6). Calanoid copepods were more abundant in the samples during the spring sampling period (up to 54% at Horsefly in May) but this taxon was generally less than 10% of the population from July to September.

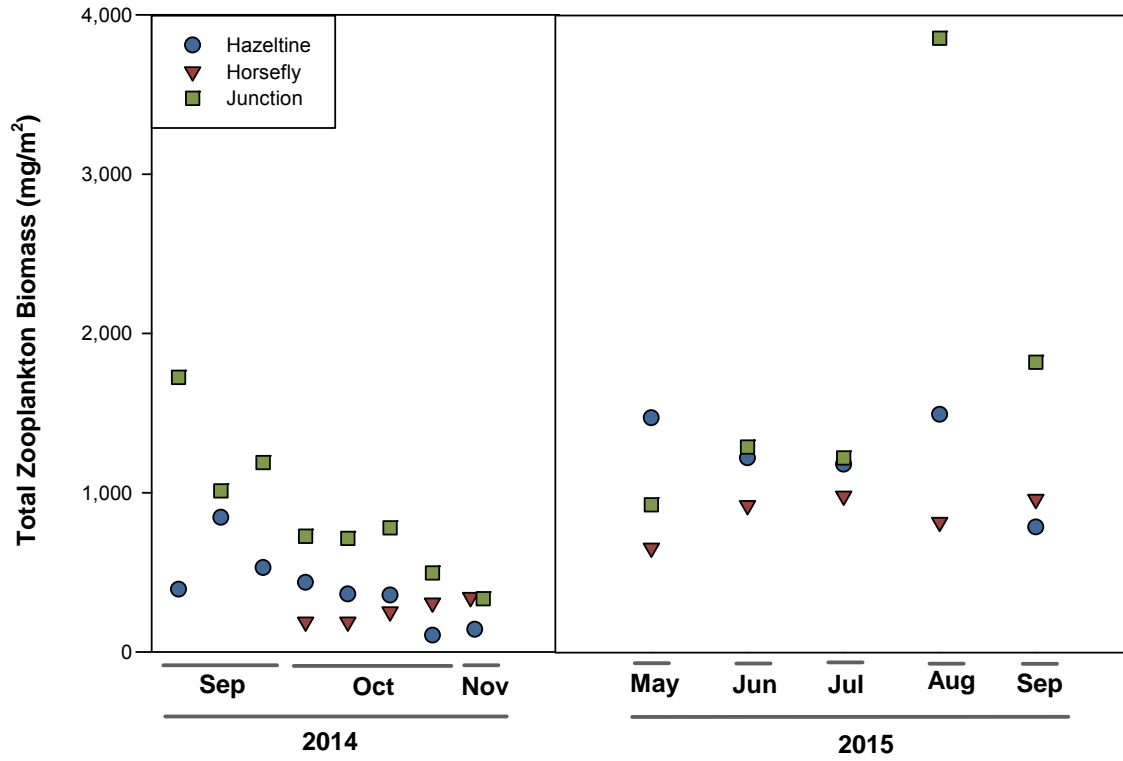


Figure 3: Total Zooplankton Biomass in Quesnel Lake, 2014 and 2015

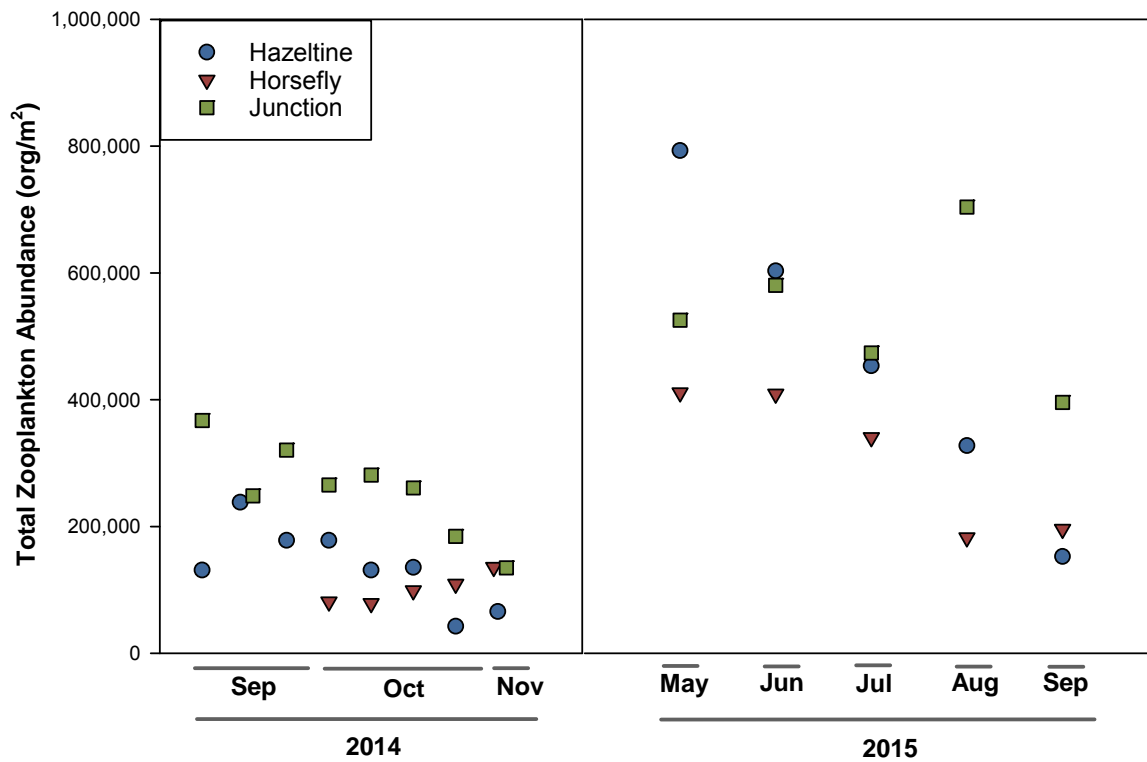
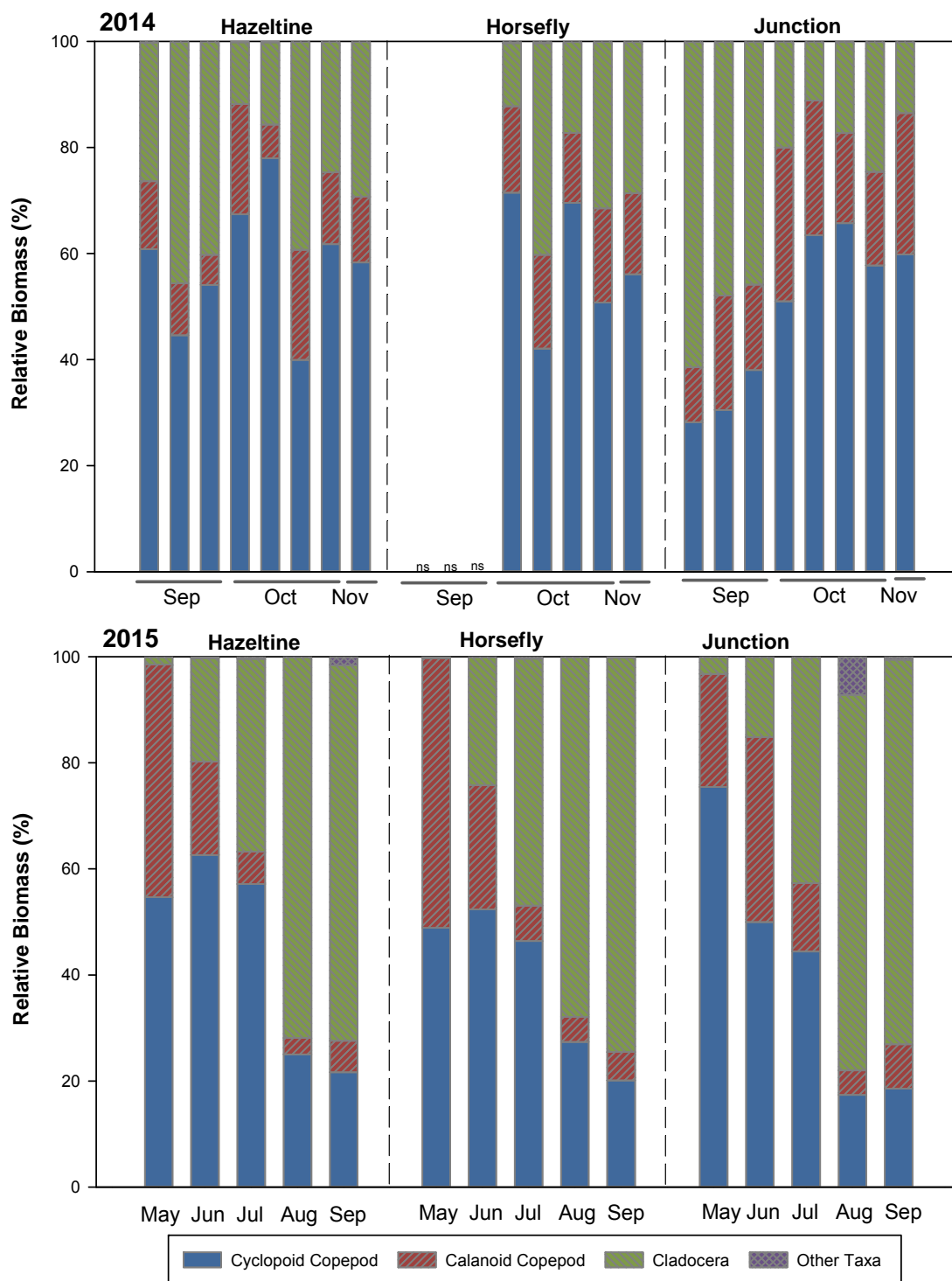
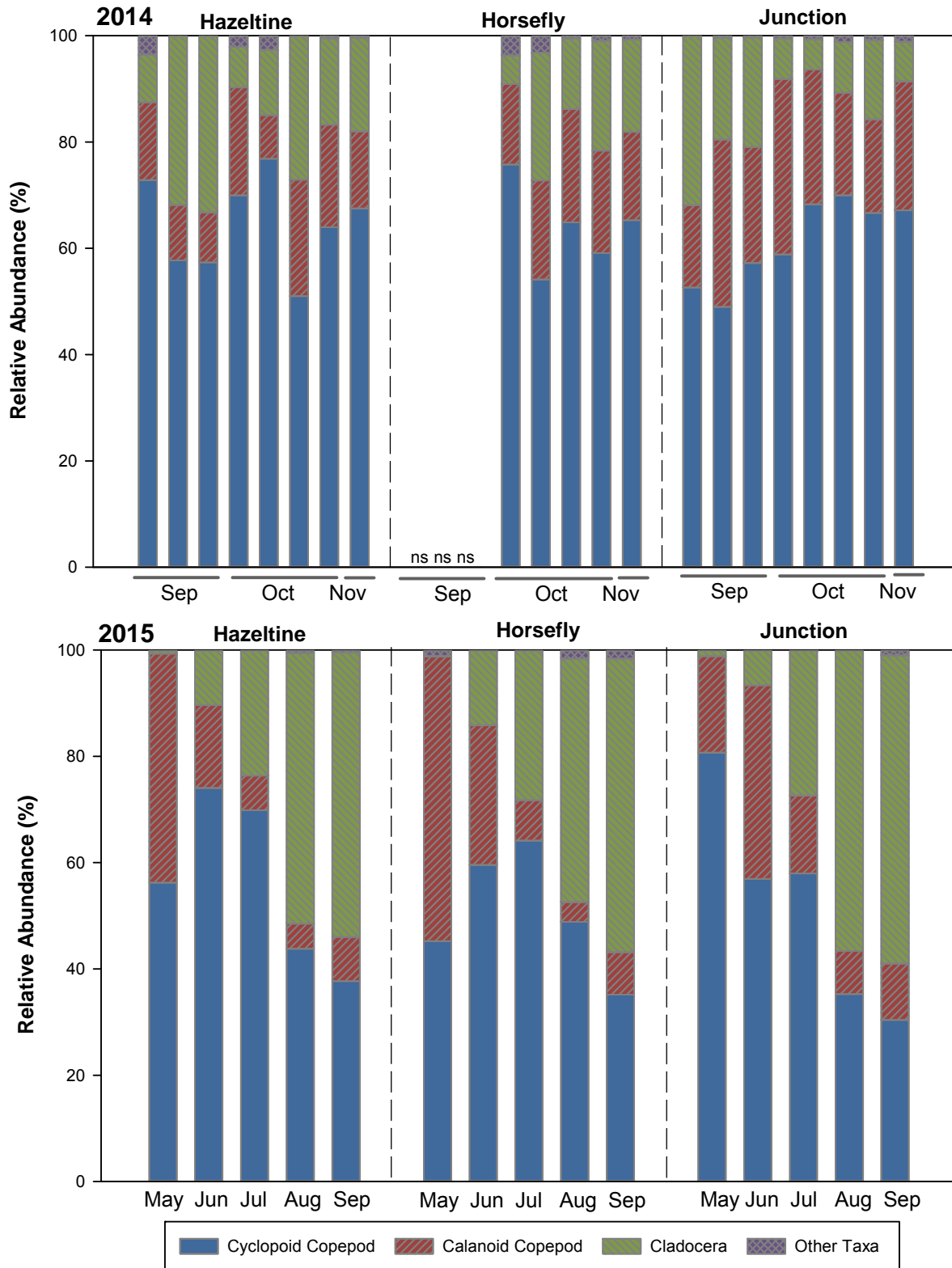


Figure 4: Total Zooplankton Abundance in Quesnel Lake, 2014 and 2015



Notes: ns = not sampled; weekly sampling conducted during 2014; monthly sampling conducted during 2015.

Figure 5: Relative Zooplankton Biomass in Quesnel Lake, 2014 and 2015



Notes: ns = not sampled; weekly sampling conducted during 2014; monthly sampling conducted during 2015.

Figure 6: Relative Zooplankton Abundance in Quesnel Lake, 2014 and 2015

4.1.3 Zooplankton Tissue Chemistry

Results for tissue chemistry measured in zooplankton collected from Quesnel Lake in the 2015 sampling program are provided in Attachment 1, Table A1-6. Analytical laboratory reports are provided in Attachment 3. Time-series plots of arsenic, copper, mercury, and selenium concentrations in zooplankton tissue and surface water are provided in Figures 7 to 10. Aqueous concentrations were plotted from surface samples collected at water quality stations QUL-18 (closest to tissue station Hazeltine), QUL-40/a (closest to tissue station Horsefly), and QUL-120/a (closest to tissue station Junction). For mercury, due to limited water chemistry data, no water chemistry data was plotted.

Arsenic

In 2014, arsenic tissue concentrations ranged from 1.81 to 7.58 mg/kg dw, with the highest concentration observed at Junction (reference) in September (Figure 7). In October and November, arsenic concentrations in zooplankton tissue appeared to increase at all three stations. In 2015, arsenic concentrations were similar among stations in terms of magnitude and temporal variability, and the highest concentration (7.89 mg/kg dw; observed in September at Hazeltine) was within the range observed at Junction during the previous fall.

Aqueous arsenic concentrations were initially higher relative to reference stations due to the event, but declined over the sampling period (Figure 7). In 2015, aqueous arsenic concentrations were generally similar at all three stations. Arsenic concentrations were below the BC WQG in all samples. The trends in tissue concentrations do not reflect what is observed in arsenic concentrations in surface water collected from nearby locations.

Copper

No consistent trends were observed in zooplankton copper concentrations measured in sampling events from 2014 and 2015 (Figure 8). Tissue concentrations of copper were generally higher at Hazeltine compared to the other two stations. In 2014, tissue concentrations of copper appeared to increase from October to November; however, this same increasing trend was not observed to continue in 2015. One elevated copper concentration of 254 mg/kg dw was observed in May 2015 but concentrations were lower during in the next sampling event in June. The copper concentration in May 2015 (254 mg/kg dw) appears to be anomalous, given that copper does not biomagnify in freshwater systems (Cardwell et al. 2013) and aqueous copper concentrations in May 2015 (Figure 8) were similar to or lower than aqueous concentrations during other sampling events that did not result in comparable copper concentrations in tissue (e.g., November 2014). Copper was re-analyzed twice for the May 2015 tissue sample, and the results were 146 mg/kg dw and 163 mg/kg dw. Although the reanalyzed concentrations were lower than the original concentration of 254 mg/kg dw, they were still higher than would be expected, based on paired tissue and aqueous copper concentrations for other months (e.g., November 2014).

The copper concentrations at Hazeltine in June may have been partially in response to copper associated with increasing suspended solids in the water column during lake turn over as small particulates may have been attached to phytoplankton biomass and consumed incidentally. When aquatic invertebrates have ingested sediment particles and gut contents are not cleared prior to whole tissue analysis, actual uptake by the organism can be overestimated (Gillis et al. 2005; Sibley et al. 1997). Alternatively, the higher concentrations at Hazeltine in June 2015 may be a result of natural variability in tissue copper concentrations at comparable aqueous copper concentrations. For example, total aqueous copper concentrations near Hazeltine in June 2015 and August 2015 were similar (Figure 8), even though the tissue copper concentration at Hazeltine in June 2015 (49.9 mg/kg dw) was more than 50% higher than the tissue copper concentration in August 2015 (30 mg/kg dw). This interpretation is further supported by the fact that the tissue copper concentration at Junction (a reference location) in September 2015 (42.7 mg/kg dw) was comparable to the tissue copper concentration at Hazeltine in June 2015 (49.9 mg/kg dw).

Aqueous copper concentrations initially increased relative to reference areas due to the event, but declined over the sampling period to concentrations below the BC WQG in 2015 (Figure 9). At all three stations, aqueous copper concentrations displayed an increasing trend from August to December 2014, and a slight decreasing trend (Hazeltine and Horsefly) or no discernable trend (Junction) through 2015. These general patterns were also observed in copper tissue concentrations collected from comparable stations.

Mercury

Zooplankton tissue mercury concentrations were variable at all three stations (Figure 9). In several samples, mercury concentrations were below detection limits because of elevated detection limits due to high moisture content in the samples. In 2015, tissue concentrations of mercury at Hazeltine and Junction increased between May and September to values within the range observed at Junction in September 2014.

Aqueous mercury data are sparse and aqueous concentrations were below the reported detection limit in all samples and interpretation of aqueous mercury trends is therefore limited.

Selenium

Zooplankton tissue selenium concentrations appeared to exhibit a generally increasing trend at all stations throughout the 2015 sampling period with the exception of the August 2015 sampling event when lower concentrations were observed (Figure 10). Throughout the 2015 sampling period, selenium concentrations at Hazeltine were observed to be higher than selenium concentrations at Horsefly and Junction stations. Selenium concentrations were generally below the BC interim dietary guideline for tissue consumption by fish (BC MOE 2014). The guideline was designated interim by BC MOE (2014) pending additional data to verify the protection afforded by this value. The dietary BC WQG was used for comparative purposes only, as it is intended to be applied to the average concentration of at least eight replicate (composite) tissue samples representing an appropriate invertebrate or other prey species (BC MOE 2014).

In July and September 2015 zooplankton tissue concentrations of selenium measured at Hazeltine and Junction were above the dietary guideline. The highest concentration was observed at Hazeltine in September 2015 with a value of 9.53 mg/kg dw observed (Figure 10).

High detection limits for selenium from August 2014 to March 2015 prevented the ability to observe trends during this time. Aqueous selenium concentrations displayed a slight decreasing trend at all stations after April 2015 (Figure 10). The decreasing trend in aqueous concentrations was not observed in tissue selenium concentrations collected from Hazeltine, Horsefly, and Junction, which all showed a general increasing trend.

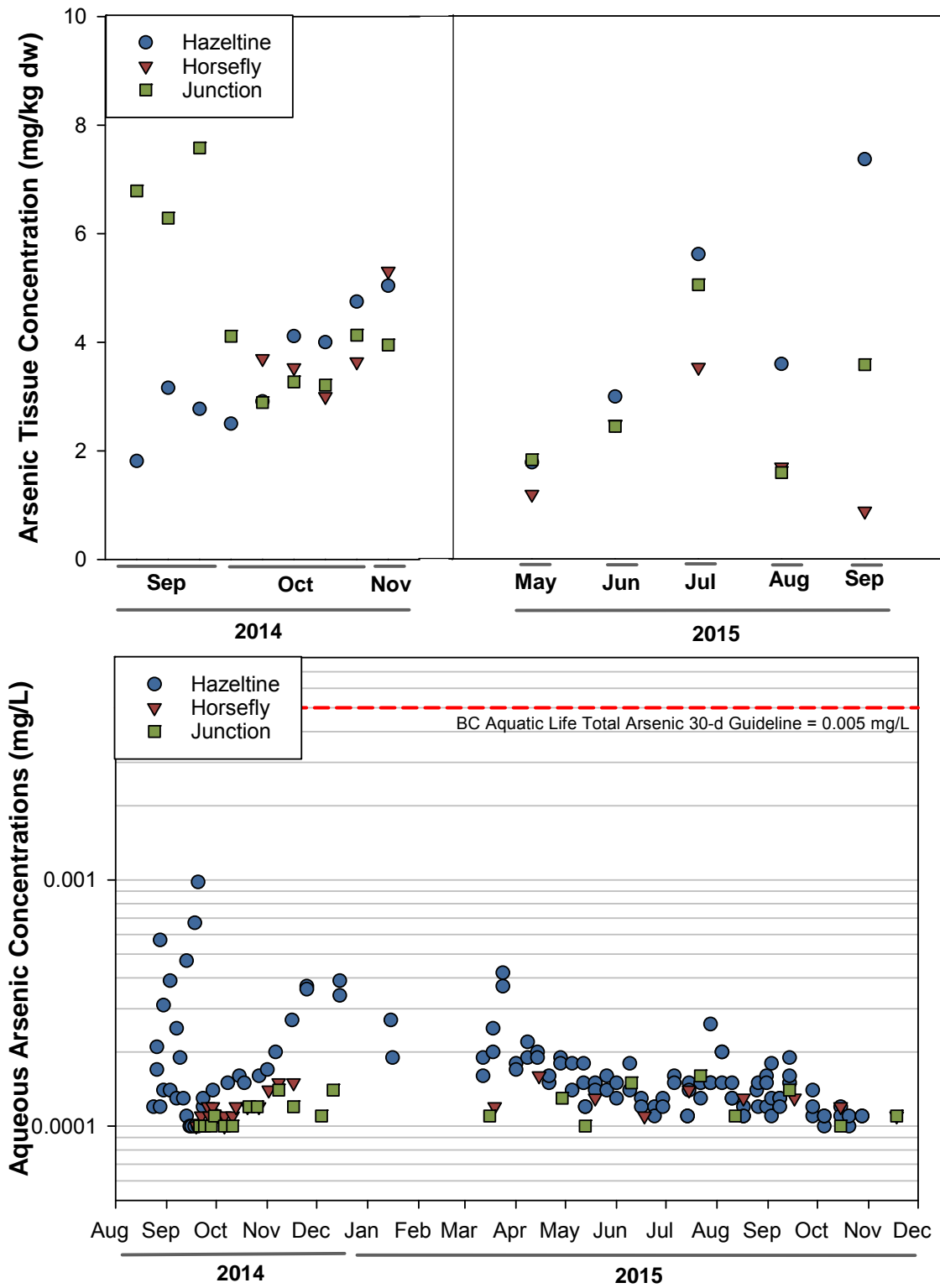
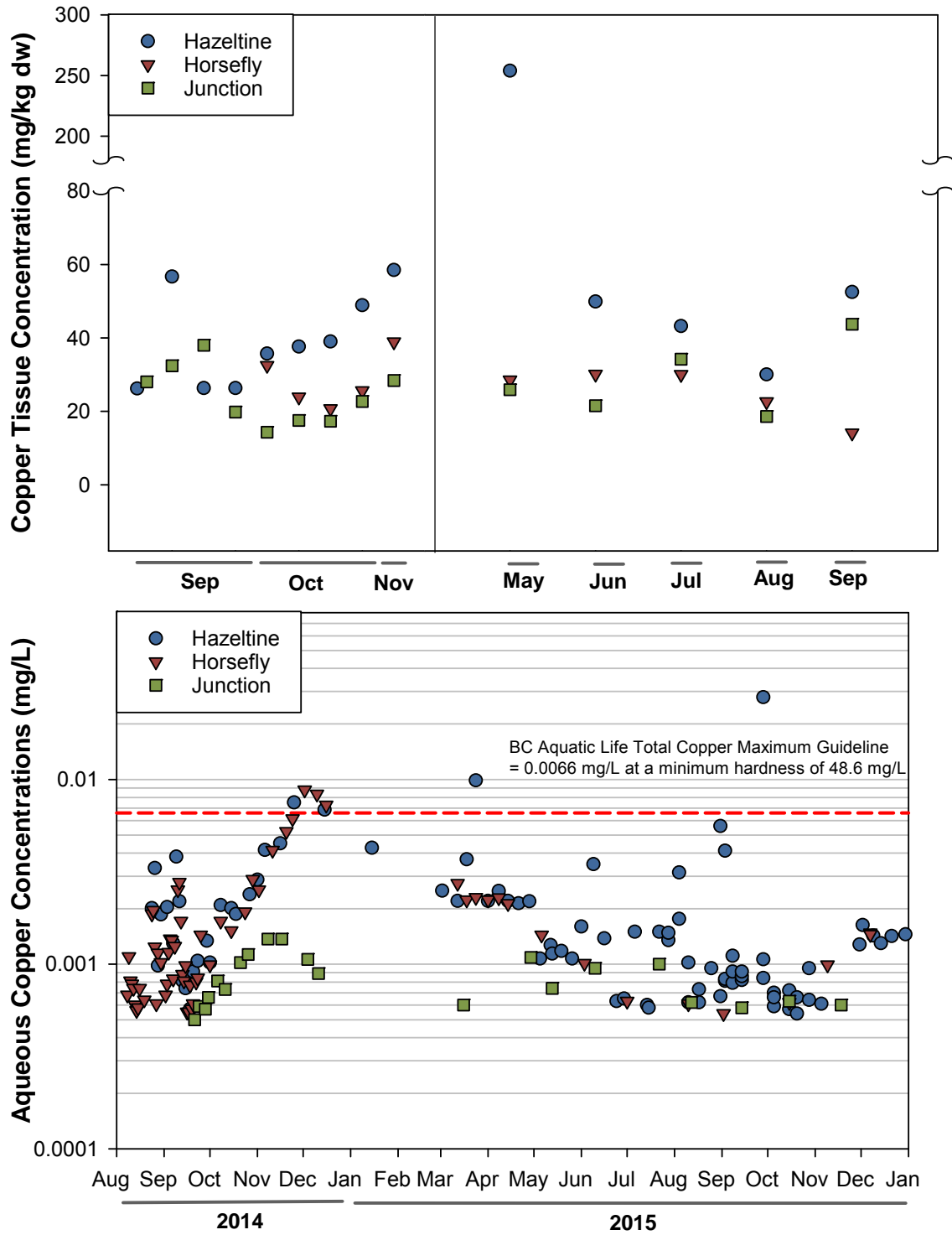
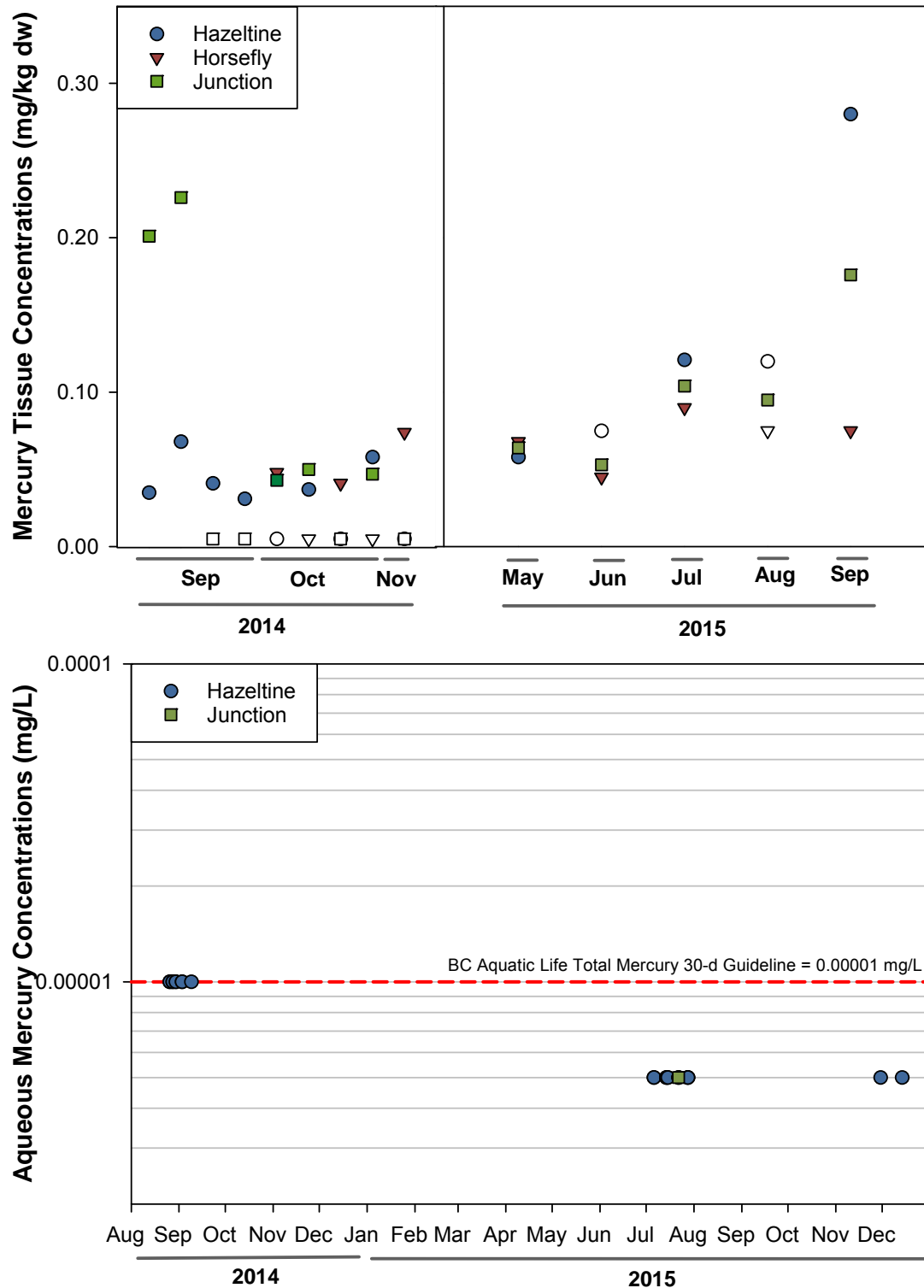


Figure 7: Concentrations of Arsenic in Zooplankton Tissue (top) and Surface Water (bottom) Collected from Quesnel Lake in Fall 2014 and 2015.



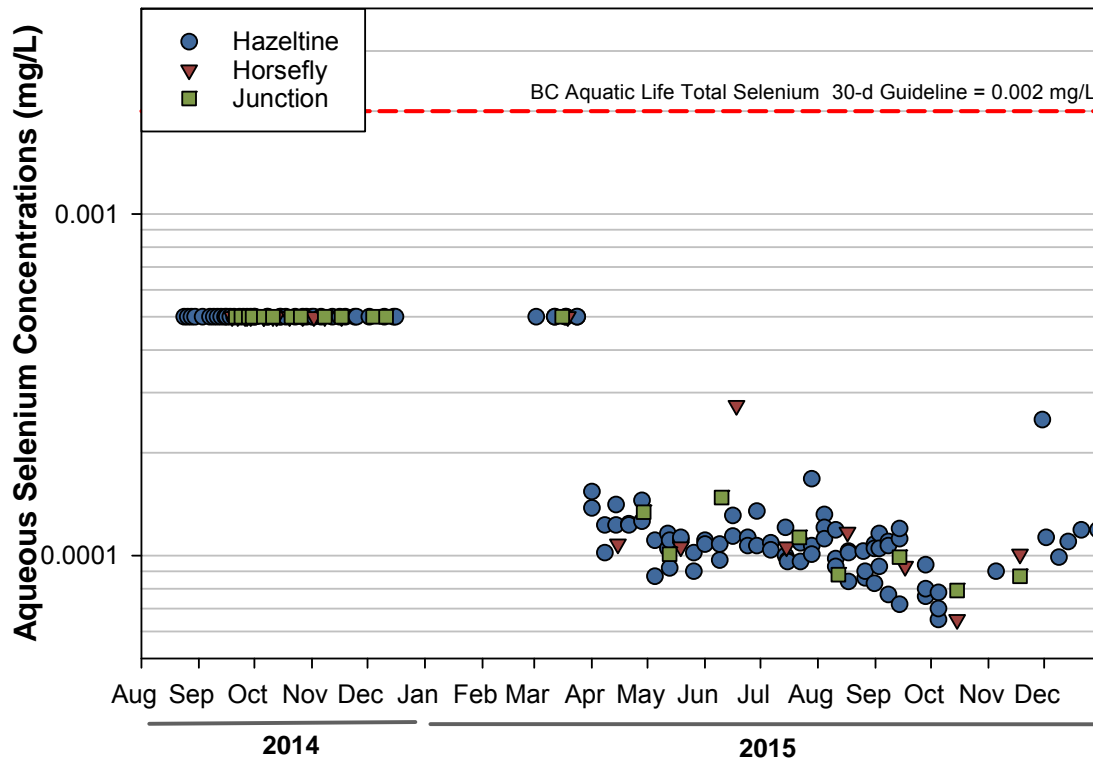
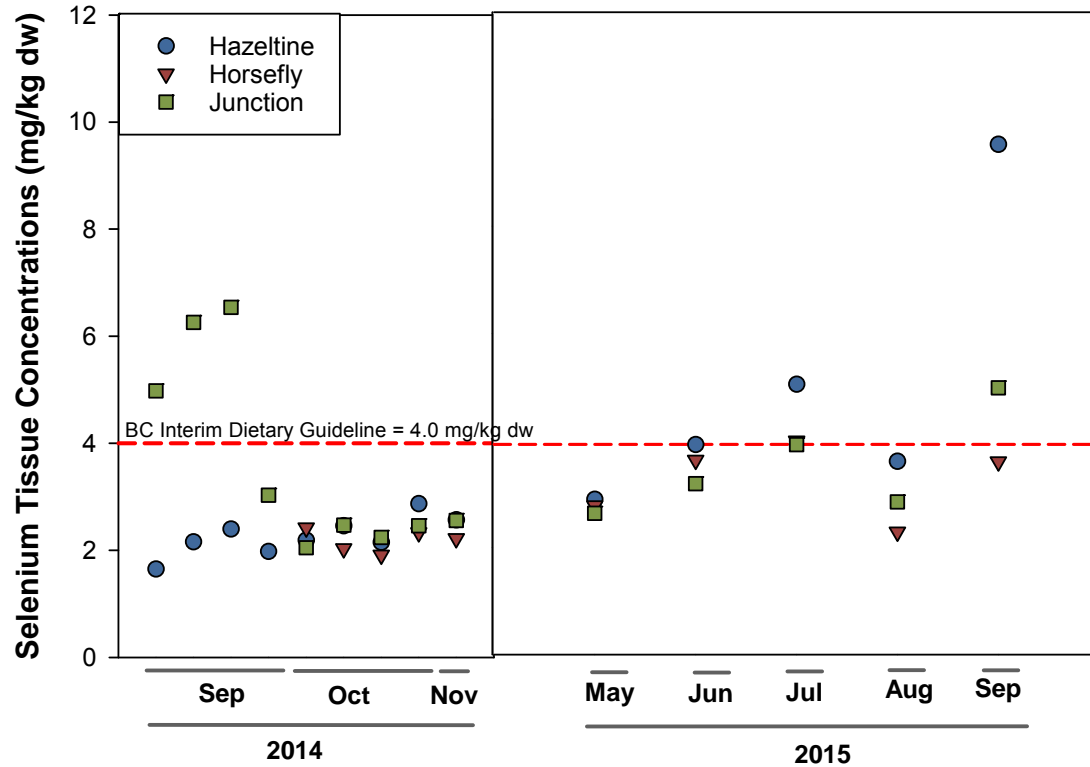
Note: Potentially anomalous value observed in Hazeltine in May 2015.

Figure 8: Concentrations of Copper in Zooplankton Tissue (top) and Surface Water (bottom) Collected from Quesnel Lake in Fall 2014 and 2015.



Note: For tissue concentrations (top figure) open symbols represent non-detect values. Where applicable full detection limits are shown. Aqueous mercury concentrations were below detection limits and show variable detection limits between years.

Figure 9: Concentrations of Mercury in Zooplankton Tissue (top) and Surface Water (bottom) Collected from Quesnel Lake in Fall 2014 and 2015.



Note: Aqueous selenium concentrations in 2014 and early 2015 were all below analytical detection limits. Where applicable, full detection limits are shown.

Figure 10: Concentrations of Selenium in Zooplankton Tissue (top) and Surface Water (bottom) Collected from Quesnel Lake in Fall 2014 and 2015.

4.2 Polley Lake

4.2.1 Phytoplankton Biomass and Trophic Status

Summary tables of Secchi depth, chlorophyll *a*, total phosphorus, total nitrogen concentrations and N:P ratios in Polley Lake in the 2015 sampling program are provided in Attachment 1, Table A1-7. Results from the TSI calculations are provided in Attachment 1, Table A1-8.

In Polley Lake, chlorophyll *a* concentrations were different between stations P1 and P2 in May, July, and September 2015 (Figure 11). Both stations showed a similar pattern where there were decreases in chlorophyll *a* concentrations in June and August, 2015. Similar concentrations of chlorophyll *a* were observed at the two stations in June and August. Secchi depth was lower for Polley Lake compared to Quesnel Lake. Secchi depth values ranged from 2.1 m (at P2 in May) to 7.3 m (at P1 in September). TP concentrations ranged from 6.4 µg/L to 20.1 µg/L with a general decreasing trend observed through the open water period. TN concentrations ranged from 326 µg/L to 409 µg/L with no apparent seasonal trends. The N:P ratio was lower than Quesnel Lake and ranged from 8 to 25, indicating that the lake is potentially nitrogen limited or co-limited by both nitrogen and phosphorus.

Based on the TSI calculations for TP, Secchi depths, and chlorophyll *a* concentrations from the open water-sampling period in Quesnel Lake, the trophic status of the lake was oligotrophic to mesotrophic (Table 7). Polley Lake can also be classified as ranging from oligotrophic to mesotrophic based on the classification systems of Vollenweider (1970). Total phosphorus values were occasionally above the CCME (2004) TP trigger ranges for oligotrophic lakes (10 µg/L).

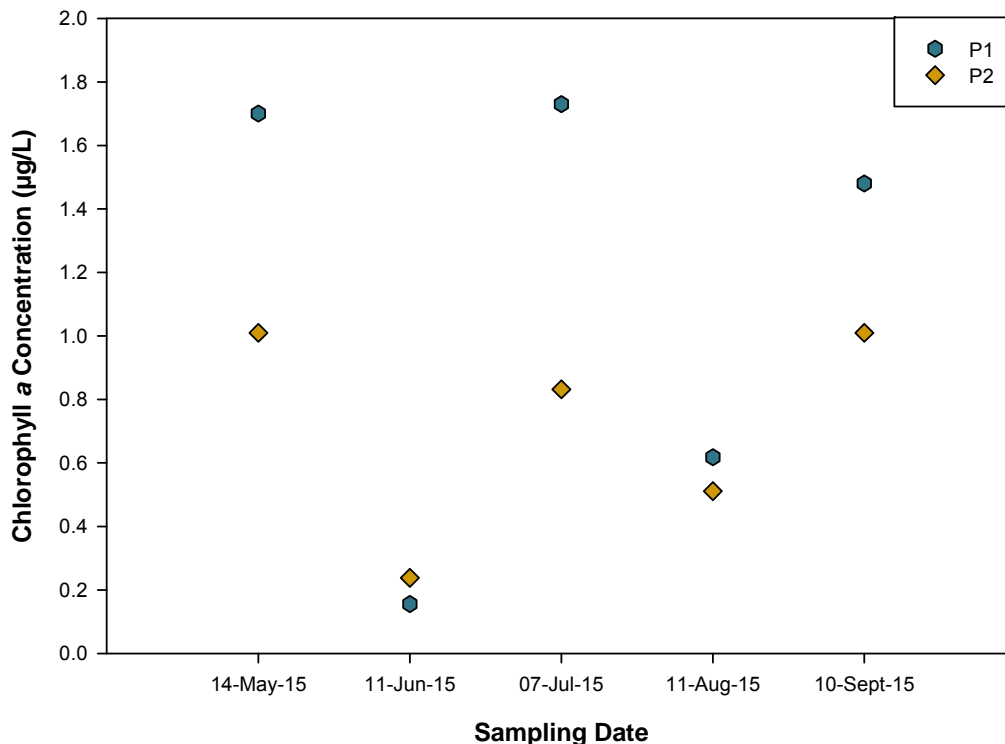


Figure 11: Chlorophyll *a* Concentrations at Stations P1 and P2 in Polley Lake, 2015

Table 7: Summary of Trophic Status in Polley Lake, 2015

Variable	P1					P2				
	May	June	July	August	September	May	June	July	August	September
TSI (TP)	47	40	44	32	32	47	41	44	31	32
TSI (TChl)	45	21	45	35	43	40	26	38	33	40
TSI (Secchi)	42	34	38	34	31	49	32	44	35	35
Trophic Status Classification	oligotrophic to mesotrophic ^(a)									

Notes:

(a) Oligotrophic to mesotrophic system based on Carlson (1977).

TSI mean values.

TSI=Trophic status index

4.2.2 Zooplankton Community

Summary tables of zooplankton taxonomy results for Polley Lake are provided in Attachment 1, Table A1-9 and A1-10. Raw data and taxonomic methods are provided in Attachment 2.

Total zooplankton abundance in Polley Lake was lower at station P1 than at P2 for all sampling events, with the exception of the June 11, 2015 sampling event in which abundance was similar between stations (Figure 12). Both stations showed an increase in zooplankton abundance between May and June followed by a decline from June to August/September. No biomass calculations were made so it is unknown whether zooplankton biomass follows a similar seasonal pattern compared to abundance.

Similar community composition was observed at the two stations in Polley Lake. Copepod nauplii made up the greatest proportion of total zooplankton abundance in Polley Lake between May and July (29 to 71%; Figure 13). Copepod nauplii were also dominant in the September sample at P2 and represented 60% of the total abundance. In the remainder of the samples for August and September, cyclopoid copepods were the dominant taxa (52 to 60%; Figure 13). Cladocerans, rotifers, and calanoid copepods were generally present in smaller numbers at both stations through the open water period.

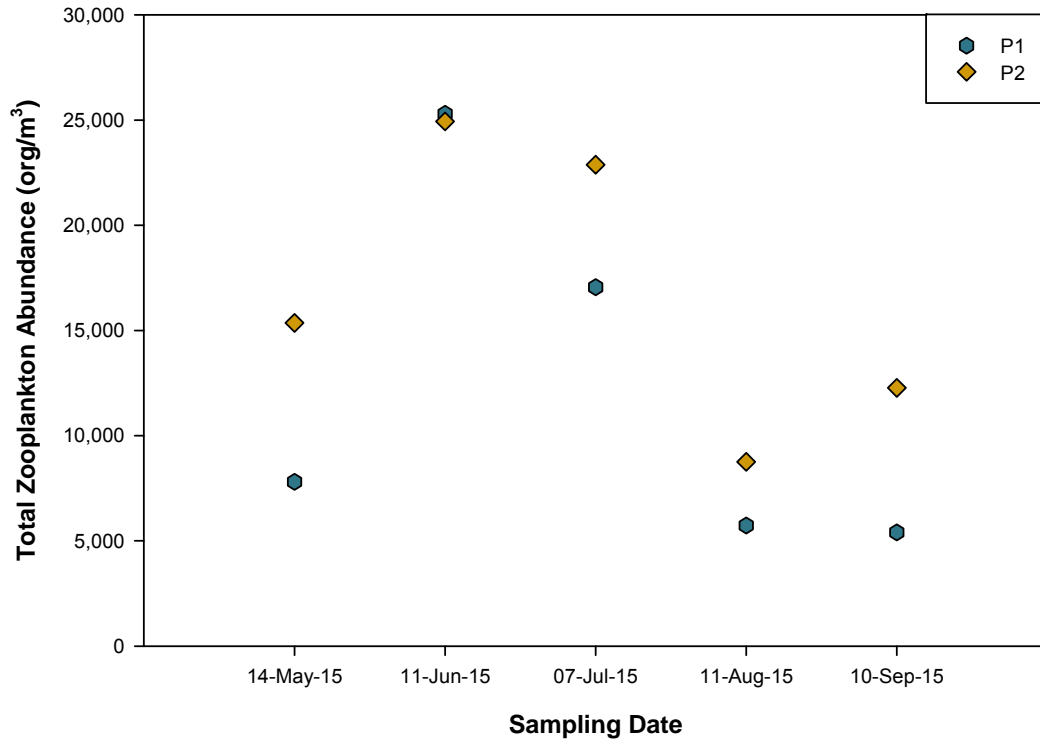


Figure 12: Total Zooplankton Abundance in Polley Lake, 2015

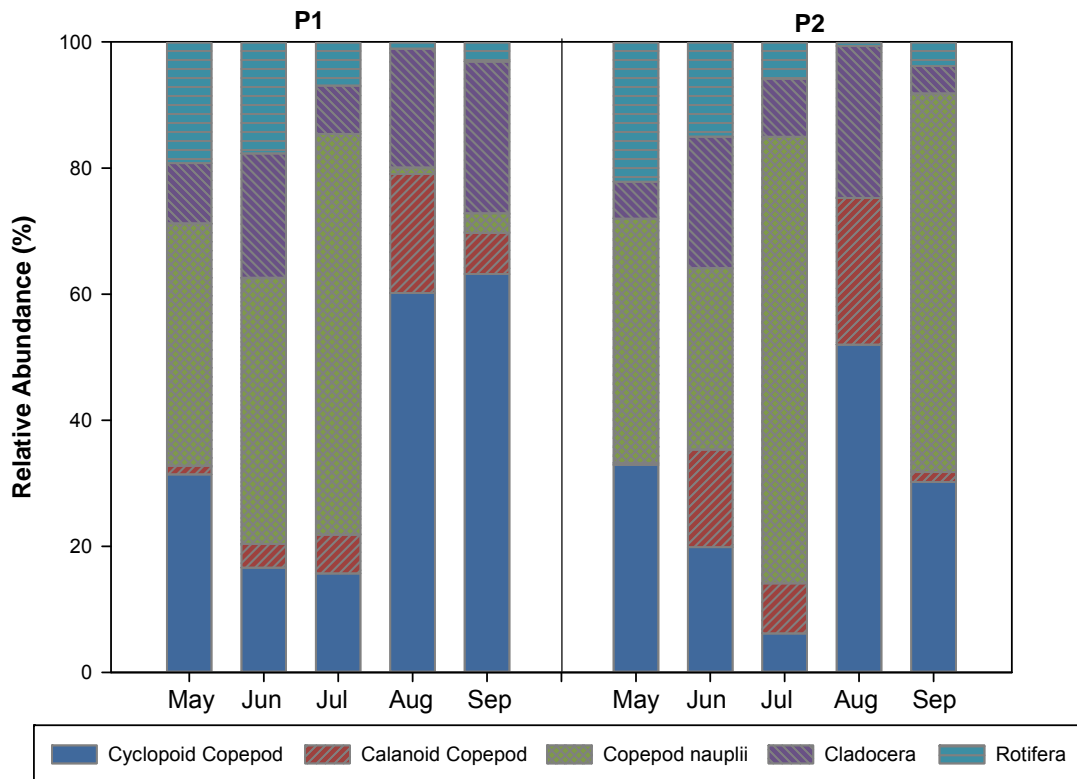


Figure 13: Relative Zooplankton Abundance in Polley Lake, 2015

4.2.3 Zooplankton Tissue Chemistry

Results for tissue chemistry measured in zooplankton collected from Polley Lake in the 2015 sampling program are provided in Attachment 1, Table A1-11. Analytical laboratory reports are provided in Attachment 3. Time-series plots of arsenic, copper, mercury, and selenium concentrations in zooplankton tissue and surface water (where available) are provided in Figures 14 to 17.

Arsenic

Arsenic concentrations in zooplankton tissue were generally similar between sampling stations (P1 and P2) in Polley Lake in 2015 with the exception of the September sampling event when P1 was higher (Figure 14). Tissue concentrations of arsenic displayed an increasing trend from May to September at P1 (Figure 14). An increasing trend was also observed at P2 from May to August but decreased during the September sampling event.

No trends were observed in aqueous arsenic concentrations over the sampling period in 2015 (Figure 14). Aqueous arsenic concentrations were below the BC WQG in all samples collected from P1 and P2. Although tissue concentrations of arsenic displayed an increasing trend at P1 (from May to September 2015) and P2 (from May to August 2015), aqueous concentrations of arsenic were generally stable during this timeframe.

Copper

Copper concentrations in zooplankton tissue were generally similar between sampling stations (P1 and P2) in Polley Lake in 2015 with the exception of the September sampling event when P1 was higher (Figure 15). Tissue concentrations of copper displayed an increasing trend from May to September at P1 (Figure 15). An increasing trend was also observed at P2 from May to August but copper concentrations decreased during the September sampling event.

A slight increasing trend was observed in aqueous copper concentrations over the sampling period in 2015 (Figure 15). Aqueous copper concentrations were below the BC short-term maximum WQG in all samples collected from P1 and P2.

Mercury

Mercury concentrations in zooplankton tissue were generally similar between sampling stations (P1 and P2) in Polley Lake in 2015 with the exception of the September sampling event when P1 was higher (Figure 16). August and September mercury tissue concentrations were higher at both stations compared to mercury concentrations in May and July.

Aqueous mercury data were limited and all below the reported detection limit; therefore, comparison of tissue to aqueous mercury concentrations could not be made.

Selenium

Selenium concentrations in zooplankton tissue were generally similar between sampling stations (P1 and P2) in Polley Lake in 2015 with the exception of the September sampling event when P1 was higher (Figure 17). Tissue concentrations of selenium displayed an increasing trend from May to September at P1 (Figure 17). No discernable trend was observed at P2. Zooplankton tissue selenium concentrations were at or above the BC interim dietary guideline for tissue consumption by fish (BC MOE 2014) at both stations during the sampling events in Polley Lake in 2015.

Aqueous selenium concentrations displayed a slight decreasing trend throughout the sampling period in 2015. The trend in aqueous concentrations was not observed in tissue selenium concentrations at P1 (which showed a general increasing trend) or P2 (which lacked any discernable trend).

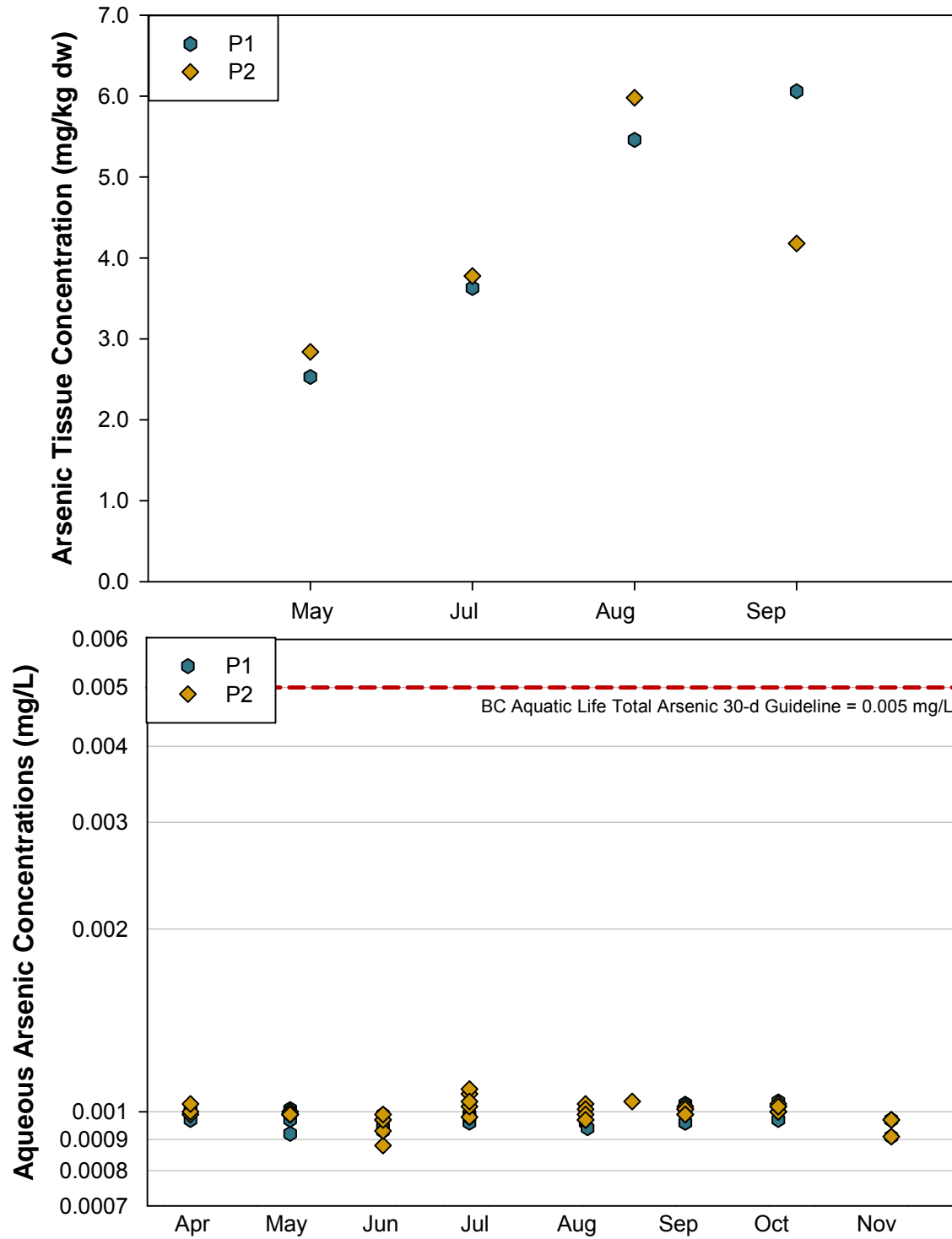


Figure 14: Concentrations of Arsenic Measured in Zooplankton Tissue (top) and Surface Water (bottom) Collected from Polley Lake, 2015.

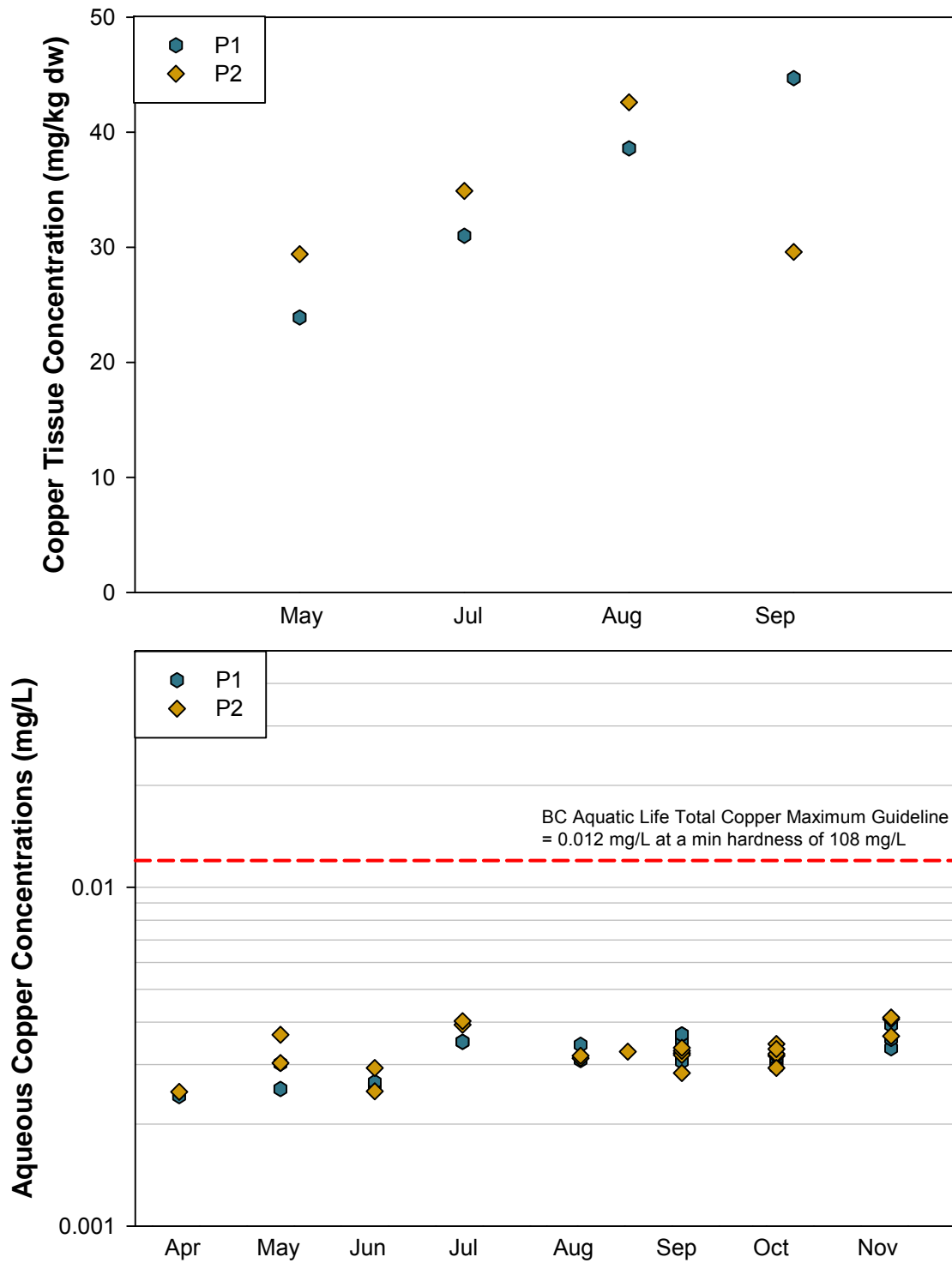


Figure 15: Concentrations of Copper Measured in Zooplankton Tissue (top) and Surface Water (bottom) Collected from Polley Lake, 2015.

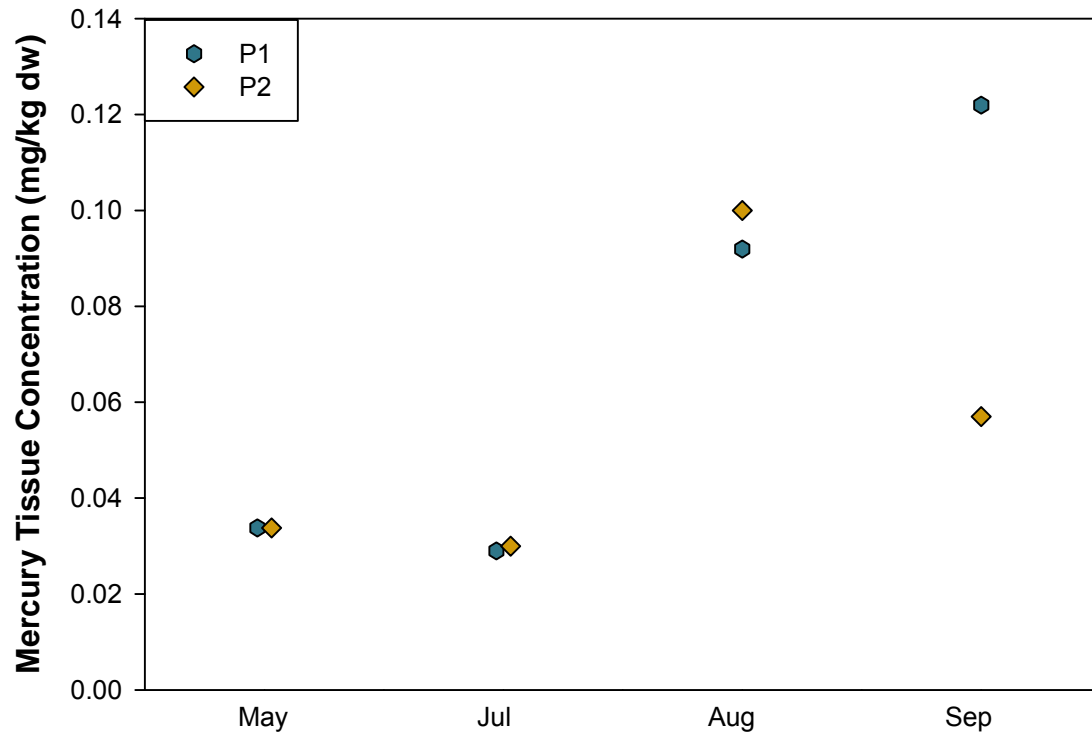


Figure 16: Concentrations of Mercury Measured in Zooplankton Tissue Collected from Polley Lake, 2015.

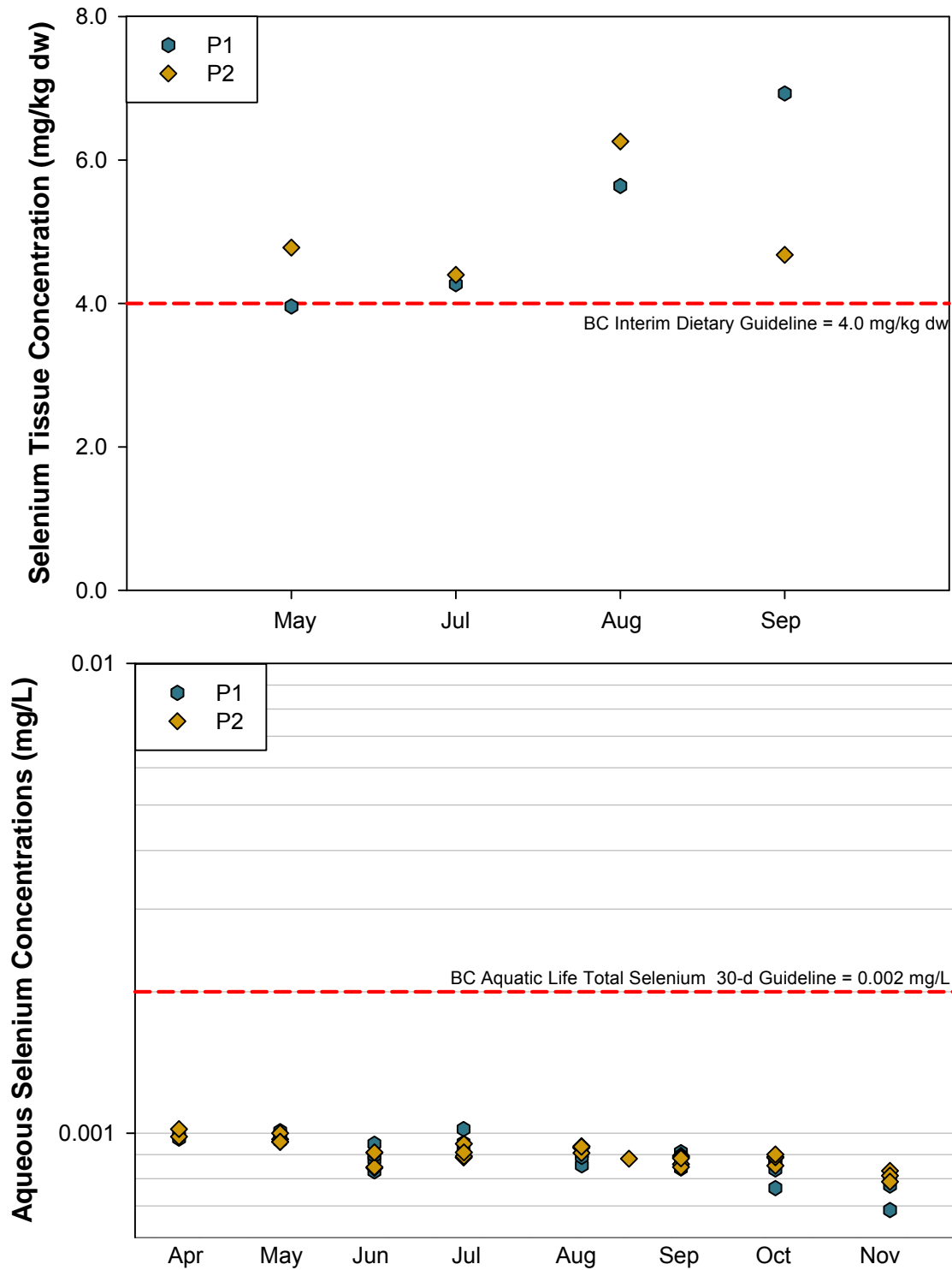


Figure 17: Concentrations of Selenium Measured in Zooplankton Tissue (top) and Surface Water (bottom) Collected from Polley Lake, 2015.

4.3 Quality Assurance/Quality Control

4.3.1 Zooplankton Community

Results of the field QA/QC are provided in Table 8. RPD's were calculated on total abundance as well as at the major group level between duplicates collected for zooplankton taxonomy.

The RPD was below 50% when calculated on total abundance (Table 8). At the major group level an RPD of 135% was calculated for copepod nauplii. All other RPDs were below 50%.

Table 8: Quality Control Comparison of Zooplankton Abundance in Polley Lake, 2015

Major Taxonomic Group	Polley Lake		
	10-Sep-15		
	P1	P1-Duplicate	RPD
	(org/m ³)	(org/m ³)	(%)
Cyclopid Copepod	3,416	4,948	37
Calanoid Copepod	352	462	27
Copepod nauplii	167	858	135
Cladocera	1,300	1,089	18
Rotifera	167	165	1
Total Zooplankton	5,402	7,522	33

Note:

Percent errors were calculated using data at the precision level provided by the taxonomist; tabulated laboratory data are rounded for presentation purposes.

org/m³ = organisms per cubic metre; RPD = relative percent difference; Sep = September; % = percent.

4.3.2 Zooplankton Tissue Chemistry

4.3.2.1 Laboratory Data Quality Objectives

Results of laboratory DQOs are provided in Attachment 3. Extraction from the certified reference material analyzed in conjunction with tissues met the laboratory's objectives, except for one of the two reference materials for sodium in laboratory file L1618673. ALS concluded that this result was due to contamination because the second reference material for sodium met the laboratory DQO and re-analysis of L1618673 samples confirmed the initial sodium concentrations in these samples (Can Dang, pers. comm.). Therefore, the certified reference material for sodium that did not meet the ALS DQO is not expected to affect the reliability of the results.

Relative percent differences for duplicates met the laboratory objectives in most tissue chemistry files. In laboratory files L1618673 and L1633703, relative percent differences for some elements in duplicates exceeded the laboratory objective of 40%. During laboratory analysis, homogenization of the sample may not have been complete, such that subsampling for analysis resulted in variability in the results. In laboratory file L1618673, parameters with relative percent differences that exceeded the laboratory DQO included aluminum, arsenic, barium, cadmium, chromium, cobalt, iron, magnesium, nickel, phosphorus, potassium, rubidium, sodium, thallium, uranium, vanadium, and zinc. In laboratory file L1633703, the relative percent difference for one parameter (thallium) exceeded the laboratory DQO. These duplicate results indicate slightly elevated uncertainty in the precision of the listed parameters' values in the given batch.

The QA/QC sample results for the tissue analysis met the laboratory's DQOs for laboratory blanks, with the exception of detected concentrations of zinc in laboratory files L1640343 and L1640340. Detected concentrations in method blanks were within five times the detection limit. Limits of reporting were adjusted for samples with concentrations below five times of the blank level.

4.3.2.2 *Sample Processing*

For three of the nine laboratory files provided in Attachment 3, the chain of custody form for the zooplankton tissue chemistry samples has the sample type as “other” and the analysis request as “Total Metals (ICPMS)”. Because the tissue samples were submitted in a 250 mL white Nalgene bottle that was filled with water, ALS assumed the sample was being submitted for analysis of total metals in water, rather than tissue (the 250 mL white Nalgene bottle is the bottle type supplied by ALS for analysis of total metals in water). Laboratory files for which the sample type was miscommunicated include:

- L1640343 (tissue samples collected from Polley Lake in July, 2015);
- L1633703 (tissue samples collected from Quesnel Lake in June, 2015); and
- L1640340 (tissue samples collected from Quesnel Lake in July, 2015).

Upon receipt of samples in the aforementioned laboratory files, ALS acidified the entire sample (i.e., the entire 250 mL Nalgene bottle, including the tissue chemistry sample). A water subsample was then taken from the 250 mL Nalgene bottle and analyzed for total metals in water. After analysis of the water sample, the mine staff informed ALS that the intended sample type was tissue. At this time, ALS dried the remaining sample and processed the tissue for metals analysis. Golder asked ALS to comment on the potential effect of sampling processing on the tissue results. However, ALS was unsure what effect, if any, the sample processing would have on the tissue chemistry results.

In addition to the laboratory files listed above, the sample type was also miscommunicated for zooplankton tissue chemistry samples collected from Polley Lake in June, 2015. Unlike the laboratory files listed above, the June 2015 Polley Lake samples were acidified, analyzed for total metals in water, and discarded before the sample type miscommunication was identified.

5.0 SUMMARY

During the 2015 field program, plankton communities were sampled at three stations in Quesnel Lake and two stations in Polley Lake during the open water period from May to September. The overall objective of the plankton sampling program was to characterize plankton communities in the lakes and to provide information to inform the HHERA and future lake monitoring programs.

A brief summary of the findings for Quesnel Lake sampling is provided below:

- Phytoplankton biomass (as chlorophyll *a*) in Quesnel Lake was below 1.0 µg/L in all sampling events but varied seasonally. Chlorophyll *a* concentrations generally increased through the open water period from May to September. Overall, Quesnel Lake is classified as oligotrophic based on several classification systems, which use nutrients (total phosphorus and total nitrogen), Secchi depths, and chlorophyll *a* concentrations to evaluate trophic status.
- Total zooplankton biomass and abundance in Quesnel Lake during the open water period of 2015 was generally higher than values observed during post-event sampling in fall of 2014. Seasonal variability was observed through the open water period of 2015 with a generally increasing trend in biomass and a generally decreasing trend in abundance observed from May to September 2015.

- Zooplankton biomass and abundance in Quesnel Lake were generally dominated by either cyclopoid copepods or cladocerans. Seasonal differences were observed throughout the open water period of 2015 with cyclopoid copepods generally dominant in spring and early-summer and cladocerans dominant in late-summer and fall. Limited spatial variability was observed among stations with similar trends observed at the Hazeltine, Horsefly, and Junctions stations through the open water period in 2015.
- Zooplankton tissue concentrations of copper, selenium, mercury, and arsenic were plotted by sampling period for each station in Quesnel Lake to qualitatively evaluate trends in these parameters in comparison to aqueous concentrations of these parameters at comparable water quality sampling locations.
 - An increasing trend in arsenic concentrations was observed in zooplankton tissue from all three stations; however, this trend was not observed in aqueous arsenic concentrations at comparable water sampling stations. In 2015, aqueous arsenic concentrations were generally similar at all three stations and all concentrations were below the BC WQG. The trends in tissue concentrations do not reflect what is observed in arsenic concentrations in surface water collected from nearby locations.
 - No consistent trends were observed in zooplankton copper concentrations measured in sampling events from 2014 and 2015. Tissue concentrations of copper were generally higher at Hazeltine compared to the other two stations. In 2014, tissue concentrations of copper appeared to increase from October to November; however, this same increasing trend was not observed to continue in 2015. One elevated copper concentration was observed at Hazeltine in May 2015. Given that copper does not biomagnify in freshwater systems (Cardwell et al. 2013) and aqueous copper concentrations in May 2015 were similar to or lower than aqueous concentrations during other sampling events that did not result in comparable copper concentrations in tissue, this elevated value appears to be anomalous.
 - Zooplankton tissue mercury concentrations were variable at all three stations, with no consistent spatial or temporal trends. In 2015, tissue concentrations of mercury at Hazeltine and Junction increased between May and September to values within the range observed at Junction in September 2014. Aqueous mercury data are sparse and aqueous concentrations were below the reported detection limit in all samples and interpretation of aqueous mercury trends is therefore limited.
 - Zooplankton tissue selenium concentrations appeared to exhibit a generally increasing trend at all stations throughout the 2015 sampling period with the exception of the August 2015 sampling event when lower concentrations were observed. Over the open-water period of 2015, aqueous selenium concentrations exhibited a slight decreasing trend.

A brief summary of the findings for Polley Lake sampling is as follows:

- Trophic status of Polley Lake was classified as ranging from oligotrophic to mesotrophic based on nutrients, Secchi depth, and chlorophyll *a* concentrations measured during the 2015 period.
- Total zooplankton abundance in Polley Lake increased from May to June followed by a decline in abundance from June to August. In September, P1 had an increase in zooplankton abundance where P2 had a slight decline from August. No biomass calculations were made so it is unknown whether zooplankton biomass follows a similar seasonal pattern compared to abundance.

- Similar community composition was observed at the two stations in Polley Lake. Copepod nauplii made up the greatest proportion of total zooplankton abundance in Polley Lake between May and July whereas cyclopoid copepods were generally dominant in August and September. Cladocerans, rotifers, and calanoid copepods were generally present in smaller numbers at both stations through the open water period.
- Zooplankton tissue concentrations of arsenic, copper, mercury, and selenium were generally similar between sampling stations (P1 and P2) in Polley Lake in 2015 with the exception of the September sampling event when P1 was consistently higher than P2 for arsenic, copper, mercury, and selenium.
 - Tissue concentrations of arsenic, copper, mercury, and selenium displayed an increasing trend from May to September at P1. This trend was not observed in aqueous concentrations of these parameters with the exception of copper, which also exhibited a slight increase in aqueous concentrations at both sampling locations.
 - Zooplankton tissue selenium concentrations were at or above the BC interim dietary guideline for tissue consumption by fish (BC MOE 2014) at both stations during the sampling events in Polley Lake in 2015.

Due to laboratory processing errors and lack of replication in zooplankton tissue chemistry samples, the ability to characterize natural variability and identify discernible trends in zooplankton tissue chemistry is limited. Field replication and evaluation of sample collection protocols would be helpful to characterize the normal range of variability in this biological matrix and evaluate the usefulness as a long-term monitoring tool.

Ongoing monitoring of plankton communities during the open water period in Quesnel and Polley lakes will continue to provide information related to seasonal and spatial variability in limnological characteristics of these lakes. Information related to lower trophic level communities, such as phytoplankton and zooplankton, will contribute to the interpretation of the overall assessment of fish productivity in the lake.

6.0 STATEMENT OF LIMITATIONS

This technical memorandum was prepared for the exclusive use of MPMC. The inferences concerning the data, site and receiving environment conditions contained in this memorandum are based on information obtained during investigations conducted at the site by Golder Associates Ltd. (Golder), other consultants and MPMC, and are based solely on the condition of the site at the time of the site studies and subsequent investigations and remediation and other information obtained by Golder, as described in this memorandum. Soil, surface water and groundwater conditions may vary with location, depth, time, sampling methodology, analytical techniques and other factors.

In evaluating the subject site and water quality data, Golder has relied in good faith on information provided. The factual data, interpretations and recommendations pertain to a specific project as described in this memorandum, based on the information obtained during the assessment by Golder on the dates cited in the memorandum, and are not applicable to any other project or site location. Golder accepts no responsibility for any deficiency or inaccuracy contained in this memorandum as a result of reliance on the aforementioned information.

The findings and conclusions documented in this memorandum have been prepared for the specific application to this project, and have been developed in a manner consistent with that level of care normally exercised by environmental professionals currently practising under similar conditions in the jurisdiction. Golder makes no other warranty, expressed or implied and assumes no liability with respect to the use of the information contained in this memorandum at the subject site, or any other site, for other than its intended purpose.

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MPMC may rely on the information contained in this memorandum subject to the above limitations.

Golder makes no other representation whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this memorandum, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein.

If new information is discovered during future work, including excavations, sampling, soil boring, predictive geochemistry or other investigations, Golder should be requested to re-evaluate the conclusions of this memorandum and to provide amendments, as required, prior to any reliance upon the information presented herein. The validity of this memorandum is affected by any change of site conditions, purpose, development plans or significant delay from the date of this memorandum in initiating or completing the project.

7.0 CLOSURE

We trust that this information is sufficient for your needs at this time. Should you have any questions or concerns, please do not hesitate to contact the undersigned at 604-296-4200.

GOLDER ASSOCIATES LTD.



Suzanne Earle, M.Sc., R.P.Bio.
Senior Environmental Scientist



Barbara Wernick, M.Sc., R.P.Bio.
Principal, Senior Environmental Scientist

Attachments: Attachment 1 – Tables
Attachment 2 – Zooplankton Taxonomy Results
Attachment 3 – Analytical Lab Report

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ATTACHMENT 1

Tables

Table A1-1: Secchi Depth, Chlorophyll a, Total Phosphorus and Total Nitrogen Data for Quesnel Lake, 2015

Station	Month	Secchi Depth (m)	Chlorophyll a (µg/L)	Total Phosphorus (µg/L)	Total Nitrogen (µg/L)	N:P Ratio
QUL-2a ^(a)	May	-	0.075	2.7	186	31
	June	7.5	0.177	2.0	164	37
	July	8.5	-	<2.0	123	28
	August	14.1	0.260	<2.0	104	24
	September	10.0	0.876	<2.0	124	28
QUL-18 ^(b)	May	6.4	0.216	2.6	172	30
	June	7.5	0.134	<2.0	168	38
	July	8.5	-	<2.0	129	29
	August	11.0	-	<2.0	117	27
	September	14.1	0.363	<2.0	117	27
QUL-40a ^(a)	May	-	0.157	2.2	174	36
	June	4.8	0.064	3.3	180	25
	July	8.0	0.390	<2.0	135	31
	August	9.5	0.498	2.2	106	22
	September	10.5	0.957	<2.0	113	26
QUL-55 ^(b)	May	6.2	0.180	2.7	200	34
	June	8.4	0.005	2.3	163	32
	July	8.5	0.228	<2.0	151	34
	September	8.5	0.513	3.5	122	16
QUL-120a ^(c)	May	6.2	0.233	2.4	182	34
	June	6.5	0.134	<2.0	150	34
	July	10.0	0.380	<2.0	121	27
	August	10.5	0.079	<2.0	97	22
	September	11.0	0.508	<2.0	498	113

QUL= Quesnel Lake; m=metre; µg/L = microgram per litre; - = no data; < = less than; N:P Ratio = molar ratio of nitrogen to phosphorus concentrations

(a)= Water quality station near Horsefly station (Zooplankton sample ID QUL-Zoo-7).

(b) = Water quality station near Hazelstine station (Zooplankton sample ID QUL-Zoo-1).

(c) = Water quality station near Junction station (Zooplankton sampled ID QUL-Zoo-8).

Reference: Mount Polley Mine Water Quality Impact Assessment, Golder Associates Ltd. 2015

Table A1-2: Trophic Status Index Calculations for Quesnel Lake, 2015

Station	Month	Trophic Status Index		
		TSI (Secchi) ^(d)	TSI (Chl) ^(e)	TSI (TP) ^(f)
QUL-2a ^(a)	May	-	14	18
	June	31	23	14
	August	22	26	4
	September	-	38	4
QUL-18 ^(b)	May	-	25	18
	June	31	20	4
	September	22	30	4
QUL-40a ^(a)	May	-	21	16
	June	38	13	21
	July	30	30	4
	August	28	33	16
	September	26	39	4
QUL-55 ^(b)	May	34	23	18
	June	29	12	16
	July	29	25	4
	September	29	33	22
QUL-120a ^(c)	May	34	25	17
	June	33	20	4
	July	27	30	4
	August	26	15	4
	September	25	33	4

QUL= Quesnel Lake; TSI = Trophic Status Index; Chl = chlorophyll a; TP = total phosphorus; nutrient data provided by Mt Polley Mine.

(a)= Water quality station near Horsefly station (Zooplankton sample ID QUL-Zoo-7).

(b) = Water quality station near Hazeltine station (Zooplankton sample ID QUL-Zoo-1).

(c) = Water quality station near Junction station (Zooplankton sampled ID QUL-Zoo-8).

(d) $TSI(\text{Secchi}) = 10(6 - (\ln(\text{Secchi Depth})/\ln 2))$

(e) $TSI(\text{Chl}) = 10(6 - (2.04 - 0.68 \ln \text{Chl}/\ln 2))$

(f) $TSI(\text{TP}) = 10(6 - (\ln(48/\text{TP})/\ln 2))$

Table A1-3: Zooplankton Abundance and Biomass Estimates for Quesnel Lake, 2014

Area	DFO Station	UNBC station	Date	Total Zooplankton biomass (mg/m ²)	Total Zooplankton (#/m ²)	Macrozooplankton biomass (>250um) (mg/m ²)	Macrozooplankton biomass (>250um) (#/m ²)	Cyclopoid Copepod		Calanoid Copepod				Cladocera					
								Diacyclops biomass (mg/m ²)	Diacyclops (#/m ²)	Diaptomid biomass (mg/m ²)	Diaptomid (#/m ²)	Epischura biomass (mg/m ²)	Epischura (#/m ²)	Daphnia biomass (mg/m ²)	Daphnia (#/m ²)	Bosmina biomass (mg/m ²)	Bosmina (#/m ²)	Leptodora kindtii biomass (mg/m ²)	Leptodora kindtii (#/m ²)
Hazeltine	1	10	10-Sep-14	393	131,071	392	126,357	239	95,464	49	19,179	1	55	89	8,605	12	3,000	2	55
	1	10	18-Sep-14	844	237,808	844	237,808	377	137,250	67	24,000	15	923	169	19,327	216	56,250	1	58
	1	10	25-Sep-14	528	177,840	528	176,340	286	102,000	30	16,750	0	20	70	9,490	141	49,500	2	80
	1	10	02-Oct-14	436	177,870	435	173,370	294	124,500	82	34,500	8	1,560	13	2,290	37	11,250	1	20
	1	10	09-Oct-14	363	131,060	362	127,060	283	100,750	23	10,750	0	0	13	1,560	43	14,500	0	0
	1	10	16-Oct-14	357	135,280	357	135,280	142	69,000	70	28,500	4	1,160	6	620	134	36,000	0	0
	1	10	23-Oct-14	105	42,529	104	42,100	65	27,214	13	7,929	1	274	7	1,326	18	5,571	0	0
Horsefly	7	4	02-Oct-14	188	80,953	188	77,953	135	61,339	28	11,786	3	469	10	1,306	13	3,054	0	0
	7	4	09-Oct-14	188	78,490	188	76,490	79	42,500	29	13,750	4	890	7	850	68	18,000	0	0
	7	4	16-Oct-14	252	98,620	251	98,120	175	64,000	30	20,000	3	1,020	4	600	39	12,500	0	0
	7	4	23-Oct-14	308	109,100	308	108,600	156	64,500	54	21,000	0	20	9	1,080	87	21,500	0	0
	7	4	05-Nov-14	342	135,540	342	134,540	192	88,500	49	21,500	3	1,020	11	2,020	87	21,500	0	0
Junction	8	8	10-Sep-14	1,724	366,971	1,724	366,971	485	193,143	141	54,571	38	2,400	969	96,000	90	20,857	0	0
	8	8	18-Sep-14	1,011	248,213	1,011	247,290	308	121,615	188	76,269	30	1,909	474	44,727	9	2,769	0	0
	8	8	25-Sep-14	1,189	320,571	1,188	318,571	452	183,500	170	68,500	22	1,429	433	46,429	86	19,000	26	714
	8	8	02-Oct-14	727	265,172	726	262,922	371	156,000	200	87,000	10	609	121	13,313	24	6,750	0	0
	8	8	09-Oct-14	713	281,120	712	279,120	452	192,000	177	71,000	4	240	24	1,880	55	14,000	0	0
	8	8	16-Oct-14	779	260,600	778	258,200	512	182,400	125	49,800	8	460	33	3,000	99	21,900	2	40
	8	8	23-Oct-14	496	184,470	495	182,970	286	123,000	84	32,250	4	280	5	420	116	27,000	0	20
8	8	05-Nov-14	335	134,760	334	133,260	200	90,500	86	32,500	3	180	4	580	41	9,500	0	0	

DFO=Department of Fisheries and Oceans; UNBC=University of Northern British Columbia; mg/m²=milligrams per square meters; >=less than; #/m²=number of organisms per square meters; Sep=September; Oct=October; Nov=November

Table A1-4: Zooplankton Abundance and Biomass Estimates for Quesnel Lake, 2015

Area	DFO Station	Date	Total Zooplankton biomass (mg/m ²)	Total Zooplankton (#/m ²)	Macrozooplankton biomass (>250um) (mg/m ²)	Macrozooplankton biomass (>250um) (#/m ²)	Cyclopoid Copepod		Calanoid Copepod				Cladocera							
							Diacyclops biomass (mg/m ²)	Diacyclops (#/m ²)	Diatomid biomass (mg/m ²)	Diatomid (#/m ²)	Epischura biomass (mg/m ²)	Epischura (#/m ²)	Daphnia biomass (mg/m ²)	Daphnia (#/m ²)	Bosmina biomass (mg/m ²)	Bosmina (#/m ²)	Holopedium biomass (mg/m ²)	Holopedium (#/m ²)	Leptodora kindtii biomass (mg/m ²)	Leptodora kindtii (#/m ²)
Hazeltime	1	20-May-15	1,472	793,025	1,472	793,025	804	445,860	646	341,560	0	0	13	2,420	9	3,185	0	0	0	0
	1	24-Jun-15	1,221	603,312	1,221	603,312	764	446,656	212	93,949	3	223	79	13,885	159	48,567	0	0	0	0
	1	08-Jul-15	1,181	453,440	1,181	453,440	675	316,720	67	29,140	5	350	225	36,911	198	68,312	5	1,911	1	64
	1	20-Aug-15	1,494	327,325	1,494	326,369	374	143,312	32	11,943	14	3,535	919	126,879	149	39,172	0	0	6	573
	1	10-Sep-15	787	152,557	787	152,215	170	57,495	40	11,431	7	1,283	475	61,957	82	19,279	0	341	0	0
Horsefly	7	20-May-15	655	410,923	655	408,535	320	185,828	333	220,223	0	32	1	64	0	0	0	0	0	0
	7	24-Jun-15	923	409,140	923	406,751	483	243,630	215	107,484	1	64	80	11,385	143	46,576	0	0	0	0
	7	08-Jul-15	982	340,223	982	340,223	455	218,153	56	23,885	10	2,134	313	49,745	143	46,178	0	0	1	96
	7	20-Aug-15	817	182,126	817	180,932	224	88,973	7	2,986	32	3,753	489	66,964	60	16,123	0	0	5	341
	7	10-Sep-15	962	195,433	962	193,642	193	68,670	48	15,525	3	171	561	68,756	148	38,814	0	0	7	341
Junction	8	20-May-15	928	525,637	928	525,637	700	423,965	198	95,541	0	0	2	159	28	5,971	0	0	0	0
	8	24-Jun-15	1,290	580,701	1,290	580,701	645	330,573	448	211,465	2	159	109	20,032	73	16,561	13	1,911	0	0
	8	08-Jul-15	1,221	473,885	1,221	473,885	542	274,681	156	69,267	1	96	319	55,605	201	74,045	0	0	2	191
	8	20-Aug-15	3,858	704,140	3,858	704,140	670	248,408	142	54,936	36	1,911	2,251	274,681	419	119,427	0	0	62	3,822
	8	10-Sep-15	1,823	395,701	1,823	395,701	338	120,223	99	35,032	53	7,006	860	112,102	459	117,038	0	0	3	318

DFO=Department of Fisheries and Oceans; mg/m²=milligrams per square meters;>=less than; #/m²=number of organisms per square meters;Jun=June; Jul=July; Aug=August; Sep=September.

Table A1-5 Zooplankton Relative Biomass and Abundance for Quesnel Lake, 2014 and 2015

Station	Sampling Date	Relative Biomass (%)				Relative Abundance (%)			
		Cyclopoid Copepod	Calanoid Copepod	Cladocera	Other Taxa	Cyclopoid Copepod	Calanoid Copepod	Cladocera	Other Taxa
Post-event weekly sampling 2014									
Hazeltine (QUL-Zoo-1)	10-Sep-14	61	13	26	0	73	15	9	4
	18-Sep-14	45	10	46	0	58	10	32	0
	25-Sep-14	54	6	40	0	57	9	33	0
	2-Oct-14	67	21	12	0	70	20	8	2
	9-Oct-14	78	6	16	0	77	8	12	3
	16-Oct-14	40	21	39	0	51	22	27	0
	23-Oct-14	62	14	25	0	64	19	16	1
6-Nov-14	58	12	29	0	68	14	18	0	
Horsefly (QUL-Zoo-7)	2-Oct-14	72	16	12	0	76	15	5	4
	9-Oct-14	42	18	40	0	54	19	24	3
	16-Oct-14	70	13	17	0	65	21	13	1
	23-Oct-14	51	18	31	0	59	19	21	1
	5-Nov-14	56	15	29	0	65	17	17	1
Junction (QUL-Zoo-8)	10-Sep-14	28	10	61	0	53	16	32	0
	18-Sep-14	30	22	48	0	49	31	19	0
	25-Sep-14	38	16	46	0	57	22	21	0
	2-Oct-14	51	29	20	0	59	33	8	1
	9-Oct-14	63	25	11	0	68	25	6	1
	16-Oct-14	66	17	17	0	70	19	10	1
	23-Oct-14	58	18	25	0	67	18	15	1
	5-Nov-14	60	27	13	0	67	24	7	1
Monthly Sampling 2015									
Hazeltine (QUL-Zoo-1)	20-May-15	55	44	2	0	56	43	1	0
	24-Jun-15	63	18	20	0	74	16	10	0
	8-Jul-15	57	6	36	0	70	7	24	0
	20-Aug-15	25	3	72	0	44	5	51	1
	10-Sep-15	22	6	71	2	38	8	53	1
Horsefly (QUL-Zoo-7)	20-May-15	49	51	0	0	45	54	0	1
	24-Jun-15	52	23	24	0	60	26	14	0
	8-Jul-15	46	7	47	0	64	8	28	0
	20-Aug-15	27	5	68	0	49	4	46	2
	10-Sep-15	20	5	74	0	35	8	55	2
Junction (QUL-Zoo-8)	20-May-15	75	21	3	0	81	18	1	0
	24-Jun-15	50	35	15	0	57	36	7	0
	8-Jul-15	44	13	43	0	58	15	27	0
	20-Aug-15	17	5	71	7	35	8	57	0
	10-Sep-15	19	8	73	1	30	11	58	1

Table A1-6: Zooplankton Tissue Chemistry Results for Quesnel Lake, 2015

Lake			Quesnel Lake														
Client Sample ID			QUL-ZOO-1 (Hazeltime)					QUL-ZOO-7 (Horsefly)					QUL-ZOO-8 (Junction)				
Date Sampled			20-May-15	24-Jun-15	8-Jul-15	20-Aug-15	10-Sep-15	20-May-15	24-Jun-15	8-Jul-15	20-Aug-15	10-Sep-15	20-May-15	24-Jun-15	8-Jul-15	20-Aug-15	10-Sep-15
ALS Sample ID			L1618673-1	L1633703-1	L1640340-1	L1668464-1	L1685523-1	L1618673-2	L1633703-2	L1640340-2	L1668464-2	L1685523-2	L1618673-3	L1633703-3	L1640340-3	L1668464-3	L1685523-3
Parameter	Detection Limit	Units															
Total Metals-Tissue																	
Aluminum	5	mg/kg dw	288	1330	574	1630	845	351	960	514	1900	169	206	495	906	817	867
Antimony	0.01 - 0.2	mg/kg dw	0.074	<0.20	0.036	<0.050	<0.070	0.138	<0.090	0.05	0.066	0.046	0.096	<0.050	0.107	<0.020	0.032
Arsenic	0.03 - 0.12	mg/kg dw	3.42	4.39	6.49	4.87	7.89	2.95	3.98	4.82	3.35	2.7	3.46	3.95	6.04	3.27	4.86
Barium	0.05 - 0.2	mg/kg dw	12.9	27.3	22.9	55	67.5	15.7	21.3	18.3	27.2	10.9	18.3	18	22.4	20.8	34.9
Beryllium	0.01 - 0.04	mg/kg dw	0.015	0.052	0.036	<0.050	<0.070	0.021	0.042	0.037	0.08	<0.010	0.014	0.022	0.054	0.045	0.059
Bismuth	0.01 - 0.04	mg/kg dw	0.017	<0.030	<0.030	<0.050	<0.070	0.039	<0.040	<0.020	<0.050	<0.010	0.029	<0.020	0.023	<0.020	<0.030
Boron	1.0 - 4.0	mg/kg dw	1.8	6.8	7.6	12.8	12.2	<2.0	6	5	7.9	2.1	1.7	2.8	4.4	3.2	3.5
Cadmium	0.01 - 0.04	mg/kg dw	0.863	3.55	5.78	2.82	6.22	1.06	3.47	4.89	1.56	2.58	1.18	1.62	4.45	1.75	5.59
Calcium	20 - 80	mg/kg dw	3680	14200	19800	60100	153000	4600	17400	20100	36300	36600	4000	13600	21600	35800	65400
Cesium	0.005 - 0.02	mg/kg dw	0.0846	0.172	0.128	0.112	0.212	0.0806	0.145	0.119	0.191	0.0906	0.064	0.115	0.229	0.098	0.248
Chromium	0.2 - 5.8	mg/kg dw	0.92	<3.0	1.72	<4.2	2.3	1.3	<5.8	1.65	5.47	0.95	0.63	<1.2	2.4	<2.0	2.11
Cobalt	0.02 - 0.08	mg/kg dw	0.493	1.68	1.16	1.29	1.23	0.602	1.39	1.09	1.63	0.519	0.433	0.847	1.44	0.961	1.61
Copper	0.2 - 0.8	mg/kg dw	254	49.9	43.2	30	52.5	28.5	30.1	30	22.6	14.1	25.9	21.5	34.2	18.6	43.7
Iron	5.0 - 20	mg/kg dw	476	2640	1470	1800	1540	817	1950	1380	3080	334	420	862	1800	1150	1940
Lead	0.05 - 0.20	mg/kg dw	99	2.58	0.76	1.65	0.62	224	1.38	0.99	4.78	2.14	155	0.67	1.8	0.98	0.95
Lithium	0.5 - 2.0	mg/kg dw	0.55	<1.5	<1.5	<2.5	<3.5	0.87	<2.0	<1.0	<1.5	0.63	0.65	<1.0	1.8	<1.0	2.2
Magnesium	2.0 - 8.0	mg/kg dw	1400	3150	3300	5590	9440	1520	3090	2800	3730	2530	1320	2280	3060	2000	4440
Manganese	0.05 - 0.2	mg/kg dw	63.9	218	192	146	152	86.7	193	190	166	48.9	48.5	68.7	201	91.4	110
Mercury	0.015 - 0.09	mg/kg dw	0.058	<0.075	0.121	<0.12	0.28	0.068	<0.090	0.091	<0.075	0.075	0.064	0.053	0.104	0.095	0.176
Molybdenum	0.04 - 0.7	mg/kg dw	0.342	<0.70	0.84	1.31	2.4	0.376	<0.70	0.765	1.02	0.724	0.309	<0.50	0.785	0.529	1.29
Nickel	0.2 - 0.8	mg/kg dw	6.72	6.17	5.08	5.9	6.9	3.15	7.27	4.58	6.78	2.06	1.95	2.99	5.63	3.53	4.98
Phosphorus	10 - 40	mg/kg dw	11500	12800	20000	18500	45300	11300	14100	17000	9550	11500	11400	12400	19300	14700	25000
Potassium	20 - 80	mg/kg dw	12800	13900	19300	11700	25000	10900	14700	16200	5940	13300	10900	12700	18100	5550	17200
Rubidium	0.05 - 0.2	mg/kg dw	22.4	34.5	33.1	14.3	46.1	16.7	35.2	28.2	8.63	14.5	16.9	25.1	32.2	7.2	25
Selenium	0.1 - 0.4	mg/kg dw	2.9	3.92	5.05	3.61	9.53	2.78	3.63	3.99	2.29	3.6	2.64	3.19	3.92	2.85	4.98
Sodium	20 - 80	mg/kg dw	5580	5940	8400	9680	21000	4450	6420	7790	4590	10700	4380	5670	9080	4240	13900
Strontium	0.1 0.4	mg/kg dw	28.4	114	153	325	894	36.8	125	144	199	194	32.7	103	178	176	388
Tellurium	0.02 - 0.08	mg/kg dw	<0.020	<0.060	<0.060	<0.10	<0.14	<0.020	<0.080	<0.040	<0.060	<0.020	<0.020	<0.040	<0.040	<0.040	<0.060
Thallium	0.002 - 0.04	mg/kg dw	0.0244	0.0849	<0.040	<0.010	0.059	0.0349	<0.036	0.0365	0.008	0.0258	0.0272	<0.030	0.0485	0.0088	0.037
Tin	0.1 - 0.4	mg/kg dw	0.22	0.8	<0.30	<0.50	<0.70	0.16	1.64	0.35	<0.30	<0.10	0.53	0.4	0.82	<0.20	<0.30
Uranium	0.002 - 0.008	mg/kg dw	0.0894	0.208	0.214	0.359	0.573	0.129	0.198	0.188	0.338	0.121	0.0911	0.145	0.214	0.221	0.236
Vanadium	0.1 - 0.4	mg/kg dw	1.04	6.26	6.6	6.62	2.63	1.46	4.88	5.62	6.59	0.39	0.69	2.72	4.42	1.94	3.31
Zinc	1.0 - 4.0	mg/kg dw	128	108	148	101	263	69	102	134	58.5	75.4	85.1	80.5	214	93.8	180
Zirconium	0.2 - 0.8	mg/kg dw	<0.20	0.94	<0.60	<1.0	<1.4	0.34	<0.80	0.43	2.81	<0.20	<0.20	<0.40	0.5	0.45	0.67

QUL= Quesnel Lake; Jun=June; Jul=July; Aug=August; Sep=September; mg/kg dw = miligrams per kilograms dry weight;<=less than

Table A1-7: Secchi Depth, Chlorophyll a, Total Phosphorus and Total Nitrogen Data for Polley Lake, 2015

Station	Month	Secchi Depth (m)	Chlorophyll a ($\mu\text{g/L}$)	Total Phosphorus ($\mu\text{g/L}$)	Total Nitrogen ($\mu\text{g/L}$)	N:P Ratio
P1	May	3.4	1.700	19.2	363	9
	June	6.0	0.156	12.1	406	15
	July	4.5	1.730	16.1	367	10
	August	6.0	0.618	7.1	335	21
	September	7.3	1.480	6.8	382	25
P2	May	2.1	1.010	20.1	380	9
	June	6.9	0.238	13.3	409	14
	July	3.1	0.832	15.0	359	11
	August	5.5	0.511	6.4	326	23
	September	5.8	1.010	6.9	370	24

P=Polley Lake; m=metre; $\mu\text{g/L}$ = microgram per litre; - = no data; < = less than; N:P = molar ratio of nitrogen to phosphorus concentrations

Table A1-8: Trophic Status Index Calculations for Polley Lake, 2015

Station	Month	Trophic Status Index		
		TSI (Secchi) ^(a)	TSI (Chl) ^(b)	TSI (TP) ^(c)
P1	May	42	45	47
	June	34	21	40
	July	38	45	44
	August	34	35	32
	September	31	43	32
P2	May	49	40	47
	June	32	26	41
	July	44	38	44
	August	35	33	31
	September	35	40	32

P=Polley Lake; TSI = Trophic Status Index; Chl = chlorophyll a; TP = total phosphorus; nutrient data provided by Mt Polley Mine.

(a) $TSI(\text{Secchi}) = 10(6 - (\ln(\text{Secchi Depth})/\ln 2))$

(b) $TSI(\text{Chl}) = 10(6 - (2.04 - 0.68 \ln \text{Chl}/\ln 2))$

(c) $TSI(\text{TP}) = 10(6 - (\ln(48/\text{TP})/\ln 2))$

Table A1-9: Zooplankton Taxonomy for Polley Lake, 2015

Sample Identification		P1-S	P1-S	P1	P1-S	P1	P1X	P2-S	P2-S	P2	P2-S	P2
FES Sample Number		150127	150141	150154	150188	150240	150241	150126	150140	150153	150187	150239
Sample Date		14-May-15	11-Jun-15	07-Jul-15	11-Aug-15	10-Sep-15	10-Sep-15	14-May-15	11-Jun-15	07-Jul-15	11-Aug-15	10-Sep-15
Sample Time		14:03	11:00	11:20	12:55	-	-	10:36	10:00	13:20	10:36	-
units		(org/m ³)	(org/m ³)	(org/m ³)	(org/m ³)	(org/m ³)	(org/m ³)	(org/m ³)	(org/m ³)	(org/m ³)	(org/m ³)	(org/m ³)
Taxon												
Sub-class : Copepoda												
Order : Cyclopoida		2,451	4,200	2,680	3,449	3,416	4,948	5,055	4,953	1,414	4,556	3,703
<i>Diacyclops thomasi</i>	adult	1,859	3,104	2,386	2,907	2,009	3,398	2,903	3,451	1,092	4,019	1,802
<i>Microcyclops sp.</i>	adult	465	685	294	541	837	627	1,752	731	323	56	1,034
UID	copepodid	127	411	0	0	569	924	400	771	0	480	867
Order : Calanoida		106	957	1,045	1,082	352	462	50	3,857	1,818	2,037	194
<i>Agalodiaptomus leptopus</i>	adult	0	0	0	140	17	231	0	0	0	764	27
<i>Leptodiaptomus pribilofensis</i>	adult	0	0	0	0	335	231	0	0	0	0	167
<i>Skistodiaptomus oregonensis</i>	adult	106	593	947	902	0	0	50	2,193	1,738	1,217	0
UID	copepodid	0	364	98	40	0	0	0	1,664	80	56	0
UID Calanoida / Cyclopoida	nauplii	3,001	10,685	10,852	60	167	858	5,955	7,188	16,216	0	7,373
Order: Cladocera		745	4,983	1,306	1,080	1,300	1,089	901	5,203	2,099	2,109	534
<i>Bosmina longirostris/longispina</i>	adult	5	27	0	20	14	0	0	0	0	17	0
<i>Chydorus sp.</i>	adult	0	45	98	12	14	0	0	6	0	28	0
<i>Daphnia longiremis</i>	adult	190	638	163	241	101	99	350	446	161	226	100
<i>Daphnia pulex</i>	adult	0	27	65	60	0	66	0	0	201	56	67
<i>Daphnia pulicaria</i>	adult	465	4,200	850	541	837	627	200	4,629	1,456	1,330	234
<i>Daphnia rosea</i>	adult	84	0	0	180	167	0	100	0	0	283	100
<i>Daphnia thorata</i>	adult	0	0	0	0	101	231	0	0	0	0	0
<i>Daphnia sp.</i>	juvenile	0	45	130	20	67	66	250	122	201	170	33
<i>Leptodora kindtii</i>	adult	0	0	0	6	0	0	0	0	80	0	0
Phylum : Rotifera		1,500	4,474	1,176	60	167	165	3,403	3,734	1,333	56	467
<i>Filinia sp.</i>	-	0	45	32	0	0	0	0	122	0	0	0
<i>Kellicottia longispina</i>	-	190	822	392	40	134	66	500	244	849	56	167
<i>Keratella cochlearis</i>	-	63	274	490	20	33	66	150	80	404	0	167
<i>Keratella quadrata</i>	-	972	3,196	65	0	0	0	2,352	3,086	0	0	0
UID	-	274	137	196	0	0	33	400	202	80	0	133
Total		7,802	25,300	17,059	5,731	5,402	7,522	15,364	24,936	22,881	8,758	12,271

sp.=species;UID = unidentified; Jun=June; Aug=August;Sep=September

Table A1-10 Zooplankton Relative Abundance for Polley Lake, 2015

Station	Sampling Date	Cyclopoid Copepod (%)	Calanoid Copepods (%)	Copepod nauplii (%)	Cladocera (%)	Rotifera (%)
P1	14-May-15	31	1	38	10	19
	11-Jun-15	17	4	42	20	18
	7-Jul-15	16	6	64	8	7
	11-Aug-15	60	19	1	19	1
	10-Sep-15	63	7	3	24	3
P2	14-May-15	33	0	39	6	22
	11-Jun-15	20	15	29	21	15
	7-Jul-15	6	8	71	9	6
	11-Aug-15	52	23	0	24	1
	10-Sep-15	30	2	60	4	4

%=percent; Jun=June; Aug=August;Sep=September

Table A1-11: Zooplankton Tissue Chemistry for Polley Lake, 2015

Lake			Polley Lake							
Client Sample ID			P1				P2			
Date Sampled			14-MAY-15	7-Jul-15	11-Aug-15	10-Sep-15	14-MAY-15	7-Jul-15	11-Aug-15	10-Sep-15
ALS Sample ID			L1618713-2	L1640343-2	L1668441-2	L1685534-1	L1618713-1	L1640343-1	L1668441-1	L1685534-3
Parameter	Detection Limit	Units								
Total Metals-Tissue										
Aluminum	5	mg/kg dw	295	512	482	411	304	495	556	264
Antimony	0.01	mg/kg dw	0.119	0.062	0.07	0.092	0.068	0.056	0.061	0.086
Arsenic	0.03	mg/kg dw	2.53	3.63	5.46	6.06	2.84	3.78	5.98	4.18
Barium	0.05	mg/kg dw	12.7	27.9	37	39.1	14	25.2	28.7	23.7
Beryllium	0.01	mg/kg dw	0.015	0.019	0.015	0.021	0.017	0.019	0.022	<0.020
Bismuth	0.01	mg/kg dw	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.010	<0.020
Boron	1	mg/kg dw	1.8	6	12.3	20.7	1.2	6.2	8.5	19
Cadmium	0.01	mg/kg dw	0.187	0.731	0.67	0.406	0.163	0.928	0.771	0.345
Calcium	20	mg/kg dw	7930	34300	48000	71500	4610	40400	43400	33300
Cesium	0.005	mg/kg dw	0.0817	0.122	0.105	0.141	0.0816	0.132	0.135	0.083
Chromium	0.2	mg/kg dw	0.37	0.69	<2.2	0.8	0.37	0.73	2.5	0.62
Cobalt	0.02	mg/kg dw	0.394	0.9	0.589	0.729	0.374	0.996	0.71	0.449
Copper	0.2	mg/kg dw	23.9	31	38.6	44.7	29.4	34.9	42.6	29.6
Iron	5	mg/kg dw	365	679	737	979	376	695	892	512
Lead	0.05	mg/kg dw	0.24	0.314	0.346	0.26	0.599	6.04	0.354	0.26
Lithium	0.5	mg/kg dw	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0
Magnesium	2	mg/kg dw	1080	2240	3720	5350	964	2520	3310	4190
Manganese	0.05	mg/kg dw	111	753	1140	863	98.6	563	853	401
Mercury	0.01 - 0.02	mg/kg dw	0.0338	0.029	0.092	0.122	0.0338	0.03	0.1	0.057
Molybdenum	0.04	mg/kg dw	0.985	2.37	6.77	9.41	0.68	2.05	4.96	7.27
Nickel	0.2	mg/kg dw	0.56	0.89	1.01	2.14	0.44	1	1.61	0.8
Phosphorus	10	mg/kg dw	7040	12000	17500	19600	7430	13700	17400	10500
Potassium	20	mg/kg dw	6530	9560	7850	12200	7020	11200	9850	9530
Rubidium	0.05	mg/kg dw	6.55	11.5	6.86	11.9	7.48	13.1	8.69	12.4
Selenium	0.1	mg/kg dw	3.96	4.27	5.64	6.93	4.78	4.4	6.26	4.68
Sodium	20	mg/kg dw	2790	7950	9150	16400	2270	9480	9940	10300
Strontium	0.1	mg/kg dw	48.8	211	291	393	31.4	236	257	211
Tellurium	0.02	mg/kg dw	<0.020	<0.020	<0.020	<0.040	<0.020	<0.020	<0.020	<0.040
Thallium	0.002 - 0.008	mg/kg dw	<0.0020	<0.0080	<0.0020	0.0057	<0.0020	<0.0050	<0.0020	0.0041
Tin	0.1	mg/kg dw	<0.10	0.16	<0.10	<0.20	0.23	<0.10	<0.10	0.47
Uranium	0.002	mg/kg dw	0.0373	0.0847	0.206	0.167	0.0265	0.0788	0.168	0.156
Vanadium	0.1	mg/kg dw	1.16	2.2	3.07	3.27	1.2	2.13	3.24	2.3
Zinc	1	mg/kg dw	47	66.8	101	106	68.1	72.5	102	55.3
Zirconium	0.2	mg/kg dw	<0.20	0.33	0.23	0.52	<0.20	<0.20	0.24	<0.40

P=Polley Lake; Jun=June; Jul=July; Aug=August; Sep=September; mg/kg dw = milligrams per kilograms dry weight; <=less than

ATTACHMENT 2
Zooplankton Taxonomy Results

Quesnel 2015 - Mt Polley Mining Co

Sample #	Station	Lake code	Replicate #	Date	Time	Depth(m)	Sample Type	Method code	Filtered Volume (m3)	Net Area (m)	Sample volume	Count category	Subsample volume	Total count in subsample volume(mls)	Condition Factor	
QUL- Zoo-1	1	80	1	150520	1100	0-30	1B		9	1.5	0.05	300	NPL	3.00	0	66.6667
													<.6mm	3.00	168	66.6667
													>.6mm	4.00	108	50.0000
													>1.2mm	300.00	1	0.6667
															277	
QUL- Zoo-7	7	80	1	150520	1430	0-30	1B		9	1.5	0.05	300	NPL	4.00	2	50.0000
EUB in sample													<.6mm	4.00	134	50.0000
													>.6mm	10.00	90	20.0000
													>1.2mm	300.00	3	0.6667
															229	
QUL- Zoo-8	8	80	1	150520	1300	0-30	1B		9	1.5	0.05	300	NPL	4.00	0	50.0000
													<.6mm	4.00	164	50.0000
													>.6mm	8.00	112	25.0000
													>1.2mm	300.00	5	0.6667
															281	
QULZoo1b	1	80	1	150624	915	0-30	1B		9	1.5	0.05	300	NPL	4.00	0	50.0000
SCA and HOL in sample													<.6mm	4.00	167	50.0000
													>.6mm	6.00	128	33.3333
													>1.2mm	300.00	19	0.6667
															314	
QULZoo7b	7	80	1	150624	1145	0-30	1B		9	1.5	0.05	300	NPL	4.00	0	50.0000
													<.6mm	4.00	100	50.0000
													>.6mm	8.00	142	25.0000
													>1.2mm	300.00	22	0.6667
															264	
QULZoo8b	8	80	1	150624	1330	0-30	1B		9	1.5	0.05	300	NPL	3.00	0	66.6667
													<.6mm	3.00	100	66.6667
													>.6mm	5.00	137	40.0000
													>1.2mm	300.00	14	0.6667
															251	
QULZoo1c	1	80	1	150708	1510	0-30	1B		9	1.5	0.05	300	NPL	4.00	0	50.0000
													<.6mm	4.00	100	50.0000
													>.6mm	5.00	112	40.0000
													>1.2mm	300.00	18	0.6667
															230	
QULZoo7c	7	80	1	150708	1410	0-30	1B		9	1.5	0.05	300	NPL	6.00	0	33.3333
HOL in sample													<.6mm	6.00	120	33.3333
													>.6mm	6.00	93	33.3333
													>1.2mm	300.00	33	0.6667
															246	
QULZoo8c	8	80	1	150708	1250	0-30	1B		9	1.5	0.05	300	NPL	4.00	0	50.0000
													<.6mm	4.00	105	50.0000
													>.6mm	4.00	93	50.0000
													>1.2mm	300.00	30	0.6667
															228	
QULZoo1d	1	80	1	150820	1422	0-30	1B		9	1.5	0.05	300	NPL	10.00	2	20.0000
													<.6mm	10.00	94	20.0000
													>.6mm	4.00	90	50.0000
													>1.2mm	50.00	108	4.0000
															294	
QULZoo7d	7	80	1	150820	1209	0-30	1B		9	1.5	0.05	300	NPL	16.00	5	12.5000
													<.6mm	16.00	90	12.5000
													>.6mm	8.00	92	25.0000
													>1.2mm	56.00	91	3.5714
															278	
QULZoo8d	8	80	1	150820	1053	0-30	1B		9	1.5	0.05	300	NPL	4.00	0	50.0000
													<.6mm	4.00	90	50.0000
													>.6mm	4.00	168	50.0000
													>1.2mm	10.00	92	20.0000
															350	
QULZoo1e	1	80	1	150910	1421	0-30	1B		9	1.5	0.05	300	NPL	28.00	2	7.1429
POY in sample.													<.6mm	28.00	103	7.1429
													>.6mm	8.00	91	25.0000
													>1.2mm	108.00	91	1.8519
															287	
QULZoo7e	7	80	1	150910	1303	0-30	1B		9	1.5	0.05	300	NPL	16.00	5	12.5000
POY in sample.													<.6mm	16.00	90	12.5000
													>.6mm	8.00	103	25.0000
													>1.2mm	56.00	92	3.5714
															290	
QULZoo8e	8	80	1	150910	1132	0-30	1B		9	1.5	0.05	300	NPL	6.00	0	33.3333
													<.6mm	6.00	91	33.3333
													>.6mm	4.00	93	50.0000
													>1.2mm	30.00	90	6.6667
															274	

Statement of Work:

The objectives were to identify, enumerate, and size samples of freshwater zooplankton using microcomputer-based measuring system and to supply data in data files according to the following work specifications.

Specifications:

The work required the identification, enumeration, and sizing of freshwater zooplankton in samples collected from Quesnel Lake. The analysis of each sample required quantitative subsampling, identification usually to genus, measurement of each animal by a microcomputer image measuring system, sending data in ASCII file format to the contact person. To process the data further, contact DFO – Steve McDonald at Steve.McDonald@dfo-mpo.gc.ca or Kelly Malange at <mailto:Kelly.Malange@dfo-mpo.gc.ca>.

Sample analysis:

The analysis of each sample, 150 zooplankton $\leq 600\mu\text{m}$ which includes a maximum of 50 nauplii, $100 \geq 600\mu\text{m}$ and $< 1.2\text{mm}$ and 100 zooplankton $\geq 1.2\text{mm}$ were enumerated. Copepoda and cladocera were identified to genus. Chironomids and nauplii were identified as such. The body length excluding spines of each animal was measured. Cladocera lengths are from the anterior margin of the head or helmet to the base of the tail spine. Copepoda lengths are to the base of the caudal rami. The identity and length of each zooplankton is entered and in datafiles under a unique code for each genera (supplied by DFO contact). Identifications are based of the following taxonomic keys (eg. Balcer et al 1984, Stemberger 1979, Kiefer 1978).

The following codes were used in the files:

Cladocera: Eubosmina – EUB, Leptodora kindti – LEP, Holopedium gibberum – HOL, Polyphemus pediculus – POY, Scapholeberis sp. – SCA, Sida crystalline – SID.

Cyclopoid Copepods: Diacyclops sp. – DCY

Calanoid Copepods: Epischura sp. - EPI, DPT – Diaptomus sp., Nauplii – NPL.

Chironomid larva – CHI.

Lake	Station	Date	Total Zooplankton biomass (mg/m ²)	Total Zooplankton (#/m ²)	Macrozooplankton biomass (>250um) (mg/m ²)	Macrozooplankton biomass (>250um) (#/m ²)	Daphnia biomass (mg/m ²)	Daphnia (#/m ²)	Bosmina biomass (mg/m ²)	Bosmina (#/m ²)	Diatoms biomass (mg/m ²)	Diatoms (#/m ²)	Diatomid biomass (mg/m ²)	Diatomid (#/m ²)	Epischura biomass (mg/m ²)	Epischura (#/m ²)	Holopedium biomass (mg/m ²)	Holopedium (#/m ²)	Leptodora kindtii biomass (mg/m ²)	Leptodora kindtii (#/m ²)
lake	stn	date	totbiom	totnum	macbiom	macnum	DPHbiom	DPHnum	BSMbiom	BSMnum	DCYbiom	DCYnum	LDPBiom	LDPnum	EpiBiom	EPI num	HOLbiom	HOLnum	LEPbiom	LEPnum
80	1	20-May-15	1472.2	793025	1472.2	793025	12.81	2420	9.35	3185	804.43	445860	645.59	341560	0	0	0	0	0	0
80	1	24-Jun-15	1220.6	603312	1220.6	603312	79.1	13885	159.19	48567	764.38	446656	211.61	93949	3.09	223	0	0	0	0
80	1	08-Jul-15	1181.2	453440	1181.2	453440	225.44	36911	197.89	68312	674.8	316720	67.25	29140	4.73	350	4.76	1911	1.35	64
80	1	20-Aug-15	1494.3	327325	1494.1	326369	919.09	126879	148.9	39172	373.97	143312	31.95	11943	14.05	3535	0	0	5.75	573
80	1	10-Sep-15	787.07	152557	787	152215	474.92	61957	81.83	19279	170.31	57495	39.83	11431	7.04	1283	0.38	341	0	0
80	7	20-May-15	655.47	410923	655.12	408535	0.77	64	0	0	320.3	185828	332.94	220223	0.32	32	0	0	0	0
80	7	24-Jun-15	923.39	409140	922.72	406751	80.37	11385	143.37	46576	483.44	243630	215.33	107484	0.87	64	0	0	0	0
80	7	08-Jul-15	981.88	340223	981.88	340223	312.92	49745	142.62	46178	455.37	218153	55.68	23885	10.14	2134	0	0	1.37	96
80	7	20-Aug-15	817.23	182126	816.98	180932	488.87	66964	59.78	16123	223.52	88973	7.26	2986	31.51	3753	0	0	5.35	341
80	7	10-Sep-15	962.15	195433	961.71	193642	560.63	68756	147.98	38814	193.47	68670	48.13	15525	3.42	171	0	0	6.61	341
80	8	20-May-15	927.65	525637	927.65	525637	1.91	159	28.13	5971	699.77	423965	197.85	95541	0	0	0	0	0	0
80	8	24-Jun-15	1290	580701	1290	580701	108.74	20032	73.21	16561	644.81	330573	448.01	211465	1.82	159	13.42	1911	0	0
80	8	08-Jul-15	1220.8	473885	1220.8	473885	319.23	55605	201.05	74045	542.26	274681	155.63	69267	1.15	96	0	0	1.53	191
80	8	20-Aug-15	3857.9	704140	3857.9	704140	2250.5	274681	419.33	119427	669.71	248408	141.89	54936	36.16	1911	0	0	61.94	3822
80	8	10-Sep-15	1823.2	395701	1823.2	395701	859.89	112102	458.98	117038	338.37	120223	99.46	35032	53.28	7006	0	0	3	318

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Prepared for MOUNT POLLEY MINING CORP.			
PO Box 12, Likely, B.C., V0L 1N0			
Contact : Colleen Hughes			
tel. (250) 790-2215			
chughes@mountpolley.com			
Inv. # 1003			
FES Sample Number			
		150126	150127
Sample Identification		P2-S	P1-S
Sample Date		May 14, 2015	May 14, 2015
Sample Time		10:36	14:03
units	stage	total organisms / sample	
Sub-class : Copepoda			
Order : Cyclopoida			
<i>Diacyclops thomasi</i>	adult	5,742	3,678
<i>Microcyclops sp.</i>	adult	3,465	920
UID	copepodid	792	251
Order : Calanoida			
<i>Skistodiaptomus oregonensis</i>	adult	99	209
UID Calanoida / Cyclopoida	nauplii	11,781	5,936
Sub-class : Branchiopoda			
<i>Bosmina longirostris/longispina</i>	adult		10
<i>Daphnia longiremis</i>	adult	693	376
<i>Daphnia pulicaria</i>	adult	396	920
<i>Daphnia rosea</i>	adult	198	167
<i>Daphnia sp.</i>	juvenile	495	
Phylum : Rotifera			
<i>Kellicottia longispina</i>		990	376
<i>Keratella cochlearis</i>		297	125
<i>Keratella quadrata</i>		4,653	1,923
UID		792	543
TOTAL		30,393	15,434
UID = unidentified due to lack of size and/or missing morphological characters.			

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PO Box 12, Likely, B.C., V0L 1N0			
Contact : Colleen Hughes			
tel. (250) 790-2215			
chughes@mountpolley.com			
Inv. # 1005			
FES Sample Number			
		150140	150141
Sample Identification		P2-S	P1-S
Sample Date		June 11, 2015	June 11, 2015
Sample Time		10:00	11:00
units	stage	total organisms / sample	
Sub-class : Copepoda			
Order : Cyclopoida			
<i>Diacyclops thomasi</i>	adult	6,827	6,140
<i>Cyclops sp.</i>	adult	1,446	1,355
UID	copepodid	1,526	813
Order : Calanoida			
<i>Skistodiaptomus oregonensis</i>	adult	4,338	1,173
UID	copepodid	3,292	721
UID Calanoida / Cyclopoida	nauplii	14,219	21,138
Sub-class : Branchiopoda			
<i>Bosmina longirostris/longispina</i>	adult		54
<i>Chydorus sp.</i>	adult	12	89
<i>Daphnia longiremis</i>	adult	882	1,263
<i>Daphnia pulex</i>	adult		54
<i>Daphnia pulicaria</i>	adult	9,158	8,309
<i>Daphnia sp.</i>	juvenile	241	89
Phylum : Rotifera			
<i>Filinia sp.</i>		241	89
<i>Kellicottia longispina</i>		482	1,626
<i>Keratella cochlearis</i>		159	542
<i>Keratella quadrata</i>		6,105	6,322
UID		400	271
TOTAL		49,328	50,048
UID = unidentified due to lack of size and/or missing morphological characters.			

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PO Box 12, Likely, B.C., V0L 1N0			
Contact : Colleen Hughes			
tel. (250) 790-2215			
chughes@mountpolley.com			
Inv. # 1007			
FES Sample Number		150153	150154
Sample Identification		P2	P1
Sample Date		July 7, 2015	July 7, 2015
Sample Time		13:20	11:20
units	stage	total organisms / sample	
Sub-class : Copepoda			
Order : Cyclopoida			
<i>Diacyclops thomasi</i>	adult	2,160	4,720
<i>Microcyclops sp.</i>	adult	638	582
Order : Calanoida			
<i>Skistodiptomus oregonensis</i>	adult	3,439	1,874
UID	copepodid	158	194
UID Calanoida / Cyclopoida	nauplii	32,078	21,468
Sub-class : Branchiopoda			
<i>Chydorus sp.</i>	adult		194
<i>Daphnia longiremis</i>	adult	319	322
<i>Daphnia pulex</i>	adult	398	128
<i>Daphnia pulicaria</i>	adult	2,880	1,681
<i>Daphnia sp.</i>	juvenile	398	258
<i>Leptodora kindtii</i>	adult	158	
Phylum : Rotifera			
<i>Filinia sp.</i>			64
<i>Kellicottia longispina</i>		1,680	776
<i>Keratella cochlearis</i>		799	970
<i>Keratella quadrata</i>			128
UID		158	388
TOTAL		45,263	33,747
UID = unidentified due to lack of size and/or missing morphological characters.			

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PO Box 12, Likely, B.C., V0L 1N0			
Contact : Colleen Hughes			
tel. (250) 790-2215			
chughes@mountpolley.com			
Inv. # 1012			
FES Sample Number		150187	150188
Sample Identification		P2-S	P1-S
Sample Date		August 11, 2015	August 11, 2015
Sample Time		10:36	12:55
units	stage	total organisms / sample	
Sub-class : Copepoda			
Order : Cyclopoida			
<i>Diacyclops thomasi</i>	adult	7,951	5,751
<i>Microcyclops sp.</i>	adult	111	1,071
UID	copepodid	950	
Order : Calanoida			
<i>Agalodiaptomus leptopus</i>	adult	1,512	277
<i>Skistodiaptomus oregonensis</i>	adult	2,407	1,785
UID	copepodid	110	79
UID Calanoida / Cyclopoida		nauplii	119
Sub-class : Branchiopoda			
<i>Bosmina longirostris/longispina</i>	adult	34	39
<i>Chydorus sp.</i>	adult	55	24
<i>Daphnia longiremis</i>	adult	447	476
<i>Daphnia pulex</i>	adult	111	119
<i>Daphnia pulicaria</i>	adult	2,631	1,071
<i>Daphnia rosea</i>	adult	559	357
<i>Daphnia sp.</i>	juvenile	336	39
<i>Leptodora kindtii</i>			12
Phylum : Rotifera			
<i>Kellicottia longispina</i>		111	79
<i>Keratella cochlearis</i>			39
TOTAL		17,325	11,337
UID = unidentified due to lack of size and/or missing morphological characters.			

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PO Box 12, Likely, B.C., V0L 1N0				
Contact : Colleen Hughes				
tel. (250) 790-2215				
chughes@mountpolley.com				
Inv. # 1016				
FES Sample Number		150239	150240	150241
Sample Identification		P2	P1	P1X
Sample Date		Sept. 10, 2015	Sept. 10, 2015	Sept. 10, 2015
Sample Time		12:59	11:31	12:07
units	stage	total organisms / sample		
Sub-class : Copepoda				
Order : Cyclopoida				
<i>Diacyclops thomasi</i>	adult	3,564	3,975	6,721
<i>Microcyclops sp.</i>	adult	2,046	1,656	1,240
UID	copepodid	1,716	1,126	1827
Order : Calanoida				
<i>Agalodiaptomus leptopus</i>	adult	53	33	457
<i>Leptodiaptomus pribilofensis</i>	adult	330	663	457
UID Calanoida / Cyclopoida	nauplii	14,586	331	1,697
Sub-class : Branchiopoda				
<i>Bosmina longirostris</i>	adult		27	
<i>Chydorus sp.</i>	adult		27	
<i>Daphnia longiremis</i>	adult	198	199	196
<i>Daphnia pulex</i>	adult	132		131
<i>Daphnia pulicaria</i>	adult	462	1,656	1,240
<i>Daphnia rosea</i>	adult	198	331	
<i>Daphnia thorata</i>	adult		199	457
<i>Daphnia sp.</i>	juvenile	66	133	131
Phylum : Rotifera				
<i>Kellicottia longispina</i>		330	265	131
<i>Keratella cochlearis</i>		330	66	131
UID		264		65
TOTAL		24,275	10,687	14,881
UID = unidentified due to lack of size and/or missing morphological characters.				

FRASER ENVIRONMENTAL SERVICES

METHODS MANUAL **JANUARY 2013**

By Linde Looy, R.P.Bio.

**Fraser Environmental Services
16 - 9324 128th Street
Surrey, B.C., V3V 6A4
Telephone and Fax (604) 588-9738
FRASER ENVIRONMENTAL SERVICES**

METHODS MANUAL

Details of the analytical methods used by Fraser Environmental Services are described here. Our firm employs similar standard techniques to ensure consistency over time. The QA/QC procedures employed can be found in the QA/QC Manual.

Phytoplankton Identification and Enumeration

Scope :

This method describes the identification and enumeration of phytoplankton.

Summary :

The sample is settled overnight and the slide is examined. Using the appropriate keys and procedures, phytoplankton can then be identified and subsequently enumerated.

Apparatus :

1. Utermohl-type settling chambers
2. Inverted microscope
3. Compound microscope
4. Appropriate taxonomic keys

Reagents :

1. Lugol's Solution : prepared as outlined in **Standard Methods for the Examination of Water and Wastewater**.

Procedure :

1. Calibrate the microscope using stage and ocular micrometers (see Section 1, page 8 for procedure).
2. Confirm that the sample is appropriately preserved.
3. Settle out an appropriate sample volume randomly removed depending on the density of organisms (usually 100 mL) for approximately 24 hours. Use smaller or diluted volumes for densely populated samples or concentrate sparsely populated samples by centrifugation or by sedimentation.
4. Scan the entire slide at increasing powers of magnification to determine which species/genera are present. Identify the organisms observed to the requested level if possible.
5. Once the identifications are made, do the counts. Count at least 20 random fields,

continue counting until you get a total count of at least 100 for the dominant species. Statistical tests for randomness will be performed.

6. Enumerate the data by a total cell count (cells/mL). Calculate the per mL total for each species or genera by multiplying the actual count by the factor F as defined below :

$$F = \frac{A / r^2 \pi N}{V}$$

where A= the area of the settling chamber

r= the radius of the field

N= the number of fields counted

V= the volume settled

Taxonomic Keys :

1. Bourrelly, P. (1966)
2. Cleve-Euler, A. (1951)
3. Cleve-Euler, A. (1968)
4. Contant, H. (1978)
5. Dodd, J. (1947)
6. Germain, H. (1981)
7. Hustedt, F. (1930)
8. Hustedt, F. (1985)
9. John, D., B. Whitton, and A. Brook. (2002)
9. Komarek, J. and K. Anagnostidis. (1999)
10. Patrick, R. (1966)
11. Patrick, R. (1975)
12. Pennak, R. (1953)
13. Prescott, G. (1978)
14. Prescott, G. (1982)
15. Stein, J. (1975)
16. Ward, H.B. (1959)
17. Webber, C. (1966)
18. Wehr, J. D. and R. G. Sheath. (2003)

Note : Other taxonomic keys may be used but they will be cited in the data summary.

References :

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Pennak, Robert W. 1953. **Fresh-Water Invertebrates of the United States.**

Prescott, G.W. 1978. **How to Know the Freshwater Algae, 3rd edition.**

Prescott, G.W. 1982. **Algae of the Western Great Lakes Area, revised edition.**

Stein, Janet R. 1975. Freshwater algae of British Columbia : the Lower Fraser Valley. **Syesis**, Vol.8, 1975.

Ward, H.B. and Whipple, G.C. 1959. **Freshwater Biology, 2nd edition.**

Weber, Cornelius I. 1966. **A Guide to the Common Diatoms at Water Pollution Surveillance System Stations.** U.S. Environmental Protection Agency, National Environmental Research Center, Analytical Quality Control Laboratory, Cincinnati, Ohio 45268. Reprint 1971.

Wehr, John D. and Sheath, Robert G. 2003. **Freshwater Algae of North America.** Ecology and Classification. Academic Press, Amsterdam. 918 pp.

Wetzel, R.G. 1983. **Limnology: Second edition.**

Periphyton Identification and Enumeration

Scope :

This method describes the identification and enumeration of periphyton.

Summary :

The sample is settled for at least two hours and the slide is examined. The minimum settling time is dependent on the volume of the chamber used. Using the appropriate keys and procedures, periphyton can then be identified and subsequently enumerated.

Apparatus :

1. Utermohl-type settling chambers
2. Inverted microscope
3. Compound microscope
4. Appropriate taxonomic keys

Reagents :

1. Lugol's Solution : prepared as outlined in **Standard Methods for the Examination of Water and Wastewater**.
2. Hyrax mounting medium (or other medium with similar optical properties).

Procedure :

1. Calibrate the microscope using stage and ocular micrometers (see Section 1, page 8 for procedure).
2. Confirm that the sample is appropriately preserved. Measure and record the total volume of the sample.
3. Settle out an appropriate sample volume randomly removed, depending on the density of organisms (usually 10 mL) for approximately 4 hours. Use smaller or diluted volumes for densely populated samples or concentrate sparsely populated samples by centrifugation or by sedimentation.
4. Scan the entire chamber at increasing powers of magnification to determine which species/genera are present. Identify the organisms observed to the requested level if possible.
5. If required prepare three diatom slides using either pyrolysis or acid digestion to clear the frustules. See Standard Methods for the Examination of Water and Wastewater for further details of these procedures.
6. Once the identifications are made, do the counts. From the settling chambers, count at least 20 random fields (at 1000X and/or 400X) continue counting until you get a count of at least 100 for the dominant species. Count at least one transect at 400X and two transects at 200X for more accurate counts of the less dominant species.

7. Enumerate the data by a total cell count (cells/mL). Calculate the per mL total for each species or genera by multiplying the actual count by the factor F as defined below :

$$F = \frac{A / r^2 \pi N}{V}$$

where A= the area of the settling chamber
 r= the radius of the field
 N= the number of fields counted
 V= the volume settled

The cells per total sample can then be determined by multiplying by the total sample volume. Then divide by the area sampled to get cells per cm². In other words the count can be multiplied by factor P as defined below to get cells per cm² :

$$P = \frac{FD V_t}{A_s}$$

where F = the factor defined previously
 D = the dilution
 V_t = the total sample volume
 A_s = the area sampled (cm²)

Taxonomic keys:

1. Bourrelly, P. (1966, 1968 & 1970)
1. Cleve-Euler, A. (1951)
2. Cleve-Euler, A. (1968)
3. Contant, H. (1978)
4. Geitler, L. (1932)
5. Huber-Pestalozzi, G. (1938, 1941, 1955, & 1961)
6. Huber-Pestalozzi, G. and B. Fott (1968 & 1972)
7. Huber-Pestalozzi, G., J. Komarek and B. Fott. (1983)
8. Hustedt, F. (1930 & 1985)
9. John, D., B. Whitton, and A. Brook. (2002)
10. Komarek, J. and K. Anagnostidis. (1999)
11. Krammer K. and H. Lange-Bertalot. (1986, 1988, 1991 & 2000)
12. Patrick, R. and C. Reimer. (1966 & 1975)
13. Prescott, G. (1978 & 1982)
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16. Starmach, K. (1985)
17. Stein, J. (1975)
18. Webber, C. (1966)
19. Wehr, J. D. and R. G. Sheath. (2003)

Note : Other taxonomic keys may be used but they will be cited in the data summary.

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Zooplankton Identification and Enumeration

Scope:

This method describes the identification and enumeration of zooplankton.

Summary:

The sample is settled and the slide is examined. Using the appropriate keys and procedures, zooplankton can then be identified and subsequently enumerated.

Apparatus:

1. Sedgwick-Rafters
2. Inverted microscope
3. Compound microscope
4. Stereoscopic microscope
5. Appropriate taxonomic keys

Reagents:

1. Preservative such as 70% ethanol or 10% buffered formalin
2. 0.04% rose bengal stain

Procedure:

1. Confirm that the sample is appropriately preserved. Measure and record the total volume of the sample.
2. Examine an appropriate sample volume depending on the density of organisms (usually 50 mL) in a petri dish. Use smaller or diluted volumes for densely populated samples or concentrate sparsely populated samples by centrifugation or by sedimentation.
3. Scan the entire sample at increasing powers of magnification to determine which species/genera are present. Identify the organisms observed to the requested level if possible.
4. Once the identifications are made, do the counts. Settle out a 1mL aliquot of a well mixed subsample in a Sedgwick-Rafter, allow to settle for at least 15 minutes. Count the entire cell using a strip counting method. Count at least 3 of the 1mL aliquots, continue counting until you get a total count of at least 200 zooplankton organisms. Also do counts of 1/16 and 1/8 of the sample.
5. Enumerate the data by calculating the total number of organisms per sample for each species or genera. Take an average count for each species or genera from all the aliquots counted. This gives you an organisms per mL count. Now the volume can then be multiplied in to give you a count of organisms per total sample. The counts may be expressed as a number/unit volume or a number/unit area, depending on the instructions in the requisition.

Taxonomic Keys :

1. Balcer, M.D. et. al (1984)
2. Brandlova, J. et. al (1972)
3. Brooks, J.L. (1957)
4. Comita, G.W. et. al (1976)
5. Deevey, E.S. et. al (1971)
6. Edmondson, W.T. et. al (1982)
7. Fulton, J. (1968)
8. Green, G.D. et. al (draft)
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10. Pennak, R.W. (1953)
11. Pinel-Alloul, B. et. al (1988)
12. Pontin, R.M. (1978)
13. Ruttner-Kolisko, A. (1974)
14. Sandercock, G. A. & G.G.E. Scudder. (1994)
15. Smith, D.L. (1977)
16. Ward, H.B. et. al (1959)

Note : Other taxonomic keys may be used but they will be cited in the data summary.

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Benthic Invertebrate Identification and Enumeration

Scope:

This method describes the identification and enumeration of benthic invertebrates.

Summary:

The sample is fractionated into various sizes. Invertebrates are removed, sorted, identified and enumerated using appropriate procedures and taxonomic keys.

Apparatus:

1. Nested screens of various sizes 1 - .001 mm
2. Dissecting microscope
3. Subsampling equipment (splitter, Stemple pipette, or gridded petri dish)
4. Compound microscope equipped with phase contrast

Reagents:

1. ethanol
2. mounting media (CMCP, Euparol)
3. KOH

Procedure:

1. Wash and decant animals and detritus from sediments and preservative.
2. Sieve through nested screens. Size classes are similar to Cummins et al. 1973.
3. Microscope sort for benthic invertebrates. Remove from detritus. Identify individuals to appropriate taxa.
4. Identified taxa will be sorted in 70% ethanol in glass vials.
5. If a sample unit contains a very large number of individuals in a given taxon, it may be necessary to subsample to obtain an estimate because the time required to count is prohibitive (Merritt and Cummins 1984). If subsampling is required, size fraction and subsample volumes will be based on the nature of the sample, especially the density of benthic invertebrates. For example, size fractions will be made up to a constant volume (500-1000 mL) and 1 - 3 subsamples (40 mL) will be randomly removed (Merritt and Cummins 1984). Statistical tests for randomness will be performed according to Elliot (1977). Subsamples will be identified as in procedure 3.
6. If permanent microscope slides are required to be made in order to identify benthic invertebrates to a particular level, the following two procedures will be used : a) direct slide mounting from water or ethanol if CMC or Euparol is used, or b) the clearing of opaque tissues by heating in 5-10% KOH solution until transparent, then transfer to distilled water and 95% ethanol 1 minute, then use mounting media.

Taxonomic Keys:

1. Clarke, A.H. (1973)
2. Curtis (1967)
3. Brinkhurst (1971)
4. Burch, J.B. (1972)
5. Burch, J.B. (1973)
6. Edmunds et al. (1978)
7. Ferris et al. (1973)
8. Forrest, H. (1963)
9. Johannsen (1934)
10. Kenk, R. (1972)
11. Klemm, D.J. (1972)
12. McAlpine et al. (1981)
13. Merritt and Cummins (1984)
14. Nimmo and Scudder (1978)
15. Pennak (1989)
16. Richards (1968)
17. Usinger (1963)
18. Wiggins (1977)
19. Scudder et al. (1976)

Note : Other taxonomic keys may be used but they will be cited in the data summary.

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ATTACHMENT 3
Analytical Lab Report



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 29-MAY-15
Report Date: 15-JUL-15 18:06 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1618673
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1618673-1	L1618673-2	L1618673-3
		Description	OTHER	OTHER	OTHER
		Sampled Date	20-MAY-15	20-MAY-15	20-MAY-15
		Sampled Time	11:00	14:30	13:00
		Client ID	QUL-ZOO-1	QUL-ZOO-7	QUL-ZOO-8
Grouping	Analyte				
TISSUE					
Metals	Aluminum (Al)-Total (mg/kg)		288	351	206
	Antimony (Sb)-Total (mg/kg)		0.074	0.138	0.096
	Arsenic (As)-Total (mg/kg)		3.42	2.95	3.46
	Barium (Ba)-Total (mg/kg)		12.9	15.7	18.3
	Beryllium (Be)-Total (mg/kg)		0.015	0.021	0.014
	Bismuth (Bi)-Total (mg/kg)		0.017	0.039	0.029
	Boron (B)-Total (mg/kg)		1.8	<2.0 ^{DLB}	1.7
	Cadmium (Cd)-Total (mg/kg)		0.863	1.06	1.18
	Calcium (Ca)-Total (mg/kg)		3680	4600	4000
	Cesium (Cs)-Total (mg/kg)		0.0846	0.0806	0.0640
	Chromium (Cr)-Total (mg/kg)		0.92	1.30	0.63
	Cobalt (Co)-Total (mg/kg)		0.493	0.602	0.433
	Copper (Cu)-Total (mg/kg)		254	28.5	25.9
	Iron (Fe)-Total (mg/kg)		476	817	420
	Lead (Pb)-Total (mg/kg)		99.0	224	155
	Lithium (Li)-Total (mg/kg)		0.55	0.87	0.65
	Magnesium (Mg)-Total (mg/kg)		1400	1520	1320
	Manganese (Mn)-Total (mg/kg)		63.9	86.7	48.5
	Mercury (Hg)-Total (mg/kg)		0.058	0.068	0.064
	Molybdenum (Mo)-Total (mg/kg)		0.342	0.376	0.309
	Nickel (Ni)-Total (mg/kg)		6.72	3.15	1.95
	Phosphorus (P)-Total (mg/kg)		11500	11300	11400
	Potassium (K)-Total (mg/kg)		12800	10900	10900
	Rubidium (Rb)-Total (mg/kg)		22.4	16.7	16.9
	Selenium (Se)-Total (mg/kg)		2.90	2.78	2.64
	Sodium (Na)-Total (mg/kg)		5580	4450	4380
	Strontium (Sr)-Total (mg/kg)		28.4	36.8	32.7
	Tellurium (Te)-Total (mg/kg)		<0.020	<0.020	<0.020
	Thallium (Tl)-Total (mg/kg)		0.0244	0.0349	0.0272
	Tin (Sn)-Total (mg/kg)		0.22	0.16	0.53
	Uranium (U)-Total (mg/kg)		0.0894	0.129	0.0911
	Vanadium (V)-Total (mg/kg)		1.04	1.46	0.69
	Zinc (Zn)-Total (mg/kg)		128	69.0	85.1
	Zirconium (Zr)-Total (mg/kg)		<0.20	0.34	<0.20

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Aluminum (Al)-Total	DUP-H	L1618673-2, -3
Duplicate	Arsenic (As)-Total	DUP-H	L1618673-2, -3
Duplicate	Barium (Ba)-Total	DUP-H	L1618673-2, -3
Duplicate	Cadmium (Cd)-Total	DUP-H	L1618673-2, -3
Duplicate	Chromium (Cr)-Total	DUP-H	L1618673-2, -3
Duplicate	Cobalt (Co)-Total	DUP-H	L1618673-2, -3
Duplicate	Iron (Fe)-Total	DUP-H	L1618673-2, -3
Duplicate	Magnesium (Mg)-Total	DUP-H	L1618673-2, -3
Duplicate	Nickel (Ni)-Total	DUP-H	L1618673-2, -3
Duplicate	Phosphorus (P)-Total	DUP-H	L1618673-2, -3
Duplicate	Potassium (K)-Total	DUP-H	L1618673-2, -3
Duplicate	Rubidium (Rb)-Total	DUP-H	L1618673-2, -3
Duplicate	Sodium (Na)-Total	DUP-H	L1618673-2, -3
Duplicate	Thallium (Tl)-Total	DUP-H	L1618673-2, -3
Duplicate	Uranium (U)-Total	DUP-H	L1618673-2, -3
Duplicate	Vanadium (V)-Total	DUP-H	L1618673-2, -3
Duplicate	Zinc (Zn)-Total	DUP-H	L1618673-2, -3
Certified Reference Material	Sodium (Na)-Total	RM-H	L1618673-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLB	Detection Limit was raised due to detection of analyte at comparable level in Method Blank.
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
RM-H	Reference Material recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

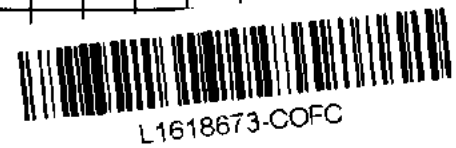
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Report to: Company: MOUNT POLLEY MINING CORP.		Report Format / Distribution <input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other			Service Requested: (rush - subject to availability) <input checked="" type="radio"/> Regular (Default)										
Contact: Colleen Hughes		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge										
Address: PO BOX 12, Likely, BC, V0L 1N0		Email 1: on file			<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge										
Phone: 250-790-2215 Fax: _____		Email 2: _____			<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS										
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No		Client / Project Information:			Analysis Request										
Company: _____		Job #: _____			Please indicate below Filtered, Preserved or both (F, P, F/P)										
Contact: _____		PO / AFE: _____			NUTRIENTS-1	Total Metals (ICPMS)	Dissolved Metals (ICPMS)	pH/Conductivity	Total Nitrogen/Ammonia	DOC	NUTRIENTS-2	Sp Chromium	COD/TKN	Sulphides	Number of Containers
Address: _____		Legal Site Description: _____													
Phone: _____ Fax: _____		Quote #: _____													
Lab Work Order # (lab use only)		ALS Contact: Can Dang		Sampler: MD											
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type											
	QUL-Zoo-1	20-May-15	11:00	Other	X										1
	QUL-Zoo-7	20-May-15	14:30	Other	X										1
	QUL-Zoo-8	20-May-15	13:00	Other	X										1

Short Holding Time

1 Rush Processing



Special Instructions / Regulations / Hazardous Details

Please inform us if there is too much water with sample.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)			
Released by: <i>Melan Dime</i>	Date & Time: 28/05/2015 15:00	Received by: <i>SSO</i>	Date: <i>28/05</i>	Time: 10:00am	Temperature: 7.2	Verified by:	Date & Time:	Observations: Yes / No? If Yes attach SIF



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 26-JUN-15
Report Date: 10-AUG-15 16:54 (MT)
Version: FINAL REV. 2

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1633703
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: F0107
Legal Site Desc:

Comments: 10-AUG-2015 This report replaces and supersedes previously sent report. This report includes Metals data for ALS identified samples L1633703-1 to -3.

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1633703-1 Other 24-JUN-15 09:15 QUL-ZOO-1	L1633703-2 Other 24-JUN-15 11:45 QUL-ZOO-7	L1633703-3 Other 24-JUN-15 13:30 QUL-ZOO-8	
Grouping	Analyte				
TISSUE					
Metals	Aluminum (Al)-Total (mg/kg)	1330	960	495	
	Antimony (Sb)-Total (mg/kg)	<0.20 ^{DLB}	<0.090 ^{DLB}	<0.050 ^{DLB}	
	Arsenic (As)-Total (mg/kg)	4.39	3.98	3.95	
	Barium (Ba)-Total (mg/kg)	27.3	21.3	18.0	
	Beryllium (Be)-Total (mg/kg)	0.052	0.042	0.022	
	Bismuth (Bi)-Total (mg/kg)	<0.030 ^{DLIS}	<0.040 ^{DLIS}	<0.020 ^{DLIS}	
	Boron (B)-Total (mg/kg)	6.8	6.0	2.8	
	Cadmium (Cd)-Total (mg/kg)	3.55	3.47	1.62	
	Calcium (Ca)-Total (mg/kg)	14200	17400	13600	
	Cesium (Cs)-Total (mg/kg)	0.172	0.145	0.115	
	Chromium (Cr)-Total (mg/kg)	<3.0 ^{DLB}	<5.8 ^{DLB}	<1.2 ^{DLB}	
	Cobalt (Co)-Total (mg/kg)	1.68	1.39	0.847	
	Copper (Cu)-Total (mg/kg)	49.9	30.1	21.5	
	Iron (Fe)-Total (mg/kg)	2640	1950	862	
	Lead (Pb)-Total (mg/kg)	2.58	1.38	0.67	
	Lithium (Li)-Total (mg/kg)	<1.5 ^{DLIS}	<2.0 ^{DLIS}	<1.0 ^{DLIS}	
	Magnesium (Mg)-Total (mg/kg)	3150	3090	2280	
	Manganese (Mn)-Total (mg/kg)	218	193	68.7	
	Mercury (Hg)-Total (mg/kg)	<0.075 ^{DLB}	<0.090 ^{DLB}	0.053 ^{DLB}	
	Molybdenum (Mo)-Total (mg/kg)	<0.70	<0.70	<0.50	
	Nickel (Ni)-Total (mg/kg)	6.17	7.27	2.99	
	Phosphorus (P)-Total (mg/kg)	12800	14100	12400	
	Potassium (K)-Total (mg/kg)	13900	14700	12700	
	Rubidium (Rb)-Total (mg/kg)	34.5	35.2	25.1	
	Selenium (Se)-Total (mg/kg)	3.92	3.63	3.19	
	Sodium (Na)-Total (mg/kg)	5940	6420	5670	
	Strontium (Sr)-Total (mg/kg)	114	125	103	
	Tellurium (Te)-Total (mg/kg)	<0.060 ^{DLIS}	<0.080 ^{DLIS}	<0.040 ^{DLIS}	
	Thallium (Tl)-Total (mg/kg)	0.0849	<0.036 ^{DLB}	<0.030 ^{DLB}	
	Tin (Sn)-Total (mg/kg)	0.80	1.64	0.40	
	Uranium (U)-Total (mg/kg)	0.208	0.198	0.145	
	Vanadium (V)-Total (mg/kg)	6.26	4.88	2.72	
	Zinc (Zn)-Total (mg/kg)	108	102	80.5	
	Zirconium (Zr)-Total (mg/kg)	0.94	<0.80 ^{DLIS}	<0.40 ^{DLIS}	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1633703-1 Other 24-JUN-15 09:15 QUL-ZOO-1	L1633703-2 Other 24-JUN-15 11:45 QUL-ZOO-7	L1633703-3 Other 24-JUN-15 13:30 QUL-ZOO-8	
Grouping	Analyte				
WATER					
Physical Tests	Hardness (as CaCO3) (mg/L)	68.2	84.3	86.7	
Total Metals	Aluminum (Al)-Total (mg/L)	2.04	1.32	0.905	
	Antimony (Sb)-Total (mg/L)	0.00045	0.00034	0.00030	
	Arsenic (As)-Total (mg/L)	0.00726	0.00615	0.00809	
	Barium (Ba)-Total (mg/L)	0.0363	0.0272	0.0292	
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	
	Boron (B)-Total (mg/L)	0.011	<0.010	<0.010	
	Cadmium (Cd)-Total (mg/L)	0.00550	0.00500	0.00313	
	Calcium (Ca)-Total (mg/L)	20.2	25.8	26.7	
	Chromium (Cr)-Total (mg/L)	0.00398	0.00310	0.00224	
	Cobalt (Co)-Total (mg/L)	0.00274	0.00231	0.00181	
	Copper (Cu)-Total (mg/L)	0.0757	0.0489	0.0474	
	Iron (Fe)-Total (mg/L)	3.28	2.80	1.66	
	Lead (Pb)-Total (mg/L)	0.00456	0.00210	0.00142	
	Lithium (Li)-Total (mg/L)	0.0034	0.0027	0.0031	
	Magnesium (Mg)-Total (mg/L)	4.33	4.82	4.83	
	Manganese (Mn)-Total (mg/L)	0.293	0.259	0.130	
	Molybdenum (Mo)-Total (mg/L)	0.00119	0.000990	0.000930	
	Nickel (Ni)-Total (mg/L)	0.0256	0.0113	0.00635	
	Potassium (K)-Total (mg/L)	22.8	22.4	27.4	
	Selenium (Se)-Total (mg/L)	0.00915	0.00886	0.00901	
	Silicon (Si)-Total (mg/L)	6.44	5.77	4.92	
	Silver (Ag)-Total (mg/L)	0.000195	0.000186	0.000163	
	Sodium (Na)-Total (mg/L)	9.56	10.1	12.4	
	Strontium (Sr)-Total (mg/L)	0.173	0.179	0.191	
	Thallium (Tl)-Total (mg/L)	0.000048	0.000052	0.000062	
	Tin (Sn)-Total (mg/L)	0.00073	0.00148	0.00055	
	Titanium (Ti)-Total (mg/L)	0.041	0.033	0.019	
	Uranium (U)-Total (mg/L)	0.000358	0.000321	0.000297	
	Vanadium (V)-Total (mg/L)	0.00877	0.00704	0.00565	
	Zinc (Zn)-Total (mg/L)	0.225	0.201	0.216	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Thallium (Tl)-Total	DUP-H	L1633703-1, -2, -3
Matrix Spike	Sodium (Na)-Total	MS-B	L1633703-1, -2, -3
Matrix Spike	Strontium (Sr)-Total	MS-B	L1633703-1, -2, -3

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLB	Detection Limit was raised due to detection of analyte at comparable level in Method Blank.
DLIS	Detection Limit Adjusted: Insufficient Sample
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.			
Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.			
MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
MET-TOT-ICP-VA	Water	Total Metals in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

F0107

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

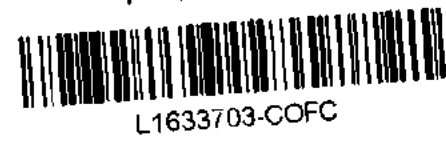


Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Colleen Hughes	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
	Email 2:	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Phone: 250-790-2215 Fax:	Analysis Request	
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	Job #:	
Contact:	PO / AFE:	
Address:	Legal Site Description:	
Phone: Fax:	Quote #:	

Lab Work Order # (lab use only)	L1633703	ALS Contact: Can Dang	Sampler: MD, AA
---------------------------------	----------	-----------------------	-----------------

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUTRIENTS-1	Total Metals (ICPMS)	Dissolved Metals (ICPMS)	pH/Conductivity	Total Nitrogen/Ammonia	DOC	NUTRIENTS-2	Sp Chromium	COD/TKN	Sulphides	Number of Containers
	QUL-Zoo-1	24-Jun-15	9:15	Other		X									1
	QUL-Zoo-7	24-Jun-15	11:45	Other		X									1
	QUL-Zoo-8	24-Jun-15	13:30	Other		X									1



Special Instructions / Regulations / Hazardous Details

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SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)			
Released by: <i>Mon Dine</i>	Date & Time: 25/06/2015 15:00	Received by: <i>Jean</i>	Date: 26 Jun 2015	Time: 9:15	Temperature: 3.2°C	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 10-JUL-15
Report Date: 17-AUG-15 15:25 (MT)
Version: FINAL REV. 2

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1640340
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: F0116
Legal Site Desc:

Comments: 17-AUG-2015 This report replaces and supersedes previously sent report. This report includes Dry weight metal results for ALS identified samples L1640340-1 to -3.

Can Dang
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID Description Sampled Date Sampled Time Client ID	L1640340-1 Tissue 08-JUL-15 15:10 QUL-ZOO-1	L1640340-2 Tissue 08-JUL-15 14:10 QUL-ZOO-7	L1640340-3 Tissue 08-JUL-15 12:50 QUL-ZOO-8
Grouping	Analyte				
TISSUE					
Metals	Aluminum (Al)-Total (mg/kg)	574 ^{DLIS}	514	906	
	Antimony (Sb)-Total (mg/kg)	0.036	0.050	0.107	
	Arsenic (As)-Total (mg/kg)	6.49	4.82	6.04	
	Barium (Ba)-Total (mg/kg)	22.9	18.3	22.4	
	Beryllium (Be)-Total (mg/kg)	0.036	0.037	0.054	
	Bismuth (Bi)-Total (mg/kg)	<0.030 ^{DLIV}	<0.020 ^{DLIV}	0.023	
	Boron (B)-Total (mg/kg)	7.6	5.0	4.4	
	Cadmium (Cd)-Total (mg/kg)	5.78	4.89	4.45	
	Calcium (Ca)-Total (mg/kg)	19800	20100	21600	
	Cesium (Cs)-Total (mg/kg)	0.128	0.119	0.229	
	Chromium (Cr)-Total (mg/kg)	1.72	1.65	2.40	
	Cobalt (Co)-Total (mg/kg)	1.16	1.09	1.44	
	Copper (Cu)-Total (mg/kg)	43.2	30.0	34.2	
	Iron (Fe)-Total (mg/kg)	1470	1380	1800	
	Lead (Pb)-Total (mg/kg)	0.76	0.99	1.80	
	Lithium (Li)-Total (mg/kg)	<1.5 ^{DLIV}	<1.0 ^{DLIV}	1.8	
	Magnesium (Mg)-Total (mg/kg)	3300	2800	3060	
	Manganese (Mn)-Total (mg/kg)	192	190	201	
	Mercury (Hg)-Total (mg/kg)	0.121	0.091	0.104	
	Molybdenum (Mo)-Total (mg/kg)	0.84	0.765	0.785	
	Nickel (Ni)-Total (mg/kg)	5.08	4.58	5.63	
	Phosphorus (P)-Total (mg/kg)	20000	17000	19300	
	Potassium (K)-Total (mg/kg)	19300	16200	18100	
	Rubidium (Rb)-Total (mg/kg)	33.1	28.2	32.2	
	Selenium (Se)-Total (mg/kg)	5.05	3.99	3.92	
	Sodium (Na)-Total (mg/kg)	8400	7790	9080	
	Strontium (Sr)-Total (mg/kg)	153	144	178	
	Tellurium (Te)-Total (mg/kg)	<0.060 ^{DLIV}	<0.040 ^{DLIV}	<0.040 ^{DLIV}	
	Thallium (Tl)-Total (mg/kg)	<0.040 ^{DLB}	0.0365	0.0485	
	Tin (Sn)-Total (mg/kg)	<0.30 ^{DLIV}	0.35	0.82	
	Uranium (U)-Total (mg/kg)	0.214	0.188	0.214	
	Vanadium (V)-Total (mg/kg)	6.60	5.62	4.42	
	Zinc (Zn)-Total (mg/kg)	148	134	214	
	Zirconium (Zr)-Total (mg/kg)	<0.60 ^{DLIV}	0.43	0.50	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1640340-1 Tissue 08-JUL-15 15:10 QUL-ZOO-1	L1640340-2 Tissue 08-JUL-15 14:10 QUL-ZOO-7	L1640340-3 Tissue 08-JUL-15 12:50 QUL-ZOO-8	
Grouping	Analyte				
WATER					
Physical Tests	Hardness (as CaCO3) (mg/L)	123	146	161	
Total Metals	Aluminum (Al)-Total (mg/L)	1.22	1.32	2.06	
	Antimony (Sb)-Total (mg/L)	0.00017	0.00019	0.00019	
	Arsenic (As)-Total (mg/L)	0.0134	0.0114	0.0152	
	Barium (Ba)-Total (mg/L)	0.0381	0.0399	0.0436	
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	0.00012	
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	
	Boron (B)-Total (mg/L)	0.015	0.015	0.016	
	Cadmium (Cd)-Total (mg/L)	0.0115	0.0107	0.00985	
	Calcium (Ca)-Total (mg/L)	38.5	48.0	53.3	
	Chromium (Cr)-Total (mg/L)	0.00287	0.00296	0.00468	
	Cobalt (Co)-Total (mg/L)	0.00244	0.00272	0.00370	
	Copper (Cu)-Total (mg/L)	0.0891	0.0746	0.0864	
	Iron (Fe)-Total (mg/L)	2.26	2.77	3.54	
	Lead (Pb)-Total (mg/L)	0.00149	0.00198	0.00403	
	Lithium (Li)-Total (mg/L)	0.0025	0.0026	0.0046	
	Magnesium (Mg)-Total (mg/L)	6.50	6.45	6.77	
	Manganese (Mn)-Total (mg/L)	0.313	0.386	0.341	
	Molybdenum (Mo)-Total (mg/L)	0.00119	0.00113	0.00139	
	Nickel (Ni)-Total (mg/L)	0.00968	0.00998	0.0132	
	Potassium (K)-Total (mg/L)	35.6	35.8	40.0	
	Selenium (Se)-Total (mg/L)	0.0149	0.0119	0.0157	
	Silicon (Si)-Total (mg/L)	6.33	6.83	7.34	
	Silver (Ag)-Total (mg/L)	0.000239	0.000234	0.000226	
	Sodium (Na)-Total (mg/L)	16.2	17.6	20.3	
	Strontium (Sr)-Total (mg/L)	0.252	0.284	0.350	
	Thallium (Tl)-Total (mg/L)	0.000066	0.000071	0.000096	
	Tin (Sn)-Total (mg/L)	0.00039	0.00038	0.00086	
	Titanium (Ti)-Total (mg/L)	0.012	0.020	0.034	
	Uranium (U)-Total (mg/L)	0.000355	0.000321	0.000462	
	Vanadium (V)-Total (mg/L)	0.0129	0.0134	0.0112	
	Zinc (Zn)-Total (mg/L)	0.361	0.348	0.592	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Zinc (Zn)-Total	MB-LOR	L1640340-1, -2, -3

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DLIS	Detection Limit Adjusted: Insufficient Sample
DLIV	Detection Limit Adjusted: Lower Initial Volume
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.			
Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.			
MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
MET-TOT-ICP-VA	Water	Total Metals in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

F0116

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1640340

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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA		Water						
Batch	R3227670							
WG2130642-2	LCS							
Aluminum (Al)-Total			106.8		%		80-120	17-JUL-15
Antimony (Sb)-Total			105.6		%		80-120	17-JUL-15
Arsenic (As)-Total			107.2		%		80-120	17-JUL-15
Barium (Ba)-Total			106.3		%		80-120	17-JUL-15
Beryllium (Be)-Total			103.5		%		80-120	17-JUL-15
Bismuth (Bi)-Total			99.7		%		80-120	17-JUL-15
Boron (B)-Total			99.7		%		80-120	17-JUL-15
Cadmium (Cd)-Total			101.2		%		80-120	17-JUL-15
Chromium (Cr)-Total			102.1		%		80-120	17-JUL-15
Cobalt (Co)-Total			104.1		%		80-120	17-JUL-15
Copper (Cu)-Total			100.2		%		80-120	17-JUL-15
Lead (Pb)-Total			101.9		%		80-120	17-JUL-15
Lithium (Li)-Total			97.3		%		80-120	17-JUL-15
Manganese (Mn)-Total			101.7		%		80-120	17-JUL-15
Molybdenum (Mo)-Total			98.5		%		80-120	17-JUL-15
Nickel (Ni)-Total			103.6		%		80-120	17-JUL-15
Potassium (K)-Total			108.4		%		80-120	17-JUL-15
Selenium (Se)-Total			97.9		%		80-120	17-JUL-15
Silver (Ag)-Total			103.6		%		80-120	17-JUL-15
Sodium (Na)-Total			106.6		%		80-120	17-JUL-15
Strontium (Sr)-Total			99.0		%		80-120	17-JUL-15
Thallium (Tl)-Total			101.9		%		80-120	17-JUL-15
Tin (Sn)-Total			103.1		%		80-120	17-JUL-15
Uranium (U)-Total			104.5		%		80-120	17-JUL-15
Vanadium (V)-Total			104.8		%		80-120	17-JUL-15
Zinc (Zn)-Total			100.3		%		80-120	17-JUL-15
WG2130642-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	17-JUL-15
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	17-JUL-15
Arsenic (As)-Total			<0.00010		mg/L		0.0001	17-JUL-15
Barium (Ba)-Total			<0.000050		mg/L		0.00005	17-JUL-15
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	17-JUL-15
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	17-JUL-15
Boron (B)-Total			<0.010		mg/L		0.01	17-JUL-15



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA								
	Water							
Batch	R3227670							
WG2130642-1 MB								
Cadmium (Cd)-Total			<0.000050		mg/L		0.000005	17-JUL-15
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	17-JUL-15
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	17-JUL-15
Copper (Cu)-Total			<0.00050		mg/L		0.0005	17-JUL-15
Lead (Pb)-Total			<0.000050		mg/L		0.00005	17-JUL-15
Lithium (Li)-Total			<0.0010		mg/L		0.001	17-JUL-15
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	17-JUL-15
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	17-JUL-15
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	17-JUL-15
Potassium (K)-Total			<0.050		mg/L		0.05	17-JUL-15
Selenium (Se)-Total			<0.000050		mg/L		0.00005	17-JUL-15
Silver (Ag)-Total			<0.000010		mg/L		0.00001	17-JUL-15
Sodium (Na)-Total			<0.050		mg/L		0.05	17-JUL-15
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	17-JUL-15
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	17-JUL-15
Tin (Sn)-Total			<0.00010		mg/L		0.0001	17-JUL-15
Uranium (U)-Total			<0.000010		mg/L		0.00001	17-JUL-15
Vanadium (V)-Total			<0.00050		mg/L		0.0005	17-JUL-15
Zinc (Zn)-Total			<0.0030		mg/L		0.003	17-JUL-15
Batch	R3229155							
WG2130642-4 MS		L1643420-14						
Aluminum (Al)-Total			96.3		%		70-130	18-JUL-15
Antimony (Sb)-Total			94.1		%		70-130	18-JUL-15
Arsenic (As)-Total			95.2		%		70-130	18-JUL-15
Barium (Ba)-Total			98.2		%		70-130	18-JUL-15
Beryllium (Be)-Total			94.5		%		70-130	18-JUL-15
Bismuth (Bi)-Total			95.1		%		70-130	18-JUL-15
Boron (B)-Total			95.2		%		70-130	18-JUL-15
Cadmium (Cd)-Total			99.7		%		70-130	18-JUL-15
Chromium (Cr)-Total			98.5		%		70-130	18-JUL-15
Cobalt (Co)-Total			97.5		%		70-130	18-JUL-15
Copper (Cu)-Total			97.5		%		70-130	18-JUL-15
Lead (Pb)-Total			94.2		%		70-130	18-JUL-15
Lithium (Li)-Total			94.7		%		70-130	18-JUL-15



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Client: MOUNT POLLEY MINING CORP.
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 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA								
	Water							
Batch	R3229155							
WG2130642-4 MS		L1643420-14						
Manganese (Mn)-Total			97.5		%		70-130	18-JUL-15
Molybdenum (Mo)-Total			91.6		%		70-130	18-JUL-15
Nickel (Ni)-Total			97.8		%		70-130	18-JUL-15
Potassium (K)-Total			98.0		%		70-130	18-JUL-15
Selenium (Se)-Total			93.4		%		70-130	18-JUL-15
Silver (Ag)-Total			98.0		%		70-130	18-JUL-15
Sodium (Na)-Total			97.6		%		70-130	18-JUL-15
Strontium (Sr)-Total			93.8		%		70-130	18-JUL-15
Thallium (Tl)-Total			94.5		%		70-130	18-JUL-15
Tin (Sn)-Total			96.1		%		70-130	18-JUL-15
Uranium (U)-Total			93.9		%		70-130	18-JUL-15
Vanadium (V)-Total			96.7		%		70-130	18-JUL-15
Zinc (Zn)-Total			90.8		%		70-130	18-JUL-15
Batch	R3230412							
WG2130642-3 DUP		L1643426-1						
Aluminum (Al)-Total		0.0311	0.0310		mg/L	0.4	20	20-JUL-15
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	20-JUL-15
Arsenic (As)-Total		0.00033	0.00030		mg/L	9.3	20	20-JUL-15
Barium (Ba)-Total		0.0473	0.0477		mg/L	0.7	20	20-JUL-15
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	20-JUL-15
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	20-JUL-15
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	20-JUL-15
Cadmium (Cd)-Total		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	20-JUL-15
Chromium (Cr)-Total		0.00020	0.00021		mg/L	6.5	20	20-JUL-15
Cobalt (Co)-Total		0.00019	0.00019		mg/L	1.1	20	20-JUL-15
Copper (Cu)-Total		0.0111	0.0112		mg/L	0.8	20	20-JUL-15
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	20-JUL-15
Lithium (Li)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-JUL-15
Manganese (Mn)-Total		0.245	0.249		mg/L	1.8	20	20-JUL-15
Molybdenum (Mo)-Total		0.259	0.245		mg/L	5.2	20	20-JUL-15
Nickel (Ni)-Total		0.00098	0.00102		mg/L	3.6	20	20-JUL-15
Potassium (K)-Total		2.05	2.10		mg/L	2.5	20	20-JUL-15
Selenium (Se)-Total		0.000081	0.000112	J	mg/L	0.000031	0.0001	20-JUL-15



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Client: MOUNT POLLEY MINING CORP.
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Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA								
	Water							
Batch	R3230412							
WG2130642-3	DUP	L1643426-1						
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	20-JUL-15
Sodium (Na)-Total		18.3	18.6		mg/L	1.8	20	20-JUL-15
Strontium (Sr)-Total		0.338	0.322		mg/L	5.1	20	20-JUL-15
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	20-JUL-15
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	20-JUL-15
Uranium (U)-Total		0.00187	0.00176		mg/L	6.1	20	20-JUL-15
Vanadium (V)-Total		0.00154	0.00150		mg/L	2.4	20	20-JUL-15
Zinc (Zn)-Total		0.0033	0.0034		mg/L	2.0	20	20-JUL-15
MET-TOT-ICP-VA								
	Water							
Batch	R3227728							
WG2130642-2	LCS							
Calcium (Ca)-Total			104.8		%		80-120	17-JUL-15
Iron (Fe)-Total			100.3		%		80-120	17-JUL-15
Magnesium (Mg)-Total			106.4		%		80-120	17-JUL-15
Silicon (Si)-Total			105.6		%		80-120	17-JUL-15
Titanium (Ti)-Total			102.1		%		80-120	17-JUL-15
WG2130642-1	MB							
Calcium (Ca)-Total			<0.050		mg/L		0.05	17-JUL-15
Iron (Fe)-Total			<0.030		mg/L		0.03	17-JUL-15
Magnesium (Mg)-Total			<0.10		mg/L		0.1	17-JUL-15
Silicon (Si)-Total			<0.050		mg/L		0.05	17-JUL-15
Titanium (Ti)-Total			<0.010		mg/L		0.01	17-JUL-15
Batch	R3229946							
WG2130642-3	DUP	L1643426-1						
Calcium (Ca)-Total		56.5	57.6		mg/L	2.0	20	19-JUL-15
Iron (Fe)-Total		0.156	0.161		mg/L	3.2	20	19-JUL-15
Magnesium (Mg)-Total		9.95	10.2		mg/L	2.0	20	19-JUL-15
Silicon (Si)-Total		11.0	11.2		mg/L	1.8	20	19-JUL-15
Titanium (Ti)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	19-JUL-15
WG2130642-4	MS	L1643420-14						
Calcium (Ca)-Total			99.9		%		70-130	19-JUL-15
Iron (Fe)-Total			92.9		%		70-130	19-JUL-15
Magnesium (Mg)-Total			91.2		%		70-130	19-JUL-15
Silicon (Si)-Total			95.2		%		70-130	19-JUL-15



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TOT-ICP-VA Water								
Batch	R3229946							
WG2130642-4 MS		L1643420-14						
Titanium (Ti)-Total			92.8		%		70-130	19-JUL-15
HG-DRY-MICR-CVAF-VA Tissue								
Batch	R3245043							
WG2134426-4 CRM		VA-NIST-1547						
Mercury (Hg)-Total			102.4		%		70-130	12-AUG-15
WG2134426-5 CRM		VA-NIST-1566B						
Mercury (Hg)-Total			97.4		%		70-130	12-AUG-15
WG2134426-3 DUP		L1640343-2						
Mercury (Hg)-Total		0.029	0.027		mg/kg	7.9	30	12-AUG-15
WG2134426-6 LCS								
Mercury (Hg)-Total			101.2		%		70-130	12-AUG-15
WG2134426-1 MB								
Mercury (Hg)-Total			<0.0050		mg/kg		0.005	12-AUG-15
WG2134426-2 MB								
Mercury (Hg)-Total			<0.0050		mg/kg		0.005	12-AUG-15
MET-DRY-MICR-HRMS-VA Tissue								
Batch	R3246667							
WG2134426-4 CRM		VA-NIST-1547						
Aluminum (Al)-Total			77.8		%		70-130	11-AUG-15
Antimony (Sb)-Total			0.017		mg/kg		0.01-0.03	11-AUG-15
Arsenic (As)-Total			0.058		mg/kg		0.03-0.09	11-AUG-15
Barium (Ba)-Total			95.2		%		70-130	11-AUG-15
Boron (B)-Total			93.0		%		70-130	11-AUG-15
Cadmium (Cd)-Total			0.020		mg/kg		0.016-0.036	11-AUG-15
Calcium (Ca)-Total			90.1		%		70-130	11-AUG-15
Cesium (Cs)-Total			84.4		%		70-130	11-AUG-15
Chromium (Cr)-Total			70.5		%		70-130	11-AUG-15
Cobalt (Co)-Total			0.040		mg/kg		0.034-0.074	11-AUG-15
Copper (Cu)-Total			84.0		%		70-130	11-AUG-15
Iron (Fe)-Total			85.4		%		70-130	11-AUG-15
Lead (Pb)-Total			105.0		%		70-130	11-AUG-15
Magnesium (Mg)-Total			83.0		%		70-130	11-AUG-15
Manganese (Mn)-Total			86.8		%		70-130	11-AUG-15
Molybdenum (Mo)-Total			0.041		mg/kg		0.006-0.086	11-AUG-15



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch	R3246667							
WG2134426-4 CRM		VA-NIST-1547						
Nickel (Ni)-Total			0.33		mg/kg		0.27-0.67	11-AUG-15
Phosphorus (P)-Total			85.2		%		70-130	11-AUG-15
Potassium (K)-Total			88.5		%		70-130	11-AUG-15
Rubidium (Rb)-Total			92.6		%		70-130	11-AUG-15
Selenium (Se)-Total			0.11		mg/kg		0.02-0.22	11-AUG-15
Sodium (Na)-Total			30		mg/kg		12-52	11-AUG-15
Strontium (Sr)-Total			100.1		%		70-130	11-AUG-15
Thallium (Tl)-Total			88.2		%		70-130	11-AUG-15
Tin (Sn)-Total			0.10		mg/kg		0.01-0.21	11-AUG-15
Uranium (U)-Total			74.9		%		70-130	11-AUG-15
Vanadium (V)-Total			0.21		mg/kg		0.17-0.47	11-AUG-15
Zinc (Zn)-Total			78.9		%		70-130	11-AUG-15
WG2134426-5 CRM		VA-NIST-1566B						
Antimony (Sb)-Total			0.007		mg/kg		0-0.018	11-AUG-15
Arsenic (As)-Total			86.8		%		70-130	11-AUG-15
Barium (Ba)-Total			98.5		%		70-130	11-AUG-15
Boron (B)-Total			114.3		%		70-130	11-AUG-15
Cadmium (Cd)-Total			100.8		%		70-130	11-AUG-15
Calcium (Ca)-Total			96.4		%		70-130	11-AUG-15
Chromium (Cr)-Total			0.20		mg/kg		0.06-0.46	11-AUG-15
Cobalt (Co)-Total			77.9		%		70-130	11-AUG-15
Copper (Cu)-Total			89.8		%		70-130	11-AUG-15
Iron (Fe)-Total			93.0		%		70-130	11-AUG-15
Lead (Pb)-Total			95.7		%		70-130	11-AUG-15
Magnesium (Mg)-Total			91.8		%		70-130	11-AUG-15
Manganese (Mn)-Total			99.3		%		70-130	11-AUG-15
Molybdenum (Mo)-Total			89.2		%		70-130	11-AUG-15
Nickel (Ni)-Total			90.9		%		70-130	11-AUG-15
Phosphorus (P)-Total			90.1		%		70-130	11-AUG-15
Potassium (K)-Total			86.7		%		70-130	11-AUG-15
Rubidium (Rb)-Total			100.1		%		70-130	11-AUG-15
Selenium (Se)-Total			89.8		%		70-130	11-AUG-15
Sodium (Na)-Total			83.6		%		70-130	11-AUG-15
Strontium (Sr)-Total			108.0		%		70-130	11-AUG-15



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch	R3246667							
WG2134426-5 CRM		VA-NIST-1566B						
Uranium (U)-Total			115.7		%		70-130	11-AUG-15
Vanadium (V)-Total			87.1		%		70-130	11-AUG-15
Zinc (Zn)-Total			80.7		%		70-130	11-AUG-15
WG2134426-3 DUP		L1640343-2						
Aluminum (Al)-Total		512	465		mg/kg	9.6	40	11-AUG-15
Antimony (Sb)-Total		0.062	0.054		mg/kg	13	40	11-AUG-15
Arsenic (As)-Total		3.63	3.05		mg/kg	17	40	11-AUG-15
Barium (Ba)-Total		27.9	25.2		mg/kg	10	40	11-AUG-15
Beryllium (Be)-Total		0.019	0.018		mg/kg	6.1	40	11-AUG-15
Bismuth (Bi)-Total		<0.010	<0.010	RPD-NA	mg/kg	N/A	40	11-AUG-15
Boron (B)-Total		6.0	5.2		mg/kg	16	40	11-AUG-15
Cadmium (Cd)-Total		0.731	0.635		mg/kg	14	40	11-AUG-15
Calcium (Ca)-Total		34300	30500		mg/kg	12	60	11-AUG-15
Cesium (Cs)-Total		0.122	0.108		mg/kg	12	40	11-AUG-15
Chromium (Cr)-Total		0.69	0.63		mg/kg	8.8	40	11-AUG-15
Cobalt (Co)-Total		0.900	0.783		mg/kg	14	40	11-AUG-15
Copper (Cu)-Total		31.0	28.1		mg/kg	9.6	40	11-AUG-15
Iron (Fe)-Total		679	603		mg/kg	12	40	11-AUG-15
Lead (Pb)-Total		0.314	0.277		mg/kg	12	40	11-AUG-15
Lithium (Li)-Total		<0.50	<0.50	RPD-NA	mg/kg	N/A	40	11-AUG-15
Magnesium (Mg)-Total		2240	1990		mg/kg	12	40	11-AUG-15
Manganese (Mn)-Total		753	686		mg/kg	9.3	40	11-AUG-15
Molybdenum (Mo)-Total		2.37	1.99		mg/kg	17	40	11-AUG-15
Nickel (Ni)-Total		0.89	0.78		mg/kg	13	40	11-AUG-15
Phosphorus (P)-Total		12000	10600		mg/kg	12	40	11-AUG-15
Potassium (K)-Total		9560	8490		mg/kg	12	40	11-AUG-15
Rubidium (Rb)-Total		11.5	10.4		mg/kg	10	40	11-AUG-15
Selenium (Se)-Total		4.27	3.98		mg/kg	7.1	40	11-AUG-15
Sodium (Na)-Total		7950	7100		mg/kg	11	40	11-AUG-15
Strontium (Sr)-Total		211	191		mg/kg	10	60	11-AUG-15
Tellurium (Te)-Total		<0.020	<0.020	RPD-NA	mg/kg	N/A	40	11-AUG-15
Tin (Sn)-Total		0.16	0.10	J	mg/kg	0.06	0.2	11-AUG-15
Uranium (U)-Total		0.0847	0.0754		mg/kg	12	40	11-AUG-15



Quality Control Report

Workorder: L1640340

Report Date: 26-APR-16

Page 8 of 12

Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch	R3246667							
WG2134426-3 DUP	L1640343-2							
Vanadium (V)-Total		2.20	2.00		mg/kg	9.9	40	11-AUG-15
Zinc (Zn)-Total		66.8	58.0		mg/kg	14	40	11-AUG-15
Zirconium (Zr)-Total		0.33	0.24		mg/kg	33	40	11-AUG-15
WG2134426-6 LCS								
Aluminum (Al)-Total			98.7		%		70-130	11-AUG-15
Antimony (Sb)-Total			96.5		%		70-130	11-AUG-15
Arsenic (As)-Total			95.9		%		70-130	11-AUG-15
Barium (Ba)-Total			106.0		%		70-130	11-AUG-15
Beryllium (Be)-Total			114.9		%		70-130	11-AUG-15
Bismuth (Bi)-Total			123.1		%		70-130	11-AUG-15
Boron (B)-Total			91.5		%		70-130	11-AUG-15
Cadmium (Cd)-Total			96.6		%		70-130	11-AUG-15
Calcium (Ca)-Total			104.9		%		70-130	11-AUG-15
Cesium (Cs)-Total			102.0		%		70-130	11-AUG-15
Chromium (Cr)-Total			106.4		%		70-130	11-AUG-15
Cobalt (Co)-Total			116.4		%		70-130	11-AUG-15
Copper (Cu)-Total			101.5		%		70-130	11-AUG-15
Iron (Fe)-Total			98.1		%		70-130	11-AUG-15
Lead (Pb)-Total			94.6		%		70-130	11-AUG-15
Lithium (Li)-Total			100.4		%		70-130	11-AUG-15
Magnesium (Mg)-Total			99.4		%		70-130	11-AUG-15
Manganese (Mn)-Total			115.1		%		70-130	11-AUG-15
Molybdenum (Mo)-Total			94.0		%		70-130	11-AUG-15
Nickel (Ni)-Total			110.4		%		70-130	11-AUG-15
Phosphorus (P)-Total			103.5		%		70-130	11-AUG-15
Potassium (K)-Total			96.0		%		70-130	11-AUG-15
Rubidium (Rb)-Total			103.0		%		70-130	11-AUG-15
Selenium (Se)-Total			87.7		%		70-130	11-AUG-15
Sodium (Na)-Total			95.3		%		70-130	11-AUG-15
Strontium (Sr)-Total			111.1		%		70-130	11-AUG-15
Tellurium (Te)-Total			107.0		%		70-130	11-AUG-15
Thallium (Tl)-Total			96.4		%		70-130	11-AUG-15
Tin (Sn)-Total			102.2		%		70-130	11-AUG-15
Uranium (U)-Total			120.2				70-130	



Quality Control Report

Workorder: L1640340

Report Date: 26-APR-16

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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch	R3246667							
WG2134426-6	LCS							
Uranium (U)-Total			120.2		%		70-130	11-AUG-15
Vanadium (V)-Total			114.2		%		70-130	11-AUG-15
Zinc (Zn)-Total			82.4		%		70-130	11-AUG-15
Zirconium (Zr)-Total			113.0		%		70-130	11-AUG-15
WG2134426-1	MB							
Aluminum (Al)-Total			<5.0		mg/kg		5	11-AUG-15
Antimony (Sb)-Total			<0.010		mg/kg		0.01	11-AUG-15
Arsenic (As)-Total			<0.030		mg/kg		0.03	11-AUG-15
Barium (Ba)-Total			<0.050		mg/kg		0.05	11-AUG-15
Beryllium (Be)-Total			<0.010		mg/kg		0.01	11-AUG-15
Bismuth (Bi)-Total			<0.010		mg/kg		0.01	11-AUG-15
Boron (B)-Total			<1.0		mg/kg		1	11-AUG-15
Cadmium (Cd)-Total			<0.010		mg/kg		0.01	11-AUG-15
Calcium (Ca)-Total			<20		mg/kg		20	11-AUG-15
Cesium (Cs)-Total			<0.0050		mg/kg		0.005	11-AUG-15
Chromium (Cr)-Total			<0.20		mg/kg		0.2	11-AUG-15
Cobalt (Co)-Total			<0.020		mg/kg		0.02	11-AUG-15
Copper (Cu)-Total			<0.20		mg/kg		0.2	11-AUG-15
Iron (Fe)-Total			<5.0		mg/kg		5	11-AUG-15
Lead (Pb)-Total			<0.050		mg/kg		0.05	11-AUG-15
Lithium (Li)-Total			<0.50		mg/kg		0.5	11-AUG-15
Magnesium (Mg)-Total			<2.0		mg/kg		2	11-AUG-15
Manganese (Mn)-Total			<0.050		mg/kg		0.05	11-AUG-15
Molybdenum (Mo)-Total			<0.040		mg/kg		0.04	11-AUG-15
Nickel (Ni)-Total			<0.20		mg/kg		0.2	11-AUG-15
Phosphorus (P)-Total			<10		mg/kg		10	11-AUG-15
Potassium (K)-Total			<20		mg/kg		20	11-AUG-15
Rubidium (Rb)-Total			<0.050		mg/kg		0.05	11-AUG-15
Selenium (Se)-Total			<0.10		mg/kg		0.1	11-AUG-15
Sodium (Na)-Total			<20		mg/kg		20	11-AUG-15
Strontium (Sr)-Total			<0.10		mg/kg		0.1	11-AUG-15
Tellurium (Te)-Total			<0.020		mg/kg		0.02	11-AUG-15
Tin (Sn)-Total			<0.10		mg/kg		0.1	11-AUG-15
Uranium (U)-Total			<0.0020		mg/kg		0.002	11-AUG-15



Quality Control Report

Workorder: L1640340

Report Date: 26-APR-16

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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch R3246667								
WG2134426-1 MB								
Vanadium (V)-Total			<0.10		mg/kg		0.1	11-AUG-15
Zinc (Zn)-Total			1.0	MB-LOR	mg/kg		1	11-AUG-15
Zirconium (Zr)-Total			<0.20		mg/kg		0.2	11-AUG-15
WG2134426-2 MB								
Aluminum (Al)-Total			<5.0		mg/kg		5	11-AUG-15
Antimony (Sb)-Total			<0.010		mg/kg		0.01	11-AUG-15
Arsenic (As)-Total			<0.030		mg/kg		0.03	11-AUG-15
Barium (Ba)-Total			<0.050		mg/kg		0.05	11-AUG-15
Beryllium (Be)-Total			<0.010		mg/kg		0.01	11-AUG-15
Bismuth (Bi)-Total			<0.010		mg/kg		0.01	11-AUG-15
Boron (B)-Total			<1.0		mg/kg		1	11-AUG-15
Cadmium (Cd)-Total			<0.010		mg/kg		0.01	11-AUG-15
Calcium (Ca)-Total			<20		mg/kg		20	11-AUG-15
Cesium (Cs)-Total			<0.0050		mg/kg		0.005	11-AUG-15
Chromium (Cr)-Total			<0.20		mg/kg		0.2	11-AUG-15
Cobalt (Co)-Total			<0.020		mg/kg		0.02	11-AUG-15
Copper (Cu)-Total			<0.20		mg/kg		0.2	11-AUG-15
Iron (Fe)-Total			<5.0		mg/kg		5	11-AUG-15
Lead (Pb)-Total			<0.050		mg/kg		0.05	11-AUG-15
Lithium (Li)-Total			<0.50		mg/kg		0.5	11-AUG-15
Magnesium (Mg)-Total			<2.0		mg/kg		2	11-AUG-15
Manganese (Mn)-Total			<0.050		mg/kg		0.05	11-AUG-15
Molybdenum (Mo)-Total			<0.040		mg/kg		0.04	11-AUG-15
Nickel (Ni)-Total			<0.20		mg/kg		0.2	11-AUG-15
Phosphorus (P)-Total			<10		mg/kg		10	11-AUG-15
Potassium (K)-Total			<20		mg/kg		20	11-AUG-15
Rubidium (Rb)-Total			<0.050		mg/kg		0.05	11-AUG-15
Selenium (Se)-Total			<0.10		mg/kg		0.1	11-AUG-15
Sodium (Na)-Total			<20		mg/kg		20	11-AUG-15
Strontium (Sr)-Total			<0.10		mg/kg		0.1	11-AUG-15
Tellurium (Te)-Total			<0.020		mg/kg		0.02	11-AUG-15
Tin (Sn)-Total			<0.10		mg/kg		0.1	11-AUG-15
Uranium (U)-Total			<0.0020		mg/kg		0.002	11-AUG-15
Vanadium (V)-Total			<0.10		mg/kg		0.1	11-AUG-15



Quality Control Report

Workorder: L1640340

Report Date: 26-APR-16

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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch R3246667								
WG2134426-2 MB								
Zirconium (Zr)-Total			<0.20		mg/kg		0.2	11-AUG-15
Batch R3247894								
WG2134426-3 DUP								
Thallium (Tl)-Total		L1640343-2 <0.0080	<0.0040	RPD-NA	mg/kg	N/A	40	14-AUG-15
WG2134426-1 MB								
Thallium (Tl)-Total			<0.0020		mg/kg		0.002	14-AUG-15
WG2134426-2 MB								
Thallium (Tl)-Total			<0.0020		mg/kg		0.002	14-AUG-15
Zinc (Zn)-Total			<1.0		mg/kg		1	14-AUG-15

Quality Control Report

Workorder: L1640340

Report Date: 26-APR-16

Client: MOUNT POLLEY MINING CORP.
PO Box 12
Likely BC VOL 1N0
Contact: Colleen Hughes

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Legend:

Limit ALS Control Limit (Data Quality Objectives)
DUP Duplicate
RPD Relative Percent Difference
N/A Not Available
LCS Laboratory Control Sample
SRM Standard Reference Material
MS Matrix Spike
MSD Matrix Spike Duplicate
ADE Average Desorption Efficiency
MB Method Blank
IRM Internal Reference Material
CRM Certified Reference Material
CCV Continuing Calibration Verification
CVS Calibration Verification Standard
LCSD Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Environmental Division

Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Colleen Hughes	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
Phone: 250-790-2215 Fax:	Email 2:	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Analysis Request Please indicate below Filtered, Preserved or both (F, P, F/P)												
Company:	Job #:	NUTRIENTS-1	Total Metals (ICPMS)	Dissolved Metals (ICPMS)	pH/Conductivity	Total Nitrogen/Ammonia	DOC	NUTRIENTS-2	Sp Chromium	COD/TKN	Sulphides	Number of Containers	P	
Contact:	PO / AFE:												P	
Address:	Legal Site Description:												P	
Phone: Fax:	Quote #:												P	

Lab Work Order # (lab use only)	ALS Contact: Can Dang	Sampler: MD, GH
L1640340		

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUTRIENTS-1	Total Metals (ICPMS)	Dissolved Metals (ICPMS)	pH/Conductivity	Total Nitrogen/Ammonia	DOC	NUTRIENTS-2	Sp Chromium	COD/TKN	Sulphides	Number of Containers
	QUL-Zoo-1	08-Jul-15	15:10	Other		X									1
	QUL-Zoo-7	08-Jul-15	14:10	Other		X									1
	QUL-Zoo-8	08-Jul-15	12:50	Other		X									1



Short Holding Time
Rush Processing

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)			
Released by: <i>Melanie Dinnelwe</i>	Date & Time: 09/07/2015 15:00	Received by:	Date:	Time:	Temperature: 7.5/5.0	Verified by: <i>JD</i>	Date & Time: Jul 10 9:10	Observations: Yes / No ? If Yes attach SIF



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 04-SEP-15
Report Date: 02-NOV-15 14:55 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1668464
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: P0205
Legal Site Desc:

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1668464-1 TISSUE 20-AUG-15 11:27 QUL-ZOO-1	L1668464-2 TISSUE 20-AUG-15 13:07 QUL-ZOO-7	L1668464-3 TISSUE 20-AUG-15 15:17 QUL-ZOO-8	
Grouping	Analyte				
TISSUE					
Metals	Aluminum (Al)-Total (mg/kg)	1630	1900	817	
	Antimony (Sb)-Total (mg/kg)	<0.050 ^{DLHM}	0.066	<0.020 ^{DLHM}	
	Arsenic (As)-Total (mg/kg)	4.87	3.35	3.27	
	Barium (Ba)-Total (mg/kg)	55.0	27.2	20.8	
	Beryllium (Be)-Total (mg/kg)	<0.050 ^{DLHM}	0.080	0.045	
	Bismuth (Bi)-Total (mg/kg)	<0.050 ^{DLHM}	<0.050 ^{DLHM}	<0.020 ^{DLHM}	
	Boron (B)-Total (mg/kg)	12.8	7.9	3.2	
	Cadmium (Cd)-Total (mg/kg)	2.82	1.56	1.75	
	Calcium (Ca)-Total (mg/kg)	60100	36300	35800	
	Cesium (Cs)-Total (mg/kg)	0.112	0.191	0.098	
	Chromium (Cr)-Total (mg/kg)	<4.2 ^{DLB}	5.47	<2.0 ^{DLB}	
	Cobalt (Co)-Total (mg/kg)	1.29	1.63	0.961	
	Copper (Cu)-Total (mg/kg)	30.0	22.6	18.6	
	Iron (Fe)-Total (mg/kg)	1800	3080	1150	
	Lead (Pb)-Total (mg/kg)	1.65	4.78	0.98	
	Lithium (Li)-Total (mg/kg)	<2.5 ^{DLHM}	<1.5 ^{DLHM}	<1.0 ^{DLHM}	
	Magnesium (Mg)-Total (mg/kg)	5590	3730	2000	
	Manganese (Mn)-Total (mg/kg)	146	166	91.4	
	Mercury (Hg)-Total (mg/kg)	<0.12 ^{DLHM}	<0.075 ^{DLHM}	0.095	
	Molybdenum (Mo)-Total (mg/kg)	1.31	1.02	0.529	
	Nickel (Ni)-Total (mg/kg)	5.9	6.78	3.53	
	Phosphorus (P)-Total (mg/kg)	18500	9550	14700	
	Potassium (K)-Total (mg/kg)	11700	5940	5550	
	Rubidium (Rb)-Total (mg/kg)	14.3	8.63	7.20	
	Selenium (Se)-Total (mg/kg)	3.61	2.29	2.85	
	Sodium (Na)-Total (mg/kg)	9680	4590	4240	
	Strontium (Sr)-Total (mg/kg)	325	199	176	
	Tellurium (Te)-Total (mg/kg)	<0.10 ^{DLHM}	<0.060 ^{DLHM}	<0.040 ^{DLHM}	
	Thallium (Tl)-Total (mg/kg)	<0.010 ^{DLHM}	0.0080	0.0088	
	Tin (Sn)-Total (mg/kg)	<0.50 ^{DLHM}	<0.30 ^{DLHM}	<0.20 ^{DLHM}	
	Uranium (U)-Total (mg/kg)	0.359	0.338	0.221	
	Vanadium (V)-Total (mg/kg)	6.62	6.59	1.94	
	Zinc (Zn)-Total (mg/kg)	101	58.5	93.8	
	Zirconium (Zr)-Total (mg/kg)	<1.0 ^{DLHM}	2.81	0.45	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DLHM	Detection Limit Adjusted: Sample has High Moisture Content

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

P0205

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Colleen Hughes	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file	<input type="radio"/> Emergency (1 Business Day) 100% Surcharge
	Email 2:	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Phone: 260-790-2215 Fax:	Analysis Request	
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	Job #:	
Contact:	PO / AFE:	
Address:	Legal Site Description:	
Phone: Fax:	Quote #:	

Lab Work Order # (lab use only)	ALS Contact: Can Dang	Sampler: AA, GH
---------------------------------	-----------------------	-----------------

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	NUTRIENTS-1	Total Metals (ICPMS)	Dissolved Metals (ICPMS)	pH/Conductivity	Total Nitrogen/Ammonia	DOC	NUTRIENTS-2	Sp Chromium	COD/TKN	Sulphides	Number of Containers
	QUL-Zoo-1	20-Aug-15	11:27	Tissue		X									1
	QUL-Zoo-7	20-Aug-15	13:07	Tissue		X									1
	QUL-Zoo-8	20-Aug-15	15:17	Tissue		X									1



Short Holding Time
Rush Processing

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
<i>Colleen Hughes</i>	<i>18/08/15 15:30</i>	<i>Sean</i>	<i>4 Sep</i>	<i>9:15</i>	<i>-0.5</i>			



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 08-OCT-15
Report Date: 14-DEC-15 11:02 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1685523
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: P0212
Legal Site Desc:

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1685523-1	L1685523-2	L1685523-3
		Description	Tissue	Tissue	Tissue
		Sampled Date	10-SEP-15	10-SEP-15	10-SEP-15
		Sampled Time	14:21	13:03	11:32
		Client ID	QUL-ZOO-1	QUL-ZOO-7	QUL-ZOO-8
Grouping	Analyte				
TISSUE					
Metals	Aluminum (Al)-Total (mg/kg)		845	169	867
	Antimony (Sb)-Total (mg/kg)		<0.070 ^{DLHM}	0.046	0.032
	Arsenic (As)-Total (mg/kg)		7.89	2.70	4.86
	Barium (Ba)-Total (mg/kg)		67.5	10.9	34.9
	Beryllium (Be)-Total (mg/kg)		<0.070 ^{DLHM}	<0.010	0.059
	Bismuth (Bi)-Total (mg/kg)		<0.070 ^{DLHM}	<0.010	<0.030 ^{DLHM}
	Boron (B)-Total (mg/kg)		12.2	2.1	3.5
	Cadmium (Cd)-Total (mg/kg)		6.22	2.58	5.59
	Calcium (Ca)-Total (mg/kg)		153000	36600	65400
	Cesium (Cs)-Total (mg/kg)		0.212	0.0906	0.248
	Chromium (Cr)-Total (mg/kg)		2.3	0.95	2.11
	Cobalt (Co)-Total (mg/kg)		1.23	0.519	1.61
	Copper (Cu)-Total (mg/kg)		52.5	14.1	43.7
	Iron (Fe)-Total (mg/kg)		1540	334	1940
	Lead (Pb)-Total (mg/kg)		0.62	2.14	0.95
	Lithium (Li)-Total (mg/kg)		<3.5 ^{DLHM}	0.63	2.2
	Magnesium (Mg)-Total (mg/kg)		9440	2530	4440
	Manganese (Mn)-Total (mg/kg)		152	48.9	110
	Mercury (Hg)-Total (mg/kg)		0.28	0.075	0.176
	Molybdenum (Mo)-Total (mg/kg)		2.40	0.724	1.29
	Nickel (Ni)-Total (mg/kg)		6.9	2.06	4.98
	Phosphorus (P)-Total (mg/kg)		45300	11500	25000
	Potassium (K)-Total (mg/kg)		25000	13300	17200
	Rubidium (Rb)-Total (mg/kg)		46.1	14.5	25.0
	Selenium (Se)-Total (mg/kg)		9.53	3.60	4.98
	Sodium (Na)-Total (mg/kg)		21000	10700	13900
	Strontium (Sr)-Total (mg/kg)		894	194	388
	Tellurium (Te)-Total (mg/kg)		<0.14 ^{DLHM}	<0.020	<0.060 ^{DLHM}
	Thallium (Tl)-Total (mg/kg)		0.059	0.0258	0.0370
	Tin (Sn)-Total (mg/kg)		<0.70 ^{DLHM}	<0.10	<0.30 ^{DLHM}
	Uranium (U)-Total (mg/kg)		0.573	0.121	0.236
	Vanadium (V)-Total (mg/kg)		2.63	0.39	3.31
	Zinc (Zn)-Total (mg/kg)		263	75.4	180
	Zirconium (Zr)-Total (mg/kg)		<1.4 ^{DLHM}	<0.20	0.67

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHM	Detection Limit Adjusted: Sample has High Moisture Content

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

P0212

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1685523

Report Date: 26-APR-16

Page 1 of 8

Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-DRY-MICR-CVAF-VA Tissue								
Batch	R3310388							
WG2195754-4 CRM		VA-NIST-1547						
Mercury (Hg)-Total			109.5		%		70-130	12-NOV-15
WG2195754-5 CRM		VA-NIST-1566B						
Mercury (Hg)-Total			102.4		%		70-130	12-NOV-15
WG2195754-3 DUP		L1685534-2						
Mercury (Hg)-Total		0.136	0.124		mg/kg	9.3	30	12-NOV-15
WG2195754-6 LCS								
Mercury (Hg)-Total			103.0		%		70-130	12-NOV-15
WG2195754-1 MB								
Mercury (Hg)-Total			<0.0050		mg/kg		0.005	12-NOV-15
WG2195754-2 MB								
Mercury (Hg)-Total			<0.0050		mg/kg		0.005	12-NOV-15
MET-DRY-MICR-HRMS-VA Tissue								
Batch	R3327079							
WG2195754-4 CRM		VA-NIST-1547						
Aluminum (Al)-Total			70.1		%		70-130	21-NOV-15
Antimony (Sb)-Total			0.016		mg/kg		0.01-0.03	21-NOV-15
Arsenic (As)-Total			0.063		mg/kg		0.03-0.09	21-NOV-15
Barium (Ba)-Total			97.7		%		70-130	21-NOV-15
Boron (B)-Total			95.4		%		70-130	21-NOV-15
Cadmium (Cd)-Total			0.026		mg/kg		0.016-0.036	21-NOV-15
Calcium (Ca)-Total			92.4		%		70-130	21-NOV-15
Cesium (Cs)-Total			87.2		%		70-130	21-NOV-15
Chromium (Cr)-Total			82.5		%		70-130	21-NOV-15
Cobalt (Co)-Total			0.046		mg/kg		0.034-0.074	21-NOV-15
Copper (Cu)-Total			100.1		%		70-130	21-NOV-15
Iron (Fe)-Total			106.0		%		70-130	21-NOV-15
Lead (Pb)-Total			98.3		%		70-130	21-NOV-15
Magnesium (Mg)-Total			97.9		%		70-130	21-NOV-15
Manganese (Mn)-Total			91.2		%		70-130	21-NOV-15
Molybdenum (Mo)-Total			0.060		mg/kg		0.006-0.086	21-NOV-15
Nickel (Ni)-Total			0.42		mg/kg		0.27-0.67	21-NOV-15
Phosphorus (P)-Total			97.9		%		70-130	21-NOV-15
Potassium (K)-Total			90.7		%		70-130	21-NOV-15
Rubidium (Rb)-Total			71.4		%		70-130	21-NOV-15
Selenium (Se)-Total			0.11		mg/kg		0.02-0.22	21-NOV-15



Quality Control Report

Workorder: L1685523

Report Date: 26-APR-16

Page 2 of 8

Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch	R3327079							
WG2195754-4 CRM		VA-NIST-1547						
Strontium (Sr)-Total			89.4		%		70-130	21-NOV-15
Thallium (Tl)-Total			104.9		%		70-130	21-NOV-15
Tin (Sn)-Total			0.11		mg/kg		0.01-0.21	21-NOV-15
Uranium (U)-Total			71.7		%		70-130	21-NOV-15
Vanadium (V)-Total			0.23		mg/kg		0.17-0.47	21-NOV-15
Zinc (Zn)-Total			108.8		%		70-130	21-NOV-15
WG2195754-5 CRM		VA-NIST-1566B						
Antimony (Sb)-Total			0.005		mg/kg		0-0.018	21-NOV-15
Arsenic (As)-Total			97.8		%		70-130	21-NOV-15
Barium (Ba)-Total			105.1		%		70-130	21-NOV-15
Boron (B)-Total			125.6		%		70-130	21-NOV-15
Calcium (Ca)-Total			103.0		%		70-130	21-NOV-15
Chromium (Cr)-Total			0.22		mg/kg		0.06-0.46	21-NOV-15
Cobalt (Co)-Total			80.0		%		70-130	21-NOV-15
Copper (Cu)-Total			81.8		%		70-130	21-NOV-15
Iron (Fe)-Total			110.8		%		70-130	21-NOV-15
Lead (Pb)-Total			92.9		%		70-130	21-NOV-15
Magnesium (Mg)-Total			102.7		%		70-130	21-NOV-15
Manganese (Mn)-Total			102.3		%		70-130	21-NOV-15
Molybdenum (Mo)-Total			101.9		%		70-130	21-NOV-15
Nickel (Ni)-Total			100.9		%		70-130	21-NOV-15
Phosphorus (P)-Total			101.0		%		70-130	21-NOV-15
Potassium (K)-Total			90.8		%		70-130	21-NOV-15
Rubidium (Rb)-Total			77.5		%		70-130	21-NOV-15
Selenium (Se)-Total			101.5		%		70-130	21-NOV-15
Sodium (Na)-Total			90.5		%		70-130	21-NOV-15
Strontium (Sr)-Total			123.5		%		70-130	21-NOV-15
Uranium (U)-Total			107.6		%		70-130	21-NOV-15
Vanadium (V)-Total			86.5		%		70-130	21-NOV-15
Zinc (Zn)-Total			81.4		%		70-130	21-NOV-15
WG2195754-3 DUP		L1685534-2						
Aluminum (Al)-Total		698	635		mg/kg	9.6	40	21-NOV-15
Antimony (Sb)-Total		0.091	0.092		mg/kg	0.9	40	21-NOV-15
Arsenic (As)-Total		7.63	6.89		mg/kg	10	40	21-NOV-15



Quality Control Report

Workorder: L1685523

Report Date: 26-APR-16

Page 3 of 8

Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch R3327079								
WG2195754-3 DUP		L1685534-2						
Barium (Ba)-Total		55.9	52.7		mg/kg	5.9	40	21-NOV-15
Beryllium (Be)-Total		0.041	0.033		mg/kg	21	40	21-NOV-15
Bismuth (Bi)-Total		<0.020	<0.020	RPD-NA	mg/kg	N/A	40	21-NOV-15
Boron (B)-Total		29.0	26.5		mg/kg	8.9	40	21-NOV-15
Cadmium (Cd)-Total		0.683	0.671		mg/kg	1.7	40	21-NOV-15
Calcium (Ca)-Total		87600	89500		mg/kg	2.1	60	21-NOV-15
Cesium (Cs)-Total		0.196	0.176		mg/kg	11	40	21-NOV-15
Chromium (Cr)-Total		1.24	1.01		mg/kg	20	40	21-NOV-15
Cobalt (Co)-Total		1.01	0.912		mg/kg	10	40	21-NOV-15
Copper (Cu)-Total		69.5	61.1		mg/kg	13	40	21-NOV-15
Iron (Fe)-Total		1630	1510		mg/kg	8.2	40	21-NOV-15
Lead (Pb)-Total		0.42	0.42		mg/kg	1.5	40	21-NOV-15
Lithium (Li)-Total		<1.0	<1.0	RPD-NA	mg/kg	N/A	40	21-NOV-15
Magnesium (Mg)-Total		6840	6840		mg/kg	0.1	40	21-NOV-15
Manganese (Mn)-Total		961	1070		mg/kg	11	40	21-NOV-15
Molybdenum (Mo)-Total		12.3	11.3		mg/kg	8.7	40	21-NOV-15
Nickel (Ni)-Total		1.64	1.51		mg/kg	8.1	40	21-NOV-15
Phosphorus (P)-Total		19600	23400		mg/kg	18	40	21-NOV-15
Potassium (K)-Total		13300	13000		mg/kg	2.3	40	21-NOV-15
Rubidium (Rb)-Total		18.0	18.3		mg/kg	1.2	40	21-NOV-15
Selenium (Se)-Total		8.02	7.65		mg/kg	4.7	40	21-NOV-15
Sodium (Na)-Total		18200	17400		mg/kg	4.2	40	21-NOV-15
Strontium (Sr)-Total		438	454		mg/kg	3.6	60	21-NOV-15
Tellurium (Te)-Total		<0.040	<0.040	RPD-NA	mg/kg	N/A	40	21-NOV-15
Thallium (Tl)-Total		0.0065	0.0070		mg/kg	7.6	40	21-NOV-15
Tin (Sn)-Total		<0.20	<0.20	RPD-NA	mg/kg	N/A	40	21-NOV-15
Uranium (U)-Total		0.249	0.258		mg/kg	3.8	40	21-NOV-15
Vanadium (V)-Total		5.72	5.11		mg/kg	11	40	21-NOV-15
Zinc (Zn)-Total		114	126		mg/kg	10	40	21-NOV-15
Zirconium (Zr)-Total		0.68	0.71		mg/kg	4.1	40	21-NOV-15
WG2195754-6 LCS								
Antimony (Sb)-Total			73.9		%		70-130	21-NOV-15
Arsenic (As)-Total			126.8		%		70-130	21-NOV-15



Quality Control Report

Workorder: L1685523

Report Date: 26-APR-16

Page 4 of 8

Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch	R3327079							
WG2195754-6	LCS							
Barium (Ba)-Total			84.8		%		70-130	21-NOV-15
Beryllium (Be)-Total			92.2		%		70-130	21-NOV-15
Bismuth (Bi)-Total			77.6		%		70-130	21-NOV-15
Boron (B)-Total			94.4		%		70-130	21-NOV-15
Cadmium (Cd)-Total			121.7		%		70-130	21-NOV-15
Calcium (Ca)-Total			78.4		%		70-130	21-NOV-15
Chromium (Cr)-Total			83.2		%		70-130	21-NOV-15
Cobalt (Co)-Total			118.0		%		70-130	21-NOV-15
Copper (Cu)-Total			91.7		%		70-130	21-NOV-15
Iron (Fe)-Total			83.4		%		70-130	21-NOV-15
Lithium (Li)-Total			77.6		%		70-130	21-NOV-15
Magnesium (Mg)-Total			82.4		%		70-130	21-NOV-15
Manganese (Mn)-Total			111.2		%		70-130	21-NOV-15
Molybdenum (Mo)-Total			80.6		%		70-130	21-NOV-15
Nickel (Ni)-Total			92.9		%		70-130	21-NOV-15
Potassium (K)-Total			73.2		%		70-130	21-NOV-15
Selenium (Se)-Total			102.2		%		70-130	21-NOV-15
Sodium (Na)-Total			79.3		%		70-130	21-NOV-15
Strontium (Sr)-Total			81.6		%		70-130	21-NOV-15
Tellurium (Te)-Total			110.4		%		70-130	21-NOV-15
Tin (Sn)-Total			91.1		%		70-130	21-NOV-15
Uranium (U)-Total			98.5		%		70-130	21-NOV-15
Vanadium (V)-Total			77.2		%		70-130	21-NOV-15
Zinc (Zn)-Total			88.4		%		70-130	21-NOV-15
Zirconium (Zr)-Total			96.0		%		70-130	21-NOV-15
WG2195754-1	MB							
Aluminum (Al)-Total			<5.0		mg/kg		5	21-NOV-15
Antimony (Sb)-Total			<0.010		mg/kg		0.01	21-NOV-15
Arsenic (As)-Total			<0.030		mg/kg		0.03	21-NOV-15
Barium (Ba)-Total			<0.050		mg/kg		0.05	21-NOV-15
Beryllium (Be)-Total			<0.010		mg/kg		0.01	21-NOV-15
Bismuth (Bi)-Total			<0.010		mg/kg		0.01	21-NOV-15
Cadmium (Cd)-Total			<0.010		mg/kg		0.01	21-NOV-15
Calcium (Ca)-Total			<20		mg/kg		20	21-NOV-15



Quality Control Report

Workorder: L1685523

Report Date: 26-APR-16

Page 5 of 8

Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch R3327079								
WG2195754-1 MB								
Cesium (Cs)-Total			<0.0050		mg/kg		0.005	21-NOV-15
Chromium (Cr)-Total			<0.20		mg/kg		0.2	21-NOV-15
Cobalt (Co)-Total			<0.020		mg/kg		0.02	21-NOV-15
Copper (Cu)-Total			<0.20		mg/kg		0.2	21-NOV-15
Iron (Fe)-Total			<5.0		mg/kg		5	21-NOV-15
Lead (Pb)-Total			<0.050		mg/kg		0.05	21-NOV-15
Lithium (Li)-Total			<0.50		mg/kg		0.5	21-NOV-15
Magnesium (Mg)-Total			<2.0		mg/kg		2	21-NOV-15
Manganese (Mn)-Total			<0.050		mg/kg		0.05	21-NOV-15
Molybdenum (Mo)-Total			<0.040		mg/kg		0.04	21-NOV-15
Nickel (Ni)-Total			<0.20		mg/kg		0.2	21-NOV-15
Phosphorus (P)-Total			<10		mg/kg		10	21-NOV-15
Potassium (K)-Total			<20		mg/kg		20	21-NOV-15
Rubidium (Rb)-Total			<0.050		mg/kg		0.05	21-NOV-15
Selenium (Se)-Total			<0.10		mg/kg		0.1	21-NOV-15
Strontium (Sr)-Total			<0.10		mg/kg		0.1	21-NOV-15
Tellurium (Te)-Total			<0.020		mg/kg		0.02	21-NOV-15
Thallium (Tl)-Total			<0.0020		mg/kg		0.002	21-NOV-15
Tin (Sn)-Total			<0.10		mg/kg		0.1	21-NOV-15
Uranium (U)-Total			<0.0020		mg/kg		0.002	21-NOV-15
Vanadium (V)-Total			<0.10		mg/kg		0.1	21-NOV-15
Zinc (Zn)-Total			<1.0		mg/kg		1	21-NOV-15
Zirconium (Zr)-Total			<0.20		mg/kg		0.2	21-NOV-15
WG2195754-2 MB								
Aluminum (Al)-Total			<5.0		mg/kg		5	21-NOV-15
Antimony (Sb)-Total			<0.010		mg/kg		0.01	21-NOV-15
Arsenic (As)-Total			<0.030		mg/kg		0.03	21-NOV-15
Barium (Ba)-Total			<0.050		mg/kg		0.05	21-NOV-15
Beryllium (Be)-Total			<0.010		mg/kg		0.01	21-NOV-15
Bismuth (Bi)-Total			<0.010		mg/kg		0.01	21-NOV-15
Cadmium (Cd)-Total			<0.010		mg/kg		0.01	21-NOV-15
Calcium (Ca)-Total			<20		mg/kg		20	21-NOV-15
Cesium (Cs)-Total			<0.0050		mg/kg		0.005	21-NOV-15
Chromium (Cr)-Total			<0.20		mg/kg		0.2	21-NOV-15



Quality Control Report

Workorder: L1685523

Report Date: 26-APR-16

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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch R3327079								
WG2195754-2 MB								
Cobalt (Co)-Total			<0.020		mg/kg		0.02	21-NOV-15
Copper (Cu)-Total			<0.20		mg/kg		0.2	21-NOV-15
Iron (Fe)-Total			<5.0		mg/kg		5	21-NOV-15
Lead (Pb)-Total			<0.050		mg/kg		0.05	21-NOV-15
Lithium (Li)-Total			<0.50		mg/kg		0.5	21-NOV-15
Magnesium (Mg)-Total			<2.0		mg/kg		2	21-NOV-15
Manganese (Mn)-Total			<0.050		mg/kg		0.05	21-NOV-15
Molybdenum (Mo)-Total			<0.040		mg/kg		0.04	21-NOV-15
Nickel (Ni)-Total			<0.20		mg/kg		0.2	21-NOV-15
Phosphorus (P)-Total			<10		mg/kg		10	21-NOV-15
Potassium (K)-Total			<20		mg/kg		20	21-NOV-15
Rubidium (Rb)-Total			<0.050		mg/kg		0.05	21-NOV-15
Selenium (Se)-Total			<0.10		mg/kg		0.1	21-NOV-15
Strontium (Sr)-Total			<0.10		mg/kg		0.1	21-NOV-15
Tellurium (Te)-Total			<0.020		mg/kg		0.02	21-NOV-15
Thallium (Tl)-Total			<0.0020		mg/kg		0.002	21-NOV-15
Tin (Sn)-Total			<0.10		mg/kg		0.1	21-NOV-15
Uranium (U)-Total			<0.0020		mg/kg		0.002	21-NOV-15
Vanadium (V)-Total			<0.10		mg/kg		0.1	21-NOV-15
Zinc (Zn)-Total			<1.0		mg/kg		1	21-NOV-15
Zirconium (Zr)-Total			<0.20		mg/kg		0.2	21-NOV-15
Batch R3328788								
WG2195754-4 CRM								
Sodium (Na)-Total		VA-NIST-1547	49		mg/kg		12-52	08-DEC-15
WG2195754-5 CRM								
Cadmium (Cd)-Total		VA-NIST-1566B	112.3		%		70-130	08-DEC-15
WG2195754-6 LCS								
Cesium (Cs)-Total			97.8		%		70-130	08-DEC-15
Rubidium (Rb)-Total			105.0		%		70-130	08-DEC-15
WG2195754-1 MB								
Boron (B)-Total			<1.0		mg/kg		1	08-DEC-15
Sodium (Na)-Total			<20		mg/kg		20	08-DEC-15
WG2195754-2 MB								
Boron (B)-Total			<1.0		mg/kg		1	08-DEC-15



Quality Control Report

Workorder: L1685523

Report Date: 26-APR-16

Page 7 of 8

Client: MOUNT POLLEY MINING CORP.
PO Box 12
Likely BC VOL 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch R3328788								
WG2195754-2 MB								
Sodium (Na)-Total			<20		mg/kg		20	08-DEC-15

Quality Control Report

Workorder: L1685523

Report Date: 26-APR-16

Client: MOUNT POLLEY MINING CORP.

PO Box 12

Likely BC VOL 1N0

Page 8 of 8

Contact: Colleen Hughes

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Environmental Division

Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Colleen Hughes	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
Phone: 250-790-2215 Fax:	Email 2:	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Analysis Request Please indicate below Filtered, Preserved or both (F, P, F/P)												
Company:	Job #:	NUTRIENTS-1	Total Metals (ICPMS)	Dissolved Metals (ICPMS)	pH/Conductivity	Total Nitrogen/Ammonia	DOC	NUTRIENTS-2	Sp Chromium	COD/TKN	Sulphides	Number of Containers	P	
Contact:	PO / AFE:												P	
Address:	Legal Site Description:												P	
Phone: Fax:	Quote #:												P	

Lab Work Order # (lab use only)	ALS Contact: Can Dang	Sampler: GH, SF
---	------------------------------	------------------------

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUTRIENTS-1	Total Metals (ICPMS)	Dissolved Metals (ICPMS)	pH/Conductivity	Total Nitrogen/Ammonia	DOC	NUTRIENTS-2	Sp Chromium	COD/TKN	Sulphides	Number of Containers
	QUL-Zoo-1	10-Sep-15	14:21	Tissue		X									1
	QUL-Zoo-7	10-Sep-15	13:03	Tissue		X									1
	QUL-Zoo-8	10-Sep-15	11:32	Tissue		X									1

Short Holding Time
● Rush Processing



Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT/RELEASE (client use)		SHIPMENT/RECEPTION (lab use only)				SHIPMENT/VERIFICATION (lab use only)		
Released by: Shauna Little	Date & Time: 07/10/15 15:30	Received by: Shafce	Date: oct. 8	Time: 9:55	Temperature: 0.4/1	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 29-MAY-15
Report Date: 26-JUN-15 11:11 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1618713
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1618713-1 Other 14-MAY-15 10:36 P2-S	L1618713-2 Other 14-MAY-15 14:03 P1-S		
Grouping	Analyte				
TISSUE					
Metals	Aluminum (Al)-Total (mg/kg)	304	295		
	Antimony (Sb)-Total (mg/kg)	0.068	0.119		
	Arsenic (As)-Total (mg/kg)	2.84	2.53		
	Barium (Ba)-Total (mg/kg)	14.0	12.7		
	Beryllium (Be)-Total (mg/kg)	0.017	0.015		
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010		
	Boron (B)-Total (mg/kg)	1.2	1.8		
	Cadmium (Cd)-Total (mg/kg)	0.163	0.187		
	Calcium (Ca)-Total (mg/kg)	4610	7930		
	Cesium (Cs)-Total (mg/kg)	0.0816	0.0817		
	Chromium (Cr)-Total (mg/kg)	0.37	0.37		
	Cobalt (Co)-Total (mg/kg)	0.374	0.394		
	Copper (Cu)-Total (mg/kg)	29.4	23.9		
	Iron (Fe)-Total (mg/kg)	376	365		
	Lead (Pb)-Total (mg/kg)	0.599	0.240		
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50		
	Magnesium (Mg)-Total (mg/kg)	964	1080		
	Manganese (Mn)-Total (mg/kg)	98.6	111		
	Mercury (Hg)-Total (mg/kg)	0.0338	0.0338		
	Molybdenum (Mo)-Total (mg/kg)	0.680	0.985		
	Nickel (Ni)-Total (mg/kg)	0.44	0.56		
	Phosphorus (P)-Total (mg/kg)	7430	7040		
	Potassium (K)-Total (mg/kg)	7020	6530		
	Rubidium (Rb)-Total (mg/kg)	7.48	6.55		
	Selenium (Se)-Total (mg/kg)	4.78	3.96		
	Sodium (Na)-Total (mg/kg)	2270	2790		
	Strontium (Sr)-Total (mg/kg)	31.4	48.8		
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020		
	Thallium (Tl)-Total (mg/kg)	<0.0020	<0.0020		
	Tin (Sn)-Total (mg/kg)	0.23	<0.10		
	Uranium (U)-Total (mg/kg)	0.0265	0.0373		
	Vanadium (V)-Total (mg/kg)	1.20	1.16		
	Zinc (Zn)-Total (mg/kg)	68.1	47.0		
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Certified Reference Material	Sodium (Na)-Total	RM-H	L1618713-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
RM-H	Reference Material recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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HG-DRY-MICR-CVAF-VA Tissue Mercury in Tissue by CVAFS Micro (DRY) EPA 200.3, EPA 245.7

This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.

MET-DRY-MICR-HRMS-VA Tissue Metals in Tissue by HR-ICPMS Micro (DRY) EPA 200.3/200.8

Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1618713

Report Date: 26-APR-16

Page 1 of 7

Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-DRY-MICR-CVAF-VA Tissue								
Batch	R3213910							
WG2103549-4 CRM		VA-NIST-1547						
Mercury (Hg)-Total			96.2		%		70-130	24-JUN-15
WG2103549-5 CRM		VA-NIST-1566B						
Mercury (Hg)-Total			89.3		%		70-130	24-JUN-15
WG2103549-3 DUP		L1618673-2						
Mercury (Hg)-Total		0.068	0.064		mg/kg	6.1	30	24-JUN-15
WG2103549-6 LCS								
Mercury (Hg)-Total			100.1		%		70-130	24-JUN-15
WG2103549-1 MB								
Mercury (Hg)-Total			<0.0050		mg/kg		0.005	24-JUN-15
WG2103549-2 MB								
Mercury (Hg)-Total			<0.0050		mg/kg		0.005	24-JUN-15
MET-DRY-MICR-HRMS-VA Tissue								
Batch	R3213980							
WG2103549-6 LCS								
Aluminum (Al)-Total			103.6		%		70-130	23-JUN-15
Antimony (Sb)-Total			91.2		%		70-130	23-JUN-15
Arsenic (As)-Total			102.1		%		70-130	23-JUN-15
Barium (Ba)-Total			109.2		%		70-130	23-JUN-15
Beryllium (Be)-Total			116.6		%		70-130	23-JUN-15
Bismuth (Bi)-Total			122.2		%		70-130	23-JUN-15
Boron (B)-Total			99.0		%		70-130	23-JUN-15
Cadmium (Cd)-Total			121.6		%		70-130	23-JUN-15
Calcium (Ca)-Total			91.1		%		70-130	23-JUN-15
Cesium (Cs)-Total			105.0		%		70-130	23-JUN-15
Chromium (Cr)-Total			103.0		%		70-130	23-JUN-15
Cobalt (Co)-Total			99.6		%		70-130	23-JUN-15
Copper (Cu)-Total			106.1		%		70-130	23-JUN-15
Iron (Fe)-Total			102.4		%		70-130	23-JUN-15
Lead (Pb)-Total			95.2		%		70-130	23-JUN-15
Lithium (Li)-Total			97.0		%		70-130	23-JUN-15
Magnesium (Mg)-Total			101.0		%		70-130	23-JUN-15
Manganese (Mn)-Total			111.2		%		70-130	23-JUN-15
Molybdenum (Mo)-Total			104.8		%		70-130	23-JUN-15
Nickel (Ni)-Total			124.3		%		70-130	23-JUN-15
Phosphorus (P)-Total			104.4		%		70-130	23-JUN-15



Quality Control Report

Workorder: L1618713

Report Date: 26-APR-16

Page 2 of 7

Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch R3213980								
WG2103549-6 LCS								
Potassium (K)-Total			101.8		%		70-130	23-JUN-15
Rubidium (Rb)-Total			104.0		%		70-130	23-JUN-15
Selenium (Se)-Total			89.2		%		70-130	23-JUN-15
Sodium (Na)-Total			99.1		%		70-130	23-JUN-15
Strontium (Sr)-Total			106.8		%		70-130	23-JUN-15
Tellurium (Te)-Total			96.2		%		70-130	23-JUN-15
Thallium (Tl)-Total			96.3		%		70-130	23-JUN-15
Tin (Sn)-Total			102.8		%		70-130	23-JUN-15
Uranium (U)-Total			112.3		%		70-130	23-JUN-15
Vanadium (V)-Total			117.3		%		70-130	23-JUN-15
Zinc (Zn)-Total			83.3		%		70-130	23-JUN-15
Zirconium (Zr)-Total			115.0		%		70-130	23-JUN-15
Batch R3214145								
WG2103549-4 CRM								
VA-NIST-1547								
Aluminum (Al)-Total			78.8		%		70-130	23-JUN-15
Antimony (Sb)-Total			0.018		mg/kg		0.01-0.03	23-JUN-15
Arsenic (As)-Total			0.059		mg/kg		0.03-0.09	23-JUN-15
Barium (Ba)-Total			99.0		%		70-130	23-JUN-15
Boron (B)-Total			99.7		%		70-130	23-JUN-15
Cadmium (Cd)-Total			0.019		mg/kg		0.016-0.036	23-JUN-15
Calcium (Ca)-Total			90.8		%		70-130	23-JUN-15
Cesium (Cs)-Total			94.5		%		70-130	23-JUN-15
Chromium (Cr)-Total			73.7		%		70-130	23-JUN-15
Cobalt (Co)-Total			0.042		mg/kg		0.034-0.074	23-JUN-15
Copper (Cu)-Total			81.0		%		70-130	23-JUN-15
Iron (Fe)-Total			79.4		%		70-130	23-JUN-15
Lead (Pb)-Total			115.4		%		70-130	23-JUN-15
Magnesium (Mg)-Total			77.0		%		70-130	23-JUN-15
Manganese (Mn)-Total			81.5		%		70-130	23-JUN-15
Molybdenum (Mo)-Total			0.042		mg/kg		0.006-0.086	23-JUN-15
Nickel (Ni)-Total			0.33		mg/kg		0.27-0.67	23-JUN-15
Phosphorus (P)-Total			75.2		%		70-130	23-JUN-15
Potassium (K)-Total			82.6		%		70-130	23-JUN-15
Rubidium (Rb)-Total			95.2		%		70-130	23-JUN-15



Quality Control Report

Workorder: L1618713

Report Date: 26-APR-16

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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch	R3214145							
WG2103549-4 CRM		VA-NIST-1547						
Selenium (Se)-Total			0.11		mg/kg		0.02-0.22	23-JUN-15
Strontium (Sr)-Total			96.3		%		70-130	23-JUN-15
Thallium (Tl)-Total			87.3		%		70-130	23-JUN-15
Tin (Sn)-Total			0.10		mg/kg		0.01-0.21	23-JUN-15
Uranium (U)-Total			90.2		%		70-130	23-JUN-15
Vanadium (V)-Total			0.21		mg/kg		0.17-0.47	23-JUN-15
Zinc (Zn)-Total			80.9		%		70-130	23-JUN-15
WG2103549-5 CRM		VA-NIST-1566B						
Antimony (Sb)-Total			0.006		mg/kg		0-0.018	23-JUN-15
Arsenic (As)-Total			85.3		%		70-130	23-JUN-15
Barium (Ba)-Total			102.1		%		70-130	23-JUN-15
Boron (B)-Total			127.2		%		70-130	23-JUN-15
Cadmium (Cd)-Total			97.3		%		70-130	23-JUN-15
Calcium (Ca)-Total			101.4		%		70-130	23-JUN-15
Chromium (Cr)-Total			0.19		mg/kg		0.06-0.46	23-JUN-15
Cobalt (Co)-Total			71.1		%		70-130	23-JUN-15
Copper (Cu)-Total			77.2		%		70-130	23-JUN-15
Iron (Fe)-Total			83.9		%		70-130	23-JUN-15
Lead (Pb)-Total			94.4		%		70-130	23-JUN-15
Magnesium (Mg)-Total			83.7		%		70-130	23-JUN-15
Manganese (Mn)-Total			88.9		%		70-130	23-JUN-15
Molybdenum (Mo)-Total			88.0		%		70-130	23-JUN-15
Nickel (Ni)-Total			84.2		%		70-130	23-JUN-15
Phosphorus (P)-Total			77.8		%		70-130	23-JUN-15
Potassium (K)-Total			87.7		%		70-130	23-JUN-15
Rubidium (Rb)-Total			102.8		%		70-130	23-JUN-15
Selenium (Se)-Total			90.8		%		70-130	23-JUN-15
Sodium (Na)-Total			88.1		%		70-130	23-JUN-15
Strontium (Sr)-Total			94.7		%		70-130	23-JUN-15
Uranium (U)-Total			123.4		%		70-130	23-JUN-15
Vanadium (V)-Total			80.5		%		70-130	23-JUN-15
Zinc (Zn)-Total			81.8		%		70-130	23-JUN-15
WG2103549-1 MB								
Aluminum (Al)-Total			<5.0		mg/kg		5	23-JUN-15



Quality Control Report

Workorder: L1618713

Report Date: 26-APR-16

Page 4 of 7

Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch R3214145								
WG2103549-1 MB								
Antimony (Sb)-Total			<0.010		mg/kg		0.01	23-JUN-15
Arsenic (As)-Total			<0.030		mg/kg		0.03	23-JUN-15
Barium (Ba)-Total			<0.050		mg/kg		0.05	23-JUN-15
Beryllium (Be)-Total			<0.010		mg/kg		0.01	23-JUN-15
Bismuth (Bi)-Total			<0.010		mg/kg		0.01	23-JUN-15
Cadmium (Cd)-Total			<0.010		mg/kg		0.01	23-JUN-15
Calcium (Ca)-Total			<20		mg/kg		20	23-JUN-15
Cesium (Cs)-Total			<0.0050		mg/kg		0.005	23-JUN-15
Chromium (Cr)-Total			<0.20		mg/kg		0.2	23-JUN-15
Cobalt (Co)-Total			<0.020		mg/kg		0.02	23-JUN-15
Copper (Cu)-Total			<0.20		mg/kg		0.2	23-JUN-15
Iron (Fe)-Total			<5.0		mg/kg		5	23-JUN-15
Lead (Pb)-Total			<0.050		mg/kg		0.05	23-JUN-15
Lithium (Li)-Total			<0.50		mg/kg		0.5	23-JUN-15
Magnesium (Mg)-Total			<2.0		mg/kg		2	23-JUN-15
Manganese (Mn)-Total			<0.050		mg/kg		0.05	23-JUN-15
Molybdenum (Mo)-Total			<0.040		mg/kg		0.04	23-JUN-15
Nickel (Ni)-Total			<0.20		mg/kg		0.2	23-JUN-15
Phosphorus (P)-Total			<10		mg/kg		10	23-JUN-15
Potassium (K)-Total			<20		mg/kg		20	23-JUN-15
Rubidium (Rb)-Total			<0.050		mg/kg		0.05	23-JUN-15
Selenium (Se)-Total			<0.10		mg/kg		0.1	23-JUN-15
Sodium (Na)-Total			<20		mg/kg		20	23-JUN-15
Strontium (Sr)-Total			<0.10		mg/kg		0.1	23-JUN-15
Tellurium (Te)-Total			<0.020		mg/kg		0.02	23-JUN-15
Thallium (Tl)-Total			<0.0020		mg/kg		0.002	23-JUN-15
Tin (Sn)-Total			<0.10		mg/kg		0.1	23-JUN-15
Uranium (U)-Total			<0.0020		mg/kg		0.002	23-JUN-15
Vanadium (V)-Total			<0.10		mg/kg		0.1	23-JUN-15
Zinc (Zn)-Total			<1.0		mg/kg		1	23-JUN-15
Zirconium (Zr)-Total			<0.20		mg/kg		0.2	23-JUN-15
WG2103549-2 MB								
Aluminum (Al)-Total			<5.0		mg/kg		5	23-JUN-15
Antimony (Sb)-Total			<0.010		mg/kg		0.01	23-JUN-15



Quality Control Report

Workorder: L1618713

Report Date: 26-APR-16

Page 5 of 7

Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch R3214145								
WG2103549-2 MB								
Arsenic (As)-Total			<0.030		mg/kg		0.03	23-JUN-15
Barium (Ba)-Total			<0.050		mg/kg		0.05	23-JUN-15
Beryllium (Be)-Total			<0.010		mg/kg		0.01	23-JUN-15
Bismuth (Bi)-Total			<0.010		mg/kg		0.01	23-JUN-15
Boron (B)-Total			<1.0		mg/kg		1	23-JUN-15
Cadmium (Cd)-Total			<0.010		mg/kg		0.01	23-JUN-15
Calcium (Ca)-Total			<20		mg/kg		20	23-JUN-15
Cesium (Cs)-Total			<0.0050		mg/kg		0.005	23-JUN-15
Chromium (Cr)-Total			<0.20		mg/kg		0.2	23-JUN-15
Cobalt (Co)-Total			<0.020		mg/kg		0.02	23-JUN-15
Copper (Cu)-Total			<0.20		mg/kg		0.2	23-JUN-15
Iron (Fe)-Total			<5.0		mg/kg		5	23-JUN-15
Lead (Pb)-Total			<0.050		mg/kg		0.05	23-JUN-15
Lithium (Li)-Total			<0.50		mg/kg		0.5	23-JUN-15
Magnesium (Mg)-Total			<2.0		mg/kg		2	23-JUN-15
Manganese (Mn)-Total			<0.050		mg/kg		0.05	23-JUN-15
Molybdenum (Mo)-Total			<0.040		mg/kg		0.04	23-JUN-15
Nickel (Ni)-Total			<0.20		mg/kg		0.2	23-JUN-15
Phosphorus (P)-Total			<10		mg/kg		10	23-JUN-15
Potassium (K)-Total			<20		mg/kg		20	23-JUN-15
Rubidium (Rb)-Total			<0.050		mg/kg		0.05	23-JUN-15
Selenium (Se)-Total			<0.10		mg/kg		0.1	23-JUN-15
Sodium (Na)-Total			<20		mg/kg		20	23-JUN-15
Strontium (Sr)-Total			<0.10		mg/kg		0.1	23-JUN-15
Tellurium (Te)-Total			<0.020		mg/kg		0.02	23-JUN-15
Thallium (Tl)-Total			<0.0020		mg/kg		0.002	23-JUN-15
Tin (Sn)-Total			<0.10		mg/kg		0.1	23-JUN-15
Uranium (U)-Total			<0.0020		mg/kg		0.002	23-JUN-15
Vanadium (V)-Total			<0.10		mg/kg		0.1	23-JUN-15
Zinc (Zn)-Total			<1.0		mg/kg		1	23-JUN-15
Zirconium (Zr)-Total			<0.20		mg/kg		0.2	23-JUN-15



Quality Control Report

Workorder: L1618713

Report Date: 26-APR-16

Page 6 of 7

Client: MOUNT POLLEY MINING CORP.
PO Box 12
Likely BC VOL 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch R3215493								
WG2103549-4	CRM	VA-NIST-1547						
Sodium (Na)-Total			87	RM-H	mg/kg		12-52	24-JUN-15
WG2103549-1	MB							
Boron (B)-Total			<1.0		mg/kg		1	24-JUN-15

Quality Control Report

Workorder: L1618713

Report Date: 26-APR-16

Client: MOUNT POLLEY MINING CORP.
PO Box 12
Likely BC VOL 1N0
Contact: Colleen Hughes

Page 7 of 7

Legend:

Limit ALS Control Limit (Data Quality Objectives)
DUP Duplicate
RPD Relative Percent Difference
N/A Not Available
LCS Laboratory Control Sample
SRM Standard Reference Material
MS Matrix Spike
MSD Matrix Spike Duplicate
ADE Average Desorption Efficiency
MB Method Blank
IRM Internal Reference Material
CRM Certified Reference Material
CCV Continuing Calibration Verification
CVS Calibration Verification Standard
LCSD Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RM-H	Reference Material recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Colleen Hughes	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Sur-charge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
	Email 2:	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Phone: 250-790-2215 Fax:	Analysis Request	
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	Job #:	
Contact:	PO / AFE:	
Address:	Legal Site Description:	
Phone: Fax:	Quote #:	

Lab Work Order # (lab use only)	ALS Contact: Can Dang	Sampler: SL, AA
---------------------------------	-----------------------	-----------------

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUTRIENTS-1	Total Metals (ICPMS)	Dissolved Metals (ICPMS)	pH/Conductivity	Total Nitrogen/Ammonia	DOC	NUTRIENTS-2	Sp Chromium	COD/TKN	Sulphides	Number of Containers
P2-S		14-May-15	10:36	Other		X									1
P1-S		14-May-15	14:03	Other		X									1



Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)			
Released by: <i>Andee Donohue</i>	Date & Time: 28/05/2015 15:00	Received by: SSO	Date: 29 May	Time: 10:00am	Temperature: 7.2	Verified by:	Date & Time:	Observations: Yes / No? If Yes attach SIF



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 10-JUL-15
Report Date: 17-AUG-15 14:56 (MT)
Version: FINAL REV. 2

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1640343
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: F0115
Legal Site Desc:

Comments: 17-AUG-2015 This report replaces and supersedes previously sent report. This report includes Dry weight tissue metal results for ALS identified samples L1640343-1 and -2.

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID Description Sampled Date Sampled Time Client ID	L1640343-1 Tissue 07-JUL-15 13:30 P2	L1640343-2 Tissue 07-JUL-15 11:30 P1		
Grouping	Analyte					
TISSUE						
Metals	Aluminum (Al)-Total (mg/kg)	495	512			
	Antimony (Sb)-Total (mg/kg)	0.056	0.062			
	Arsenic (As)-Total (mg/kg)	3.78	3.63			
	Barium (Ba)-Total (mg/kg)	25.2	27.9			
	Beryllium (Be)-Total (mg/kg)	0.019	0.019			
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010			
	Boron (B)-Total (mg/kg)	6.2	6.0			
	Cadmium (Cd)-Total (mg/kg)	0.928	0.731			
	Calcium (Ca)-Total (mg/kg)	40400	34300			
	Cesium (Cs)-Total (mg/kg)	0.132	0.122			
	Chromium (Cr)-Total (mg/kg)	0.73	0.69			
	Cobalt (Co)-Total (mg/kg)	0.996	0.900			
	Copper (Cu)-Total (mg/kg)	34.9	31.0			
	Iron (Fe)-Total (mg/kg)	695	679			
	Lead (Pb)-Total (mg/kg)	6.04	0.314			
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50			
	Magnesium (Mg)-Total (mg/kg)	2520	2240			
	Manganese (Mn)-Total (mg/kg)	563	753			
	Mercury (Hg)-Total (mg/kg)	0.030	0.029			
	Molybdenum (Mo)-Total (mg/kg)	2.05	2.37			
	Nickel (Ni)-Total (mg/kg)	1.00	0.89			
	Phosphorus (P)-Total (mg/kg)	13700	12000			
	Potassium (K)-Total (mg/kg)	11200	9560			
	Rubidium (Rb)-Total (mg/kg)	13.1	11.5			
	Selenium (Se)-Total (mg/kg)	4.40	4.27			
	Sodium (Na)-Total (mg/kg)	9480	7950			
	Strontium (Sr)-Total (mg/kg)	236	211			
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020			
	Thallium (Tl)-Total (mg/kg)	<0.0050 ^{DLB}	<0.0080 ^{DLB}			
	Tin (Sn)-Total (mg/kg)	<0.10	0.16			
	Uranium (U)-Total (mg/kg)	0.0788	0.0847			
	Vanadium (V)-Total (mg/kg)	2.13	2.20			
	Zinc (Zn)-Total (mg/kg)	72.5	66.8			
	Zirconium (Zr)-Total (mg/kg)	<0.20	0.33			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1640343-1 Tissue 07-JUL-15 13:30 P2	L1640343-2 Tissue 07-JUL-15 11:30 P1		
Grouping	Analyte				
WATER					
Physical Tests	Hardness (as CaCO3) (mg/L)	686	663		
Total Metals	Aluminum (Al)-Total (mg/L)	2.81	3.00		
	Antimony (Sb)-Total (mg/L)	0.00048	0.00055		
	Arsenic (As)-Total (mg/L)	0.0322	0.0302		
	Barium (Ba)-Total (mg/L)	0.137	0.162		
	Beryllium (Be)-Total (mg/L)	0.00011	0.00012		
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050		
	Boron (B)-Total (mg/L)	0.046	0.051		
	Cadmium (Cd)-Total (mg/L)	0.00567	0.00500		
	Calcium (Ca)-Total (mg/L)	248	238		
	Chromium (Cr)-Total (mg/L)	0.00382	0.00373		
	Cobalt (Co)-Total (mg/L)	0.00715	0.00693		
	Copper (Cu)-Total (mg/L)	0.217	0.207		
	Iron (Fe)-Total (mg/L)	3.62	3.85		
	Lead (Pb)-Total (mg/L)	0.0285	0.00214		
	Lithium (Li)-Total (mg/L)	0.0036	0.0037		
	Magnesium (Mg)-Total (mg/L)	15.9	16.3		
	Manganese (Mn)-Total (mg/L)	3.50	5.20		
	Molybdenum (Mo)-Total (mg/L)	0.0147	0.0164		
	Nickel (Ni)-Total (mg/L)	0.00578	0.00580		
	Potassium (K)-Total (mg/L)	73.2	68.7		
	Selenium (Se)-Total (mg/L)	0.0502	0.0502		
	Silicon (Si)-Total (mg/L)	8.79	9.55		
	Silver (Ag)-Total (mg/L)	0.000073	0.000070		
	Sodium (Na)-Total (mg/L)	62.0	56.3		
	Strontium (Sr)-Total (mg/L)	1.40	1.40		
	Thallium (Tl)-Total (mg/L)	0.000024	0.000023		
	Tin (Sn)-Total (mg/L)	0.00039	0.00048		
	Titanium (Ti)-Total (mg/L)	0.049	0.052		
	Uranium (U)-Total (mg/L)	0.000527	0.000551		
	Vanadium (V)-Total (mg/L)	0.0104	0.0118		
	Zinc (Zn)-Total (mg/L)	0.527	0.523		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Zinc (Zn)-Total	MB-LOR	L1640343-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLB	Detection Limit was raised due to detection of analyte at comparable level in Method Blank.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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HARDNESS-CALC-VA Water Hardness APHA 2340B
 Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO₃ equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-DRY-MICR-CVAF-VA Tissue Mercury in Tissue by CVAFS Micro (DRY) EPA 200.3, EPA 245.7
 This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.

MET-DRY-MICR-HRMS-VA Tissue Metals in Tissue by HR-ICPMS Micro (DRY) EPA 200.3/200.8
 Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)
 Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B
 This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

F0115

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Environmental Division

Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Colleen Hughes	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
Phone: 250-790-2215 Fax:	Email 2:	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Analysis Request Please indicate below Filtered, Preserved or both (F, P, F/P)											
Company:	Job #:												
Contact:	PO / AFE:												
Address:	Legal Site Description:												
Phone: Fax:	Quote #:												

Lab Work Order # (lab use only)	21640343	ALS Contact: Can Dang	Sampler: MD, AA
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Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUTRIENTS-1	Total Metals (ICPMS)	Dissolved Metals (ICPMS)	pH/Conductivity	Total Nitrogen/Ammonia	DOC	NUTRIENTS-2	Sp Chromium	COD/TKN	Sulphides	Number of Containers
P2		07-Jul-15	13:30	Other		X									1
P1		07-Jul-15	11:30	Other		X									1

Short Holding Time
Rush Processing



Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)			
Released by: Melan Donohue	Date & Time: 09/07/2015 15:40	Received by:	Date:	Time:	Temperature: 7.5/5.0	Verified by: DJ	Date & Time: Jul 10 9:15	Observations: Yes / No? If Yes attach SIF



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 04-SEP-15
Report Date: 02-NOV-15 14:26 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1668441
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: P0199
Legal Site Desc:

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1668441-1	L1668441-2		
		Description	Tissue	Tissue		
		Sampled Date	11-AUG-15	11-AUG-15		
		Sampled Time	10:36	12:55		
		Client ID	P2-S	P1-S		
Grouping	Analyte					
TISSUE						
Metals	Aluminum (Al)-Total (mg/kg)		556	482		
	Antimony (Sb)-Total (mg/kg)		0.061	0.070		
	Arsenic (As)-Total (mg/kg)		5.98	5.46		
	Barium (Ba)-Total (mg/kg)		28.7	37.0		
	Beryllium (Be)-Total (mg/kg)		0.022	0.015		
	Bismuth (Bi)-Total (mg/kg)		<0.010	<0.010		
	Boron (B)-Total (mg/kg)		8.5	12.3		
	Cadmium (Cd)-Total (mg/kg)		0.771	0.670		
	Calcium (Ca)-Total (mg/kg)		43400	48000		
	Cesium (Cs)-Total (mg/kg)		0.135	0.105		
	Chromium (Cr)-Total (mg/kg)		2.50	<2.2 ^{DLB}		
	Cobalt (Co)-Total (mg/kg)		0.710	0.589		
	Copper (Cu)-Total (mg/kg)		42.6	38.6		
	Iron (Fe)-Total (mg/kg)		892	737		
	Lead (Pb)-Total (mg/kg)		0.354	0.346		
	Lithium (Li)-Total (mg/kg)		<0.50	<0.50		
	Magnesium (Mg)-Total (mg/kg)		3310	3720		
	Manganese (Mn)-Total (mg/kg)		853	1140		
	Mercury (Hg)-Total (mg/kg)		0.100	0.092		
	Molybdenum (Mo)-Total (mg/kg)		4.96	6.77		
	Nickel (Ni)-Total (mg/kg)		1.61	1.01		
	Phosphorus (P)-Total (mg/kg)		17400	17500		
	Potassium (K)-Total (mg/kg)		9850	7850		
	Rubidium (Rb)-Total (mg/kg)		8.69	6.86		
	Selenium (Se)-Total (mg/kg)		6.26	5.64		
	Sodium (Na)-Total (mg/kg)		9940	9150		
	Strontium (Sr)-Total (mg/kg)		257	291		
	Tellurium (Te)-Total (mg/kg)		<0.020	<0.020		
	Thallium (Tl)-Total (mg/kg)		<0.0020	<0.0020		
	Tin (Sn)-Total (mg/kg)		<0.10	<0.10		
	Uranium (U)-Total (mg/kg)		0.168	0.206		
	Vanadium (V)-Total (mg/kg)		3.24	3.07		
	Zinc (Zn)-Total (mg/kg)		102	101		
	Zirconium (Zr)-Total (mg/kg)		0.24	0.23		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

P0199

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1668441

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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-DRY-MICR-CVAF-VA Tissue								
Batch R3291412								
WG2191559-4 CRM		VA-NIST-1547						
Mercury (Hg)-Total			102.2		%		70-130	16-OCT-15
WG2191559-5 CRM		VA-NIST-1566B						
Mercury (Hg)-Total			96.0		%		70-130	16-OCT-15
WG2191559-3 DUP		L1668464-3						
Mercury (Hg)-Total		0.095	0.111		mg/kg	15	30	16-OCT-15
WG2191559-6 LCS								
Mercury (Hg)-Total			103.2		%		70-130	16-OCT-15
WG2191559-1 MB								
Mercury (Hg)-Total			<0.0050		mg/kg		0.005	16-OCT-15
WG2191559-2 MB								
Mercury (Hg)-Total			<0.0050		mg/kg		0.005	16-OCT-15
MET-DRY-MICR-HRMS-VA Tissue								
Batch R3297079								
WG2191559-4 CRM		VA-NIST-1547						
Aluminum (Al)-Total			84.8		%		70-130	16-OCT-15
Antimony (Sb)-Total			0.018		mg/kg		0.01-0.03	16-OCT-15
Arsenic (As)-Total			0.067		mg/kg		0.03-0.09	16-OCT-15
Barium (Ba)-Total			94.2		%		70-130	16-OCT-15
Boron (B)-Total			99.5		%		70-130	16-OCT-15
Cadmium (Cd)-Total			0.018		mg/kg		0.016-0.036	16-OCT-15
Cesium (Cs)-Total			86.6		%		70-130	16-OCT-15
Chromium (Cr)-Total			80.2		%		70-130	16-OCT-15
Cobalt (Co)-Total			0.041		mg/kg		0.034-0.074	16-OCT-15
Copper (Cu)-Total			97.2		%		70-130	16-OCT-15
Iron (Fe)-Total			87.8		%		70-130	16-OCT-15
Lead (Pb)-Total			99.1		%		70-130	16-OCT-15
Magnesium (Mg)-Total			79.8		%		70-130	16-OCT-15
Manganese (Mn)-Total			80.5		%		70-130	16-OCT-15
Molybdenum (Mo)-Total			0.049		mg/kg		0.006-0.086	16-OCT-15
Nickel (Ni)-Total			0.38		mg/kg		0.27-0.67	16-OCT-15
Phosphorus (P)-Total			86.5		%		70-130	16-OCT-15
Potassium (K)-Total			82.5		%		70-130	16-OCT-15
Rubidium (Rb)-Total			88.9		%		70-130	16-OCT-15
Selenium (Se)-Total			0.10		mg/kg		0.02-0.22	16-OCT-15
Sodium (Na)-Total			27		mg/kg		12-52	16-OCT-15



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch	R3297079							
WG2191559-4 CRM		VA-NIST-1547						
Strontium (Sr)-Total			99.6		%		70-130	16-OCT-15
Thallium (Tl)-Total			96.4		%		70-130	16-OCT-15
Tin (Sn)-Total			0.10		mg/kg		0.01-0.21	16-OCT-15
Uranium (U)-Total			91.3		%		70-130	16-OCT-15
Vanadium (V)-Total			0.25		mg/kg		0.17-0.47	16-OCT-15
Zinc (Zn)-Total			83.5		%		70-130	16-OCT-15
WG2191559-5 CRM		VA-NIST-1566B						
Antimony (Sb)-Total			0.006		mg/kg		0-0.018	16-OCT-15
Arsenic (As)-Total			94.6		%		70-130	16-OCT-15
Barium (Ba)-Total			99.2		%		70-130	16-OCT-15
Boron (B)-Total			120.3		%		70-130	16-OCT-15
Cadmium (Cd)-Total			102.4		%		70-130	16-OCT-15
Calcium (Ca)-Total			95.7		%		70-130	16-OCT-15
Chromium (Cr)-Total			0.24		mg/kg		0.06-0.46	16-OCT-15
Cobalt (Co)-Total			86.0		%		70-130	16-OCT-15
Copper (Cu)-Total			115.5		%		70-130	16-OCT-15
Iron (Fe)-Total			91.2		%		70-130	16-OCT-15
Lead (Pb)-Total			104.3		%		70-130	16-OCT-15
Magnesium (Mg)-Total			84.1		%		70-130	16-OCT-15
Manganese (Mn)-Total			84.9		%		70-130	16-OCT-15
Molybdenum (Mo)-Total			108.0		%		70-130	16-OCT-15
Nickel (Ni)-Total			99.2		%		70-130	16-OCT-15
Phosphorus (P)-Total			91.5		%		70-130	16-OCT-15
Potassium (K)-Total			96.2		%		70-130	16-OCT-15
Rubidium (Rb)-Total			100.1		%		70-130	16-OCT-15
Selenium (Se)-Total			97.5		%		70-130	16-OCT-15
Sodium (Na)-Total			91.8		%		70-130	16-OCT-15
Strontium (Sr)-Total			93.2		%		70-130	16-OCT-15
Uranium (U)-Total			101.2		%		70-130	16-OCT-15
Vanadium (V)-Total			99.8		%		70-130	16-OCT-15
Zinc (Zn)-Total			84.4		%		70-130	16-OCT-15
WG2191559-3 DUP		L1668464-3						
Antimony (Sb)-Total		<0.020	0.033	RPD-NA	mg/kg	N/A	40	16-OCT-15
Arsenic (As)-Total		3.27	4.16		mg/kg	24	40	16-OCT-15



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch R3297079								
WG2191559-3 DUP		L1668464-3						
Barium (Ba)-Total		20.8	24.1		mg/kg	15	40	16-OCT-15
Beryllium (Be)-Total		0.045	0.053		mg/kg	15	40	16-OCT-15
Bismuth (Bi)-Total		<0.020	<0.020	RPD-NA	mg/kg	N/A	40	16-OCT-15
Cadmium (Cd)-Total		1.75	2.25		mg/kg	25	40	16-OCT-15
Cesium (Cs)-Total		0.098	0.142		mg/kg	37	40	16-OCT-15
Cobalt (Co)-Total		0.961	1.22		mg/kg	24	40	16-OCT-15
Iron (Fe)-Total		1150	1540		mg/kg	28	40	16-OCT-15
Lead (Pb)-Total		0.98	1.28		mg/kg	26	40	16-OCT-15
Lithium (Li)-Total		<1.0	<1.0	RPD-NA	mg/kg	N/A	40	16-OCT-15
Molybdenum (Mo)-Total		0.529	0.641		mg/kg	19	40	16-OCT-15
Nickel (Ni)-Total		3.53	4.09		mg/kg	15	40	16-OCT-15
Rubidium (Rb)-Total		7.20	9.90		mg/kg	32	40	16-OCT-15
Selenium (Se)-Total		2.85	3.45		mg/kg	19	40	16-OCT-15
Strontium (Sr)-Total		176	218		mg/kg	21	60	16-OCT-15
Tellurium (Te)-Total		<0.040	<0.040	RPD-NA	mg/kg	N/A	40	16-OCT-15
Thallium (Tl)-Total		0.0088	0.0096		mg/kg	9.2	40	16-OCT-15
Tin (Sn)-Total		<0.20	<0.20	RPD-NA	mg/kg	N/A	40	16-OCT-15
Uranium (U)-Total		0.221	0.282		mg/kg	24	40	16-OCT-15
Vanadium (V)-Total		1.94	2.58		mg/kg	28	40	16-OCT-15
Zirconium (Zr)-Total		0.45	0.53		mg/kg	18	40	16-OCT-15
WG2191559-6 LCS								
Aluminum (Al)-Total			70.6		%		70-130	16-OCT-15
Antimony (Sb)-Total			102.5		%		70-130	16-OCT-15
Barium (Ba)-Total			100.8		%		70-130	16-OCT-15
Beryllium (Be)-Total			105.5		%		70-130	16-OCT-15
Bismuth (Bi)-Total			99.9		%		70-130	16-OCT-15
Boron (B)-Total			106.9		%		70-130	16-OCT-15
Cadmium (Cd)-Total			102.1		%		70-130	16-OCT-15
Calcium (Ca)-Total			119.6		%		70-130	16-OCT-15
Cesium (Cs)-Total			97.0		%		70-130	16-OCT-15
Chromium (Cr)-Total			100.8		%		70-130	16-OCT-15
Cobalt (Co)-Total			125.3		%		70-130	16-OCT-15
Copper (Cu)-Total			97.6		%		70-130	16-OCT-15



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Client: MOUNT POLLEY MINING CORP.
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Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch	R3297079							
WG2191559-6	LCS							
Iron (Fe)-Total			70.4		%		70-130	16-OCT-15
Lead (Pb)-Total			99.8		%		70-130	16-OCT-15
Molybdenum (Mo)-Total			104.3		%		70-130	16-OCT-15
Phosphorus (P)-Total			73.0		%		70-130	16-OCT-15
Potassium (K)-Total			80.3		%		70-130	16-OCT-15
Rubidium (Rb)-Total			97.7		%		70-130	16-OCT-15
Selenium (Se)-Total			103.3		%		70-130	16-OCT-15
Sodium (Na)-Total			81.4		%		70-130	16-OCT-15
Strontium (Sr)-Total			99.6		%		70-130	16-OCT-15
Tellurium (Te)-Total			105.1		%		70-130	16-OCT-15
Thallium (Tl)-Total			99.1		%		70-130	16-OCT-15
Tin (Sn)-Total			102.8		%		70-130	16-OCT-15
Uranium (U)-Total			103.2		%		70-130	16-OCT-15
Zirconium (Zr)-Total			101.0		%		70-130	16-OCT-15
WG2191559-1	MB							
Aluminum (Al)-Total			<5.0		mg/kg		5	16-OCT-15
Antimony (Sb)-Total			<0.010		mg/kg		0.01	16-OCT-15
Barium (Ba)-Total			<0.050		mg/kg		0.05	16-OCT-15
Beryllium (Be)-Total			<0.010		mg/kg		0.01	16-OCT-15
Cadmium (Cd)-Total			<0.010		mg/kg		0.01	16-OCT-15
Calcium (Ca)-Total			<20		mg/kg		20	16-OCT-15
Cesium (Cs)-Total			<0.0050		mg/kg		0.005	16-OCT-15
Cobalt (Co)-Total			<0.020		mg/kg		0.02	16-OCT-15
Copper (Cu)-Total			<0.20		mg/kg		0.2	16-OCT-15
Iron (Fe)-Total			<5.0		mg/kg		5	16-OCT-15
Lead (Pb)-Total			<0.050		mg/kg		0.05	16-OCT-15
Lithium (Li)-Total			<0.50		mg/kg		0.5	16-OCT-15
Magnesium (Mg)-Total			<2.0		mg/kg		2	16-OCT-15
Manganese (Mn)-Total			<0.050		mg/kg		0.05	16-OCT-15
Nickel (Ni)-Total			<0.20		mg/kg		0.2	16-OCT-15
Phosphorus (P)-Total			<10		mg/kg		10	16-OCT-15
Rubidium (Rb)-Total			<0.050		mg/kg		0.05	16-OCT-15
Selenium (Se)-Total			<0.10		mg/kg		0.1	16-OCT-15
Strontium (Sr)-Total			<0.10		mg/kg		0.1	16-OCT-15



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch R3297079								
WG2191559-1 MB								
Tellurium (Te)-Total			<0.020		mg/kg		0.02	16-OCT-15
Thallium (Tl)-Total			<0.0020		mg/kg		0.002	16-OCT-15
Tin (Sn)-Total			<0.10		mg/kg		0.1	16-OCT-15
Uranium (U)-Total			<0.0020		mg/kg		0.002	16-OCT-15
Vanadium (V)-Total			<0.10		mg/kg		0.1	16-OCT-15
Zinc (Zn)-Total			<1.0		mg/kg		1	16-OCT-15
Zirconium (Zr)-Total			<0.20		mg/kg		0.2	16-OCT-15
WG2191559-2 MB								
Aluminum (Al)-Total			<5.0		mg/kg		5	16-OCT-15
Antimony (Sb)-Total			<0.010		mg/kg		0.01	16-OCT-15
Barium (Ba)-Total			<0.050		mg/kg		0.05	16-OCT-15
Beryllium (Be)-Total			<0.010		mg/kg		0.01	16-OCT-15
Bismuth (Bi)-Total			<0.010		mg/kg		0.01	16-OCT-15
Cadmium (Cd)-Total			<0.010		mg/kg		0.01	16-OCT-15
Calcium (Ca)-Total			<20		mg/kg		20	16-OCT-15
Cesium (Cs)-Total			<0.0050		mg/kg		0.005	16-OCT-15
Chromium (Cr)-Total			<0.20		mg/kg		0.2	16-OCT-15
Cobalt (Co)-Total			<0.020		mg/kg		0.02	16-OCT-15
Copper (Cu)-Total			<0.20		mg/kg		0.2	16-OCT-15
Iron (Fe)-Total			<5.0		mg/kg		5	16-OCT-15
Lead (Pb)-Total			<0.050		mg/kg		0.05	16-OCT-15
Lithium (Li)-Total			<0.50		mg/kg		0.5	16-OCT-15
Magnesium (Mg)-Total			<2.0		mg/kg		2	16-OCT-15
Manganese (Mn)-Total			<0.050		mg/kg		0.05	16-OCT-15
Nickel (Ni)-Total			<0.20		mg/kg		0.2	16-OCT-15
Phosphorus (P)-Total			<10		mg/kg		10	16-OCT-15
Rubidium (Rb)-Total			<0.050		mg/kg		0.05	16-OCT-15
Selenium (Se)-Total			<0.10		mg/kg		0.1	16-OCT-15
Strontium (Sr)-Total			<0.10		mg/kg		0.1	16-OCT-15
Tellurium (Te)-Total			<0.020		mg/kg		0.02	16-OCT-15
Thallium (Tl)-Total			<0.0020		mg/kg		0.002	16-OCT-15
Tin (Sn)-Total			<0.10		mg/kg		0.1	16-OCT-15
Uranium (U)-Total			<0.0020		mg/kg		0.002	16-OCT-15
Vanadium (V)-Total			<0.10		mg/kg		0.1	16-OCT-15



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch R3297079								
WG2191559-2 MB								
Zinc (Zn)-Total			<1.0		mg/kg		1	16-OCT-15
Zirconium (Zr)-Total			<0.20		mg/kg		0.2	16-OCT-15
Batch R3300686								
WG2191559-4 CRM VA-NIST-1547								
Calcium (Ca)-Total			97.8		%		70-130	27-OCT-15
WG2191559-3 DUP L1668464-3								
Aluminum (Al)-Total		817	1090		mg/kg	28	40	27-OCT-15
Boron (B)-Total		3.2	4.2		mg/kg	28	40	27-OCT-15
Calcium (Ca)-Total		35800	40900		mg/kg	13	60	27-OCT-15
Chromium (Cr)-Total		<2.0	<2.4	RPD-NA	mg/kg	N/A	40	27-OCT-15
Copper (Cu)-Total		18.6	26.0		mg/kg	33	40	27-OCT-15
Magnesium (Mg)-Total		2000	2670		mg/kg	29	40	27-OCT-15
Manganese (Mn)-Total		91.4	104		mg/kg	13	40	27-OCT-15
Phosphorus (P)-Total		14700	16500		mg/kg	12	40	27-OCT-15
Potassium (K)-Total		5550	7510		mg/kg	30	40	27-OCT-15
Sodium (Na)-Total		4240	5710		mg/kg	29	40	27-OCT-15
Zinc (Zn)-Total		93.8	116		mg/kg	21	40	27-OCT-15
WG2191559-6 LCS								
Arsenic (As)-Total			114.1		%		70-130	27-OCT-15
Lithium (Li)-Total			84.6		%		70-130	27-OCT-15
Magnesium (Mg)-Total			106.8		%		70-130	27-OCT-15
Nickel (Ni)-Total			108.6		%		70-130	27-OCT-15
Zinc (Zn)-Total			93.2		%		70-130	27-OCT-15
WG2191559-1 MB								
Arsenic (As)-Total			<0.030		mg/kg		0.03	27-OCT-15
Bismuth (Bi)-Total			<0.010		mg/kg		0.01	27-OCT-15
Boron (B)-Total			<1.0		mg/kg		1	27-OCT-15
Chromium (Cr)-Total			<0.20		mg/kg		0.2	27-OCT-15
Molybdenum (Mo)-Total			<0.040		mg/kg		0.04	27-OCT-15
Potassium (K)-Total			<20		mg/kg		20	27-OCT-15
Sodium (Na)-Total			<20		mg/kg		20	27-OCT-15
WG2191559-2 MB								
Arsenic (As)-Total			<0.030		mg/kg		0.03	27-OCT-15
Boron (B)-Total			<1.0		mg/kg		1	27-OCT-15



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch R3300686								
WG2191559-2 MB								
	Molybdenum (Mo)-Total		<0.040		mg/kg		0.04	27-OCT-15
	Potassium (K)-Total		<20		mg/kg		20	27-OCT-15
	Sodium (Na)-Total		<20		mg/kg		20	27-OCT-15
Batch R3313822								
WG2191559-6 LCS								
	Manganese (Mn)-Total		125.3		%		70-130	13-NOV-15

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Likely BC VOL 1N0
Contact: Colleen Hughes

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Legend:

Limit ALS Control Limit (Data Quality Objectives)
DUP Duplicate
RPD Relative Percent Difference
N/A Not Available
LCS Laboratory Control Sample
SRM Standard Reference Material
MS Matrix Spike
MSD Matrix Spike Duplicate
ADE Average Desorption Efficiency
MB Method Blank
IRM Internal Reference Material
CRM Certified Reference Material
CCV Continuing Calibration Verification
CVS Calibration Verification Standard
LCSD Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:


All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

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Company: MOUNT POLLEY MINING CORP.		<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax			<input checked="" type="radio"/> Regular (Default) <input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge <input type="radio"/> Emergency (1 Business Day) - 100% Surcharge <input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS										
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Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No		Client / Project Information:			Please indicate below Filtered, Preserved or both (F, P, F/P)										
Company:		Job #:			NUTRIENTS-1	Total Metals (ICPMS)	Dissolved Metals (ICPMS)	pH/Conductivity	Total Nitrogen/Ammonia	DOC	NUTRIENTS-2	Sp Chromium	COD/TKN	Sulphides	Number of Containers
Contact:		PO / AFE:													
Address:		Legal Site Description:													
Phone: Fax:		Quote #:													
Lab Work Order # (lab use only)		ALS Contact: Can Dang	Sampler: GH, AA												
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type											
	P2-S	11-Aug-15	10:36	Tissue		X									1
	P1-S	11-Aug-15	12:55	Tissue		X									1
 L1668441-COFC															

Short Holding Time

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Released by: <i>Carla Holman</i>	Date & Time: AUG 31 15:30	Received by: <i>Jeon</i>	Date: 4 Sep	Time: 9:15	Temperature: -0.5	Verified by:	Date & Time:	Observations: Yes / No? If Yes attach SIF



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PO Box 12
Likely BC VOL 1N0

Date Received: 08-OCT-15
Report Date: 09-DEC-15 14:27 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1685534
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: E0090
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Can Dang
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1685534-1 Tissue 10-SEP-15 11:42 P1	L1685534-2 Tissue 10-SEP-15 12:14 P1X	L1685534-3 Tissue 10-SEP-15 14:12 P2		
Grouping	Analyte					
TISSUE						
Metals	Aluminum (Al)-Total (mg/kg)	411	698	264		
	Antimony (Sb)-Total (mg/kg)	0.092	0.091	0.086		
	Arsenic (As)-Total (mg/kg)	6.06	7.63	4.18		
	Barium (Ba)-Total (mg/kg)	39.1	55.9	23.7		
	Beryllium (Be)-Total (mg/kg)	0.021	0.041	<0.020 ^{DLHM}		
	Bismuth (Bi)-Total (mg/kg)	<0.020 ^{DLHM}	<0.020 ^{DLHM}	<0.020 ^{DLHM}		
	Boron (B)-Total (mg/kg)	20.7	29.0	19.0		
	Cadmium (Cd)-Total (mg/kg)	0.406	0.683	0.345		
	Calcium (Ca)-Total (mg/kg)	71500	87600	33300		
	Cesium (Cs)-Total (mg/kg)	0.141	0.196	0.083		
	Chromium (Cr)-Total (mg/kg)	0.80	1.24	0.62		
	Cobalt (Co)-Total (mg/kg)	0.729	1.01	0.449		
	Copper (Cu)-Total (mg/kg)	44.7	69.5	29.6		
	Iron (Fe)-Total (mg/kg)	979	1630	512		
	Lead (Pb)-Total (mg/kg)	0.26	0.42	0.26		
	Lithium (Li)-Total (mg/kg)	<1.0 ^{DLHM}	<1.0 ^{DLHM}	<1.0 ^{DLHM}		
	Magnesium (Mg)-Total (mg/kg)	5350	6840	4190		
	Manganese (Mn)-Total (mg/kg)	863	961	401		
	Mercury (Hg)-Total (mg/kg)	0.122	0.136	0.057		
	Molybdenum (Mo)-Total (mg/kg)	9.41	12.3	7.27		
	Nickel (Ni)-Total (mg/kg)	2.14	1.64	0.80		
	Phosphorus (P)-Total (mg/kg)	19600	19600	10500		
	Potassium (K)-Total (mg/kg)	12200	13300	9530		
	Rubidium (Rb)-Total (mg/kg)	11.9	18.0	12.4		
	Selenium (Se)-Total (mg/kg)	6.93	8.02	4.68		
	Sodium (Na)-Total (mg/kg)	16400	18200	10300		
	Strontium (Sr)-Total (mg/kg)	393	438	211		
	Tellurium (Te)-Total (mg/kg)	<0.040 ^{DLHM}	<0.040 ^{DLHM}	<0.040 ^{DLHM}		
	Thallium (Tl)-Total (mg/kg)	0.0057	0.0065	0.0041		
	Tin (Sn)-Total (mg/kg)	<0.20 ^{DLHM}	<0.20 ^{DLHM}	0.47		
	Uranium (U)-Total (mg/kg)	0.167	0.249	0.156		
	Vanadium (V)-Total (mg/kg)	3.27	5.72	2.30		
	Zinc (Zn)-Total (mg/kg)	106	114	55.3		
	Zirconium (Zr)-Total (mg/kg)	0.52	0.68	<0.40 ^{DLHM}		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHM	Detection Limit Adjusted: Sample has High Moisture Content

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
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Chain of Custody Numbers:

E0090

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

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Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Please indicate below Filtered, Preserved or both (F, P, F/P)
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Lab Work Order # (lab use only)	ALS Contact: Can Dang	Sampler: VH, AA
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Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUTRIENTS-1	Total Metals (ICPMS)	Dissolved Metals (ICPMS)	pH/Conductivity	Total Nitrogen/Ammonia	DOC	NUTRIENTS-2	Sp Chromium	COD/TKN	Sulphides	Number of Containers
P1		10-Sep-15	11:42	Tissue	X										1
P1X		10-Sep-15	12:14	Tissue	X										1
P2		10-Sep-15	14:12	Tissue	X										1
<div style="border: 1px solid black; padding: 10px; display: inline-block;"> <p>Short Holding Time Rush Processing</p> </div>															
 L1685534-COFC															

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DATE 2 June 2016**REFERENCE No.** 1411734-160-TM-Rev0**TO** Ms. Colleen Hughes
Mount Polley Mining Corporation**FROM** Barbara Wernick**EMAIL** bwernick@golder.com

MOUNT POLLEY MINE – UPDATE OF QUESNEL AND POLLEY LAKES PRODUCTIVITY ASSESSMENT

Golder Associates Ltd. (Golder) is pleased to provide Mount Polley Mining Corporation (MPMC) with this technical memorandum updating the assessment of potential effects on fish productivity in Quesnel Lake and Polley Lake following the foundation failure of the Mount Polley Mine tailings storage facility (TSF) in August, 2014.

1.0 BACKGROUND

Following the TSF foundation failure, monitoring programs were implemented to collect information on changes in environmental components such as water and sediment quality, biological communities, and tissue chemistry. A preliminary assessment of potential effects on the aquatic environment was conducted based on information available and the understanding of the event as of mid-2015, with the objective of addressing potential effects on overall aquatic productivity of Quesnel Lake, Polley Lake, and the Quesnel River (Golder 2015). It was acknowledged at that time that understanding of potential effects would increase as further studies were undertaken. The purpose of this technical memorandum is to update the assessment of potential effects on aquatic productivity in Quesnel Lake and Polley Lake by integrating more recent information with that collected immediately following the event.

2.0 APPROACH

2.1 Fish-Habitat-Food Assemblages

To facilitate the assessment of potential effects on the productivity of Quesnel and Polley lakes, a conceptual ecological model was developed to identify fish-habitat-food assemblages which have implications on the potential effects of stressors related to the event on productivity, as summarized below and described in greater detail in Golder (2015). The three fish-habitat-food assemblages identified in Golder (2015) were as follows:

Littoral zone and benthic habitats – Fish associated with the littoral zone and benthic habitats are oriented to the near-shore environment and feed largely on benthic prey, periphyton, or in some cases zooplankton in the water column (McPhail 2007; Scott and Crossman 1973). Fish in this group include juvenile stages of salmon (*Oncorhynchus* spp.) and Burbot (*Lota lota*), Lake Whitefish (*Coregonus clupeaformis*), and forage fish such as sucker, sculpin, chub, shiner and Northern Pikeminnow (*Ptychocheilus oregonensis*). This assemblage occurs in Quesnel Lake.



Open-water habitat and fish that feed on emerging insects – Fish that are associated with open-water habitat and feed on emerging insects include Mountain Whitefish (*Prosopium williamsoni*) and smaller Rainbow Trout (*Oncorhynchus mykiss*). Larger adult Rainbow Trout in Quesnel Lake may consume juvenile Sockeye Salmon (*Oncorhynchus nerka*) and Kokanee (*O. nerka*; freshwater variant; Parkinson et al. 1989). This assemblage occurs in Quesnel and Polley Lakes.

Open-water habitat and fish that feed on crustacean zooplankton - The assemblage of fish that is associated with open-water habitat and that feed on crustacean zooplankton consists of juvenile Sockeye Salmon and juvenile and adult Kokanee. This assemblage occurs in Quesnel Lake.

2.2 Framework for Assessing Productivity

The preliminary assessment of productivity (Golder 2015) was based on Fisheries and Oceans Canada’s (DFO’s) framework for assessing the potential for impacts to productivity from activities or undertakings (Bradford et al. 2014; Tupper de Kerckhove 2015) and the components and subcomponents of productivity summarized in Table 1. In the context of this productivity framework, survival, migration, and reproduction are primarily based on a mechanism related to physical habitat, which is being addressed separately by the multi-agency habitat working group. Therefore, this technical memorandum focusses on updating the evaluation of fish growth and individual performance as measures of productivity, for which the mechanisms are primarily related to environmental conditions.

Table 2 summarizes the types of indicators and measures available for evaluating potential changes in growth and individual performance.

Table 1: Framework for Assessing Impacts to Fisheries Productivity

Component of Productivity	Sub-component	Mechanism
Survival	Density independent mortality	Direct mortality Exceedance of environmental tolerances
	Habitat quality or quantity	Habitat supply limitation
Growth	Fish growth	NA
	Food supply	Quantity Quality
		Efficiency
Individual Performance	Stress	Suboptimal environmental conditions
	Olfactory effects	Suboptimal environmental conditions
	Disease	Infection
Migration	-	Disruption of normal behaviour
Reproduction	Adult maturation	Suboptimal environmental conditions
	Density-independent reproductive stress	Spawning habitat quality
	Density-dependent reproductive success	Spawning habitat quantity

Table 2: Information Available and Measurements to Assess Effects on the Growth and Individual Performance Component of Fisheries Productivity

Component	Sub-component	Mechanism	Indicator		Information Available/Measure	
			Qualitative	Quantitative		
Growth	Fish growth	NA	Yes	No	<ul style="list-style-type: none"> ■ Water toxicity tests ■ Length and weight of Sockeye Salmon juveniles (Quesnel Lake) ■ Length and weight of Rainbow Trout (Polley Lake) ■ Tissue chemistry 	
	Food supply	Quantity	Yes	No	<ul style="list-style-type: none"> ■ Water column measurements: <ul style="list-style-type: none"> ■ Nutrient concentrations ■ Chlorophyll a measurements ■ Water toxicity test data ■ Sediment/benthic habitat measurements: <ul style="list-style-type: none"> ■ Sediment toxicity test data ■ <i>In situ</i> benthic invertebrate community data ■ Zooplankton community abundance and composition 	
		Quality	Yes	No	<ul style="list-style-type: none"> ■ Zooplankton tissue chemistry 	
	Efficiency	Foraging		Yes	No	<ul style="list-style-type: none"> ■ Length and weight of Sockeye Salmon juveniles (Quesnel Lake) ■ Length and weight of Rainbow Trout (Polley Lake)
		Bioenergetics		Yes	No	<ul style="list-style-type: none"> ■ Length and weight of Sockeye Salmon juveniles (Quesnel Lake) ■ Length and weight of Rainbow Trout (Polley Lake)
Individual Performance	Stress	Suboptimal environmental conditions	Yes	No	<ul style="list-style-type: none"> ■ Water toxicity tests ■ Tissue chemistry 	
	Olfactory effects	Suboptimal environmental conditions	Yes	No	<ul style="list-style-type: none"> ■ Literature information on direction of change based on copper concentrations 	
	Disease	Infection	Yes	No	<ul style="list-style-type: none"> ■ Literature information on direction of change ■ Tissue chemistry 	

3.0 UPDATED ASSESSMENT OF POTENTIAL EFFECTS ON PRODUCTIVITY IN QUESNEL LAKE

The following sections provide an updated assessment of the potential for effects on productivity in Quesnel Lake based on data collected in 2015 subsequent to the preliminary assessment. This technical memorandum should be read in conjunction with Golder (2015), which provides additional description of the ecology of Quesnel Lake and an overview of literature regarding the mechanisms of effect.

3.1 Fish Growth

The growth of fish themselves is a time-integrated measure of the cumulative influence of factors that contribute to their wellness or productivity, such as food supply and exposure to contaminants and other potential stressors like turbidity (Rand and Petrocelli 1985). Organism growth and development also requires the simultaneous function of numerous cellular and sub-cellular processes, each of which could be potential targets for toxicants. Successful growth is therefore an indication that such toxic effects are not occurring.

3.1.1 Toxicity Testing

Toxicity testing of Quesnel Lake water was conducted to assess potential effects on survival and growth of Fathead Minnow and Rainbow Trout. Growth of Fathead Minnow was not affected in 7-day survival and growth tests conducted in water collected from Quesnel Lake in August and September 2014, and between November 2014 and February 2015 (Minnow 2015a). Growth of juvenile Rainbow Trout was not affected in 7-day survival and growth test in water collected between November 2014 and April 2015 (Minnow 2015b).

3.1.2 Fish Length and Weight Data

DFO collected Sockeye Salmon juveniles from mid-net depths of approximately 20 m from four locations in Quesnel Lake between September 23 and 27, 2014 and measured length and weight (D. Selbie, DFO, pers. comm.). This sampling was repeated by DFO in September 2015.

Juvenile Sockeye Salmon collected from the West Arm west of Cariboo Island in 2014 were notably larger than those collected from other parts of the lake east of Cariboo Island. In 2015, however, juvenile Sockeye Salmon collected from the West Arm were similar in size to those collected from other parts of the lake that year and similar to those collected prior to the event (Figure 1). The September 2015 data suggest that a decrease in foraging efficiency of juvenile Sockeye Salmon did not occur in 2014, perhaps because *Daphnia* have been reported to occupy the upper 10 m of the water column during the summer (Levy 1990; Morton and Williams 1990) where turbidity was relatively low. Another possible explanation is that a decrease in foraging efficiency did occur in 2014 but was offset by a larger food supply that may have resulted from the influx of phosphorus into the lake (Section 3.2.1). The data also suggest that the higher growth of Sockeye Salmon observed in 2014 was temporary.

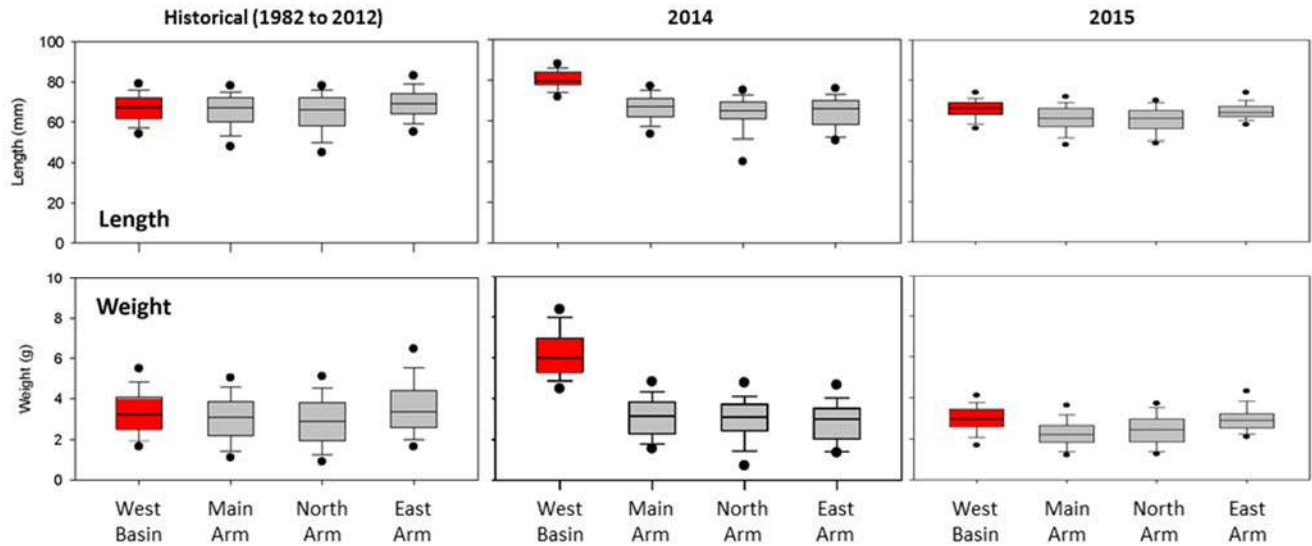


Figure 1: Comparison of Age 0+ Sockeye Salmon Length and Weight Between Exposed (West; red boxes) and Reference (Main, North, East; grey boxes) Areas of Quesnel Lake and Pre- (2013) and Post-event (2014 and 2015) (Box-plots Courtesy of D. Selbie, DFO)

3.2 Food Supply – Quantity

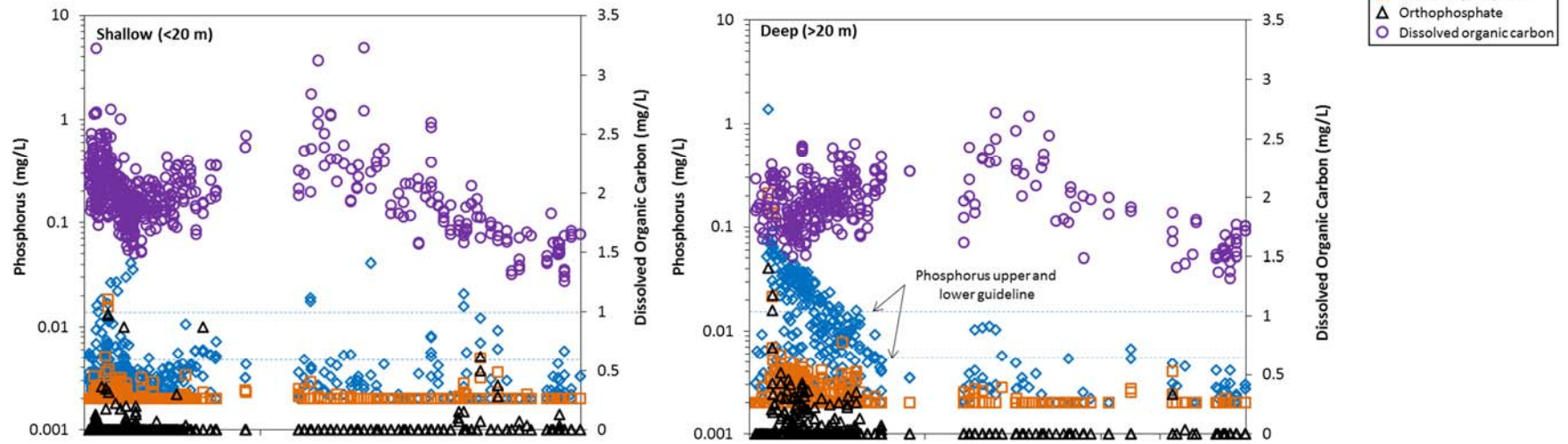
3.2.1 Nutrient Inputs

Introduction of suspended sediments can release nutrients and result in increased productivity (Schallenberg and Burns 1997) and mean total phosphorus concentrations have been correlated with fish production (Downing et al. 1990).

As illustrated in Figure 2, there was an influx of phosphorus and dissolved organic carbon (DOC) in August 2014. Total phosphorus concentrations were higher than pre-event conditions and higher than those measured outside the West Basin, especially at >20 m depth. The dissolved phosphorus fraction was relatively lower in the West Basin, however, and it was inferred that the phosphorus was associated with suspended particles deeper in the water column.

During the same season in 2015, DOC and phosphorus concentrations were lower than those observed in 2014 and dissolved phosphorus and orthophosphate were generally non-detectable except on a few occasions. Based on a comparison to several indices of trophic status (Golder 2016a), Quesnel Lake appears to have returned to an oligotrophic state in 2015.

A – West of Cariboo Island



B – East of Cariboo Island

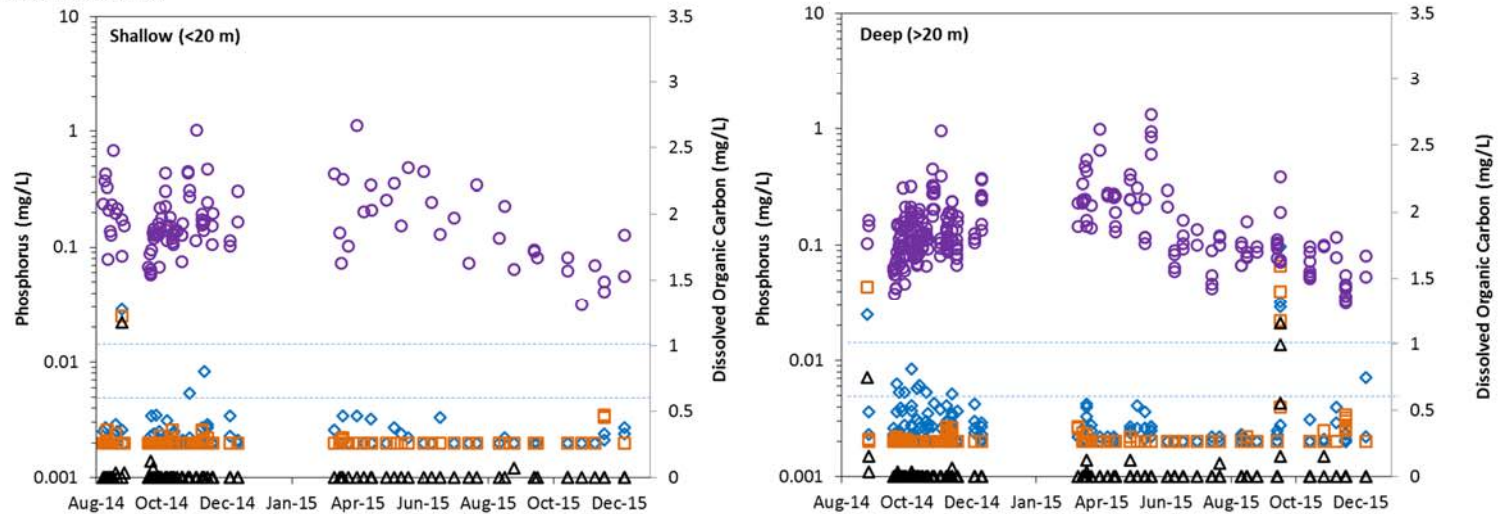


Figure 2: Temporal and Spatial Variability in Phosphorus and Dissolved Organic Carbon in Shallow (<20 m) and Deep (>20 m) Waters in (A) the West Arm of the West Basin (West of Cariboo Island) Compared to (B) the Middle Arm (East of Cariboo Island) of Quesnel Lake

3.2.2 Primary Productivity

3.2.2.1 Toxicity Testing

Minnow (2015a) reported the findings of two plant tests conducted on water collected from Quesnel Lake in 2014:

- 7-d growth inhibition in the vascular aquatic plant *Lemna minor*.
- 72-h growth inhibition in the alga *Pseudokirchneriella subcapitata* (formerly *Selenastrum capricornutum*).

There was no impairment of growth of either test species, including in turbid water from a deeper sampling location in Quesnel Lake. Further testing with plant species was not conducted in 2015.

3.2.2.2 Biomass

The direction of change in primary productivity as a result of introduction of suspended sediments to a lake depends on whether the phytoplankton are light limited or nutrient limited (Northcote et al. 2005; Schallenberg and Burns 2004, 2001). Suspended sediment can inhibit photosynthesis by changing the depth to which light penetrates or can contribute nutrients that may be used by phytoplankton in an oligotrophic system, as discussed in Section 3.2.1.

On-going monitoring of total suspended solids (TSS; Figure 3) and turbidity/Secchi depth (Figure 4) indicates that after fall turnover in 2014, water clarity was similar between the west and east portions of the lake and through the 2015 growing season clarity continued to increase.

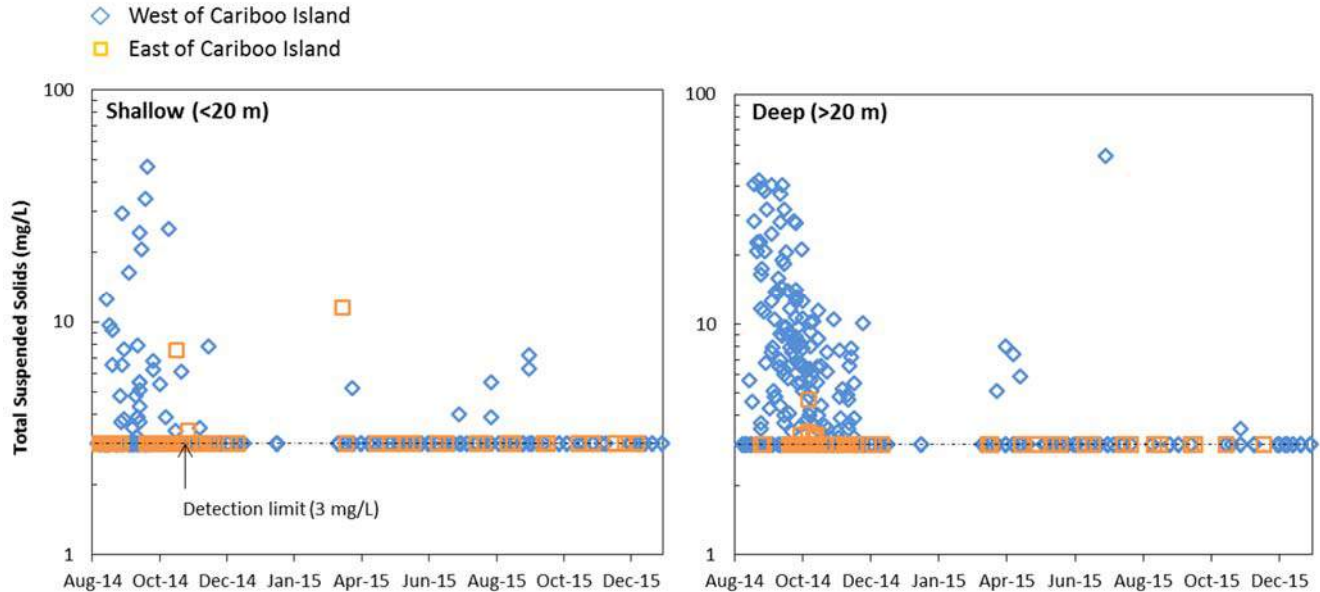


Figure 3: Spatial and Temporal Variability in Total Suspended Solids Concentration in the West Arm of the West Basin (West of Cariboo Island) Compared to the Middle Arm (East of Cariboo Island) of Quesnel Lake

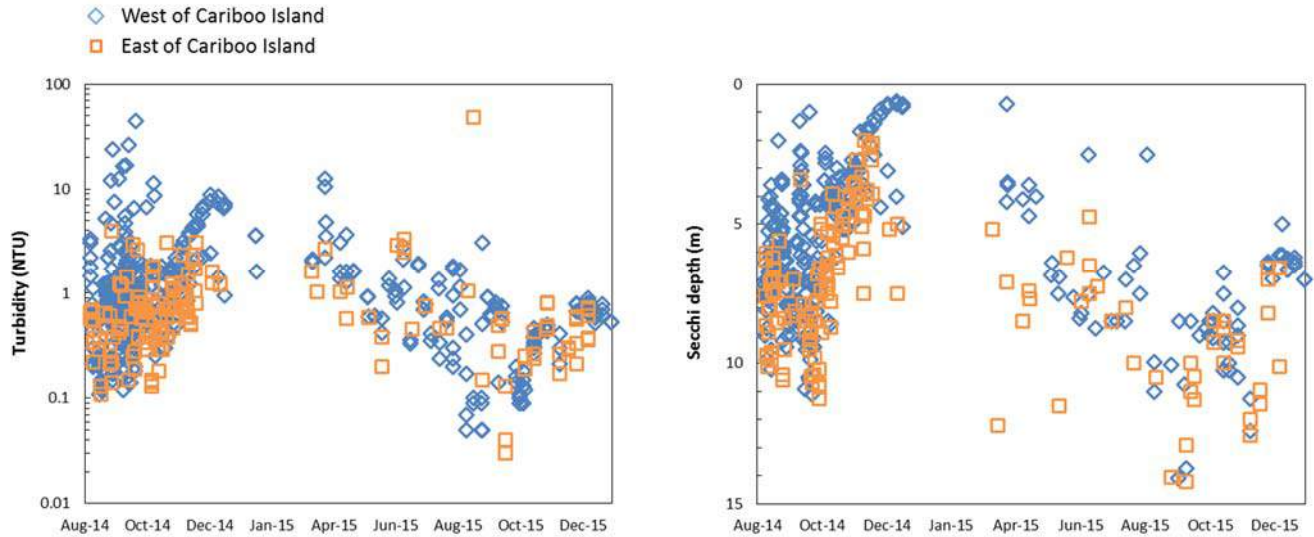


Figure 4: Spatial and Temporal Variability in Water Clarity (Left – Turbidity; Right – Secchi Depth) in the Upper 20 m of the West Arm of the West Basin (West of Cariboo Island) Compared to the Middle Arm (East of Cariboo Island) of Quesnel Lake

Based on a visual assessment of the chlorophyll a time series, biomass in the West Arm was similar to that in the lake east of Cariboo Island (Figure 5). The net growth of phytoplankton is controlled by zooplankton grazing (Huovinen et al. 1999) and the conversion of phytoplankton into fish production is relatively efficient in oligotrophic lakes (Downing et al. 1990). Phytoplankton biomass resulting from the phosphorus input in 2014 may therefore have been rapidly converted into zooplankton and then fish biomass. The potential change in juvenile Sockeye Salmon biomass is discussed in Section 3.1.2.

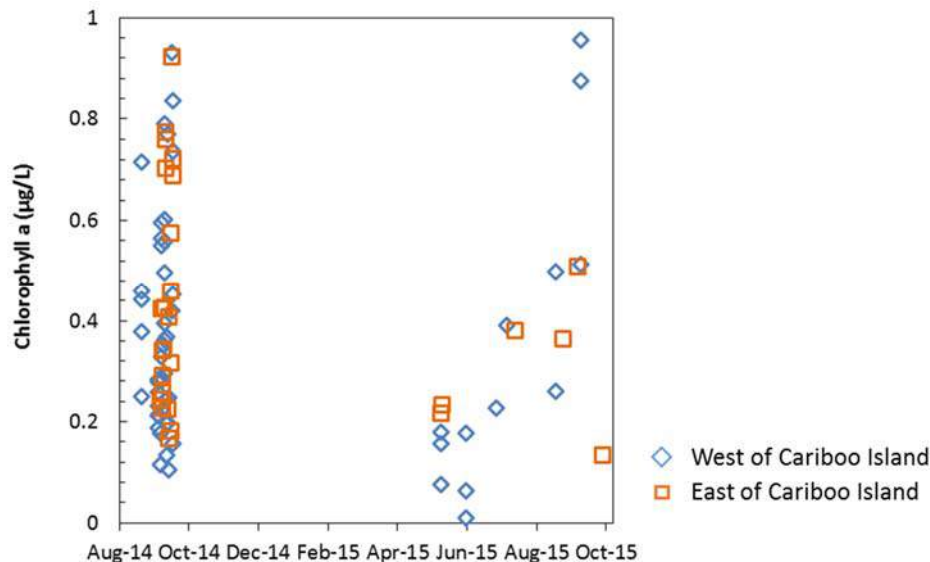


Figure 5: Temporal and Spatial Variability in Chlorophyll a Concentration in Shallow (0 to 20 m) Water in the West Arm of the West Basin (West of Cariboo Island) Compared to the Middle Arm of Quesnel Lake

3.2.3 Zooplankton Productivity

3.2.3.1 Toxicity Testing

Minnow (2015a,b) reported the findings of toxicity testing using two daphnid zooplankton species:

- 48-h acute lethality to *Daphnia magna*.
- 7-d survival and reproduction of *Ceriodaphnia dubia*.

Water from Quesnel Lake was not acutely toxic to *Daphnia magna* and did not affect survival of *Ceriodaphnia dubia*. There were observations of impaired reproduction in *C. dubia* exposed to turbid deep water samples from Quesnel Lake. However, additional testing showed that reproductive effects occurred in unfiltered samples only, whereas no toxicity was observed in corresponding filtered samples. This suggested that suspended particulate matter may have caused the observed responses in this sensitive test species. This test response is expected to have limited relevance to the zooplankton community of Quesnel Lake because resident species are non-migratory and occupy the upper 25 to 30 m of the water column where suspended solids levels were relatively low. Therefore, exposure to TSS that may cause reproductive effects to invertebrates *in situ* is not expected.

3.2.3.2 Community

Depth-integrated (surface to 30 m) samples of zooplankton were collected by the University of Northern British Columbia (UNBC) approximately weekly between 5 September and 6 November, 2014 (S. Albers, pers. comm.) and a taxonomy dataset (identification of species and enumeration) was provided for use in this report. In 2015, MPMC collected samples monthly from May through September for zooplankton analysis at the same stations sampled by UNBC (further details regarding this sampling are provided in Golder [2016a]).

Based on an evaluation of stomach contents, juvenile Sockeye Salmon preferentially consumed the calanoid copepod *Leptodiaptomus* during the early (May-June) shore-oriented migration of the fish from their natal streams (Morton and Williams 1990). In June, the fish migrate offshore and their prey consumption shifted to the cladoceran *Daphnia*. Rainbow Trout, Lake Trout, and some forage fish species may also consume crustacean zooplankton during the summer.

Abundance and biomass data are shown for the total sample as well as separately for copepods and cladocerans to provide information relevant to the seasonality of feeding habits of juvenile Sockeye Salmon (Figure 6). In general, zooplankton abundance and biomass in the affected area of Quesnel Lake (Hazeltine) was intermediate between the two reference areas (Horsefly and Junction) and did not indicate an effect on productivity related to the event.

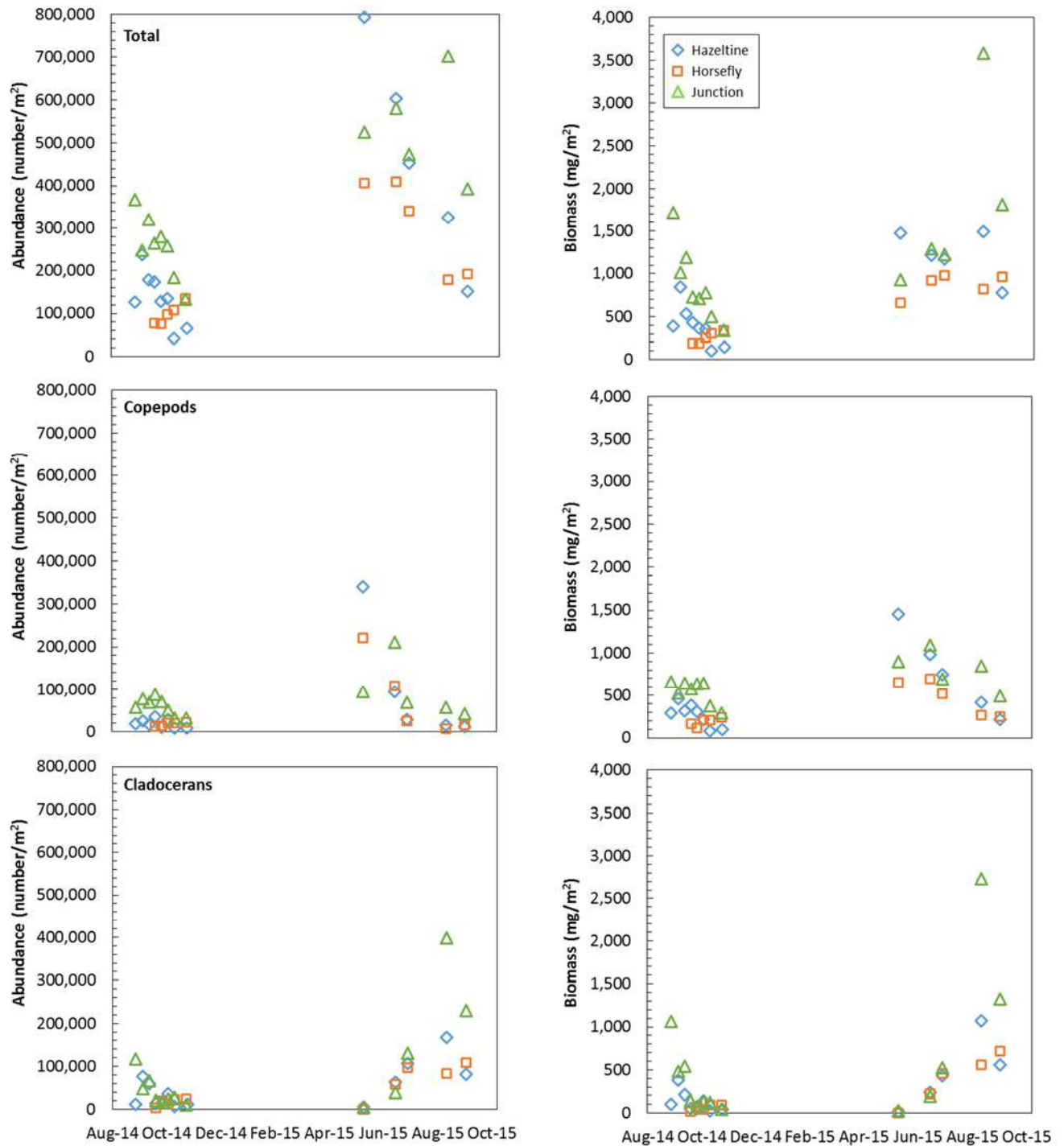


Figure 6: Spatial and Temporal Variability in Zooplankton Abundance and Biomass from Composite, Depth-integrated Samples Collected in the Exposed (Hazeltine) and Reference (Horsefly, Junction) Areas of Quesnel Lake Following the Tailings Dam Failure (2014 Data Courtesy of UNBC)

3.3 Food Supply – Quality

UNBC collected zooplankton samples in 2014 approximately weekly from three locations on Quesnel Lake concurrent with the taxonomy and had them analyzed for a suite of metals (S. Albers, pers. comm.). In 2015, MPMC staff repeated this sampling at the same locations monthly from May through September (described further in Golder 2016a). Figure 7 illustrates the temporal and spatial variability in copper, which was considered a parameter of concern based on water column concentrations, and selenium, mercury, and arsenic, which were parameters of potential concern because their primary mode of toxicity is via dietary uptake and bioaccumulation versus direct toxicity from a water exposure. Representative fish tissue data are discussed in conjunction with plankton tissue chemistry data. A more detailed discussion of fish tissue chemistry data is provided in Golder (2016b).

- **Copper** concentrations in zooplankton at Hazeltine (exposed) were higher than at the other two stations (reference) between October and December 2014 and from May to September 2015. Copper in zooplankton tissues at all three stations showed an increasing trend through late 2014 and a decreasing trend through 2015. A single anomalous value of 254 mg/kg was reported at Hazeltine, but this was considered to be a potential sampling or laboratory error because it was several-fold higher than the next highest concentration and was not associated with a difference in water chemistry (Golder 2016a). Furthermore, copper does not biomagnify and overall concentrations were lower than those that had no adverse effect on Rainbow Trout (Miller et al. 1993). The anomalously higher copper concentration was also observed in June, when Sockeye Salmon have been documented to preferentially consume copepods during the early (May-June) shore-oriented migration of the fish from their natal streams (Morton and Williams 1990). Mean copper concentrations in whole-body Sockeye Salmon collected in September 2015 were generally higher than in 2014 and associated with higher variability across all four areas of the lake. Copper in whole body Sockeye Salmon from the West Arm was not significantly different than in Middle, East and North Arm fish (Figure 8).
- **Selenium** concentrations were below the BC interim dietary guideline for invertebrate tissue that may be consumed by fish (BC MoE 2014) for all samples collected from Hazeltine and Horsefly in 2014 (Figure 7). The highest concentrations in 2014 were observed at Junction. Selenium tissue concentrations were higher at Hazeltine and Horsefly in 2015 compared to 2014, but concentrations in 2015 were generally similar among the three stations. The highest concentration observed in 2015 was at Hazeltine. This change in selenium concentrations in zooplankton tissue from 2014 to 2015 did not appear to result in higher whole-body concentrations in Sockeye Salmon in 2015 (Figure 8).
- **Mercury** concentrations were variable at all three stations in 2014, ranging from non-detectable to less than 0.1 mg/kg dw (Figure 7). The highest concentrations in 2014 were observed in zooplankton from Junction. Mercury in zooplankton collected in 2015 was similar among stations. The highest concentration observed in 2015 was at Hazeltine. Sockeye Salmon whole-body tissue concentrations were not available for 2015 and therefore a comparison between plankton and fish tissue data between years could not be made.
- **Arsenic** concentrations increased between September and November 2014 at Hazeltine; however, they were all lower than the highest concentrations observed at Junction in September and were similar to concentrations observed at Horsefly and Junction in October through November (Figure 7). Arsenic concentrations in zooplankton collected in 2015 varied from May through September but were similar among stations. Sockeye Salmon tissue concentrations were higher in the West Arm in both 2014 and 2015 and higher in the Middle Arm in 2015 than 2014; however, the reason for this is not clear as aqueous arsenic concentrations were lower than during fall 2014 and continued to decrease through 2015. Later in the season, juvenile Sockeye Salmon migrate into deeper waters of the lake, so it is possible that there was mixing of populations from other areas.

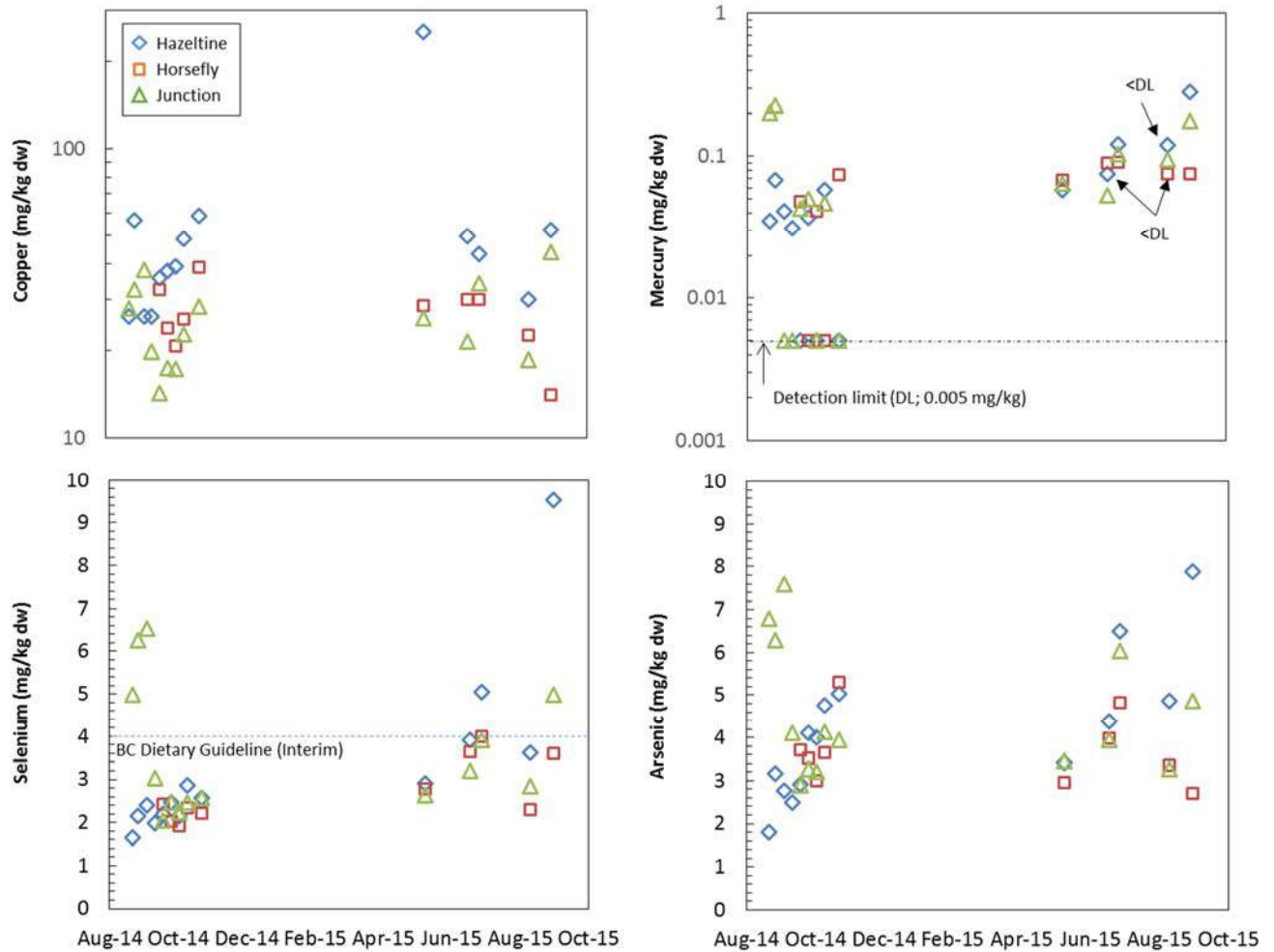


Figure 7: Spatial and Temporal Variability in Zooplankton Tissue Chemistry from Composite, Depth-integrated Samples Collected in the Exposed (Hazeltine) and Reference (Horsefly, Junction) Areas of Quesnel Lake (2014 Data Courtesy of UNBC)

Overall, the event did not appear to result in a biologically significant change in arsenic, mercury or selenium concentrations in zooplankton from the West Arm of the West Basin of Quesnel Lake relative to concentrations observed in the lake east of Cariboo Island. As discussed in Section 3.1.2, growth of juvenile Sockeye in the West Basin in 2014 was higher than that of fish collected in reference areas of the lake and thus consumption of zooplankton from the West Arm immediately following the event does not appear to have adversely affected growth.

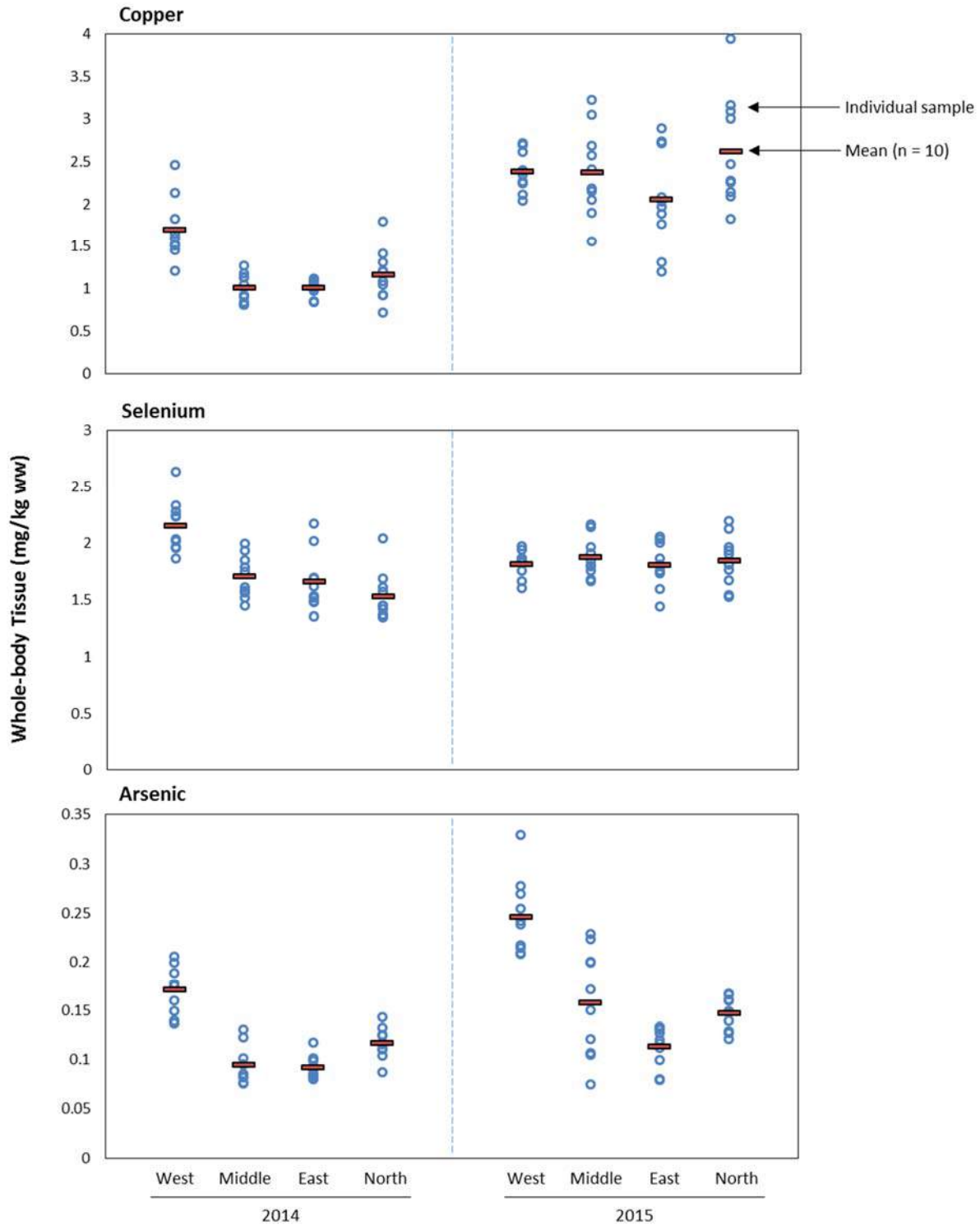


Figure 8: Temporal and Spatial Variability in Copper, Selenium and Arsenic Concentrations in Whole-body Juvenile Sockeye Salmon Collected from Quesnel Lake (Samples Collected in September; Data Courtesy of DFO)

Minnow (2016) collected benthic invertebrates from littoral and profundal substrates in the West Arm of Quesnel Lake and in Horsefly Bay (reference area) in August 2015. Copper in the littoral zone was similar between reference and West Arm invertebrates, whereas invertebrates from the profundal zone in the West Arm had more variable concentrations, some of which were higher than those observed in the reference area (Figure 9). Both arsenic and selenium were similar between reference and West Arm areas (littoral) or lower in the West Arm than in the reference area (profundal). Mercury data were not available for benthic invertebrate tissues. The tissue chemistry data should be viewed with caution because when aquatic invertebrates have ingested sediment particles and gut contents are not cleared prior to whole tissue analysis, actual uptake by the organism can be overestimated (Gillis et al. 2005; Sibley et al. 1997).

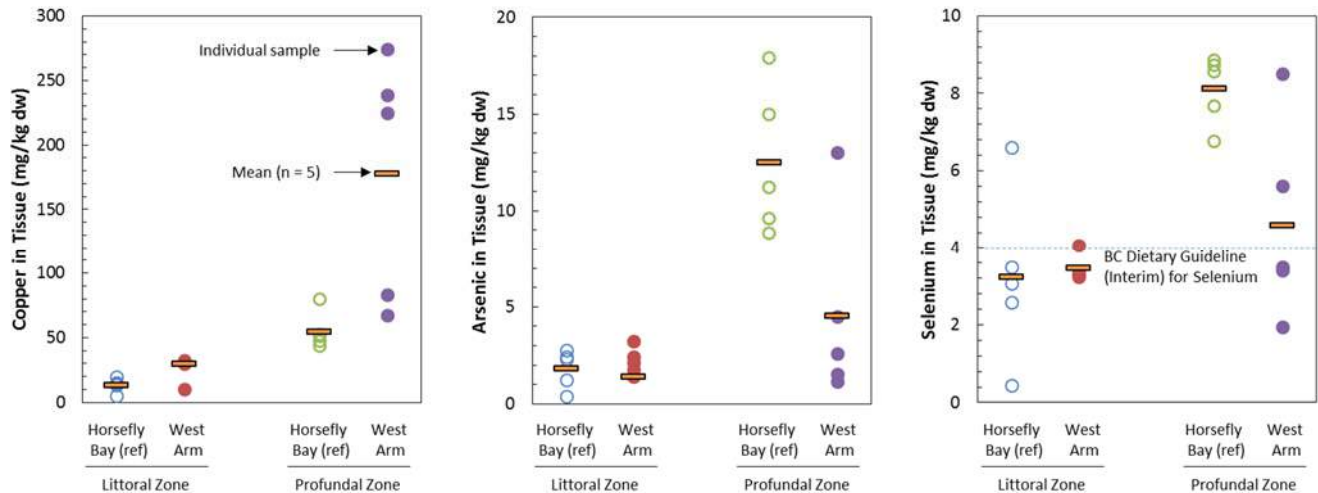


Figure 9: Spatial Variability in Benthic Invertebrate Tissue Chemistry from Composite Samples Collected in the Exposed (West Arm) and Reference (Horsefly) Areas of Quesnel Lake (August 2015; Minnow [2016])

3.4 Food Supply – Foraging Efficiency

Foraging efficiency can be affected by increased turbidity via change in feeding rates, reaction distance, prey selection and prey abundance (Bash et al. 2001; Muck 2010; Sigler et al. 1984). The potential for effects on foraging efficiency and food capture is dependent on the species and habitat being occupied, and the ultimate influence on productivity is balanced among food availability, prey capture success, and predator avoidance (De Robertis et al. 2003; Levy 1990; Roberge et al. 2001; Robertson et al. 2006).

The evaluation of potential effects of turbidity in 2015 on foraging efficiency indicated:

- **Littoral/Nearshore Area** - Fish feeding in littoral (i.e., the area less than 6 m deep along the shoreline) and nearshore zones may not have been affected because turbidity was less than 5 to 10 NTU in the top 5 to 10 m of the water column. Moreover, several fish species occupying the littoral zone feed at night or are benthic feeders and therefore do not rely on sight to capture prey (e.g., Northern Pikeminnow; sucker), or are not sensitive to turbidity (e.g., sculpin) (McPhail 2007).
- **Open-water Area** – Turbidity has remained at or lower than levels observed in 2014 (Figure 4) at which time effects to foraging efficiency did not appear to have occurred. The length and weight data for Sockeye Salmon collected in 2015 further support the interpretation that effects to fish in the open-water column are not occurring.

- **Benthic Area** - Fish species occupying the benthic zone feed at night or are benthic feeders and would not necessarily rely on sight to capture prey (e.g., Burbot, sucker; McPhail 2007). Feeding efficiency may thus not have been affected by increased turbidity. However, in those benthic zones at the bottom of Quesnel Lake, a reduction in food supply would have been expected. Benthic invertebrate data collected in 2015 is currently being reported on and will provide more information regarding food availability.

3.5 Bioenergetics

As discussed in Section 3.1.2, length and weigh data collected by DFO indicated that juvenile Sockeye Salmon captured from the West Arm of the West Basin in September 2014 were larger than those captured in reference areas of the lake, and were also larger than those collected from the West Arm in 2013 and 2015. Data for other fish species were not available. Turbidity has remained lower than levels observed in 2014 (Figure 4) at which time effects to foraging efficiency did not appear to have occurred. Therefore, it is unlikely that effects on bioenergetics occurred in 2015.

3.6 Stress

Suspended sediment can cause changes in behaviour such as avoidance (Bisson and Bilby 1982; Robertson et al. 2006) and physiological trauma such as gill damage (Birtwell 1999; Muck 2010; Servizi and Martens 1987). Turbidity and TSS concentrations in 2015 were lower than those observed in 2014, at which time avoidance behaviour and physical trauma were not noted. Therefore, it is unlikely that stress effects occurred in 2015.

As discussed in Section 3.1, Fathead Minnow and Rainbow Trout exposed to Quesnel Lake water in laboratory toxicity testing and juvenile Sockeye Salmon collected from Quesnel Lake did not exhibit reduced growth, which further supports the conclusion presented above.

3.7 Olfactory Effects

In natural waters, copper is known to be complexed with a variety of organic and inorganic ligands and thus free copper (Cu^{2+}) is typically present in minor amounts (Allen and Hansen 1996; Bazzi et al. 2002). It is this Cu^{2+} form that is the more toxic form of copper and has greater effect on olfactory organs, which play a role in predator avoidance and homing ability (Hecht et al. 2007).

When compared to literature thresholds for olfactory impairment, copper concentrations observed in Quesnel Lake in 2014 and 2015 are below the concentrations at which olfactory effects in salmon would be expected.

3.8 Disease

The physiological stress associated with exposure to elevated concentrations of TSS may reduce the ability of a fish to resist disease. Turbidity and TSS concentrations in 2015 were lower than those observed in 2014, at which time an increased incidence of disease was not expected. This was confirmed by the histopathological assessment of Sockeye Salmon collected in October 2014 from the West, Middle, East and North Arms of the lake (UPEI 2014; n = 160; data courtesy of MOE). The incidence of disease and parasites was not found to be different in the West Arm than in reference areas of Quesnel Lake.

As discussed in Section 3.1, Fathead Minnow and Rainbow Trout exposed to Quesnel Lake water in laboratory toxicity testing and juvenile Sockeye Salmon collected from Quesnel Lake did not exhibit reduced growth, which further supports the interpretation presented above.

3.9 Summary of Effects on Fish Productivity in Quesnel Lake

Post-event toxicity testing indicated that Quesnel Lake water did not affect survival or growth of fish, survival or growth of daphnid zooplankton, or growth of plant test species. The literature indicates that the direction of change in primary productivity as a result of introduction of suspended sediments to a lake depends on whether the phytoplankton are light limited or nutrient limited. The information available suggest that there was an influx of phosphorus into Quesnel Lake. Although changes in phytoplankton and zooplankton biomass were not observed, juvenile Sockeye Salmon collected west of Cariboo Island in 2014 were larger than those from the lake east of Cariboo Island. Juvenile Sockeye Salmon collected west of Cariboo Island in 2015 were similar in size to fish collected in other parts of the lake pre-event and in 2015. The absence of an observed increase in either phytoplankton or zooplankton abundance may reflect grazing/predation, which may in turn be reflected in the larger and possibly more numerous juvenile Sockeye observed in DFO's data compared to previous years.

4.0 UPDATED ASSESSMENT OF POTENTIAL EFFECTS ON PRODUCTIVITY IN POLLEY LAKE

The following sections provide an updated assessment on the potential for effects on productivity in Polley Lake based on data collected in 2015 subsequent to the preliminary assessment. This technical memorandum should be read in conjunction with Golder (2015), which provides additional description of the ecology of Polley Lake and an overview of literature regarding mechanisms of effect.

4.1 Fish Growth

4.1.1 Toxicity Testing

Growth of Fathead Minnow and Rainbow Trout were not affected in 7-day survival and growth tests conducted in water from Polley Lake (Minnow 2015a,b).

4.1.2 Fish Length and Weight

Lirette (2015a) surveyed the age structure and body condition of Rainbow Trout and Longnose Sucker in Polley Lake in September 2014. Mean condition factor (CF or K ; calculated based on length and weight) for rainbow trout was higher in 2014 than in 2012 and slightly lower for Longnose Sucker in 2014 than in 2012. The condition of these fish species did not appear to have been affected within seven weeks of the event, which corresponded to the period of highest turbidity at depth.

4.2 Food Supply – Quantity

4.2.1 Nutrient Inputs

Following the event, surface measurements of total phosphorus were higher than applicable WQGs, but the trophic status of Polley Lake did not change and remained mesotrophic/eutrophic post-event (Figure 10). Based on comparison to several indices of trophic status, Polley Lake was considered oligotrophic to mesotrophic in 2015 (Golder 2016a).

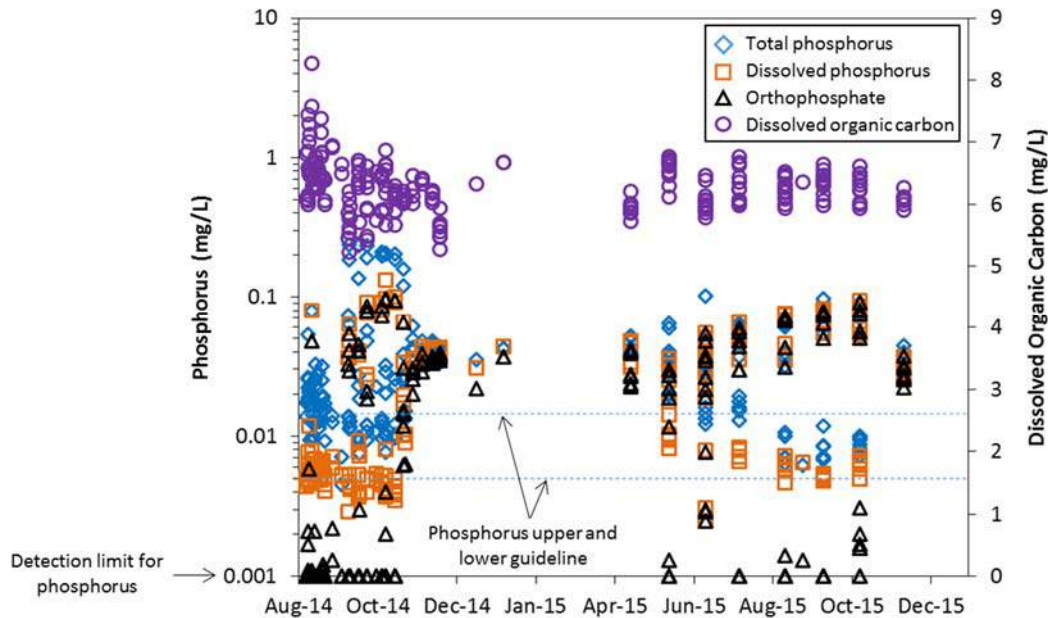


Figure 10: Temporal Variability in Phosphorus and Dissolved Organic Carbon in Polley Lake

4.2.2 Primary Productivity

There was no impairment of growth of either *Lemna minor* (vascular aquatic plant) or *Pseudokirchneriella subcapitata* (alga) in laboratory toxicity tests on water from Polley Lake in 2014 (Minnow 2015a).

TSS and turbidity levels through 2015 were lower than observed immediately following the event and the Secchi depths measured in Polley Lake post-event in September and October 2014 were similar to pre-event conditions in June and July 2014 and were within historical ranges (Figure 11; Golder 2015). There was no indication of a reduction in light penetration into the lake surface based on Secchi depth measured post event, during the period of measurement.

The most recent pre-event data for chlorophyll *a* measured in Polley Lake is from baseline studies conducted in 1995 and 1996, in which mean chlorophyll *a* concentrations were reported to range from 0.4 to 1.0 µg/L (Minnow 2014). In comparison, chlorophyll *a* measured in late 2014 was higher, and in 2015 was variable among sampling events, with some concentrations reported as within this historical range (July and September) and some higher or lower than this range (Figure 11).

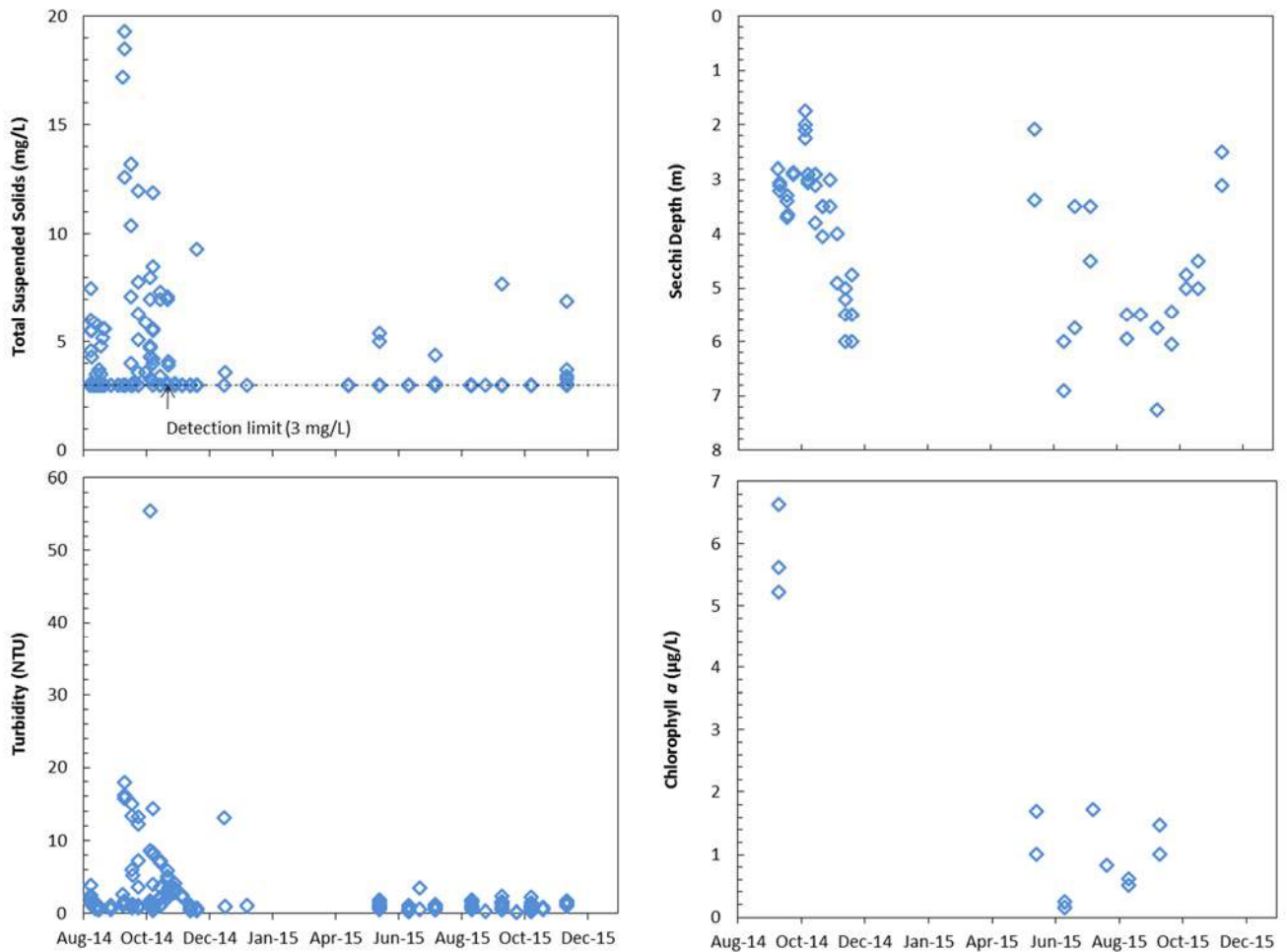


Figure 11: Temporal Variability in Water Clarity (Total Suspended Solids, Turbidity, Secchi Depth) and Chlorophyll a Concentration in Polley Lake

4.2.3 Zooplankton Productivity

Water from Polley Lake was not acutely toxic to *Daphnia magna* and did not affect survival or reproduction in *Ceriodaphnia dubia* (Minnow 2015a,b).

Zooplankton abundance in Polley Lake was highest in mid-summer, primarily driven by copepod abundance (Figure 12). Cladocerans comprised a smaller proportion of the community. In comparison, total zooplankton abundance in baseline samples (1989 to 1996) ranged from 1,394 to 559,437 organisms/m³, indicating that the plankton community in Polley Lake can be naturally variable (Minnow 2014).

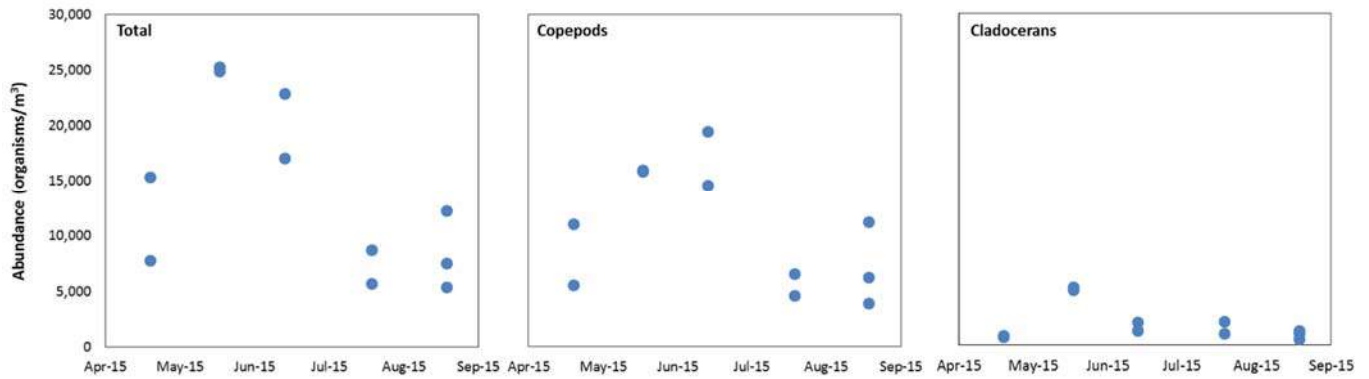


Figure 12: Temporal Variability in Zooplankton Abundance in Composite, Depth-integrated Samples Collected From Polley Lake

4.2.4 Benthic Invertebrates/Emerging Insects

Production of benthic invertebrates and emerging insects was disrupted in the littoral zone and immediately adjacent lakebed. Based on the findings of Minnow (2015a), this effect was temporary as invertebrates were found in most sediment samples collected in Polley Lake between August and October 2014. Additional data were collected in 2015 and are in the process of being reported.

4.3 Food Supply – Quality

MPMC staff collected zooplankton samples in 2015 for tissue chemistry (methods provided in Golder [2016a]). Data were not available from 2014 for comparison. Figure 13 illustrates the variability in copper, selenium, arsenic, and mercury concentrations through May to September sampling season. Copper and mercury appear to increase at the two Polley Lake sampling locations, whereas selenium and arsenic were similar among sampling dates. Selenium concentrations were at or near the BC dietary guideline (interim) for fish food items.

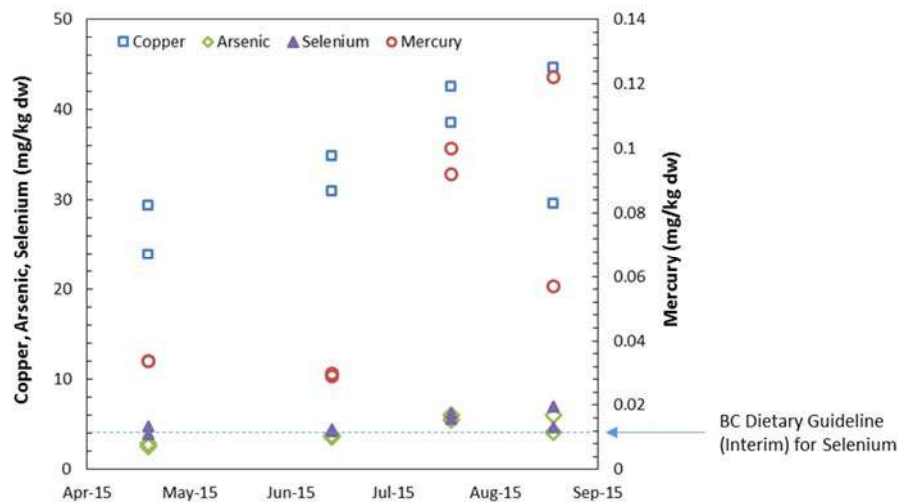


Figure 13: Temporal Variability in Zooplankton Tissue Chemistry from Composite, Depth-integrated Samples Collected From Polley Lake

Minnow (2016) collected benthic invertebrates from Polley Lake and Bootjack Lake (reference area) in August 2015. Copper, arsenic, and selenium concentrations were higher in Polley Lake samples than in Bootjack Lake samples and notably variable between replicates (Figure 14). Benthic invertebrates were also collected for tissue analysis in 2009 and 2012; during those sampling events, selenium concentrations ranged from approximately 5 to 10 mg/kg dw (Minnow 2014). The tissue chemistry data should be viewed with caution because when aquatic invertebrates have ingested sediment particles and gut contents are not cleared prior to whole tissue analysis, actual uptake by the organism can be overestimated (Gillis et al. 2005; Sibley et al. 1997).

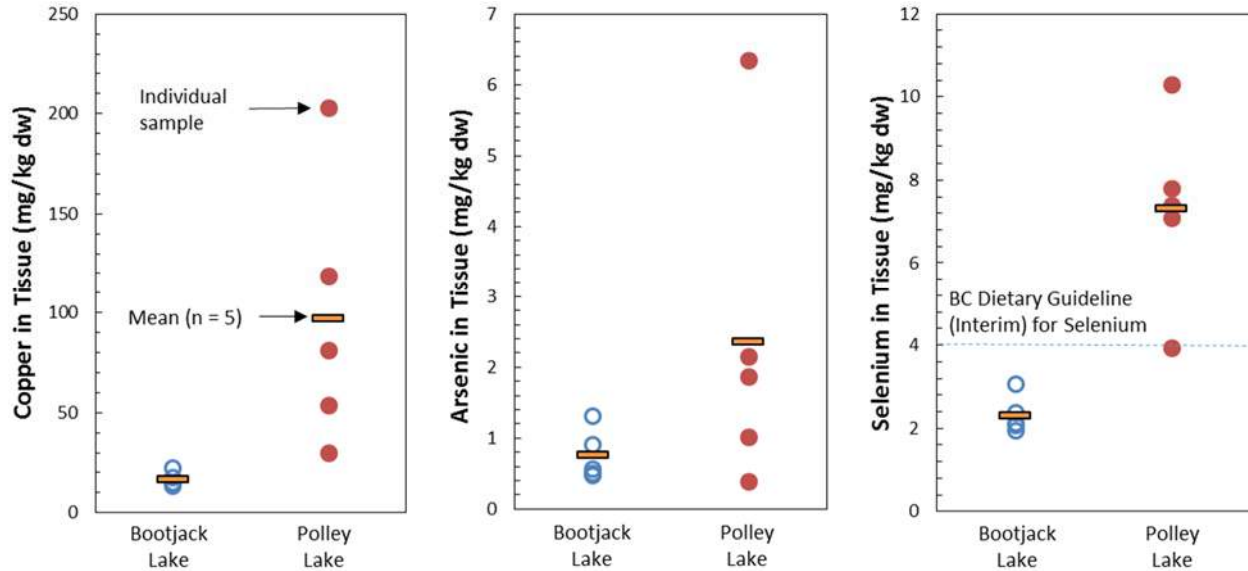


Figure 14: Spatial Variability in Benthic Invertebrate Tissue Concentrations of Copper, Arsenic, and Selenium (August 2015)

Despite the apparent increase in copper and mercury in zooplankton through the sampling season and higher concentrations in Polley Lake benthic invertebrates compared to Bootjack Lake, Rainbow Trout collected in May 2015 had liver and muscle tissue concentrations that were within the range observed in uncontaminated BC lakes (Figure 15; MELP 1992). Arsenic in liver and muscle tissues were lower than that observed in other BC lakes. The tissue concentrations observed in 2015 were also similar to or lower than concentrations in the same tissues collected from Polley Lake in September 2014.

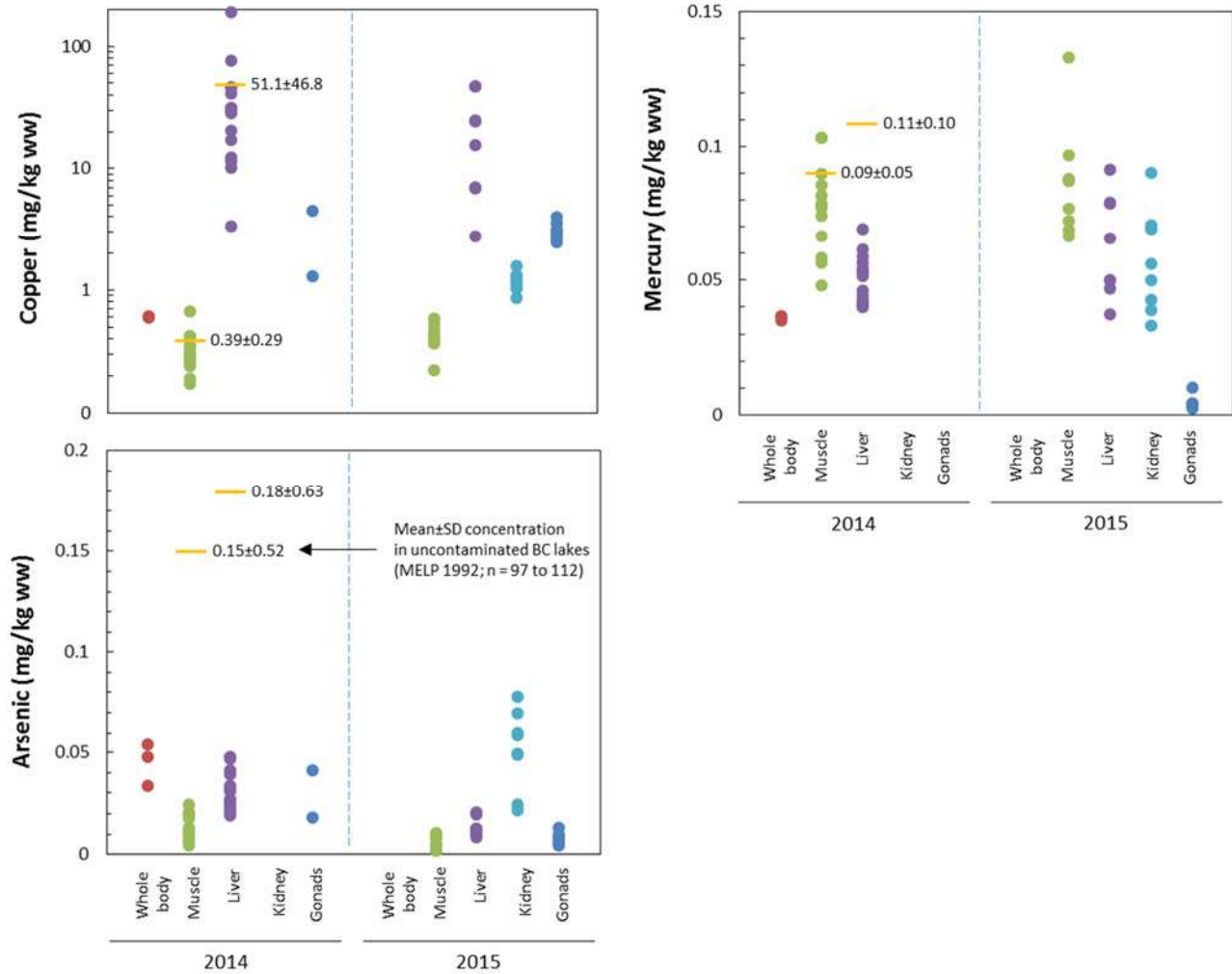


Figure 15: Copper, Arsenic and Mercury in Rainbow Trout Tissues Collected from Polley Lake (September 2014 and May 2015; data shown as wet weight concentrations)

Measured concentrations of selenium in a number of rainbow trout ovary samples from Polley Lake exceeded the applicable guideline of 11 mg/kg dw in 2015 and were higher than observed in 2014 or 2016. Whole-body and/or muscle concentrations have also exceeded the applicable guideline of 4 mg/kg dw in some instances in 2014 and 2015 (2016 data for tissues other than ovary were not available in time for inclusion in this memo). The rainbow trout data from Polley Lake in 2015 are undergoing additional data quality evaluation, as the concentrations appear to be anomalous and were not confirmed by sampling in 2016 (Golder, 2016b). The relationship between these concentrations and selenium in potential food sources is not clear and a definitive conclusion about whether or not selenium has increased in fish tissue in the study area as a result of the tailings deposit and the potential implications for reproduction (which is not addressed in this memo) will need to consider the site-specific ecology in the context of the variability between tissues, species, and sites. This level of analysis would typically be conducted in the detailed quantitative risk assessment. The data presented here are intended primarily to illustrate if there are gross differences in concentration that would highlight a topic for further evaluation. Additional discussion of these data is provided in Golder (2016b).

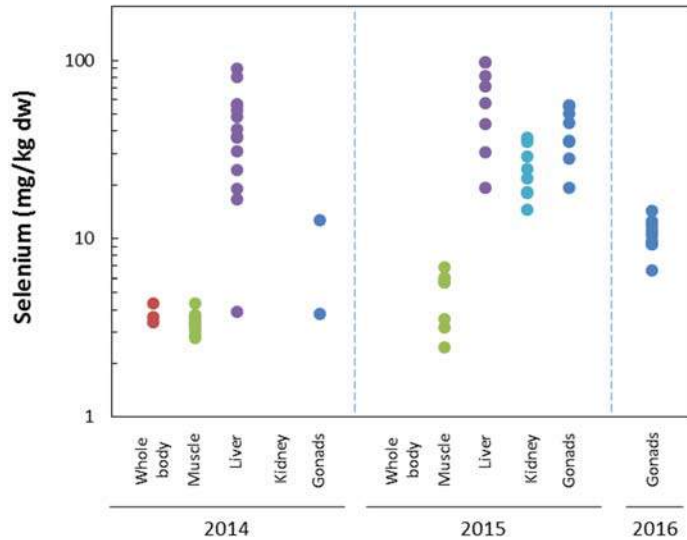


Figure 16: Selenium in Rainbow Trout Tissues Collected from Polley Lake (September 2014, and May 2015 and 2016; data shown as dry weight concentrations)

4.4 Food Supply – Foraging Efficiency

The potential for effects on foraging efficiency and food capture is dependent on the species and habitat being occupied. Fish feeding in littoral and nearshore zones was likely not affected in 2014 or through 2015 because turbidity was low (i.e., ≤ 3 NTU) in the top 7 m of the water column. Rainbow Trout length and weight data for 2014 do not suggest that foraging efficiency was affected (Section 4.1).

4.5 Bioenergetics

Rainbow Trout condition factor data for 2014 do not suggest that efficiency in conversion of energy was affected (Section 4.1).

4.6 Stress

As discussed in Section 4.1.1, Fathead Minnow and Rainbow Trout exposed to Polley Lake water in laboratory toxicity tests, and Rainbow Trout and Longnose Sucker collected from Polley Lake did not exhibit reduced growth, which is a potential outcome of stressors.

4.7 Olfactory Effects

Olfactory effects were not assessed for Polley Lake because the rainbow trout in Polley Lake are a resident population. A migration barrier between Polley Lake and Quesnel Lake exists at Hazeltine Canyon.

4.8 Disease

TSS concentrations observed were not high enough to reduce the ability of fish to resist disease and thus an increase in the incidence of disease as a result of increased turbidity would not be expected (Figure 11). As discussed in Section 4.1.1, Rainbow Trout and Longnose Sucker collected from Polley Lake did not exhibit reduced growth, which is a potential outcome of disease.

4.9 Summary of Effects on Fish Productivity in Polley Lake

The primary effect of the event on the Rainbow Trout of Polley Lake was the disruption to rearing habitat in Hazeltine Creek and the potential loss of a year-class of Rainbow Trout and the blockage of access to Hazeltine Creek for spawning in 2015. Post-event toxicity testing indicated that Polley Lake water did not affect survival or growth of fish, survival or growth of daphnid zooplankton, or growth of plant test species. Rainbow Trout and Longnose Sucker length and weight data suggest that feeding efficiency was not affected.

5.0 STATEMENT OF LIMITATIONS

This technical memorandum was prepared for the exclusive use of Mount Polley Mining Corporation (the Client). Any use that a third party may make of this report, or any reliance on or decisions made based on it, is the responsibility of the third parties. We disclaim responsibility for consequential financial effects on transactions or property values, or requirements for follow-up actions and costs. In evaluating the project, we have relied in good faith on information provided by others as noted. We assume that the information provided is factual and accurate. We accept no responsibility for any deficiency, mis-statement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons providing data, including derived predictions from those data, persons interviewed or contacted.

The services performed as described in this report were conducted in a manner consistent with the level of care and skill normally exercised by other members of the engineering and science professions currently practising under similar conditions, subject to the time limits and financial and physical constraints applicable to the services. The content of this report is based on information collected during our investigation, our present understanding of site conditions, the assumptions stated in this report, and our professional judgement in light of such information at the time of this report. This report provides a professional opinion and, therefore, no warranty is expressed, implied, or made as to the conclusions, advice and recommendations offered in this report. This report does not provide a legal opinion regarding compliance with applicable laws.

6.0 CLOSURE

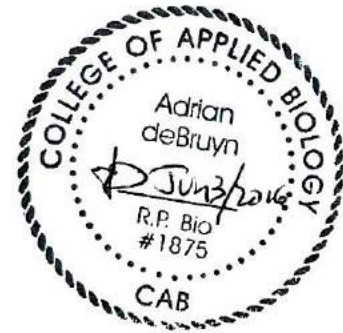
We trust that this technical memorandum provides sufficient information for your present needs. If you have any questions, please do not hesitate to contact the undersigned at 604-296-4200.

GOLDER ASSOCIATES LTD.



Barbara Wernick, M.Sc., R.P.Bio.
Principal, Senior Environmental Scientist

BGW/AMD/ih



Adrian deBruyn, Ph.D., R.P.Bio.
Associate, Senior Environmental Scientist

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APPENDIX H

Fish Tissue Metal Analysis

Summary of Available Fish Tissue Chemistry Data (2014-2015) for Assessment of Potential Changes in Concentrations related to the Mount Polley Tailings Storage Facility Dam Failure.

Prepared by:

Melanie Jaeger, B.Sc., Rainie Sharp, Ph.D., and Blair McDonald, M.E.T., R.P.Bio.

Golder Associates Ltd.

Summary of Selenium in Tissue Data Verification for Mount Polley Mining Corporation Frypan Gonad Tissue Samples – ALS Work Order L1621080 – ALS Corrective Action Report (CAR) #143968.

Prepared by:

Katherine B. Thomas, B.Sc., and Jerry Hozbecher, B.Sc.

ALS Environmental



APPENDIX H

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Golder Associates Ltd.

Letter Entitled: "Summary of Selenium in Tissue Data Verification for Mount Polley Mining Corporation Frypan Gonad Tissue Samples – ALS Work Order L1621080 – ALS Corrective Action Report (CAR) #14398" to Trish Miller

Prepared by:

Katherine B. Thomas, B.Sc. and Jerry Holzbecher, B.Sc.

ALS

DATE 3 June 2016**REFERENCE No.** 1411734-158-TM-Rev0-10000**TO** Colleen Hughes
Mount Polley Mining Corporation**CC** Lyn Anglin, Ph.D., Imperial Metals**FROM** Trish Miller, Golder Associates Ltd.**EMAIL** trish_miller@golder.com**SUMMARY OF AVAILABLE FISH TISSUE CHEMISTRY DATA (2014 – 2015) FOR ASSESSMENT OF POTENTIAL CHANGES IN CONCENTRATIONS RELATED TO THE MOUNT POLLEY TAILINGS DAM FAILURE****1.0 EXECUTIVE SUMMARY**

This technical memorandum provides a summary of fish tissue chemistry collected after the release of tailings as a result of a foundation failure of the Tailings Storage Facility at the Mount Polley Mine in British Columbia, Canada, on August 4, 2014. All available fish tissue chemistry data collected subsequent to the tailing release was consolidated into a single data set to facilitate future interpretative efforts, including a small number of samples from the spring of 2016 which were analyzed on a rush basis. Additional 2016 fish tissue samples are still being processed by the analytical laboratory. Golder has prepared the following preliminary summary of the nature of the available fish tissue data (e.g., sample locations, number of species and types of tissues sampled). The data were divided into exposure and reference sites, and subdivided by species, tissue type and year to facilitate a high-level exploratory analysis. Basic descriptive statistics were calculated and boxplots were visually examined to provide a preliminary view of the available data in light of relevant exposure pathways. Based on this visual examination, Golder's preliminary view is:

- Selenium concentrations in Polley Lake rainbow trout ovary tissue in 2015 showed a substantial increase that appeared anomalous relative to other species, locations and years. This increase in selenium concentrations was not present in rainbow trout samples collected in 2016. Further work to validate the potentially anomalous data with the analytical laboratory is on-going. Regardless, measured concentrations in a number of rainbow trout ovary samples from Polley Lake in a number of samples in 2014 and 2016 have exceeded the applicable guideline of 11 mg/kg dw, and whole-body and/or muscle concentrations have also exceeded the applicable guideline of 4 mg/kg dw in a number of samples in all three years. Further evaluation is recommended.
- Arsenic accumulation in fish may also be occurring. There were no exceedances of the applicable guideline observed in tissue samples that would be typically consumed by humans (e.g., muscle samples), but there were increases observed in some organ-specific analysis that may be a precursor for accumulation in muscle tissue over time.
- For other metals, the pattern of accumulation in tissues was inconsistent.



Although a sizeable number of fish have been collected, sampling has been generally opportunistic. Data are also currently limited to two years of sampling and bioaccumulation may change over time for different metals as restoration of the food web continues. Further evaluation of the 2016 fish tissue chemistry as it becomes available is recommended.

Golder emphasizes that the value of this type of a data set is enhanced when it is based on a sampling program that consistently targets specific locations along a representative exposure gradient and focuses on specific species (or functional groups of species) and tissue types with a sufficient number of samples to allow for statistical analysis (i.e., to test specific hypotheses). A minimum sample size of 8 and a preferred sample size of 20 or more should be considered in future sampling programs to support quantitative statistical analyses. These analyses are central to both the initial quantitative risk assessment (i.e., a realistic worst-case exposure concentration is typically based on a 95% upper confidence limit of the mean) as well as future monitoring programs (i.e., trends in fish tissue concentrations over time; statistical differences between exposure and reference sites). Golder cautions that sampling effort for reference sites will need to be reviewed, given that some samples from reference sites were also elevated relative to numerical guidelines (e.g., mercury).

2.0 CONTEXT OF DATA SOURCES

This technical memorandum provides a summary of fish tissue chemistry collected after the release of tailings as a result of the failure of the Tailings Storage Facility (TSF) at the Mount Polley Mine (the Mine) in British Columbia, Canada, on August 4, 2014. Multiple stakeholders collected fish tissue samples following the release of tailings. This technical memorandum is intended to consolidate the data from these multiple sources into a single data set to facilitate future interpretative efforts, and consists of the following three elements:

- A narrative preliminary summary of the nature of the available fish tissue data is provided (e.g., sample locations, number of species and types of tissues sampled). Data were divided into exposure and reference sites, and subdivided by species, tissue type and year.
- Basic descriptive statistics (e.g., sample size (n); mean; standard deviation) and censored boxplots of concentrations) have been calculated for all substances measured in fish tissue data. Each censored boxplot considers one classification of data (e.g., difference in tissue concentration of a metal¹ in a given species by exposure/reference site or by year) resulting in a large number of individual boxplots.
- Observations are summarized for those specific combinations of metals and fish tissues that have been identified for the ecological and human health risk assessment to frame future statistical analyses that may be conducted. A preliminary summary based on the fish tissue chemistry data collected to date and provides important early context about the nature of the available data, and highlights several sources of uncertainty that will need to be considered in greater detail as the monitoring program progresses.

¹ For the purposes of this memo, the term “metals” includes metalloids (e.g., arsenic) and non-metals (e.g. selenium).

3.0 METHODS

This section provides an overview of the methods used to view the fish tissue chemistry data and the quality assurance/quality control (QA/QC) measures taken by Golder Associates to consolidate the data into a single data set.

- Analytical chemistry reports and field collection notes were provided by Mount Polley Mining Corporation (MPMC) and their consultants, the British Columbia Ministry of Environment (BC MoE), and the Department of Fisheries and Oceans (DFO). Golder has relied on the information provided by others and has not conducted independent verification of those data or field information beyond a QA/QC check that analytical data were correctly transcribed and that there were no obvious errors in fish collection methodology as described in the field notes.
- Fish were collected from multiple locations within the study area by the various parties (Figure 1). Fish were collected by the various stakeholders in coordination with local First Nations groups, lodge owners, and guide outfitters. A wide variety of sampling methods were used, including electrofishing units, multi-panel gill nets, trap nets, gee minnow traps, and angling.
- Fish tissue samples include both whole-body and muscle tissues, as well as specific organs (Tables 1 and 2). Some samples were a composite of multiple individual fish. Species include lake trout (*Salvelinus namaycush*), peamouth chub (*Mylocheilus caurinus*), sockeye salmon (*Oncorhynchus nerka*), rainbow trout (*Oncorhynchus mykiss*), burbot (*Lota lota*), kokanee (*Oncorhynchus nerka*), largescale sucker (*Catostomus macrocheilus*), northern pikeminnow (*Ptychocheilus oregonensis*), redbelt shiner (*Richardsonius balteatus*), longnose dace (*Rhinichthys cataractae*), longnose sucker (*Catostomus catostomus*), and mountain whitefish (*Prosopium williamsoni*). A general trend was that samples for small-body fish tended to be either composite or whole-body, while samples for large-body fish tended to focus on muscle or other organs. In a limited number of instances, field duplicate samples were available (e.g., two muscle samples from the same fish) as part of QA/QC protocols, but these samples were not included in the data analyses to avoid pseudo-replication.
- Fish tissue samples were submitted to ALS Environmental (ALS) in Burnaby, British Columbia. Detection limits (DL) are summarized in Table 3. All laboratory results, including confirmation of detection limits and parameter lists, were reviewed by Golder upon receipt. Golder conducted a review of the certificates of analysis and examined data distributions to verify the validity of the data. Golder concluded the data are reliable based on consideration of the reported qualifiers related to the laboratory QA/QC methods (i.e., relative percent differences; recovery of certified reference samples) and consistency in data distribution among samples (i.e., no large magnitude differences among samples, or unexplained outliers)².
- Tissue chemistry results were reported in milligrams per kilogram (mg/kg) and expressed in terms of wet weight (ww), with the exception of selenium which is expressed in terms of dry weight (dw). Selenium is expressed in terms of dw to allow direct comparisons to the BC MoE selenium guideline, which is presented in dw. If a parameter was reported below the analytical DL, a value of one half the DL was used to calculate summary statistics.
- Data was provided to Golder in electronic form by the various stakeholders and was compiled into a master spreadsheet for data evaluation. Tables containing data summaries (e.g., summary statistics) underwent a 10% QA check by a second, independent person.

² One peamouth chub sample was removed as an outlier due to field notes that indicated the sample was contaminated. One northern pikeminnow sample was excluded because the collection site could not be determined.

The primary method for data evaluation was to subdivide the data into location (i.e., exposure versus reference), species and year. Differences amongst each classification (location, species, tissue type, year) were examined visually using boxplots. A key consideration is sample collection was conducted to support a variety of sampling objectives and/or preliminary hypotheses. There was no integrative *a priori* study design or associated objectives regarding sample collection (i.e., target species, fish age, tissue types, or sample sizes). Fish tissue sample collection should be considered as opportunistic, and in many of the sample classifications, there are insufficient data to allow for meaningful comparisons.

Table-1: Site naming convention and classification of sampling locations

Site Name	Description of Location	Fish Species Collected in 2014	Fish Species Collected in 2015	Collecting Agency
Bootjack Lake ^A	Reference site located East of Polley Lake.	Rainbow Trout	Rainbow Trout	MPMC
Hazeltine Creek	Considered a reference site because samples were collected prior to the event.	Rainbow Trout (pre-event)	n/a	MPMC
Horsefly River	Exposed site located South of Quesnel Lake (i.e., migratory exposure as fish moved through Quesnel Lake to this location).	Sockeye Salmon (adult)	n/a	DFO
Polley Lake ^A	Exposed site located North of the TSF.	Longnose Sucker, Rainbow Trout ¹ , Redside Shiner	Rainbow Trout	MPMC, BC MoE
Quesnel Lake East ^B	Reference site located in the East arm of Quesnel Lake	Sockeye Salmon (juvenile)	Burbot, Lake Trout, Sockeye Salmon	MPMC, DFO
Quesnel Lake Hazeltine Creek Confluence ^B	Exposed site located at the confluence of Hazeltine Creek and Quesnel Lake	Burbot, Lake Trout, Longnose Dace, Longnose Sucker, Mountain Whitefish ² , Northern Pikeminnow, Peamouth Chub, Redside Shiner	Burbot, Lake Trout, Largescale Sucker, Northern Pikeminnow, Peamouth Chub, Redside Shiner	MPMC, BC MoE
Quesnel Lake Horsefly River Confluence ^B	Exposed site located at the confluence of Horsefly River and Quesnel Lake	Burbot, Longnose Dace, Northern Pikeminnow, Peamouth Chub	n/a	MPMC
Quesnel Lake near Quesnel River ^B	Exposed site located in north-west Quesnel Lake near the lake-to-river transition zone	Burbot, Kokanee, Mountain Whitefish, Northern Pikeminnow, Peamouth Chub, Rainbow Trout	Kokanee	MPMC, BC MoE
Quesnel Lake North ^B	Reference site located in the North arm of Quesnel Lake; also includes fish captured at the Wasco Creek and Grain Creek confluences.	Kokanee, Northern Pikeminnow, Peamouth Chub, Sockeye Salmon (juvenile)	Largescale Sucker, Peamouth Chub, Sockeye Salmon	MPMC, BC MoE, DFO
Quesnel Lake Middle ^B	Potentially exposed site, located in Quesnel Lake, east of the Horsefly River Confluence, but west of the North and East Arms	Sockeye Salmon (juvenile)	Sockeye Salmon	DFO
Quesnel Lake West ^B	Exposed site located in Quesnel Lake, NW of the Hazeltine Creek Confluence	Sockeye Salmon (juvenile)	Sockeye Salmon	DFO
Quesnel River ^B	Exposed site located in Quesnel River, downstream of Likely	Rainbow Trout	Rainbow Trout	MPMC
Soda Creek	Reference site	Sockeye Salmon (adult)	n/a	DFO
Trio Lake ^A	Reference site located west of Bootjack Lake	n/a	Rainbow Trout	MPMC

Notes: BC MoE = British Columbia Ministry of Environment; DFO = Department of Fisheries and Oceans; MPMC = Mount Polley Mining Corporation; n/a = not applicable

¹ Rainbow trout collected in 2015 were collected from Frypan Creek, a tributary on the north side of Polley Lake. Samples were pooled with Polley Lake because rainbow trout move between the creek and lake, and use Frypan Creek as spawning habitat.

² Fish species was not provided, field notes indicated "whitefish"; species was therefore assumed to be Mountain Whitefish.

^{A, B} The focus of comparisons between reference and exposed sites are amongst small lake sites (A) or within Quesnel Lake (B)

Table-2: Summary of Fish Tissue Samples Collected from the Study Area for All Sites, Fish Species, and Tissue Types during 2014 and 2015 Sample Collections

Sample Collection Site	Pre-Event		2014																																	
	Rainbow Trout		Burbot				Kokanee			Lake Trout			Longnose Dace		Longnose Sucker		Mountain Whitefish				NPM	Peamouth Chub		Rainbow Trout				RS	Sockeye Salmon							
	O	M	O	L	M	WB	O	L	M	O	L	M	WB	L	M	WB	O	L	M	WB	WB	WB	O	L	M	WB	WB	O	L	M	WB	G	C			
Bootjack Lake																																				
Horsefly River																																				
Polley Lake															1	16																				
Quesnel Lake East																																				
Quesnel L - Hazeltine Creek Confluence	8	8	8	12	12					33	51	51	1	1	1		3	4	4		36	1														
Quesnel L - Horsefly River Confluence				1	1								2								10	6														
Quesnel L - near Quesnel River							1	10	10	10											7	12		1	1											
Quesnel L - North Arm							10	10	10												31	2										3		10	3	3
Quesnel L - Middle																																3		10	3	3
Quesnel L - West																															6		10	6	6	
Quesnel River																							3	12	12											
Soda Creek																															30	30	30			
Trio Lake																																				
GRAND TOTAL	8	8	8	13	13	1	20	20	20	33	51	51	3	1	2	16	3	4	4	1	84	21	6	36	36	3	4	30	72	60	40	12	12			

Sample Collection Site	2015																												GRAND TOTAL							
	Burbot			Kokanee				Lake Trout			Largescale Sucker		NPM			Peamouth Chub		Rainbow Trout				RS	Sockeye Salmon													
	O	L	M	O	K	L	M	O	K	L	M	M	O	K	L	M	WB	O	K	L	M	WB	WB	L	G	C										
Bootjack Lake																		8		8	8														41	
Horsefly River																																				60
Polley Lake																		8	8	8	8														86	
Quesnel Lake East		7	7					2	10	10	10													10	3	3	3								75	
Quesnel L - Hazeltine Creek Confluence	1	4	4					3	9	10	10	8	4	6	4	7	8						8												322	
Quesnel L - Horsefly River Confluence																																			20	
Quesnel L - near Quesnel River				1	8	8	8																												78	
Quesnel L - North Arm												8					8						8	10	3	3	3								125	
Quesnel L - Middle																							10	4	4	4									41	
Quesnel L - West																							10	7	7	7									59	
Quesnel River																		1	8	8	8														52	
Soda Creek																																			90	
Trio Lake																			8	8	8														24	
GRAND TOTAL	1	11	11	1	8	8	8	5	19	20	20	16	4	6	4	7	16	17	24	32	32	16	40	17	17	17								1073		

Notes: NPM = Northern pikeminnow; RS = Redside shiner; O = Ovary; M = Muscle; L = Liver; WB = Whole Body; G = Gill; C = Carcass; K = Kidney.
Ovary Se data from eight additional rainbow trout collected from Polley Lake in spring 2016 have considered in the interpretation. Data for other analytes, species and tissue types have not yet been integrated.

Table 3: Detection Limits for Fish Tissue Samples Collected in 2014 and 2015 from the Quesnel Lake Region

Parameter	Detection Limit
% Moisture	-
Aluminum (Al)-Total	0.2 - 1.0
Antimony (Sb)-Total	0.001 - 0.008
Arsenic (As)-Total	0.004 / 0.006
Barium (Ba)-Total	0.01- 0.04
Beryllium (Be)-Total	0.002 - 0.04
Bismuth (Bi)-Total	0.002 / 0.004
Boron (B)-Total	0.2 - 0.8
Cadmium (Cd)-Total	0.001 - 0.003
Calcium (Ca)-Total	-
Cesium (Cs)-Total	0.001
Chromium (Cr)-Total	0.01 - 0.08
Cobalt (Co)-Total	0.004
Copper (Cu)-Total	-
Iron (Fe)-Total	2
Lead (Pb)-Total	0.002 - 0.01
Lithium (Li)-Total	0.1 / 0.2
Magnesium (Mg)-Total	-
Manganese (Mn)-Total	-
Mercury (Hg)-Total	0.006
Molybdenum (Mo)-Total	0.004 - 0.02
Nickel (Ni)-Total	0.010 - 0.080
Phosphorus (P)-Total	-
Potassium (K)-Total	-
Rubidium (Rb)-Total	-
Selenium (Se)-Total	-
Silicon (Si) – Total	10.0 / 20.0
Silver (Ag)-Total	0.001 - 0.008
Sodium (Na)-Total	-
Strontium (Sr)-Total	-
Sulphur (S) – Total	-
Tellurium (Te)-Total	0.004 / 0.008
Thallium (Tl)-Total	0.0004
Tin (Sn)-Total	0.02 / 0.04
Titanium (Ti)-Total	0.2 / 0.4
Uranium (U)-Total	0.0004
Vanadium (V)-Total	0.02 - 0.08
Zinc (Zn)-Total	-
Zirconium (Zr)-Total	0.04 / 0.08
Methyl Mercury (MeHg) - Total	-
Lipid Content	-

DL = Detection Limit; % = percent; mg/kg ww = milligrams per kilogram wet weight; - = all samples above DL.

Note: Parameters with DL ranges indicate more than two DL were reported.

4.0 SYNTHESIS

4.1 Narrative Summary

A total of 1073 samples were submitted for fish tissue chemistry analysis: 663 samples were collected in 2014, and 286 samples were collected in 2015. The narrative summaries in Tables 1 and 2 highlight that:

- Many samples were collected from the exposure site in Quesnel Lake near the mouth of Hazeltine Creek. Several species/tissue types were collected in both 2014 and 2015 from this location, with sample sizes of more than 10 samples.
- Many of the remainder of the fish tissue data in terms of sample location, fish species, and tissue type had limited number of samples, which will likely reduce statistical power in any future analysis of spatial or temporal patterns. It may be necessary to group data (e.g., a general comparison of exposure to reference in lieu of specific locations correlated by proximity to the tailings release).
- Different types of tissue are used in the ecological and human health risk assessments. The general practice is that ecological risk assessments for piscivores would focus on whole-body and organ-specific tissue chemistry, while human health risk assessment would focus on muscle tissue data. The diversity of tissue types will need to be considered in the calculation of representative worst case concentrations for different receptor groups.

As part of the compilation of the various datasets, it was necessary to make several inferences due to an ambiguity in the accompanying field notes. These assumptions are listed in Attachment 1.

4.2 Basic Descriptive Statistics

4.2.1 Summary Statistics and Magnitude of Difference

Summary statistics for the available fish tissue chemistry data are provided in Attachment 2, and include:

- Number of samples (n);
- Percent of samples with a concentration greater than the detection limit;
- Minimum, median and maximum concentration; and
- Mean concentration, standard deviation, and standard error.

Attachment 2 also includes a comparison between exposure and reference and/or year for a subset of sites, species, and tissue types, where sufficient data was available. The magnitude of the difference (as a percentage of the median) was calculated if:

- Greater than (>) 50 percent (%) of samples were > DL;
- There were at least four samples in each data set available for comparison.

As an example, the magnitude difference between exposure and reference sites was calculated as follows:

$$\text{Magnitude Difference (\%)} = \frac{(\text{Exposure Median} - \text{Reference Median})}{\text{Reference Median}} \times 100$$

4.2.2 Censored Boxplots

Fish tissue chemistry data were plotted for each metal by species, tissue type and waterbody using censored boxplots as described in Barrett et al. (2014). Boxplots are provided in Attachment 3, and focused on the following three broad comparisons:

- Exposure versus reference based on 2014 data;
- Exposure versus reference based on 2015 data; and
- 2014 data versus 2015 data.

Censored boxplots were created as follows:

- Data sets with six or more samples were plotted using censored boxplots. Data sets with less than six samples, or when few samples had concentrations greater than the detection limit were plotted as individual values. This approach was used because boxplots can provide a misleading representation of the data distribution when sample sizes are small.
- The box of the boxplot was defined as the 25th percentile, the 75th percentile, and the median. The lower whisker was defined as the minimum concentration within 1.5 times the interquartile range (IQR) below the 25th percentile; the upper whisker was defined as the maximum concentration within 1.5 times the IQR above the 75th percentile. Concentrations outside of the range of the whiskers were plotted as individual values.
- The boxplots were censored at the DL (Helsel 2005) using the maximum DL if multiple detection limits exist within the dataset. Concentrations below the DL were represented by open symbols at half the DL. The approximate proportion (e.g., <25% or 25% to 50%) of concentrations below DL can be determined by the sections of the boxplot that are censored (and are reported in Attachment 2).

The purpose of these boxplots was to provide a visual representation of the available fish tissue chemistry data in an exploratory format and to identify obvious changes in tissue chemistry. Subdivision of the data by species, sample type, location and year produced a substantial number of boxplots. The boxplots are not considered to be a statistical analysis, but are provided to facilitate a visual inspection of the data. When summarizing the observations from the data, if the boxplots overlapped between reference and exposed sites, this was taken to indicate that the populations were similar. When boxplots did not overlap, this was considered an indication that the populations may be different. Preliminary observations included:

- Boxplots were not created for a number of fish species and/or sites because there was insufficient samples. As noted above in Section 4.1, the available data was collected opportunistically, and as a result, some of the data are insufficient to draw conclusions about metal concentrations for a given location or species.
- Beryllium and lithium concentrations were below DL in greater than 50% of samples in all species, while chromium, lead, nickel, and vanadium were below DL in greater than 50% of samples in many fish species. From a statistical perspective, a large proportion of non-detectable values means that further detailed analysis is unlikely to be defensible. From a toxicological perspective, a large number of non-detectable values in multiple species, and in both reference and exposed locations, suggests that bioaccumulation of those specific metals is limited.
- Silver and titanium were only analyzed for a small subset of samples submitted to the laboratory by BC MoE in 2014; therefore, no comparisons could be made for these metals (and no boxplots were created).

4.2.3 Regression Analysis

Censored boxplots are presented for mercury and selenium in Attachment 2. A linear regression analysis for tissue concentration against fish length as a covariate was conducted (Attachment 4). Regression plots were created in Excel; outliers were removed if the standardized residual was >3 . A statistical significance, or P-value (P), of <0.1 was used to identify statistically significant regression relationships. The purpose of performing the regression analyses was to account for variability in fish size as potential source of bias in the comparison of fish tissue chemistry. Both selenium and mercury have the potential to biomagnify in the food web and differences in fish size could reflect differences in fish diet that could influence the apparent difference (or lack thereof) in the comparison between exposure and reference sites. A statistically significant regression relationship between fish length and metal concentration supports the conclusion that differences in fish size would need to be considered as a potential bias. If the size of fish collected overlap, and the regression is significant, the magnitude of the difference between exposure and reference (or between years) in metal concentrations is determined visually by examining the regression plots (Attachment 4). If the size of the fish collected do not overlap between groups, differences in mercury and selenium concentrations cannot be fully assessed. If the size of the fish do overlap, but the regression was not significant, the magnitude of the difference between exposure and reference (or between years) in metal concentrations is determined visually by examining the censored boxplots (Attachment 2), and/or by consideration of the magnitude calculations. General observations of the regression analyses include:

- The mercury-length regression was most often significant in muscle and whole-body tissue samples of piscivorous species (e.g., lake trout and northern pikeminnow). In some instances, mercury-length regressions were also significant in liver and kidney tissue samples of these species.
- The selenium-length regression was not significant in the majority of species and tissue types; selenium-length regressions were only significant in kokanee (muscle, liver and ovary from reference sites only), lake trout (only in kidney tissue), northern pikeminnow (whole body from reference sites only), and sockeye (muscle, and whole body from reference sites only).
- Of those regressions that were significant, both mercury and selenium relationships were positive for the majority of analyses, with the exceptions of kokanee (ovary, exposure sites only), northern pikeminnow (whole body, exposure sites only), and sockeye salmon (muscle, reference sites only).
 - The mercury-length regression relationships were significant ($P < 0.1$) at one or more sites in kokanee (2014 muscle and ovary), lake trout (all years, muscle, liver, and kidney), largescale sucker (2015 muscle), northern pikeminnow (2014 whole body), rainbow trout (all years, muscle, liver and kidney), and sockeye salmon (2014, muscle liver, and whole body).
 - The selenium-length regression relationships were significant ($P < 0.1$) at one or more sampling sites in kokanee (2014 liver and ovary, 2014 and 2015 muscle), lake trout (2015 kidney), northern pikeminnow (2014 whole body), and sockeye salmon (2014 muscle, liver and whole body).
- A regression analysis for peamouth chub collected in 2015 was not conducted because fish length data were not available.

These observations highlight that a definitive conclusion about whether or not mercury or selenium have increased in fish tissue in the study area as a result of the tailings deposit will need to consider the site-specific ecology in the context of the variability between tissues, species, and sites. This level of analysis would typically be conducted in the detailed quantitative risk assessment. Boxplots for selenium and mercury should be considered in this context, and are intended primarily to illustrate if there are gross differences in concentration that would highlight a topic for further evaluation.

4.3 Guideline Comparisons

Fish tissue metal concentrations were compared to provincial and national guidelines when available. There are guidelines for arsenic, mercury and selenium.

- Fish protein is subject to Canadian Food Inspection Agency (CFIA, 2015) guidelines concerning the sale of fishery products for human consumption: arsenic concentrations must be below 3.5 mg/kg ww for human consumption. Golder notes that the Health Canada guideline for protein concentrate is being used to screen intact fish tissues; therefore, it is used for preliminary comparisons only.
- The CFIA and Health Canada guidelines state that fish collected for commercial use may contain a maximum of 0.5 mg/kg ww mercury to be approved for human consumption (CFIA 2015).
- The BC MoE (2014) in collaboration with the Ministry of Health recommended screening values for selenium concentrations in fish for human consumption. The screening values are 7.3 ug/g dw for subsistence consumers, 14.5 ug/g dw for the general population and 75 ug/g dw based on the recommended two servings of fish per week.
- BC MoE also contains tissue-based guidelines for selenium for fish ovary, whole body and muscle (BC MoE 2016) for environmental protection: 11 mg/kg dw for fish ovary and 4 mg/kg dw for whole body and muscle. For the purposes of comparison to the BC MoE guideline, selenium data are presented in mg/kg dw herein. All other metal concentrations are presented in mg/kg ww. From a toxicological perspective, the preferred tissue for evaluating the potential for adverse effects to fish populations will be eggs and ripe ovary tissues (McDonald and Chapman 2007| Janz 2012). BCMOE (2014) derived the guideline of 11 mg/kg dw by applying a 2-fold safety factor to a toxicological effects threshold of approximately 22 mg/kg dw observed for cold-water salmonids such as rainbow trout. This guideline is intended to provide a protective screening value in the absence of a detailed site-specific evaluation. Golder notes that the approach for deriving site-specific science-based benchmarks for quantitative risk assessment of selenium is an evolving topic.

The proportion of samples above guidelines is reported by species (including all species for which data are available) and tissue type. The primary comparison for arsenic and mercury is for muscle tissue because this sample type is the most frequently consumed portion of the fish. However, liver and kidney may be consumed by some populations, and therefore, Golder has conservatively retained those comparisons in this data summary. General observations regarding the number of exceedances of these guideline values are as follows.

- There were no arsenic guideline exceedances observed in lake trout, peamouth chub, rainbow trout, or sockeye salmon from the study area in 2014 or 2015. There was one burbot liver sample (Quesnel Lake Hazeltine Creek Confluence, collected in 2014) with an arsenic concentration of 5.1 mg/kg ww.
- Mercury concentrations exceeded the CFIA guideline of 0.5 mg/kg ww in 30 fish tissue samples collected from the study area in 2014, and in 19 samples collected from the study area in 2015 (Table 4). Some of these exceedances occurred in fish from the reference areas. Mercury concentrations that were greater than the CFIA mercury guideline in 2014 ranged from 0.506 to 2.5 mg/kg ww. This does not necessarily imply a risk to human health: fish consumption advisories consider both the magnitude and frequency of exceedances using an aggregate measure of fish consumption over time.

Table 4: Summary of Mercury Tissue Exceedances

Year	Species	Location	Type and Number
2014	Burbot	Quesnel Lake Horsefly River Confluence (exposure)	1 of 1 muscle
	Burbot	Quesnel Lake Hazeltine Creek Confluence (exposure)	4 of 12 muscle and 2 of 12 liver samples
	Lake trout	Quesnel Lake Hazeltine Creek Confluence (exposure)	5 of 51 muscle, 15 of 51 liver, and 1 of 33 ovary sample
	Rainbow trout	Quesnel Lake near Quesnel River (exposure)	1 of 2 muscle and 1 of 2 liver sample
2015	Burbot	Quesnel Lake East (reference)	1 of 7 muscle
	Lake trout	Quesnel Lake Hazeltine Creek Confluence (exposure)	1 of 10 muscle, 1 of 10 liver, and 2 of 9 kidney
	Lake trout	Quesnel Lake East (reference)	1 of 10 muscle, 2 of 10 liver, and 5 of 10 kidney
	Rainbow trout	Trio Lake (reference)	1 of 8 muscle, 2 of 8 liver, and 3 of 8 kidney

Selenium concentrations that exceed the BC MoE screening values for the protection of First Nation subsistence consumers and the general population are outlined in Table 5. The screening value for the protection of First Nation subsistence consumers of 7.3 ug/g dw was based on a fish ingestion rate of 220 g/day (Health Canada, 2004). The screening value for the protection of the general population of 17.5 ug/g dw was based on a fish ingestion rate of 111 g/day (Health Canada, 2004). Concentrations of selenium in muscle, liver and ovary tissue were compared to the guidelines. Further input is needed from the Williams Lake and Soda Creek First Nations regarding appropriate fish tissue to consider for local consumption.

Table-5: Summary of Selenium Exceedances in Fish Tissue Samples Compared to Screening Values for the Protection of Human Health.

Guideline	Year	Species	Location	Type and Number
Low Fish Intake (75 mg/kg dw) Recreational Fishers	2014	Rainbow Trout	Bootjack Lake (reference)	2 of 8 liver
		Rainbow Trout	Polley Lake (exposure)	3 of 15 liver
		Rainbow Trout	Quesnel Lake near Quesnel River (exposure)	1 of 2 liver
		Rainbow Trout	Quesnel River (exposure)	1 of 12 liver
		Sockeye Salmon (adult)	Horsefly River (exposure)	8 of 30 liver
		Sockeye Salmon (adult)	Soda Creek (reference)	3 of 30 liver
	2015	Kokanee	Quesnel Lake near Quesnel River (exposure)	1 of 8 liver
		Rainbow Trout	Polley Lake (exposure)	3 of 8 liver
Moderate Fish Intake (14.5 mg/kg dw) General Population	2014	Burbot	Quesnel Lake Hazeltine Creek (exposure)	2 of 12 liver
		Kokanee	Quesnel Lake near Quesnel River (exposure)	10 of 10 liver
		Kokanee	Quesnel Lake North Arm (reference)	10 of 10 liver
		Lake Trout	Quesnel Lake Hazeltine Creek (exposure)	1 of 51 liver
		Rainbow Trout	Bootjack Lake (reference)	6 of 8 liver
		Rainbow Trout	Polley Lake (exposure)	14 of 15 liver
		Rainbow Trout	Quesnel Lake near Quesnel River (exposure)	2 of 2 liver
		Rainbow Trout	Quesnel River (exposure)	2 of 3 ovary, 8 of 12 liver, 1 of 12 muscle
		Sockeye Salmon (adult)	Soda Creek (reference)	30 of 30 liver
		Sockeye Salmon (adult)	Horsefly River (exposure)	30 of 30 liver
	2015	Kokanee	Quesnel Lake near Quesnel River (exposure)	8 of 8 liver
		Rainbow Trout	Bootjack Lake (reference)	1 of 8 liver
		Rainbow Trout	Polley Lake (exposure)	8 of 8 ovary, 8 of 8 kidney, 8 of 8 liver
		Rainbow Trout	Quesnel River (exposure)	6 of 8 liver
		Rainbow Trout	Trio Lake	8 of 8 liver
		Sockeye Salmon (juvenile)	Quesnel Lake East (reference)	1 of 3 liver
		Sockeye Salmon (juvenile)	Quesnel Lake North Arm (reference)	1 of 3 liver
		Sockeye Salmon (juvenile)	Quesnel Lake Middle (exposure)	1 of 4 liver
Sockeye Salmon (juvenile)	Quesnel Lake West (exposure)	1 of 7 liver		

Guideline	Year	Species	Location	Type and Number
High Fish Intake (7.3 mg/kg dw) First Nation Subsistence	2014	Burbot	Quesnel Lake Hazeltine Creek (exposure)	1 of 8 ovary, 2 of 12 liver
		Kokanee	Quesnel Lake Quesnel River (exposure)	10 of 10 liver
		Kokanee	Quesnel Lake North Arm (reference)	10 of 10 liver
		Lake Trout	Quesnel Lake Hazeltine Creek (exposure)	36 of 51 liver
		Longnose Sucker	Polley Lake (exposure)	3 of 16 whole body
		Mountain Whitefish	Quesnel Lake Hazeltine Creek (exposure)	3 of 3 ovary, 3 of 4 liver
		Rainbow Trout	Bootjack Lake (reference)	1 of 1 ovary, 8 of 8 liver
		Rainbow Trout	Polley Lake (exposure)	1 of 2 ovary, 14 of 15 liver
		Rainbow Trout	Quesnel Lake near Quesnel River (exposure)	2 of 2 liver
		Rainbow Trout	Quesnel River (exposure)	3 of 3 ovary, 10 of 12 liver, and 1 of 12 muscle
		Sockeye Salmon (adult)	Horsefly River (reference)	30 of 30 liver
		Sockeye Salmon (adult)	Soda Creek (reference)	4 of 30 ovary, 30 of 30 liver
		Sockeye Salmon (juvenile)	Quesnel Lake North Arm (reference)	3 of 3 liver
		Sockeye Salmon (juvenile)	Quesnel Lake Middle (exposure)	1 of 3 liver
	Sockeye Salmon (juvenile)	Quesnel Lake West (exposure)	6 of 6 liver	
	2015	Burbot	Quesnel Lake Hazeltine Creek (exposure)	1 of 1 ovary
		Kokanee	Quesnel Lake Quesnel River (exposure)	8 of 8 liver
		Lake Trout	Quesnel Lake Hazeltine Creek (exposure)	2 of 9 kidney, 1 of 10 liver
		Lake Trout	Quesnel Lake East (reference)	3 of 10 kidney, 2 of 10 liver
		Rainbow Trout	Bootjack Lake (reference)	7 of 8 liver
		Rainbow Trout	Polley Lake (exposure)	8 of 8 ovary, 8 of 8 kidney, 8 of 8 liver
		Rainbow Trout	Quesnel River (exposure)	1 of 1 ovary, 7 of 8 kidney, 8 of 8 liver
		Rainbow Trout	Trio Lake	3 of 8 kidney, 8 of 8 liver
		Sockeye Salmon (juvenile)	Quesnel Lake North Arm (reference)	3 of 3 liver
Sockeye Salmon (juvenile)		Quesnel Lake Middle (exposure)	4 of 4 liver	
Sockeye Salmon (juvenile)	Quesnel Lake West (exposure)	7 of 7 liver		
Sockeye Salmon (juvenile)	Quesnel Lake East (reference)	3 of 3 liver		

Note: Samples from Polley Lake rainbow trout in 2015 are potentially anomalous.

Selenium concentrations that exceed the BC MoE guideline for Environmental Protection are outlined in Table 6. Selenium concentrations in 2014 exceeded BC MoE guidelines in 4 ovary samples (12.6 to 18.1 mg/kg dw), 3 muscle samples (4.3 to 18.1 mg/kg dw) and 21 whole body samples (4.2 to 8.5 mg/kg dw). Selenium concentrations in 2015 exceeded BC MoE guidelines in 8 ovary samples (19.3 to 55.7 mg/kg dw), 6 muscle samples (4.6 to 6.9 mg/kg dw) and 1 whole-body sample (4.1 mg/kg dw). Data from eight rainbow trout collected from Polley Lake in the spring of 2016 were also analyzed on a rush basis. Selenium concentrations in these 2016 fish exceeded or met BC MoE guidelines in 3 ovary samples (11 to 14.2 mg/kg dw). Data from other tissues, species and sampling locations are still being processed by the analytical laboratory. Further validation of the 2015 rainbow trout ovary samples is being conducted by the analytical laboratory in light of the potential anomaly (i.e., ovary concentrations in Polley Lake rainbow trout are substantially higher in 2015 than in either 2014 or 2016). Additional context about the potentially anomalous data is provided below in Section 5.3.2.

Table 6: Summary of Selenium Tissue Exceedances for Environmental Protection

Year	Species	Location	Type and Number
2014	Longnose sucker	Polley Lake (exposure)	1 of 1 muscle
	Rainbow trout	Polley Lake (exposure)	1 of 15 muscle and 1 of 2 ovary
	Rainbow trout	Quesnel River (exposure)	1 of 12 muscle and 3 of 3 ovary
	Rainbow trout	Quesnel Lake near Quesnel River (exposure)	1 of 2 muscle
	Longnose Sucker	Polly Lake (exposure)	16 of 16 whole-body
	Northern Pikeminnow	Quesnel Lake Hazeltine Creek Confluence (exposure)	2 of 36 whole-body
	Northern Pikeminnow	Quesnel Lake Horsefly River Confluence (exposure)	1 of 10 whole-body
	Northern Pikeminnow	Quesnel Lake North Arm (reference)	1 of 31 whole-body
	Rainbow trout	Polly Lake (exposure)	1 of 3 whole-body
2015	Largescale Sucker	Quesnel Lake Hazeltine Creek Confluence (exposure)	1 of 8 muscle
	Peamouth Chub	Quesnel Lake Hazeltine Creek Confluence (exposure)	1 of 8 whole-body
	Rainbow trout	Polley Lake (exposure)	5 of 8 muscle and 8 of 8 ovary
2016	Rainbow trout	Polley Lake (exposure)	3 of 8 ovary

Note: Additional fish tissue samples from 2016 are being analyzed. Ovary samples from Polley Lake rainbow trout in 2015 are potentially anomalous.

5.0 FURTHER EVALUATION OF SELECTED SPECIES AND METALS

5.1 Risk Assessment and Toxicological Context

As noted in Section 2, fish tissue chemistry data were reviewed in further detail for selected combinations of metals and fish species and/or sample types to provide early context for how the data will be integrated into the ecological and human health risk assessment. The risk assessment focuses on evaluating source, exposure pathways and receptors that are retained for quantitative analysis at the completion of the problem formulation. Fish tissue chemistry data would typically be used to develop a realistic, worst-case exposure estimate for each receptor being evaluated. This receptor-specific evaluation means that different parts of the fish tissue chemistry data set would be used for each receptor, depending on a variety of factors such as fish ecology, variability in the data, and the strength of association between the chemistry data and the underlying assessment endpoint. Ultimately, fish tissue can be used as part of the following three measurement endpoints:

- Bioaccumulation by fish – Increased accumulation of metals in fish tissue can cause adverse effects to the fish themselves.
- Consumption of fish by humans --- Increased metals concentrations in muscle samples from large bodied fish caught for recreation or sustenance can contribute to risks to human receptors. Further input is needed from the Williams Lake and Soda Creek First Nations regarding appropriate fish tissue to consider for local consumption.
- Consumption of fish by ecological receptors – Increased metals concentrations in whole-body samples from smaller fish can contribute to risks to piscivorous fish and wildlife. Increased metals concentrations in muscle or organ samples can also contribute to increased risk to higher trophic level wildlife such as bears or raptors which might preferentially feed on these parts of this fish instead of consuming the whole body.

Metal uptake varies among fish species and tissue types, and is dependent upon source (i.e., exposure from the water, food, or both), environmental conditions (e.g., water temperature, pH, hardness), exposure frequency, exposure duration (i.e., acute or chronic), and tissue function (e.g., storage versus elimination capacity). Key factors that need to be considered in the risk assessment in terms of selecting specific fish species or tissue types to generate the realistic worst-case exposure estimates include:

- For metals that have the potential to biomagnify (e.g., mercury and selenium), fish age, size, or trophic level will influence tissue concentrations (Jeziarska and Witeska 2006). Food-borne metal concentrations will have larger influences on exposure than the concentrations of these metals in the water (Wood et al. 2012). Trophic level is important in selecting species for monitoring and evaluating exposure scenarios.
- For nutritionally essential metals (e.g., copper, selenium, and zinc), physiological mechanisms exist for uptake of the metals from the environment and depuration, because they are required in trace amounts for biological life (i.e., due to their participation in metabolic reactions; Jeffrey 2001 in Wood et al. 2012).
- Some metals are known to accumulate to a greater degree in specific tissues. In some instances, tissue-specific samples are more relevant for evaluating the potential for direct effects to fish than muscle tissue or whole-body samples. Some general considerations include:
 - Arsenic — The potential for arsenic to be taken up from the water may be substantially different among fish species, varying by orders of magnitude (Wood et al. 2012). Upon uptake by fish, arsenic tends to accumulate primarily in liver, and to a lesser degree in the muscle and kidney tissue (Oladimeji et al. 1979 in Wood et al. 2012).

- Cadmium – Cadmium is rapidly absorbed in fish first by the liver, and then by the kidney (Chowdhury et al. 2003 in Wood et al. 2012); however, the primary organ for long-term storage of cadmium in fish is the kidney. Cadmium has also been shown to accumulate in the gills and intestine, but not significantly in muscle tissue (Wood et al. 2012).
- Copper – Copper primarily accumulates in the liver, accounting for 40%-90% of whole-body copper concentrations in fish (Miller et al., 1992; 1993).
- Mercury - Mercury is primarily accumulated in muscle tissue of fish; however, mercury accumulates first in the gills, intestine, kidney, and liver tissues following water- or food-borne exposures. Mercury is incorporated into the tertiary structure of proteins, so is not easily depurated over time.
- Selenium - Fish primarily accumulate selenium in the liver and kidney, followed by the ovary, muscle and bone (Muscatello et al. 2006 in Wood et al. 2012); however, the most important organ with respect to fish health is the ovary. This is because selenium is maternally transferred to developing eggs, leading to toxicity to developing larvae (BC MoE 2016).
- Fish mobility (i.e., home range size) will also influence bioaccumulation. Fish with large home ranges may avoid impacted areas and thereby reduce their overall exposure. Some species (i.e., adult sockeye salmon) are transitory and would only be in contact with impacted waters as they migrate to their natal streams. Salmon are unlikely to be feeding during their migration which will further reduce their dietary exposure. Conversely, fish with small home range sizes (e.g., small-bodied fish) are more likely to remain in direct contact with the impacted area, and therefore, their exposure will be more closely linked to the water-borne and dietary exposure conditions within their home range. If a fish was captured from an immediately impacted area (e.g., Quesnel Lake at the Hazeltine Creek confluence), they will most reflect the conditions of exposure in that area if they have a small home range size.

5.2 Selection of Representative Fish Species and Locations

For the purposes of this preliminary evaluation, Golder selected a subset of fish species for which there were adequate data (e.g., at least 8 samples in both exposure and reference sites; sampled in both years) and focused on species that represent small-bodied fish that are more likely to reflect local conditions and large bodied fish that likely reflect exposure in a larger area and are valued for human consumption. The following species were selected:

- Peamouth chub and juvenile sockeye salmon were selected as a representative small-bodied fish that are expected to occupy a smaller home range (relative to large-bodied fish such as lake trout or rainbow trout) and would be consumed by piscivorous fish. Definitive data regarding peamouth chub home range size are not currently available, but literature supports this assumption (e.g., Environment Canada 1995). There is also an adequate number of peamouth chub samples from both exposed and reference sites in both years. Juvenile sockeye salmon were also considered to occupy a smaller home range, although they move from their spawning habitats out in to the open lakes as they mature.
- Lake trout and rainbow trout were selected as representative larger-bodied fish that are likely to be consumed by humans (and potentially, by large piscivorous wildlife). There are also adequate numbers of lake trout and rainbow trout samples from both exposed and reference sites in both years.
- Adult sockeye salmon were excluded because the duration and frequency of their time in impacted areas is limited to migration back to their natal streams. Feeding during this time is expected to be minimal. Juvenile sockeye are included because they would be residents within the study area and are of concern to many stakeholders.

The primary focus of the comparison was between locations that shared a similar ecology. For example, fish samples from Polley Lake were compared to samples from Bootjack Lake or Trio Lake. Fish samples from exposed sites in Quesnel Lake were compared to reference sites in Quesnel Lake.

5.3 Findings

5.3.1 Consumption by Humans

Figure 2 provides a summary of the available boxplots for specific metals in the muscle samples from large-bodied fish species. As described above, lake trout, rainbow trout and juvenile sockeye salmon were identified as a reasonable surrogate for the preliminary consideration of this pathway. Individual boxplots with pair-wise comparisons for different sites, species and years are provided in Attachment 2. The purpose of Figure 2 is to highlight whether there are obvious changes in metal accumulation between reference and exposed sites, or between years that would indicate that there has been a change in tissue concentrations. In brief, results are summarized as follows:

- Arsenic concentrations in muscle samples were variable among reference and the exposed sites. Samples from Polley Lake rainbow trout appeared to be similar to Bootjack and Trio Lake rainbow trout, as well as rainbow trout collected from Hazeltine Creek prior to the release of tailings. The boxplots for rainbow trout and lake trout caught in exposed sites in Quesnel Lake overlapped with the boxplots for lake trout collected from the reference sites in Quesnel Lake, indicating that there was not a significant increase in fish tissue concentrations observed. All measured concentrations were less than the tissue guideline.
- Copper concentrations in muscle samples were similar among reference and exposed sites.
- Mercury concentrations in muscle samples appeared to be similar between exposed sites and reference sites. The maximum observed concentrations were observed in Trio Lake³ and Quesnel Lake (East) which were sampled as reference areas. About 10% lake trout muscle samples from both exposed and reference areas of Quesnel Lake had tissue concentrations that exceeded the muscle tissue guideline for the protection of human health.
- Selenium concentrations in rainbow trout muscle from 2015 Frypan Creek (tributary to Polley Lake) were frequently higher than the tissue guideline for environmental protection, and appear to be elevated relative to the applicable reference sites (i.e., Bootjack Lake, Trio Lake). These samples are part of the same certificate of analysis as the anomalous ovary data and data validation has not yet been completed. The selenium concentrations measured in Frypan Creek rainbow trout muscle did not exceed the screening value for First Nation subsistence fish consumers. Selenium concentrations in Polley Lake rainbow trout muscle appear similar to those observed in Hazeltine Creek rainbow trout, which were collected prior to the release of tailings.
- Zinc concentrations in muscle tissue appeared to be generally consistent between exposed and reference sites, and were also lower than the median concentrations measured in Hazeltine Creek rainbow trout, which were collected prior to the release of tailings.

³ Based on the metals concentrations found in fish tissue from Trio Lake, it was observed that Trio Lake should be reviewed as a reference location

5.3.2 Bioaccumulation by Fish

Figure 3 to 5 provide summaries of the available fish tissue chemistry data for organ-specific samples presented as censored boxplots for the specific metals identified. Individual censored boxplots showing comparisons of exposure and reference sites, species and years are provided in Attachment 2. The purpose of the five summary figures presented herein is to highlight changes in metal concentrations between reference and exposed sites, or between years in tissues that have been associated with metal accumulation. In brief, results are summarized as follows:

- For arsenic and copper, liver concentrations were generally consistent between the exposed and reference sites (e.g., Polley Lake compared to Bootjack and Trio Lakes; Quesnel Lake (Quesnel River) compared to Quesnel Lake (East)). One potential exception is juvenile sockeye salmon from Quesnel Lake (West) which tended to have higher liver arsenic and copper concentrations than those observed in other species. There are no juvenile sockeye salmon liver samples from reference sites, and therefore, it is not clear whether this is a species-specific difference (i.e., sockeye accumulate more arsenic in their liver than rainbow trout) or a potential site-specific influence. For arsenic in kidney samples, there may be an increased concentration in the exposed site (Quesnel River) compared to the relevant reference site (Quesnel Lake – East). This was not observed in the Polley Lake to Trio Lake comparison. Kidney concentrations were generally consistent for other metals (i.e., boxplots tended to overlap).
- Mercury concentrations in fish liver were variable for both the reference sites and exposed sites. Some of these concentrations exceeded the fish tissue guideline. Liver tissue is not commonly consumed, but Golder would welcome input on this from the Williams Lake and Soda Creek First Nations.
- For zinc, a similar pattern was observed in sockeye salmon livers as was observed for arsenic and copper (i.e., zinc concentrations in juvenile sockeye are higher than those observed in other species). There was no relevant reference site for sockeye salmon. There was no visually evident difference in zinc liver concentrations for the other species. There may be an increase in zinc kidney concentrations based on the lack of overlap in the boxplots for Quesnel River versus Quesnel Lake (East); however, the magnitude of this difference is quite low.
- Concentrations of vanadium in fish liver samples were generally consistent between reference and exposed sites and between 2014 and 2015 and many concentrations were below the detection limit.

A potential anomaly for selenium was identified. Specifically, ovary concentrations in rainbow trout collected from Polley Lake (Frypan Creek) in 2015 showed a substantial increase relative to ovary concentrations in rainbow trout collected from Hazeltine Creek or Bootjack Lake in 2014 (Figure 5). A similar increase was noted in rainbow trout kidney (Figure 4) and muscle samples (Figure 2) for the same individual fish. These data was contained in a single certificate of analysis, and therefore, the analytical laboratory was requested to provide further validation (currently in progress). No obvious calculation errors have been found to this point, and further validation checks are underway. These concentrations were considered potentially anomalous based on the magnitude of the increase, the lack of a similar magnitude of increase in water or fish dietary concentrations, and:

- Consideration of rainbow trout muscle and ovary data for a broader range of dates. Data were assembled from monitoring data collected prior to the tailings release, and a rush analysis was requested for rainbow trout samples collected in the spring of 2016. Figure 7 provides plots of the individual fish concentrations grouped by year and sampling location. The 2015 ovary samples were markedly elevated in the context of both pre-tailings monitoring, as well as two of the three years of post-tailings data. The concentrations in 2015 were not duplicated in the 2016 sampling, despite the fact that a number of the 2016 fish were collected from the same location as those collected in 2015.

- Consideration of the ratio of egg:muscle samples. The ratios of concentrations were calculated for individual fish and are summarized in Figure 8. The median ratio for all rainbow trout (excluding the potential anomalous fish) was 2.2, which is consistent with the median ratio of 2.3 observed for rainbow trout measured from a range of selenium-impacted sites (deBruyn and Costa 2015). The median ratio observed for the potentially anomalous fish (i.e., the eight 2015 rainbow trout from Polley Lake) was 7.9. Although site-specific variation in the ratio would be expected, the magnitude of the departure for the specific subset of potentially anomalous fish relative to the overall population of fish throughout the watershed provides further evidence that the rainbow trout data from 2015 may not be representative of the population as a whole.

Golder is also pursuing the alternative hypothesis that the data from 2015 are valid and potentially representative by expanding on the preliminary analysis summarized in Figures 7 and 8. Notwithstanding the potential for anomalous data in a subset of the available data, Golder recommends further evaluation of long-term trends in selenium concentrations and their potential for adverse effects to aquatic populations because there have been several other rainbow trout with an ovary concentration greater than the guideline value of 11 mg/kg, and a number of muscle or whole-body samples from a variety of species with a tissue concentration greater than the guideline value of 4 mg/kg dw. An exceedance of the generic guideline does not necessarily indicate that there is a risk to fish populations because guidelines are based on a conservative evaluation of the available scientific literature. Toxicological thresholds will vary for different species, and the available rainbow trout ovary concentrations (excluding the potential anomalous data) does not exceed the lowest reported species-specific EC10 value of 21 mg/kg dw cited by BCMOE (2014; various re-analysis of Holm et al 2005). Further evaluation of the potential effects of selenium on aquatic communities will need to consider a variety of field- and laboratory-based lines of evidence and establish that there is a cause-effect relationship between increased selenium in the environment from mine influences and a relevant population-level effect for fish (cf. McDonald and Chapman 2007 for an example of a weight-of-evidence framework designed for selenium).

5.3.3 Consumption by Piscivores

Figure 6 provides a summary of the available boxplots for specific metals in the available whole body peamouth chub and juvenile sockeye salmon samples. As described above, peamouth chub and juvenile sockeye salmon were considered reasonable surrogates for the preliminary consideration of potential risks to piscivorous wildlife. Individual boxplots with pair-wise comparisons for different sites, species and years are provided in Attachment 2. The purpose of this summary figure is to highlight whether there are obvious changes in metal accumulation between reference and exposed sites, or between years that would indicate that this pathway is operable. An operable pathway would require further in-depth evaluation as part of the detailed risk assessment.

Cadmium, mercury and selenium concentrations may be elevated in whole body peamouth chub samples collected from Quesnel Lake at Hazeltine Creek relative to Quesnel Lake in the North Arm, based on the lack of overlap in their boxplots. Conversely, the box plots overlapped for zinc and copper, indicating that the concentrations were similar between exposed and reference fish. This comparison is limited to one exposed site (Quesnel Lake – Hazeltine Creek) compared to one reference site (Quesnel Lake – North Arm).

For juvenile sockeye salmon, arsenic concentrations may be higher in whole body samples from exposed compared to reference and also higher in 2015 compared to 2014. For mercury, a difference in fish length did not allow a comparison between exposed and reference fish. There were no apparent spatial or temporal trends in the whole body concentrations of copper, cadmium, selenium and zinc in juvenile sockeye salmon.

6.0 CONCLUSIONS AND NEXT STEPS

The primary objective of this assignment was to integrate fish tissue data collected by a variety of parties into a single data set, and to complete a basic exploratory analyses of the available data to help determine if there has been a change in metal concentrations in fish as a result of the tailings dam failure. The potential for increased metal concentrations to be present in muscle and whole-body samples is relevant to risks to humans and ecological receptors that feed on fish. Concentrations of metals in liver, kidney or ovary tissues may be a concern for human health if these tissue are consumed, but are generally used to indicate exposure and the potential to lead to chronic effects on fish, either as a result of direct toxicological effects, or as an indirect result as an increased proportion of their metabolic energy is spent on detoxification, storage or excretion processes.

Basic descriptive statistics were calculated and boxplots were visually examined to provide early context about the nature of the available data in light of relevant exposure pathways. Based on this visual examination, Golder concluded:

- Selenium in Polley Lake rainbow trout ovary tissue in 2015 was one of the few metal/tissue combinations that suggest a significant increase in metal accumulation may be present; however, a portion of the data set may be anomalous relative to the preponderance of available selenium tissue data and was not duplicated by data collected in the spring of 2016. Golder recommends further evaluation of long-term trends in selenium concentrations and their potential for adverse effects to aquatic populations. Further effort to determine if the potentially anomalous data are valid is on-going.
- About 10% of lake trout muscle samples from both exposed and reference areas of Quesnel Lake had tissue mercury concentrations that exceeded the muscle tissue guideline for the protection of human health.
- There is some indication that arsenic concentrations may be elevated in liver tissue. There were no exceedances of the Food Directorate guideline observed in muscle tissue samples that would be typically consumed by humans, but there were increases observed in some liver and whole body samples (juvenile sockeye salmon) that suggest concentrations should be monitored over time.
- Whole-body concentrations of mercury and selenium appeared to be elevated in whole body peamouth chub samples collected from Quesnel Lake at Hazeltine Creek relative to Quesnel Lake in the North Arm.
- For copper and vanadium, concentrations in fish tissues did not appear to be different in exposed compared to reference sites.
- For other metal and tissue combinations considered in the above evaluation, this preliminary examination of the data did not reveal a trend.

These observations should be considered in the context of the limitations of the data set. Although a sizeable number of fish have been collected, sampling has been opportunistic and not necessarily connected to a specific hypothesis or study design. Opportunistic sampling has the advantages of providing initial coverage for a wider area with a large number of species, and acts to highlight that bioaccumulation is ultimately based on a large number of inter-dependent species- and location-specific factors. Data are also limited to two years of sampling, even though impacted areas have not necessarily been fully recolonized by aquatic invertebrates that interact directly with deposited tailings and form the base of the food web for the fish community.

The value of this type of a data set is enhanced when it is based on a sampling program that targets specific locations along a representative exposure gradient and focuses on specific species (or functional groups of species) and tissue types with a sufficient number of samples to allow for statistical analysis. A minimum sample size of 8 and a preferred sample size of 20 or more should be considered in future sampling programs to support quantitative statistical analyses. These analyses are central to both the quantitative risk assessment (i.e., a realistic worst-case exposure concentration is typically based on a 95% upper confidence limit of the mean) as well as future monitoring programs (i.e., trends in fish tissue concentrations over time; statistical differences between exposure and reference sites). Sampling effort for reference sites will need to be considered, given that some samples from reference sites were also elevated relative to numerical guidelines.

7.0 CLOSURE

We trust that the information contained in this technical memo is sufficient for your needs at this time. If you have any questions or concerns, please do not hesitate contact us.

GOLDER ASSOCIATES LTD.

M. Jaeger

Melanie Jaeger, BSc.
Fisheries Biologist

Sharpe

Rainie Sharpe, MSc., PhD
Fish Biologist/Ecotoxicologist

B. McDonald

Blair McDonald, M.E.T., R.P.Bio.
Senior Environmental Scientist, Associate



MJ/RLS/syd

- Figures:
- Figure 1 - Fish Tissue Sampling Locations
 - Figure 2 - Summary of Available Muscle Chemistry Data for Select Fish Species and Sampling Sites (2014, 2015)
 - Figure 3 - Summary of Available Liver Chemistry Data for Select Fish Species and Sampling Sites (2014, 2015)
 - Figure 4 - Summary of Available Kidney Chemistry Data for Select Fish Species and Sampling Sites (2015 only)
 - Figure 5 - Summary of Available Ovary Chemistry Data for Rainbow Trout from Relevant Sampling Sites (2014, 2015)
 - Figure 6 - Summary of Available Whole Body and Carcass Chemistry Data for Sockeye Salmon and Peamouth Chub from Relevant Sampling Sites (2014, 2015)
 - Figure 7 - Summary of Ovary and Muscle Chemistry Data for Rainbow Trout with Historical and 2016 Data (Ovary) or Historical Data only (Muscle).
 - Figure 8 - Paired Ovary and Muscle Chemistry Data for Rainbow Trout with Historical Data

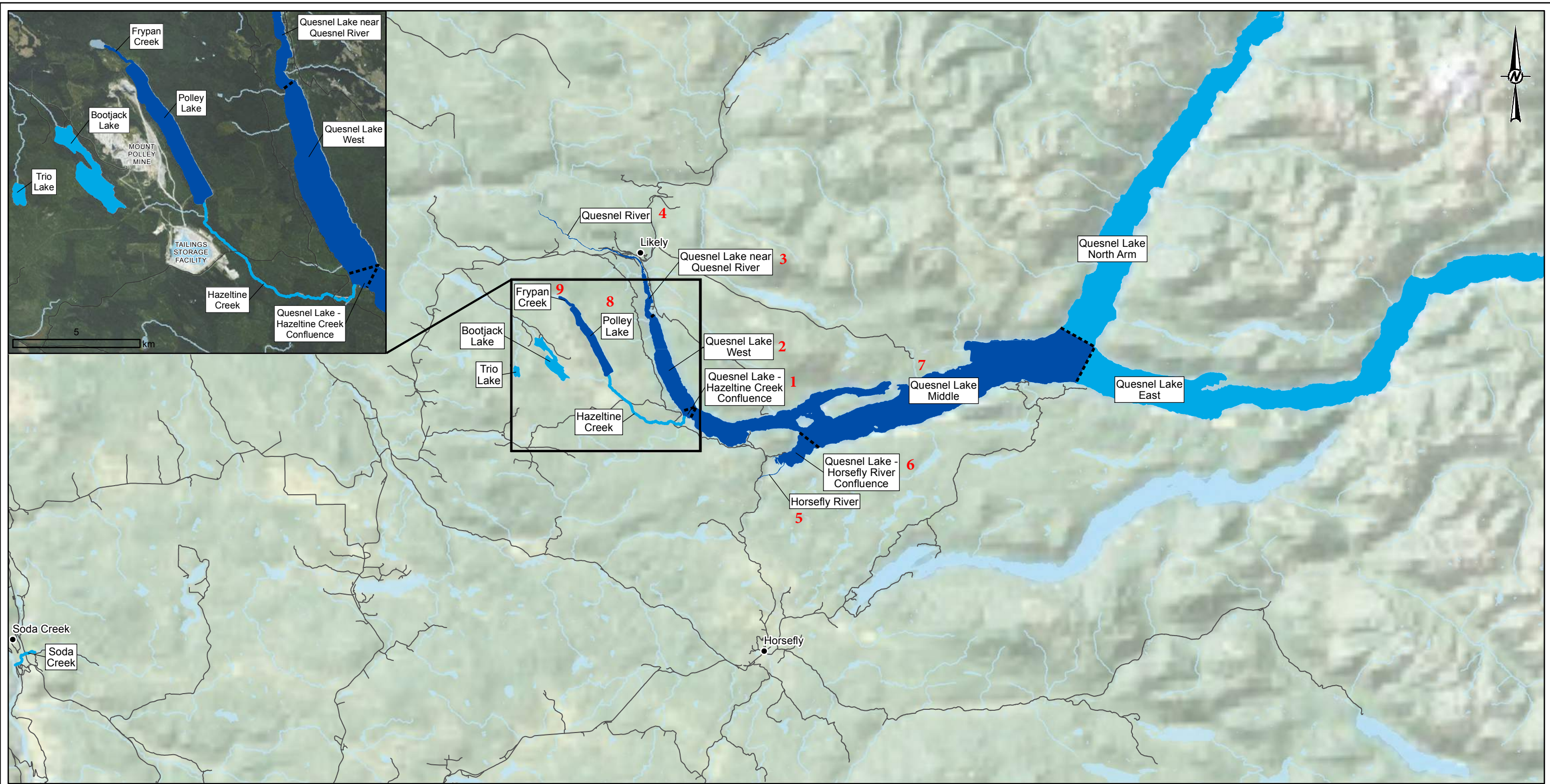
- Attachments:
- Attachment 1 - Field Data Assumptions
 - Attachment 2 - Summary Statistics
 - Attachment 3 - Fish Tissue Chemistry Censored Boxplots
 - Attachment 4 - Fish Tissue Chemistry Regression Plots
 - Attachment 5 - Laboratory Data Files

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LEGEND

FISH TISSUE SAMPLING LOCATIONS

- EXPOSED
- REFERENCE
- FISH TISSUE SAMPLING LOCATION BOUNDARIES

BASE DATA

- TOWN
- ROAD
- WATERCOURSE
- WATERBODY

DRAFT



CLIENT
**IMPERIAL METALS
 MOUNT POLLEY MINING CORPORATION**

CONSULTANT	YYYY-MM-DD	2016-03-22
	DESIGNED	AA
	PREPARED	CD
	REVIEWED	
	APPROVED	

NOTE
 1. HAZELTINE CREEK IS CONSIDERED A REFERENCE SITE SINCE SAMPLES WERE COLLECTED PRIOR TO THE BREACH

REFERENCES
 1. WATERCOURSE DATA OBTAINED FROM IHS ENERGY INC.
 2. ROAD, TOWN AND WATERBODY DATA OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED
 3. IMAGERY COPYRIGHT © ESRI AND IT'S LICENSORS. SOURCE: DIGITALGLOBE WV01. USED UNDER LICENCE. ALL RIGHTS RESERVED. IMAGERY DATE: 20100411
 DATUM: NAD 83. PROJECTION: UTM ZONE 10

PROJECT
MOUNT POLLEY TAILING STORAGE FACILITY DAM FALIURE

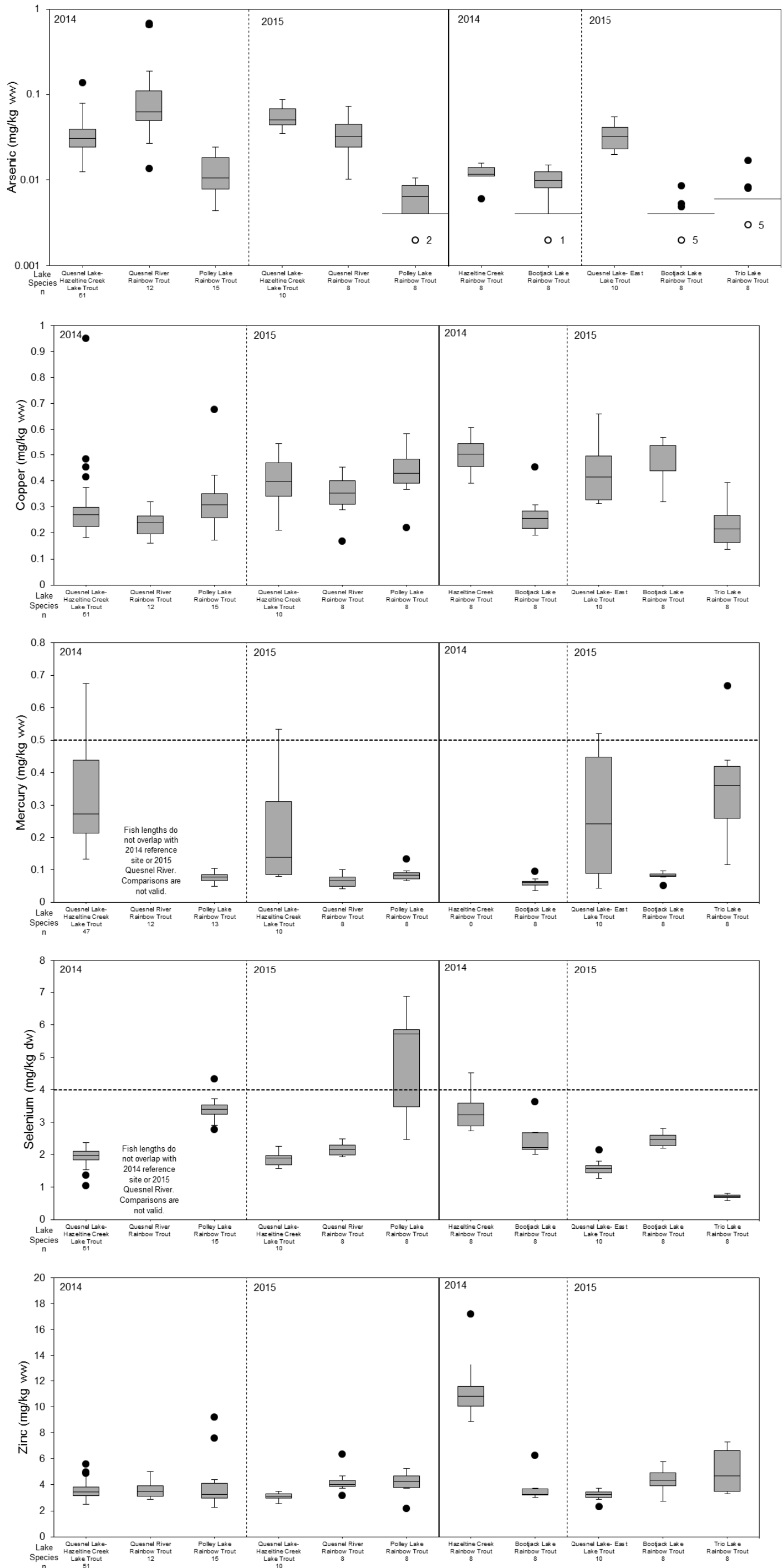
TITLE
FISH TISSUE SAMPLING LOCATIONS

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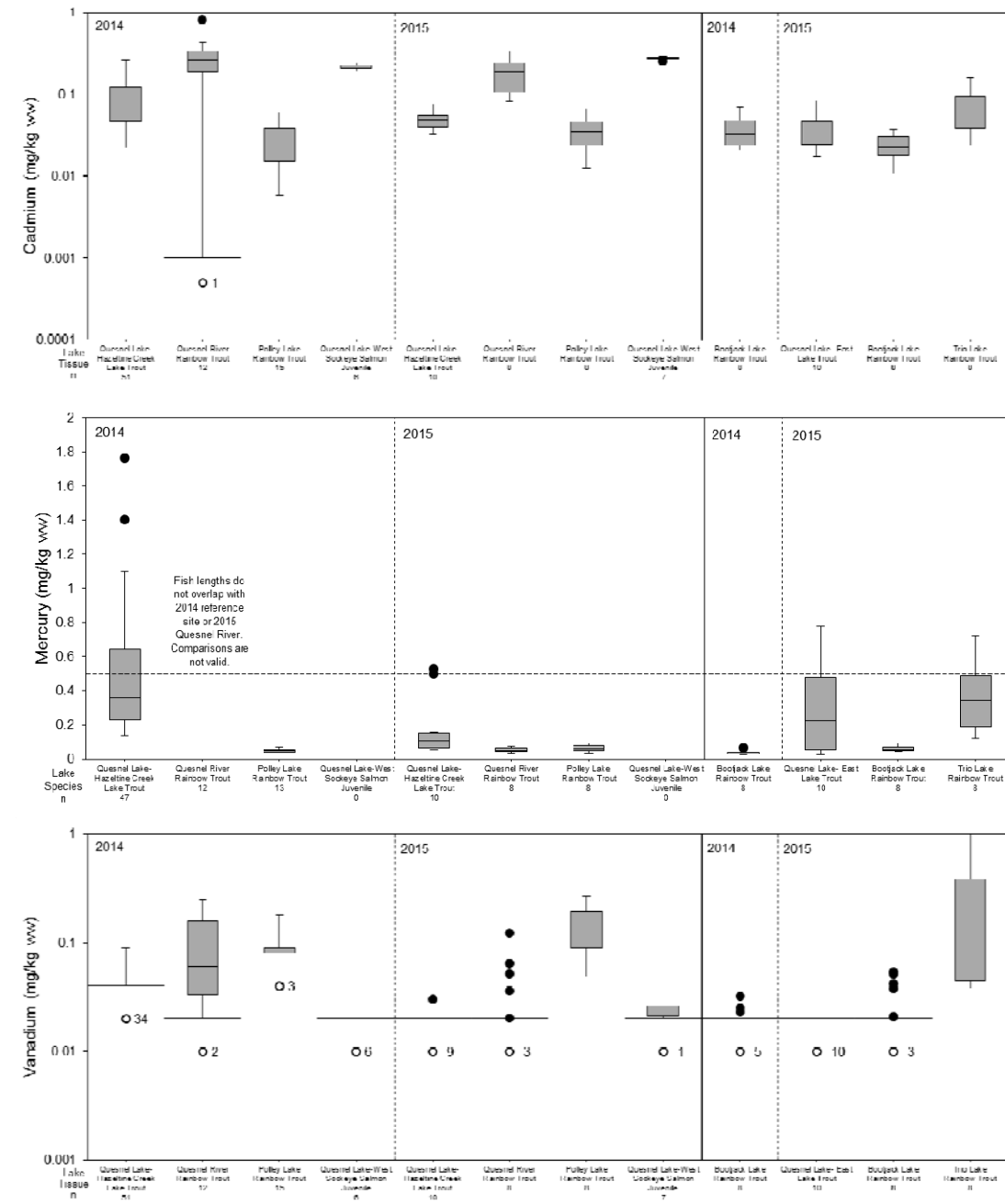
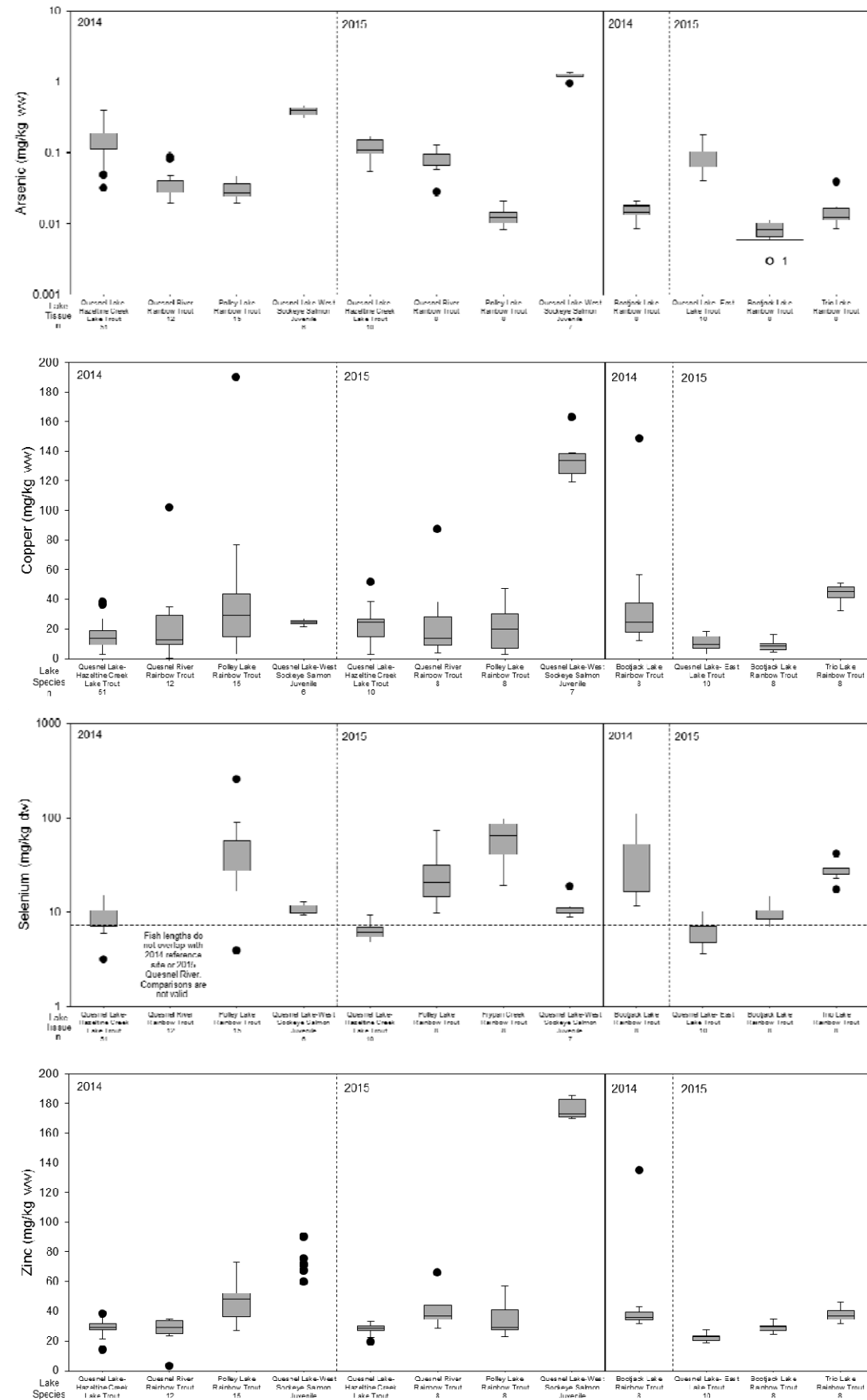
25mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANS I B

Figure 2. Summary of Available Muscle Chemistry Data for Select Fish Species and Sampling Sites (2014, 2015).



Note: Cadmium and vanadium are not presented because most values were below detection limit with the exception of four samples for cadmium, and one sample for vanadium. Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed vertical lines (---) indicate the separation of years; solid vertical lines (—) indicate the separation of exposure and reference; dashed horizontal lines (---) indicate guidelines from CFIA (mercury) or BC MoE (selenium).

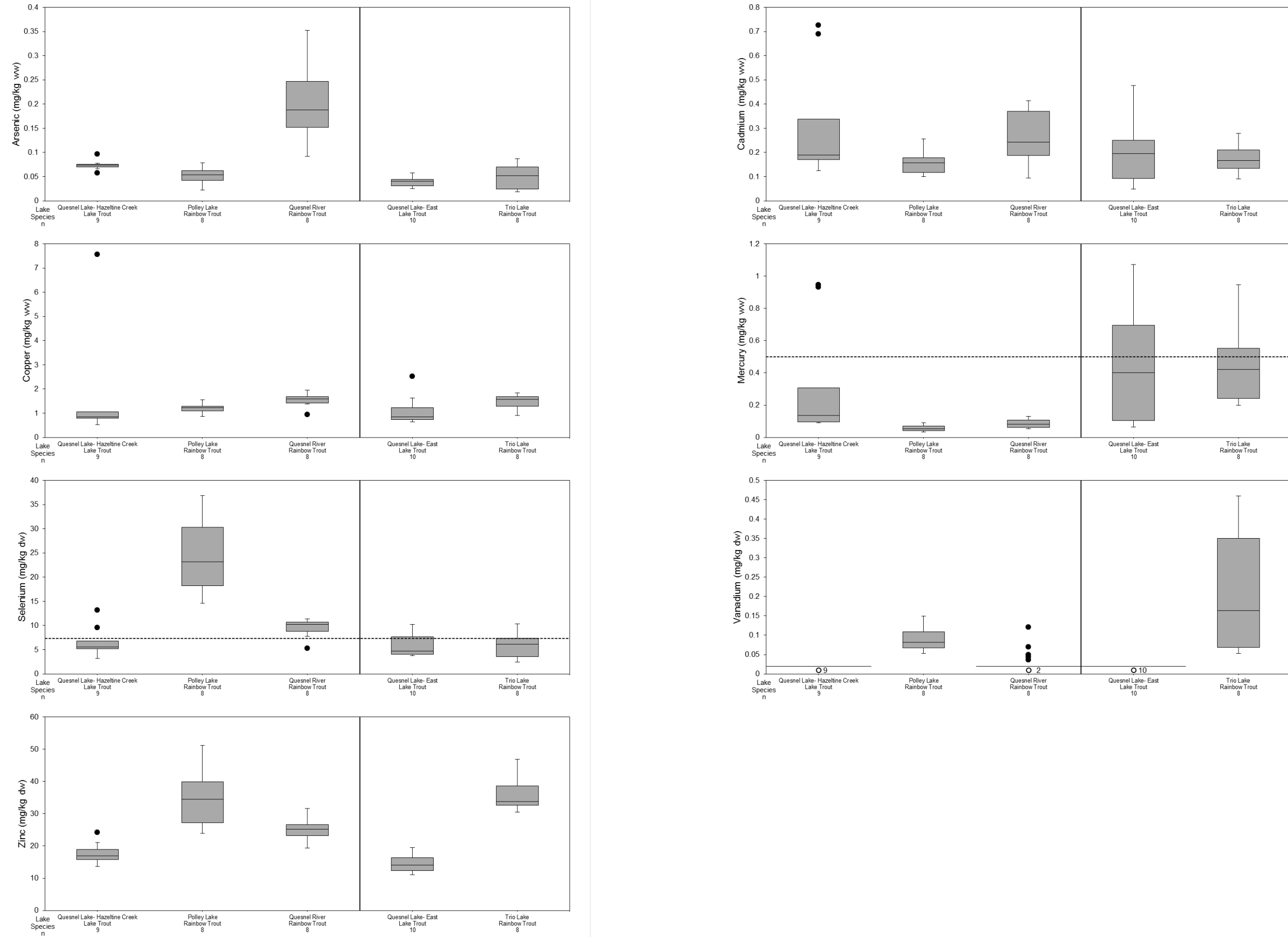
Figure 3. Summary of Available Liver Chemistry Data for Select Fish Species and Sampling Sites (2014, 2015).



Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed vertical lines (- -) indicate the separation of years; solid vertical lines (-) indicate the separation of exposure and reference; dashed horizontal lines (- -) indicate guidelines from CFIA (mercury) or BC MoE (selenium).

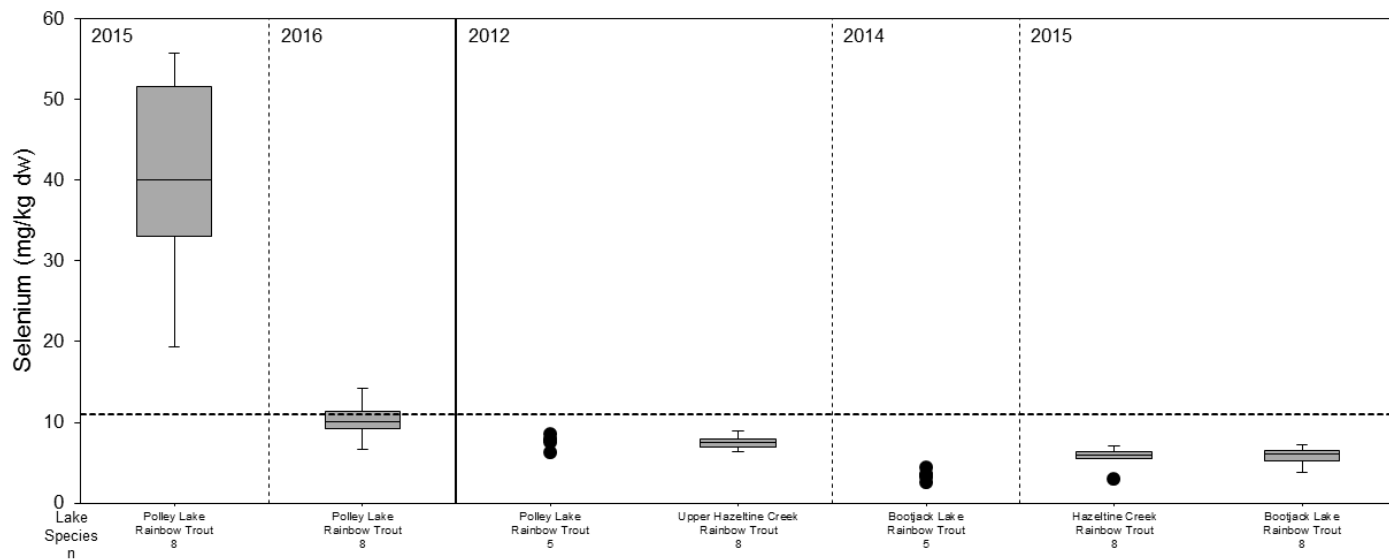
Figure 4. Summary of Available Kidney Chemistry Data for Select Fish Species and Sampling Sites (2015 only)



Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed vertical lines (- - -) indicate the separation of years; solid vertical lines (-) indicate the separation of exposure and reference; dashed horizontal lines (- - -) indicate guidelines from CFIA (mercury) and BC MoE (selenium).

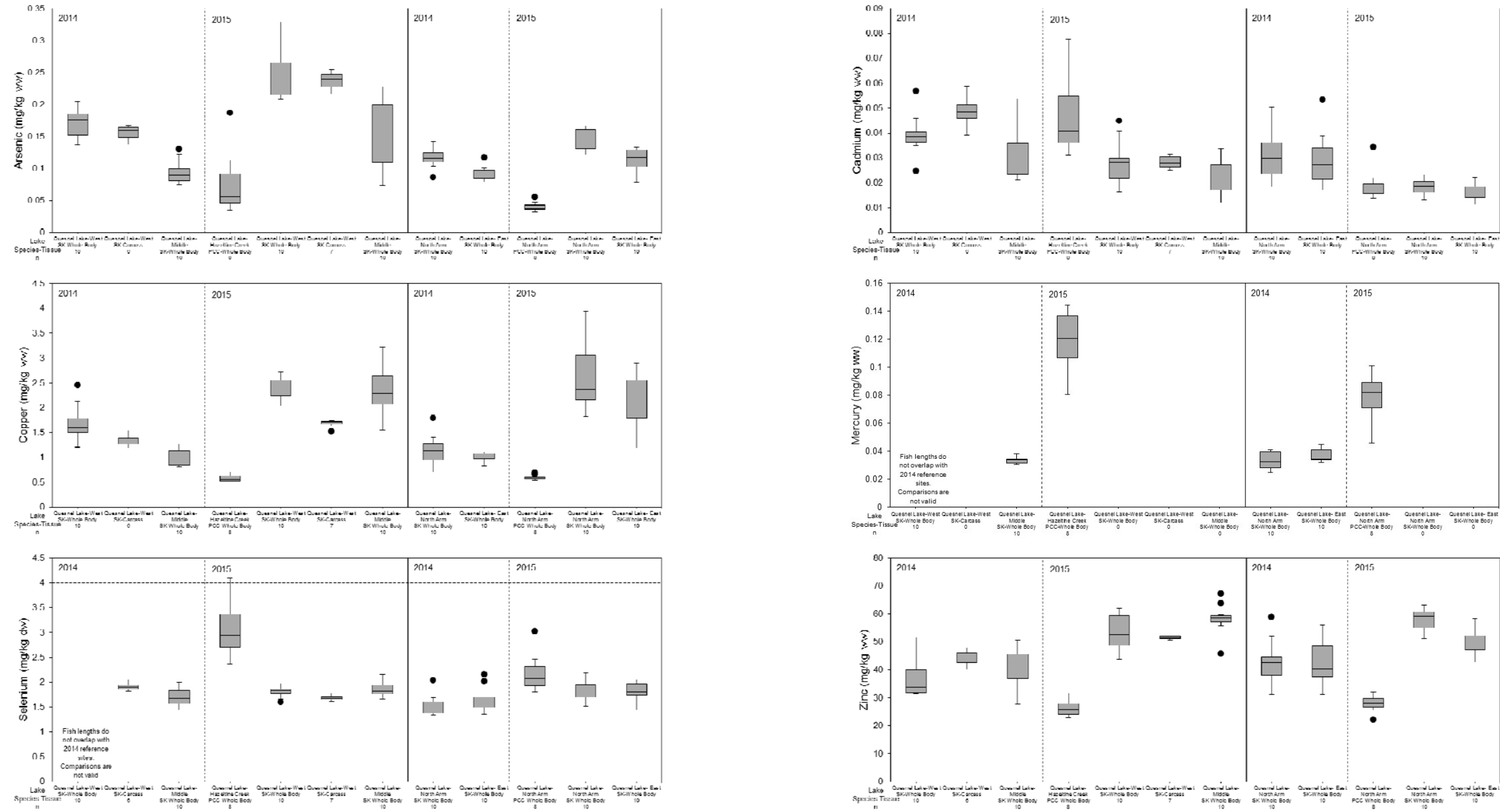
Figure 5. Summary of Available Ovary Chemistry Data for Rainbow Trout from Relevant Sampling Sites.



Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed vertical lines (- - -) indicate the separation of years; solid vertical lines (-) indicate the separation of exposure and reference; dashed horizontal lines (- - -) indicate guidelines from CFIA or BCMoE.

Figure 6. Summary of Available Whole Body and Carcass Chemistry Data for Sockeye Salmon and Peamouth Chub from Relevant Sampling Sites (2014, 2015).



Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed vertical lines (- -) indicate the separation of years; solid vertical lines (-) indicate the separation of exposure and reference; dashed horizontal lines (- -) indicate guidelines from CFIA (mercury) or BCMoE (selenium).

Figure 7. Summary of Ovary and Muscle Chemistry Data for Rainbow Trout with Historical and 2016 Data (Ovary) or Historical Data only (Muscle).

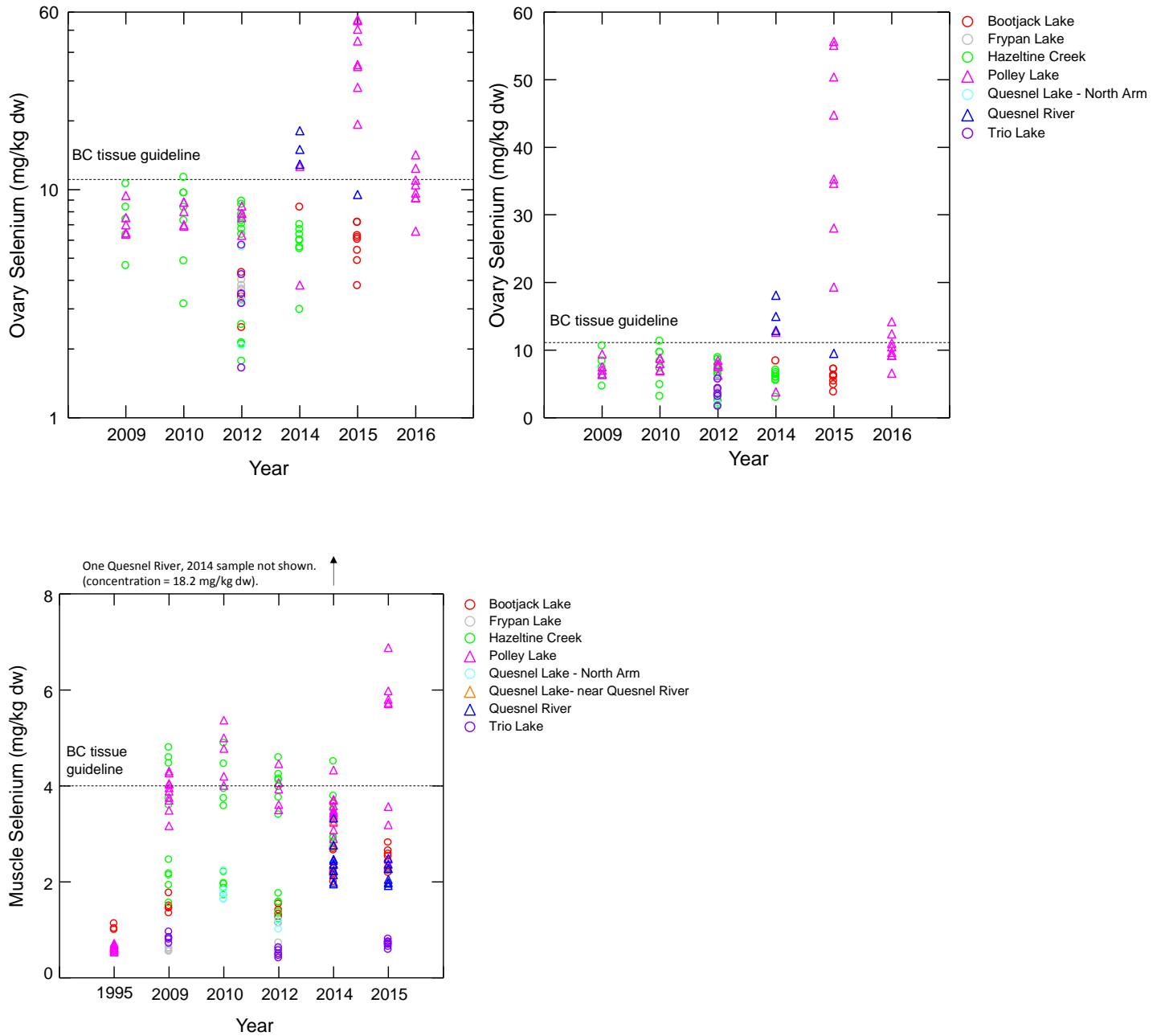
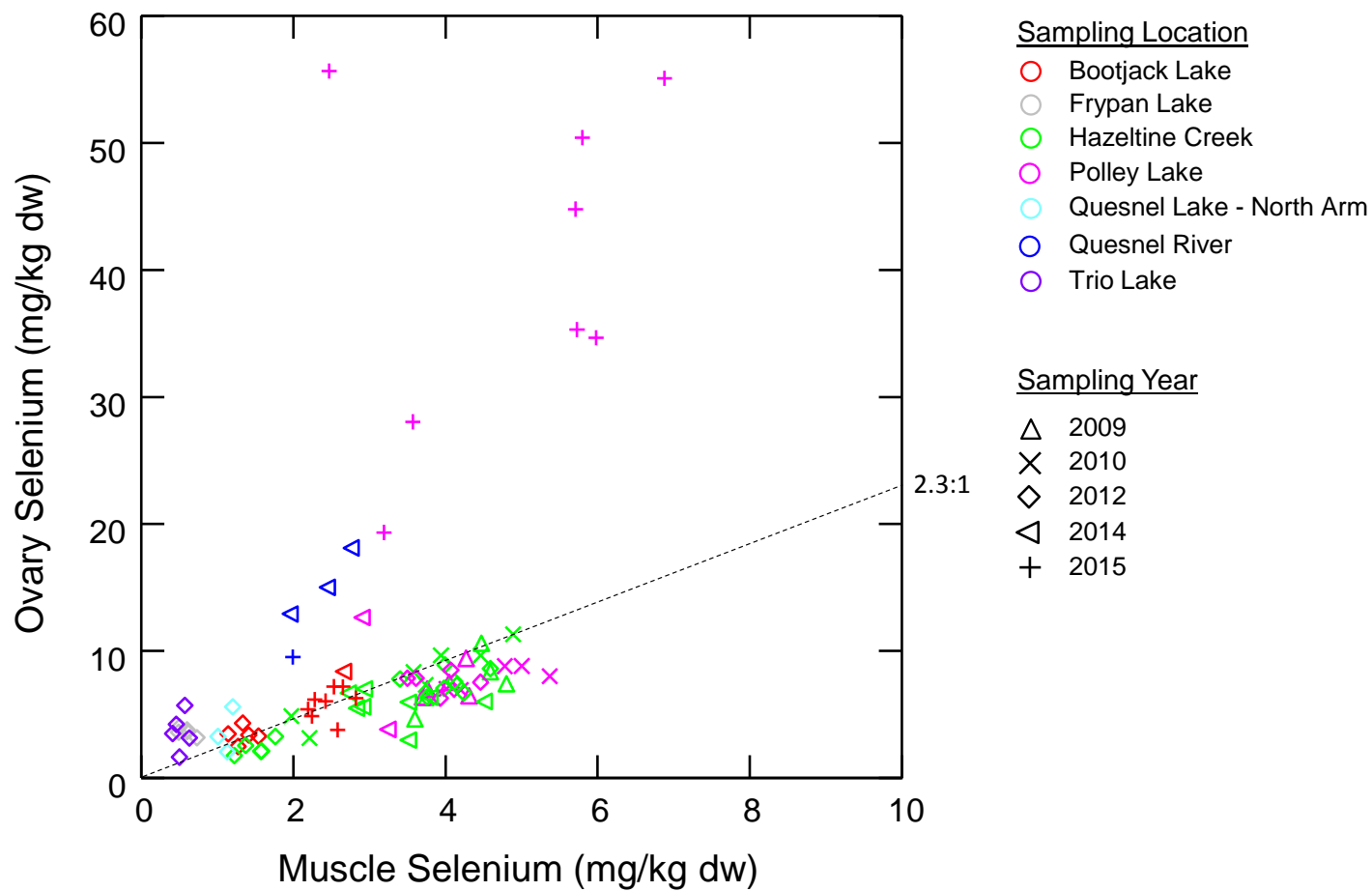


Figure 8. Paired Ovary and Muscle Chemistry Data for Rainbow Trout with Historical Data.



ATTACHMENT 1
FIELD DATA ASSUMPTIONS



1.0 FIELD DATA ASSUMPTIONS

As a result of multiple agencies collecting fish tissue chemistry samples, a number of uncertainties exist regarding details for some of the samples. Where information was uncertain, the following assumptions were made:

- BC MoE data collected on August 9 & 10 2014 was not specific on the sampling location for fish collections, and no effort information could be found for those dates. It was assumed that sampling occurred in the same area that was sampled on August 8 (i.e., near the Hazeltine Creek Confluence).
- BC MoE recorded a sample collected as being “Whitefish”. It was assumed this was a Mountain Whitefish.
- The MPMC sample naming convention was assumed to be in relation to the sampling area (e.g., sample ID “NSC-2, 3 HAZ-2” was sampled near the Hazeltine Creek Confluence). The sampling locations were confirmed with the data sheets wherever possible.
- Any recorded fish lengths that did not have specified fork length or total length were assumed to be fork length, unless the fish species does not have a fork, in which case it is assumed total length (e.g., Burbot).
- Sockeye Salmon lengths and weights were found in an attachment to an ALS sample submission form (i.e., COC); these lengths were assumed to be valid and were used within this technical memo.
- Assumptions were made regarding tissue types collected and submitted for fish tissue chemistry analyses as follows: Largescale Sucker had muscle collected, and Peamouth Chub and Redside Shiner had whole body collected.
- Final age was provided by MPMC and were assumed to be valid; however, age data were not used and are, therefore, not presented.

ATTACHMENT 2
SUMMARY STATISTICS

Table 1: Summary Statistics for Muscle Tissues of all Fish Species Captured in the Exposure Sites in 2014

Parameter	Quesnel Lake- near Quesnel River										Quesnel Lake- near Quesnel River							Quesnel River												
	Kokanee										Rainbow Trout							Rainbow Trout												
	n	%>DL	Min	Med	% Magnitude Quesnel Lake North Arm	% Magnitude 2015	Max	Mean	SD	SE	n	%>DL	Min	Med	Max	Mean	SD	SE	n	%>DL	Min	Med	% Magnitude Bootjack Lake	% Magnitude Hazeltine Creek	% Magnitude 2015	Max	Mean	SD	SE	
% Moisture	10	100	79.7	83.3	2	-1	85.4	83.2	1.8	0.6	2	100	77.5	--	89.8	--	--	--	12	100	71.2	77.6	0	-2	0	80.6	77.4	2.6	0.7	
Aluminum	10	40	<0.4	<0.4	-	-	0.89	-	-	-	2	50	<0.4	--	0.88	--	--	--	12	8	<0.4	<0.4	-	-	-	4.7	-	-	-	
Antimony	10	40	<0.002	<0.002	-	-	0.0279	-	-	-	2	0	<0.002	--	<0.002	--	--	--	12	0	<0.002	<0.002	-	-	-	<0.002	-	-	-	
Arsenic	10	100	0.0066	0.0132	-20	11	0.0188	0.0126	0.0039	0.0012	2	100	0.0149	--	0.0549	--	--	--	12	100	0.0137	0.0626	538	432	93	0.6740	0.1652	0.2360	0.0681	
Barium	10	50	<0.01	<0.01	-	-	0.032	-	-	-	2	50	<0.01	--	0.084	--	--	--	12	100	0.011	0.019	16	-44	-23	0.033	0.019	0.008	0.002	
Beryllium	10	0	<0.002	<0.002	-	-	<0.002	-	-	-	2	0	<0.002	--	<0.002	--	--	--	12	0	<0.002	<0.002	-	-	-	<0.002	-	-	-	
Bismuth	10	10	<0.002	<0.002	-	-	0.0034	-	-	-	2	0	<0.002	--	<0.002	--	--	--	12	0	<0.002	<0.002	-	-	-	<0.002	-	-	-	
Boron	10	0	<0.2	<0.2	-	-	<0.2	-	-	-	2	0	<0.2	--	<0.2	--	--	--	12	8	<0.2	<0.2	-	-	-	0.22	-	-	-	
Cadmium	10	80	<0.001	0.0011	-	-	0.0018	0.0011	0.0004	0.0001	2	50	<0.001	--	0.0026	--	--	--	12	8	<0.001	<0.001	-	-	-	0.375	-	-	-	
Calcium	10	100	104	257	13	96	796	373	271	86	2	100	51.7	--	1530	--	--	--	12	100	87.4	220.5	33	-69	-13	361.0	238.3	84.3	24.3	
Cesium	10	100	0.0255	0.0413	6	25	0.0467	0.0384	0.0078	0.0025	2	100	0.0162	--	0.0242	--	--	--	12	100	0.0046	0.0173	34	322	-26	0.0215	0.0160	0.0050	0.0014	
Chromium	10	0	<0.01	<0.01	-	-	<0.01	-	-	-	2	100	0.038	--	0.073	--	--	--	12	8	<0.01	<0.01	-	-	-	0.05	-	-	-	
Cobalt	10	40	<0.004	<0.004	-	-	0.0056	-	-	-	2	100	0.007	--	0.0119	--	--	--	12	100	0.0072	0.0107	-	61	-25	0.0277	0.0122	0.0057	0.0017	
Copper	10	100	0.359	0.507	-6	6	0.667	0.520	0.104	0.033	2	100	0.288	--	0.323	--	--	--	12	100	0.16	0.24	-7	-53	-33	9.35	0.99	2.63	0.76	
Iron	10	100	3.82	5.30	0	10	6.66	5.26	1.05	0.33	2	100	10.2	--	17.2	--	--	--	12	100	3.17	4.29	20	-37	13	639.00	56.96	183.30	52.91	
Lead	10	10	<0.004	<0.004	-	-	0.0067	-	-	-	2	0	<0.004	--	<0.004	--	--	--	12	17	<0.004	<0.004	-	-	-	0.011	-	-	-	
Lithium	10	0	<0.1	<0.1	-	-	<0.1	-	-	-	2	0	<0.1	--	<0.1	--	--	--	12	0	<0.1	<0.1	-	-	-	<0.1	-	-	-	
Magnesium	10	100	168	195	-7	-4	217	193	18	6	2	100	129	--	242	--	--	--	12	100	185	291	-1	9	7	304	278	33	9	
Manganese	10	100	0.077	0.145	22	64	0.242	0.154	0.049	0.016	2	100	0.047	--	0.332	--	--	--	12	100	0.065	0.105	8	-61	-22	2.370	0.297	0.654	0.189	
Mercury	10	100	0.0756	0.1045	11	16	0.1190	0.1002	0.0160	0.0050	2	100	0.0888	--	0.654	--	--	--	12	100	0.0631	0.1300	115	-	100	0.2520	0.1430	0.0582	0.0168	
Molybdenum	10	10	<0.004	<0.004	-	-	0.0065	-	-	-	2	0	<0.004	--	<0.004	--	--	--	12	8	<0.004	<0.004	-	-	-	0.478	-	-	-	
Nickel	10	0	<0.04	<0.04	-	-	<0.04	-	-	-	2	0	<0.04	--	<0.04	--	--	--	12	0	<0.04	<0.04	-	-	-	<0.04	-	-	-	
Phosphorus	10	100	1930	2195	-3	4	2540	2195	187	59	2	100	1270	--	2840	--	--	--	12	100	2280	2650	0	-5	14	3520	2696	298	86	
Potassium	10	100	3300	3730	-3	0	4030	3732	249	79	2	100	1910	--	3630	--	--	--	12	100	3010	4300	0	2	12	4610	4223	449	130	
Rubidium	10	100	3.22	4.03	3	-10	5.03	3.98	0.52	0.17	2	100	2.11	--	3.44	--	--	--	12	100	2.42	3.70	62	181	-5	5.08	3.75	0.72	0.21	
Selenium*	10	100	1.514	1.752	-14	-27	2.521	1.829	0.294	0.093	2	100	2.218	--	3.275	--	--	--	12	100	1.955	2.370	6	-26	10	18.194	3.709	4.577	1.321	
Silicon	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silver	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Sodium	10	100	712	825	-21	31	1130	874	136	43	2	100	697	--	1810	--	--	--	12	100	205	257	17	-44	-45	972	323	209	60	
Strontium	10	100	0.117	0.355	24	111	1.190	0.520	0.400	0.127	2	100	0.042	--	2.04	--	--	--	12	100	0.112	0.264	10	-77	-29	0.508	0.290	0.120	0.035	
Sulphur	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tellurium	10	0	<0.004	<0.004	-	-	<0.004	-	-	-	2	0	<0.004	--	<0.004	--	--	--	12	0	<0.004	<0.004	-	-	-	<0.004	-	-	-	
Thallium	10	100	0.00252	0.00358	-24	-6	0.00646	0.00397	0.00126	0.00040	2	100	0.00315	--	0.0036	--	--	--	12	100	0.00349	0.00559	154	333	35	0.04190	0.00859	0.01059	0.00306	
Tin	10	30	<0.02	<0.02	-	-	0.031	-	-	-	2	50	<0.02	--	0.024	--	--	--	12	17	<0.02	<0.02	-	-	-	0.026	-	-	-	
Titanium	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Uranium	10	10	<0.0004	<0.0004	-	-	0.00057	-	-	-	2	50	<0.0004	--	0.00061	--	--	--	12	8	<0.0004	<0.0004	-	-	-	0.0038	-	-	-	
Vanadium	10	0	<0.02	<0.02	-	-	<0.02	-	-	-	2	50	<0.02	--	0.155	--	--	--	12	8	<0.02	<0.02	-	-	-	0.422	-	-	-	
Zinc	10	100	4.55	7.93	-21	57	13.00	8.08	2.33	0.74	2	100	6.47	--	15.10	--	--	--	12	100	2.86	3.50	7	-68	-13	29.60	5.70	7.55	2.18	
Zirconium	10	0	<0.04	<0.04	-	-	<0.04	-	-	-	2	0	<0.04	--	<0.04	--	--	--	12	0	<0.04	<0.04	-	-	-	<0.04	-	-	-	
Methylmercury	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Lipid Content	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Units = mg/kg ww except selenium * (i.e., mg/kg dw)

n = sample size; nd = no data collected; < = less than; % > DL = percent of samples greater than detection limit; Min = minimum ; Med = median; Max = maximum; SD = standard deviation; SE = standard error; - = not calculated due to %>DL; -- = not calculated due to small sample size; % = percent

Table 5: Summary Statistics for Ovary Tissues of all Fish Species Captured in the Exposure Sites in 2014

Parameter	Quesnel Lake- near Quesnel River									Quesnel River							
	Kokanee									Rainbow Trout							
	n	%>DL	Min	Med	% Magnitude Quesnel Lake North Arm	Max	Mean	SD	SE	n	%>DL	Min	Med	Max	Mean	SD	SE
% Moisture	10	100	81.1	85.0	6	89.9	85.2	2.8	0.9	3	100	65.4	70.4	72.0	69.3	3.4	2.0
Aluminum	10	0	<0.4	<1	-	<1	-	-	-	3	100	0.70	0.71	0.95	0.79	0.14	0.08
Antimony	10	0	<0.002	<0.002	-	<0.002	-	-	-	3	0	<0.002	<0.002	<0.002	-	-	-
Arsenic	10	100	0.0051	0.0123	-23	0.0259	0.0151	0.0080	0.0025	3	100	0.0146	0.0165	0.0304	0.0205	0.0086	0.0050
Barium	10	30	<0.01	<0.01	-	0.019	-	-	-	3	100	0.183	0.192	0.215	0.197	0.017	0.010
Beryllium	10	0	<0.002	<0.002	-	<0.002	-	-	-	3	0	<0.002	<0.002	<0.002	-	-	-
Bismuth	10	0	<0.002	<0.002	-	<0.002	-	-	-	3	0	<0.002	<0.002	<0.002	-	-	-
Boron	10	0	<0.2	<0.2	-	<0.2	-	-	-	3	0	<0.2	<0.2	<0.2	-	-	-
Cadmium	10	100	0.0030	0.0134	214	0.0218	0.0123	0.0070	0.0022	3	100	0.0025	0.0031	0.0037	0.0031	0.0006	0.0003
Calcium	10	100	43.7	88.3	36	306.0	115.8	78.1	24.7	3	100	258	350	465	358	104	60
Cesium	10	100	0.0064	0.0152	-10	0.0205	0.0148	0.0046	0.0015	3	100	0.0055	0.0079	0.0086	0.0073	0.0016	0.0009
Chromium	10	0	<0.01	<0.04	-	<0.04	-	-	-	3	100	0.012	0.013	0.032	0.019	0.011	0.007
Cobalt	10	100	0.0051	0.0137	50	0.0218	0.0128	0.0052	0.0017	3	100	0.108	0.109	0.183	0.133	0.043	0.025
Copper	10	100	0.617	1.885	-15	5.820	2.487	1.731	0.547	3	100	8.73	9.00	12.70	10.14	2.22	1.28
Iron	10	100	19.6	40.3	45	62.6	37.5	13.3	4.2	3	100	45.3	47.7	70.1	54.4	13.7	7.9
Lead	10	0	<0.004	<0.01	-	<0.01	-	-	-	3	33	<0.004	<0.004	0.0066	-	-	-
Lithium	10	0	<0.1	<0.1	-	<0.1	-	-	-	3	0	<0.1	<0.1	<0.1	-	-	-
Magnesium	10	100	70	104	-12	137	100	23	7	3	100	334	381	445	387	56	32
Manganese	10	100	0.079	0.127	23	0.477	0.185	0.123	0.039	3	100	2.08	2.66	3.19	2.64	0.56	0.32
Mercury	10	100	0.0148	0.0424	83	0.0807	0.0439	0.0215	0.0068	3	100	0.0135	0.0252	0.0254	0.0214	0.0068	0.0039
Molybdenum	10	100	0.0045	0.0149	59	0.0265	0.0140	0.0064	0.0020	3	100	0.0075	0.0084	0.0094	0.0084	0.0010	0.0005
Nickel	10	0	<0.04	<0.04	-	<0.04	-	-	-	3	0	<0.04	<0.04	<0.04	-	-	-
Phosphorus	10	100	1070	1430	-73	6300	2503	1746	552	3	100	2590	3100	3430	3040	423	244
Potassium	10	100	1460	1945	-13	2060	1895	179	56	3	100	1570	1650	1790	1670	111	64
Rubidium	10	100	1.57	1.96	-15	2.61	1.98	0.32	0.10	3	100	1.88	2.07	2.20	2.05	0.16	0.09
Selenium*	10	100	1.217	2.818	96	3.576	2.649	0.793	0.251	3	100	12.91	15.00	18.12	15.34	2.63	1.52
Silicon	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silver	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Sodium	10	100	742	1205	-14	1510	1168	256	81	3	100	756	1090	1170	1005	220	127
Strontium	10	100	0.053	0.106	16	0.473	0.158	0.125	0.039	3	100	0.543	0.821	1.210	0.858	0.335	0.193
Sulphur	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tellurium	10	0	<0.004	<0.004	-	<0.004	-	-	-	3	0	<0.004	<0.004	<0.004	-	-	-
Thallium	10	100	0.00219	0.00297	-5	0.00517	0.00313	0.00081	0.00026	3	100	0.00172	0.00225	0.00251	0.00216	0.00040	0.00023
Tin	10	60	<0.02	0.022	-	0.094	0.027	0.025	0.008	3	33	<0.02	<0.02	0.023	-	-	-
Titanium	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Uranium	10	0	<0.0004	<0.0004	-	<0.0004	-	-	-	3	100	0.00095	0.00118	0.00145	0.00119	0.00025	0.00014
Vanadium	10	0	<0.02	<0.02	-	<0.02	-	-	-	3	0	<0.02	<0.02	<0.02	-	-	-
Zinc	10	100	27.5	105.1	169	655.0	155.0	185.9	58.8	3	100	41.4	45.0	51.9	46.1	5.3	3.1
Zirconium	10	0	<0.04	<0.04	-	<0.04	-	-	-	3	33	<0.04	<0.04	0.081	-	-	-
Methylmercury	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Lipid Content	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Units = mg/kg ww except selenium * (i.e., mg/kg dw)

n = sample size; nd = no data collected; < = less than; % > DL = percent of samples greater than detection limit; Min = minimum ; Med = median; Max = maximum; SD = standard deviation; SE = standard error; - = not calculated due to %>DL; -- = not calculated due to small sample size; % = percent

Table 9: Summary Statistics for Whole Body Tissues of all Fish Species Captured in the Exposure Sites in 2014

Parameter	Quesnel Lake- Middle											Quesnel Lake- West										
	Sockeye Salmon											Sockeye Salmon										
	n	%>DL	Min	Med	% Magnitude Quesnel Lake East	% Magnitude Quesnel Lake North	% Magnitude 2015	Max	Mean	SD	SE	n	%>DL	Min	Med	% Magnitude Quesnel Lake East	% Magnitude Quesnel Lake North	% Magnitude 2015	Max	Mean	SD	SE
% Moisture	10	100	69.6	71.8	0	-2	-1	74.9	72.1	1.8	0.6	10	100	68.9	72.0	1	-1	1	73.9	71.6	1.9	0.6
Aluminum	10	70	<1	1.9	-24	-77	195	10.3	3.0	3.2	1.0	10	100	2.83	6.06	142	-27	402	12.50	6.16	2.84	0.90
Antimony	10	0	<0.002	<0.002	-	-	-	<0.002	-	-	-	10	20	<0.002	<0.002	-	-	-	0.117	-	-	-
Arsenic	10	100	0.0749	0.0896	-1	-23	-44	0.1300	0.0943	0.0188	0.0059	10	100	0.137	0.176	95	52	-27	0.205	0.171	0.024	0.008
Barium	10	100	0.208	0.483	18	-11	24	0.626	0.472	0.128	0.040	10	100	0.132	0.232	-43	-57	-49	0.386	0.246	0.067	0.021
Beryllium	10	0	<0.002	<0.002	-	-	-	<0.002	-	-	-	10	0	<0.002	<0.002	-	-	-	<0.002	-	-	-
Bismuth	10	0	<0.002	<0.002	-	-	-	<0.002	-	-	-	10	0	<0.002	<0.002	-	-	-	<0.002	-	-	-
Boron	10	0	<0.2	<0.2	-	-	-	<0.2	-	-	-	10	0	<0.2	<0.2	-	-	-	<0.2	-	-	-
Cadmium	10	100	0.0212	0.0291	6	-3	56	0.0536	0.0316	0.0105	0.0033	10	100	0.0248	0.0385	41	29	37	0.0568	0.0393	0.0082	0.0026
Calcium	10	100	3660	5995	5	-1	3	9730	6202	1938	613	10	100	2130	4690	-18	-23	-8	6110	4384	1067	337
Cesium	10	100	0.0310	0.0338	-3	-21	32	0.0367	0.0334	0.0019	0.0006	10	100	0.0203	0.0212	-39	-50	-21	0.0247	0.0216	0.0013	0.0004
Chromium	10	10	0.012	<0.04	-	-	-	<0.04	-	-	-	10	90	<0.01	0.016	-	-27	-	0.028	0.016	0.006	0.002
Cobalt	10	100	0.0188	0.0241	0	-16	112	0.0300	0.0253	0.0036	0.0011	10	100	0.0102	0.0140	-42	-51	12	0.0174	0.0141	0.0022	0.0007
Copper	10	100	0.808	0.978	-6	-14	-57	1.270	1.000	0.168	0.053	10	100	1.20	1.60	55	41	-32	2.46	1.69	0.36	0.11
Iron	10	100	10.7	16.9	4	-30	-13	30.1	17.5	5.5	1.7	10	100	12.8	15.1	-7	-38	1	23.2	16.6	3.5	1.1
Lead	10	50	<0.01	<0.01	-	-	-	0.015	-	-	-	10	100	0.0069	0.0090	-76	-49	-12	0.0147	0.0093	0.0024	0.0008
Lithium	10	0	<0.1	<0.1	-	-	-	<0.1	-	-	-	10	0	<0.1	<0.1	-	-	-	<0.1	-	-	-
Magnesium	10	100	255	320	2	-1	5	387	316	44	14	10	100	248	328	5	1	10	359	320	34	11
Manganese	10	100	0.814	1.760	48	-11	59	3.030	1.751	0.725	0.229	10	100	0.535	1.003	-16	-49	-10	1.410	0.970	0.238	0.075
Mercury	10	100	0.0306	0.0340	-1	5	nd	0.0381	0.0338	0.0026	0.0008	10	100	0.0238	0.0313	-9	-3	nd	0.0435	0.0321	0.0053	0.0017
Molybdenum	10	100	0.0132	0.0150	1	1	42	0.0184	0.0151	0.0017	0.0005	10	100	0.0120	0.0160	8	8	41	0.0235	0.0165	0.0033	0.0010
Nickel	10	10	<0.04	<0.04	-	-	-	0.042	-	-	-	10	10	<0.04	<0.04	-	-	-	0.043	-	-	-
Phosphorus	10	100	3510	4765	-1	-8	-17	6310	4834	863	273	10	100	3320	5010	4	-3	-2	5770	4782	675	213
Potassium	10	100	2780	2985	-2	1	-9	3160	2969	117	37	10	100	3150	3365	11	14	-1	3750	3380	173	55
Rubidium	10	100	4.03	4.37	-2	-16	-18	4.58	4.34	0.18	0.06	10	100	5.31	5.50	24	6	-	6.16	5.56	0.26	0.08
Selenium*	10	100	1.445	1.677	7	16	-8	1.992	1.700	0.186	0.059	10	100	1.860	2.131	35	47	16	2.632	2.153	0.232	0.073
Silicon	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silver	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Sodium	10	100	596	640	1	1	-21	674	635	27	9	10	100	603	680	8	7	-17	708	666	37	12
Strontium	10	100	7.4	13.0	35	11	30	18.6	12.6	3.8	1.2	10	100	3.26	7.31	-24	-38	-18	9.87	7.04	1.82	0.58
Sulphur	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tellurium	10	0	<0.004	<0.004	-	-	-	<0.004	-	-	-	10	0	<0.004	<0.004	-	-	-	<0.004	-	-	-
Thallium	10	100	0.00959	0.01085	-3	2	39	0.01260	0.01096	0.00116	0.00037	10	100	0.00652	0.00683	-39	-36	5	0.00755	0.00690	0.00030	0.00010
Tin	10	0	<0.02	<0.02	-	-	-	<0.02	-	-	-	10	10	<0.02	<0.02	-	-	-	0.101	-	-	-
Titanium	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Uranium	10	80	<0.0004	0.00048	-13	-54	-41	0.00125	0.00052	0.00029	0.00009	10	90	<0.0004	0.00057	3	-46	-58	0.00079	0.00057	0.00016	0.00005
Vanadium	10	10	<0.02	<0.02	-	-	-	0.035	-	-	-	10	50	<0.02	0.016	-	-	-	0.036	-	-	-
Zinc	10	100	27.6	41.4	2	-3	-29	50.5	40.8	6.9	2.2	10	100	31.5	33.8	-17	-21	-36	51.6	36.9	6.7	2.1
Zirconium	10	0	<0.04	<0.04	-	-	-	<0.04	-	-	-	10	0	<0.04	<0.04	-	-	-	<0.04	-	-	-
Methylmercury	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Lipid Content	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Units = mg/kg ww except selenium * (i.e., mg/kg dw)
n = sample size; nd = no data collected; < = less than; % > DL = percent of samples greater than detection limit; Min = minimum ; Med = median; Max = maximum; SD = standard deviation; SE = standard error; - = not calculated due to %>DL; -- = not calculated due to small sample size; % = percent

Table 14: Summary Statistics for Liver Tissues of all Fish Species Captured in the Reference Sites in 2015

Parameter	Quesnel Lake - North Arm								Quesnel Lake - East							
	Sockeye Salmon								Sockeye Salmon							
	n	%>DL	Min	Med	Max	Mean	SD	SE	n	%>DL	Min	Med	Max	Mean	SD	SE
% Moisture	3	100	61.3	63.9	64.9	63.4	1.9	1.1	3	100	64.6	65.9	66.9	65.8	1.2	0.7
Aluminum	3	100	1.3	2.0	2.3	1.9	0.5	0.3	3	67	<1	1.0	1.1	0.9	0.3	0.2
Antimony	3	67	<0.002	0.0023	0.0034	0.0022	0.0012	0.0007	3	0	<0.002	<0.002	<0.002	-	-	-
Arsenic	3	100	0.636	0.892	0.927	0.818	0.159	0.092	3	100	0.594	0.618	0.827	0.680	0.128	0.074
Barium	3	100	0.093	0.126	0.174	0.131	0.041	0.024	3	100	0.059	0.069	0.099	0.076	0.021	0.012
Beryllium	3	0	<0.002	<0.002	<0.002	-	-	-	3	0	<0.002	<0.002	<0.002	-	-	-
Bismuth	3	0	<0.002	<0.002	<0.002	-	-	-	3	0	<0.002	<0.002	<0.002	-	-	-
Boron	3	0	<0.2	<0.2	<0.2	-	-	-	3	0	<0.2	<0.2	<0.2	-	-	-
Cadmium	3	100	0.180	0.206	0.216	0.201	0.019	0.011	3	100	0.109	0.159	0.203	0.157	0.047	0.027
Calcium	3	100	1160	1460	1520	1380	193	111	3	100	1180	1290	1530	1333	179	103
Cesium	3	100	0.0285	0.0299	0.0327	0.0304	0.0021	0.0012	3	100	0.0252	0.0254	0.0290	0.0265	0.0021	0.0012
Chromium	3	100	0.043	0.090	0.595	0.243	0.306	0.177	3	67	<0.04	0.06	0.06	0.05	0.02	0.01
Cobalt	3	100	0.0173	0.0196	0.0227	0.0199	0.0027	0.0016	3	100	0.0162	0.0164	0.0165	0.0164	0.0002	0.0001
Copper	3	100	119	130	137	129	9	5	3	100	75.3	104.0	117.0	98.8	21.3	12.3
Iron	3	100	247	289	293	276	25	15	3	100	205	259	276	247	37	21
Lead	3	0	<0.01	<0.01	<0.01	-	-	-	3	0	<0.01	<0.01	<0.01	-	-	-
Lithium	3	0	<0.1	<0.1	<0.1	-	-	-	3	0	<0.1	<0.1	<0.1	-	-	-
Magnesium	3	100	189	202	212	201	12	7	3	100	171	182	195	183	12	7
Manganese	3	100	0.601	0.684	0.807	0.697	0.104	0.060	3	100	0.530	0.595	0.654	0.593	0.062	0.036
Mercury	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
Molybdenum	3	100	0.114	0.126	0.132	0.124	0.009	0.005	3	100	0.0913	0.1160	0.1200	0.1091	0.0155	0.0090
Nickel	3	67	<0.04	0.042	0.284	0.115	0.146	0.085	3	33	<0.04	<0.04	0.047	-	-	-
Phosphorus	3	100	2390	2510	2800	2567	211	122	3	100	2390	2470	2600	2487	106	61
Potassium	3	100	3170	3410	3660	3413	245	141	3	100	3030	3080	3250	3120	115	67
Rubidium	3	100	6.04	6.31	7.03	6.46	0.51	0.30	3	100	5.32	5.35	5.84	5.50	0.29	0.17
Selenium*	3	100	9.35	11.30	14.90	11.85	2.82	1.63	3	100	9.72	11.40	16.50	12.54	3.53	2.04
Silicon	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
Silver	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
Sodium	3	100	900	916	1030	949	71	41	3	100	816	867	915	866	50	29
Strontium	3	100	1.59	1.72	1.74	1.68	0.08	0.05	3	100	1.49	1.57	1.81	1.62	0.17	0.10
Sulphur	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
Tellurium	3	0	<0.004	<0.004	<0.004	-	-	-	3	0	<0.004	<0.004	<0.004	-	-	-
Thallium	3	100	0.0163	0.0170	0.0182	0.0172	0.0010	0.0006	3	100	0.0135	0.0153	0.0180	0.0156	0.0023	0.0013
Tin	3	100	0.078	0.082	0.117	0.092	0.021	0.012	3	100	0.102	0.108	0.133	0.114	0.016	0.009
Titanium	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
Uranium	3	100	0.00096	0.00143	0.0018	0.00140	0.00042	0.00024	3	100	0.00080	0.00090	0.00125	0.00098	0.00024	0.00014
Vanadium	3	33	<0.02	<0.02	0.021	-	-	-	3	0	<0.02	<0.02	<0.02	-	-	-
Zinc	3	100	188	192	207	196	10	6	3	100	168	177	200	182	17	10
Zirconium	3	0	<0.04	<0.04	<0.04	-	-	-	3	0	<0.04	<0.04	<0.04	-	-	-
Methylmercury	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
Lipid Content	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	

Units = mg/kg ww except selenium * (i.e., mg/kg dw)

n = sample size; nd = no data collected; < = less than; % > DL = percent of samples greater than detection limit; Min = minimum ; Med = median; Max = maximum; SD = standard deviation; SE = standard error; - = not calculated due to %>DL; -- = not calculated due to small sample size; % = percent

Table 16: Summary Statistics for Kidney Tissues of all Fish Species Captured in the Reference Sites in 2015

Parameter	Quesnel Lake- East								Trio Lake							
	Lake Trout								Rainbow Trout							
	n	%>DL	Min	Med	Max	Mean	SD	SE	n	%>DL	Min	Med	Max	Mean	SD	SE
% Moisture	10	100	76.3	79.9	82.0	79.3	1.9	0.6	8	100	69.1	78.7	87.4	78.8	5.6	2.0
Aluminum	10	70	<1	2.4	4.6	2.2	1.5	0.5	8	88	<1	1.6	3.4	1.9	1.1	0.4
Antimony	10	0	<0.002	<0.002	<0.002	-	-	-	8	75	<0.002	0.00275	0.0084	0.0030	0.0023	0.0008
Arsenic	10	100	0.0257	0.0407	0.0576	0.0389	0.0097	0.0031	8	100	0.0182	0.0520	0.0871	0.0501	0.0263	0.0093
Barium	10	80	<0.01	0.020	0.031	0.018	0.009	0.003	8	100	0.082	0.117	0.324	0.149	0.078	0.028
Beryllium	10	0	<0.002	<0.002	<0.002	-	-	-	8	0	<0.002	<0.002	<0.002	-	-	-
Bismuth	10	0	<0.002	<0.002	<0.002	-	-	-	8	0	<0.002	<0.002	<0.002	-	-	-
Boron	10	0	<0.2	<0.2	<0.2	-	-	-	8	25	<0.2	<0.2	0.25	-	-	-
Cadmium	10	100	0.0486	0.1945	0.4770	0.19917	0.1329	0.0420	8	100	0.0897	0.1660	0.2780	0.1728	0.0649	0.0230
Calcium	10	100	97.7	122.0	157.0	124.7	22.5	7.1	8	100	218	339	426	336	72	26
Cesium	10	100	0.0621	0.0861	0.1290	0.0876	0.0192	0.0061	8	100	0.0039	0.00545	0.0086	0.0058	0.0018	0.0006
Chromium	10	40	<0.04	<0.04	0.058	-	-	-	8	100	0.135	0.253	0.525	0.270	0.128	0.045
Cobalt	10	100	0.0243	0.0609	0.1590	0.0694	0.0368	0.0116	8	100	0.208	0.311	0.450	0.303	0.076	0.027
Copper	10	100	0.646	0.843	2.530	1.106	0.592	0.187	8	100	0.912	1.570	1.840	1.475	0.311	0.110
Iron	10	100	75.3	141.5	209.0	135.0	43.3	13.7	8	100	147	170	487	245	133	47
Lead	10	0	<0.01	<0.01	<0.01	-	-	-	8	13	<0.01	<0.01	0.01	-	-	-
Lithium	10	0	<0.1	<0.1	<0.1	-	-	-	8	0	<0.1	<0.1	<0.1	-	-	-
Magnesium	10	100	106	162	206	157	33	10	8	100	141	202	270	201	39	14
Manganese	10	100	0.128	0.190	0.337	0.199	0.062	0.020	8	100	0.303	0.450	0.836	0.491	0.168	0.059
Mercury	10	100	0.0647	0.4025	1.0700	0.4396	0.3681	0.1164	8	100	0.198	0.421	0.946	0.454	0.256	0.090
Molybdenum	10	100	0.0241	0.0395	0.0452	0.0382	0.0061	0.0019	8	100	0.0822	0.1260	0.1550	0.1194	0.0286	0.0101
Nickel	10	60	<0.04	0.053	0.073	0.045	0.023	0.007	8	100	0.066	0.111	0.263	0.127	0.063	0.022
Phosphorus	10	100	1830	2265	2770	2338	317	100	8	100	2000	2440	2680	2395	243	86
Potassium	10	100	2160	2890	3300	2809	417	132	8	100	2300	2610	3100	2646	286	101
Rubidium	10	100	4.10	5.37	8.07	5.80	1.43	0.45	8	100	0.524	1.034	1.410	1.007	0.318	0.112
Selenium*	10	100	3.783	4.700	10.200	5.837	2.509	0.793	8	100	2.437	6.117	10.292	5.810	2.648	0.936
Silicon	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silver	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Sodium	10	100	496	881	1170	882	191	61	8	100	613	784	985	791	143	50
Strontium	10	100	0.155	0.186	0.369	0.219	0.078	0.025	8	100	0.601	0.766	1.230	0.857	0.242	0.086
Sulphur	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tellurium	10	0	<0.004	<0.004	<0.004	-	-	-	8	63	<0.004	0.0066	0.0127	0.0061	0.0039	0.0014
Thallium	10	100	0.0116	0.02065	0.0343	0.0226	0.0079	0.0025	8	100	0.00828	0.01870	0.03410	0.01996	0.00784	0.00277
Tin	10	100	0.039	0.083	0.165	0.087	0.035	0.011	8	100	0.039	0.214	0.839	0.270	0.249	0.088
Titanium	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Uranium	10	30	<0.0004	<0.0004	0.00049	-	-	-	8	100	0.00046	0.00164	0.00480	0.00208	0.00153	0.00054
Vanadium	10	0	<0.02	<0.02	<0.02	-	-	-	8	100	0.053	0.164	0.459	0.211	0.160	0.057
Zinc	10	100	11.1	14.1	19.5	14.6	2.8	0.9	8	100	30.5	33.7	46.8	36.1	5.7	2.0
Zirconium	10	0	<0.04	<0.04	<0.04	-	-	-	8	13	<0.04	<0.04	0.047	-	-	-
Methylmercury	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Lipid Content	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Units = mg/kg ww except selenium * (i.e., mg/kg dw)

n = sample size; nd = no data collected; < = less than; % > DL = percent of samples greater than detection limit; Min = minimum; Med = median; Max = maximum; SD = standard deviation; SE = standard error; - = not calculated due to %>DL; -- = not calculated due to small sample size; % = percent

Table 18: Summary Statistics for Ovary Tissues of all Fish Species Captured in the Reference Sites in 2015 1411734

Parameter	Bootjack Lake								Quesnel Lake - East							
	Rainbow Trout								Lake Trout							
	n	%>DL	Min	Med	Max	Mean	SD	SE	n	%>DL	Min	Med	Max	Mean	SD	SE
% Moisture	8	100	61.3	62.6	64.0	62.6	1.1	0.4	2	100	64.1	--	70.2	--	--	--
Aluminum	8	0	<0.4	<0.4	<1	-	-	-	2	50	0.57	--	<1	--	--	--
Antimony	8	0	<0.002	<0.002	<0.002	-	-	-	2	0	<0.002	--	<0.002	--	--	--
Arsenic	8	100	0.0069	0.0094	0.0130	0.0095	0.0020	0.0007	2	100	0.0181	--	0.0262	--	--	--
Barium	8	100	0.151	0.190	0.251	0.199	0.035	0.012	2	0	<0.01	--	<0.01	--	--	--
Beryllium	8	0	<0.002	<0.002	<0.002	-	-	-	2	0	<0.002	--	<0.002	--	--	--
Bismuth	8	0	<0.002	<0.002	<0.002	-	-	-	2	0	<0.002	--	<0.002	--	--	--
Boron	8	0	<0.2	<0.2	<0.2	-	-	-	2	0	<0.2	--	<0.2	--	--	--
Cadmium	8	0	<0.001	<0.001	<0.002	-	-	-	2	0	<0.001	--	<0.002	--	--	--
Calcium	8	100	438	521	575	518	45	16	2	100	303	--	339	--	--	--
Cesium	8	100	0.0040	0.0049	0.0056	0.0047	0.0005	0.0002	2	100	0.0323	--	0.0390	--	--	--
Chromium	8	0	<0.01	<0.01	<0.04	-	-	-	2	0	<0.01	--	<0.04	--	--	--
Cobalt	8	100	0.0158	0.0285	0.0371	0.0275	0.0070	0.0025	2	100	0.0102	--	0.0139	--	--	--
Copper	8	100	2.49	3.71	4.29	3.50	0.65	0.23	2	100	3.60	--	4.62	--	--	--
Iron	8	100	11.0	13.4	15.4	13.4	1.5	0.5	2	100	15.3	--	20.1	--	--	--
Lead	8	0	<0.004	<0.004	<0.01	-	-	-	2	0	<0.004	--	<0.01	--	--	--
Lithium	8	0	<0.1	<0.1	<0.1	-	-	-	2	0	<0.1	--	<0.1	--	--	--
Magnesium	8	100	484	553	628	543	48	17	2	100	373	--	491	--	--	--
Manganese	8	100	0.966	1.415	2.280	1.501	0.482	0.170	2	100	0.172	--	0.950	--	--	--
Mercury	8	100	0.0032	0.0037	0.0049	0.0039	0.0006	0.0002	2	100	0.0308	--	0.0433	--	--	--
Molybdenum	8	100	0.0112	0.0147	0.0164	0.0143	0.0018	0.0007	2	50	0.004	--	<0.008	--	--	--
Nickel	8	0	<0.04	<0.04	<0.04	-	-	-	2	0	<0.04	--	<0.04	--	--	--
Phosphorus	8	100	3550	4335	4500	4155	354	125	2	100	2990	--	3450	--	--	--
Potassium	8	100	2310	2515	2790	2524	187	66	2	100	1760	--	2210	--	--	--
Rubidium	8	100	1.17	1.46	1.66	1.45	0.17	0.06	2	100	3.36	--	4.83	--	--	--
Selenium*	8	100	3.79	6.11	7.18	5.87	1.15	0.41	2	100	2.92	--	3.59	--	--	--
Silicon	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silver	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Sodium	8	100	450	543	603	540	57	20	2	100	736	--	931	--	--	--
Strontium	8	100	1.26	1.56	1.89	1.56	0.18	0.06	2	100	0.751	--	1.090	--	--	--
Sulphur	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tellurium	8	0	<0.004	<0.004	<0.004	-	-	-	2	0	<0.004	--	<0.004	--	--	--
Thallium	8	0	<0.0004	<0.0004	<0.0004	-	-	-	2	100	0.00731	--	0.01110	--	--	--
Tin	8	25	<0.02	<0.02	0.027	-	-	-	2	0	<0.02	--	<0.02	--	--	--
Titanium	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Uranium	8	13	<0.0004	<0.0004	0.00041	-	-	-	2	0	<0.0004	--	<0.0004	--	--	--
Vanadium	8	0	<0.02	<0.02	<0.02	-	-	-	2	0	<0.02	--	<0.02	--	--	--
Zinc	8	100	18.9	22.3	33.3	23.9	5.4	1.9	2	100	14.8	--	17.0	--	--	--
Zirconium	8	0	<0.04	<0.04	<0.04	-	-	-	2	0	<0.04	--	<0.04	--	--	--
Methylmercury	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Lipid Content	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Units = mg/kg ww except selenium * (i.e., mg/kg dw)

n = sample size; nd = no data collected; < = less than; % > DL = percent of samples greater than detection limit; Min = minimum ; Med = median; Max = maximum; SD = standard deviation; SE = standard error; - = not calculated due to %>DL; -- = not calculated due to small sample size; % = percent

ATTACHMENT 3
FISH TISSUE CHEMISTRY CENSORED BOXPLOTS



ATTACHMENT 3
Fish Tissue Chemistry Censored Boxplots

Table 1: Fish tissue chemistry summary of changes observed in metal concentrations by fish species by tissue type

Parameter	Lake Trout		Peamouth Chub		Rainbow Trout			Sockeye Salmon					
	EXP vs REF	2014 vs 2015	EXP vs REF	2014 vs 2015	EXP vs REF	2014 vs 2015		EXP vs REF	2014 vs 2015				
	2015 only	Quesnel Lake Hazeltine Creek Confluence	2014 + 2015*	Quesnel Lake Hazeltine Creek Confluence	2014 + 2015*	Quesnel River	Polley Lake	2014 + 2015*	Quesnel Lake - Middle	Quesnel Lake - West			
Aluminum	↓(c)	-	--	↑(f) DL	--	↑(b)	↑(b)	↑(b)	-	↓(f)(e)DL	↑(f)	↑(f)	↑(e)↓(g)
Arsenic	↑(e)	↓(a)↑(b)	--	↑(f)	--	↑(e)	↑(a)↓(b)	(e)	↓(e)(f)	↑(f)	↓(f)	(e)	(e)
Barium	↑(c)	-	--	-	--	↓(a)	↓(e)(e)	↓(b)	-	↓(f)	↑(f)	-	↑(e)↓(f)
Beryllium	-	-	--	-	--	-	-	-	-	-	-	-	-
Cadmium	↑(b)	↑(b)	--	↑(f)	--	↑(b)	(e)↓(b)	↑(b)	-	↑(f)	(f)	(f)	↑(e)
Chromium	-	-	--	-	--	↓(b)	↓(c)	↑(b) DL	-	↑(e)	↓(f)	↓(f)	↑(e)↓(g)
Cobalt	↓(e)	↑(e)	--	↓(f)	--	↑(e)	(e)↓(c)	↓(b)	-	↓(f)	-	(f)	↑(carcass)
Copper	↑(b)	↓(e)	--	-	--	↓(e)	(e)↓(e)	↓(a)	↑(b)	↑(f)	-	↓(f)	↓(e)
Iron	↓(c)	↑(b)	--	-	--	↓(a)(b)	(b)↓(e)	↑(b)	↓(a)	↓(e)(a)	-	-	↑(carc)↓(b)
Lead	-	-	--	-	--	-	-	-	-	↓(f)	-	↓(f)	↓(g)
Lithium	-	-	--	-	--	-	-	-	-	-	-	-	-
Manganese	↑(c)	↑(a)	--	-	--	↓(a)	↑(e)	-	↓(a)	↓(f)↑(e)	-	(f)	-
Mercury	↓(e)	↑(e)	--	↑(f,i)	--	↓(i)	↓(e,k)	↓(i,k)	-	(i,k)	--	--	--
Molybdenum	-	-	--	-	--	↓(a)(b)	(e)	-	-	↑(a)	-	(f)	↑(e)
Nickel	↑(c)	↑(b)	--	-	--	-	↓(c)	-	-	↑(e) DL	↓(f)	-	-
Selenium	-(k)	↑(b,k)	--	↑(f,i)	--	↓(i,k)	↑(e,k)	↓(i,k)	↓(e,i)	-(i,k)	-	-	-
Thallium	↑(e)	↓(b)	--	↑(f)	--	↓(e)↑(e)	↓(e)↑(e)	↑(a)	↓(b)	↑(a)↓(f)	-	(f)	-
Vanadium	-	-	--	-	--	↑(b) DL	(b)↓(e)	↑(b)	↓(b)	-	-	-	↑(f)↓(b,g) DL
Zinc	-	-	--	-	--	↓(a)(b)	-	-	↑(b)	-	-	-	↑(e)

- (a) muscle tissue only
- (b) liver tissue only
- (c) kidney tissue only
- (d) ovary tissue only
- (e) multiple tissue types
- (f) whole body
- (g) gills
- (h) carcass

(i) fish sizes do not overlap or length data is not available, will not be able to compare statistically; result of visual assessment of concentrations (without length consideration) indicated where appropriate

(k) no regression relationship evident with length

DL based on proportion of samples above DL

↑ / ↓ = direction of difference between exposure and reference sites, or 2014 and 2015 data. E.g., - in the EXP vs REF column indicates the exposure site(s) have a greater concentration of metal than the reference site(s) for the given metal, - in the 2014 vs 2015 column indicates 2014 metal concentration is less than the 2015 concentration for the given metal.

- = no difference

-- = insufficient or no data

* The side to which the arrow is placed in the 2014 + 2015 pcolumn indicates which year the difference was observed, if the arrow is placed in the middle, the results were consistent in both years.

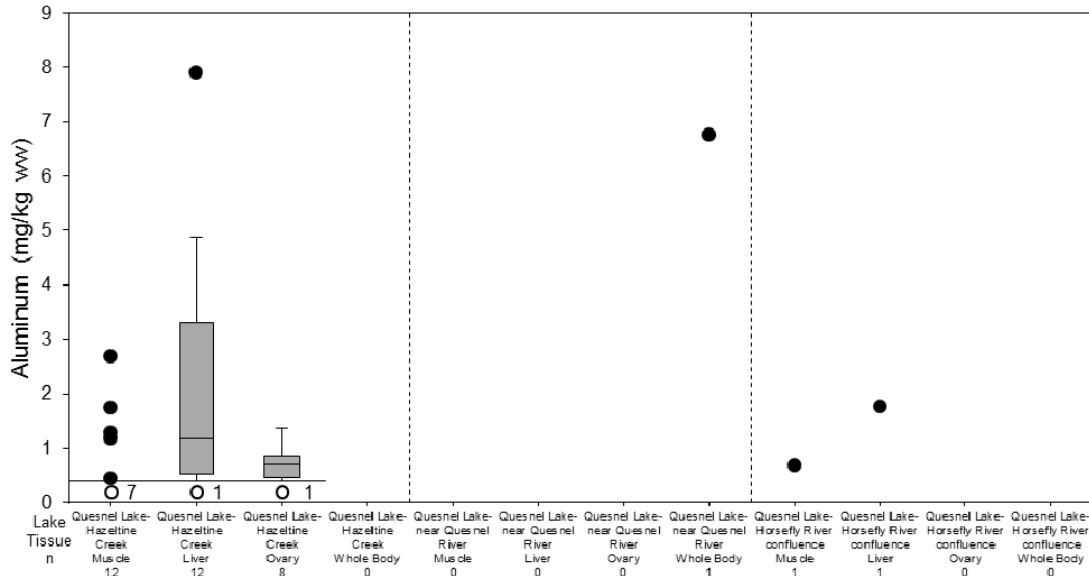
NOTE: limited to no data for titanium or silver (not analyzed by the laboratory)



1.0 BURBOT

1.1 Aluminum

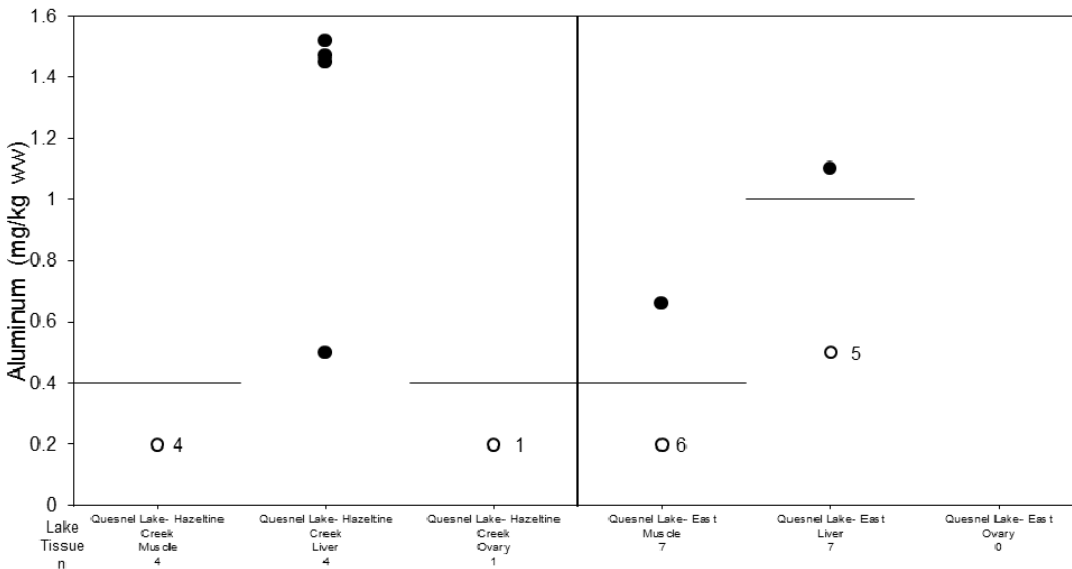
Figure 1: Aluminum Concentrations in Burbot Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 2: Aluminum Concentrations in Burbot Tissues Collected in 2015



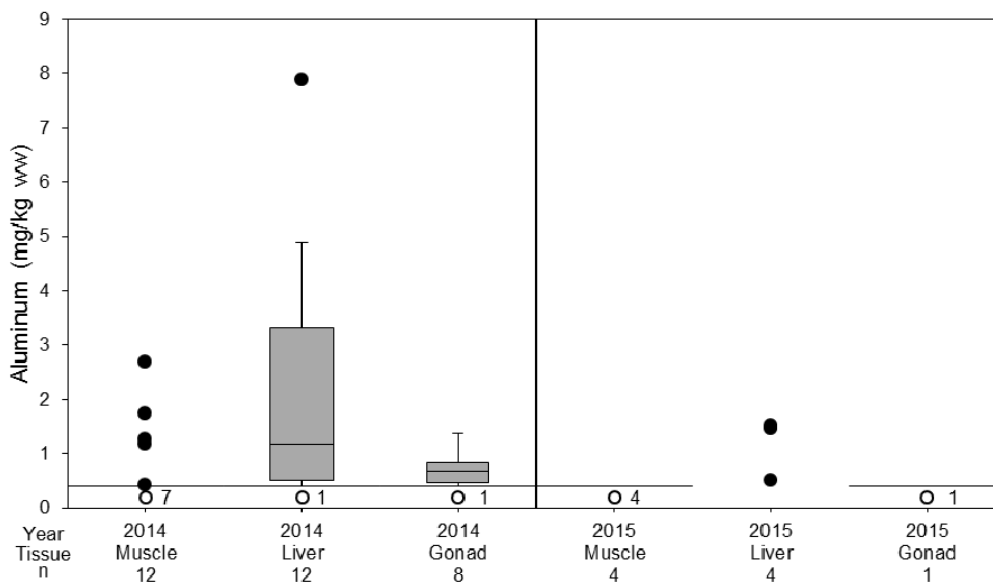
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 3: Aluminum Concentrations in Burbot Tissues Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015

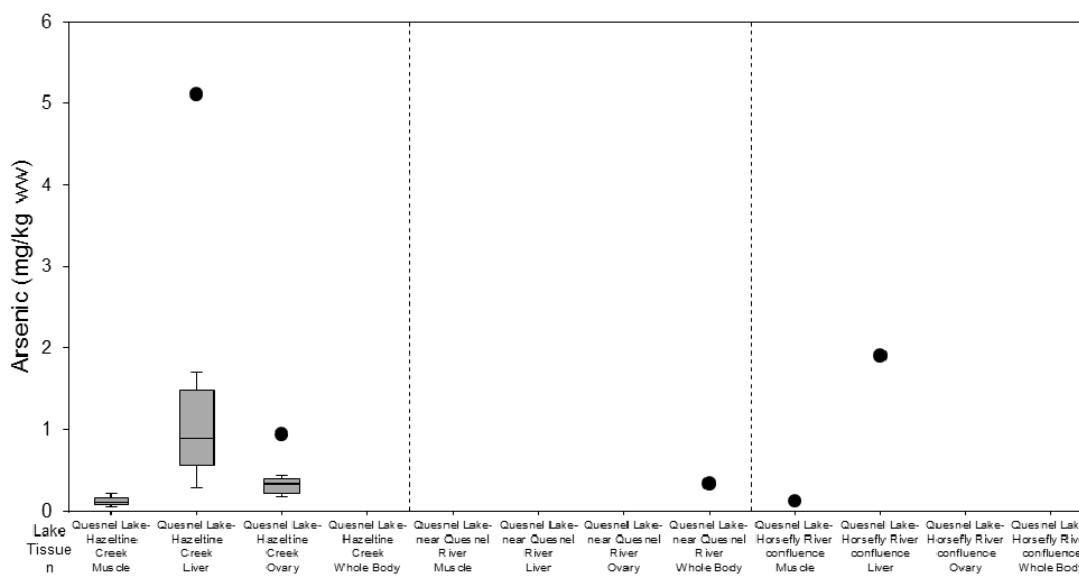


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

1.2 Arsenic

Figure 4: Arsenic Concentrations in Burbot Tissues Collected in 2014



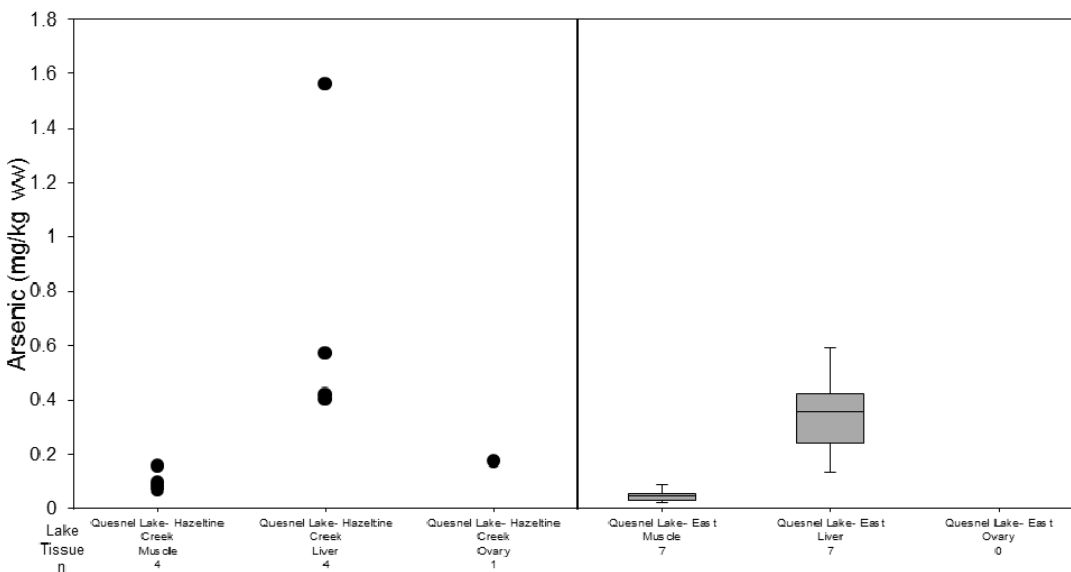
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



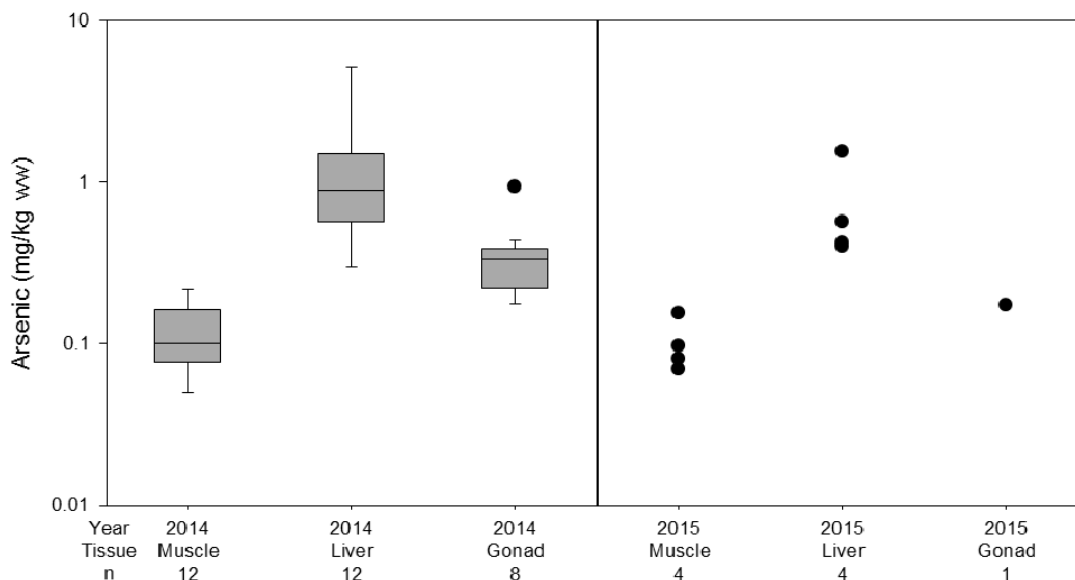
ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 5: Arsenic Concentrations in Burbot Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 6: Arsenic Concentrations in Burbot Tissues Collected from the Quesnel Lake – Hazeltiline Creek Confluence in 2014 and 2015

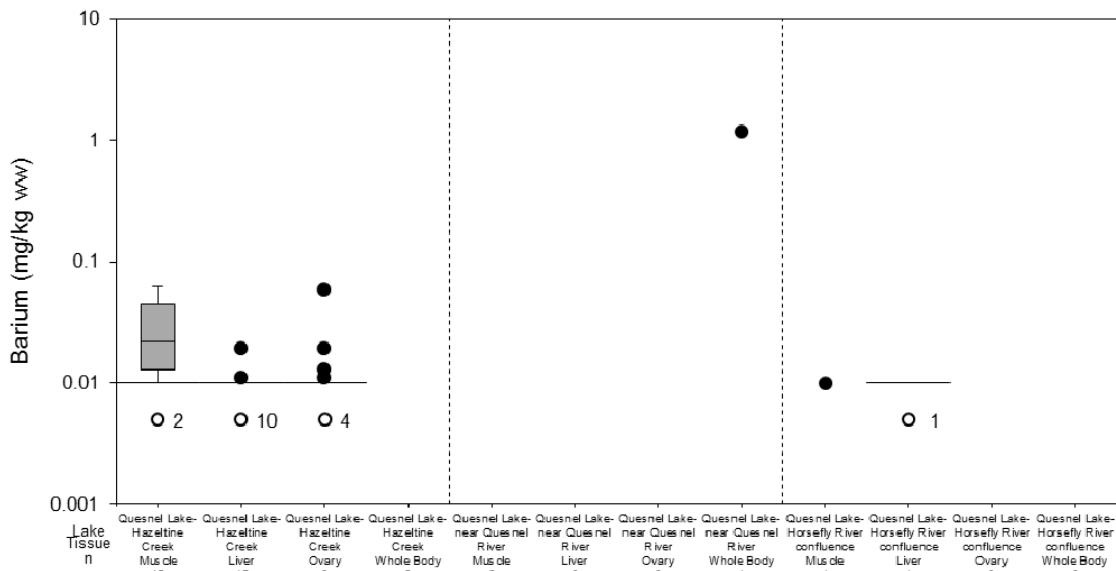


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



1.3 Barium

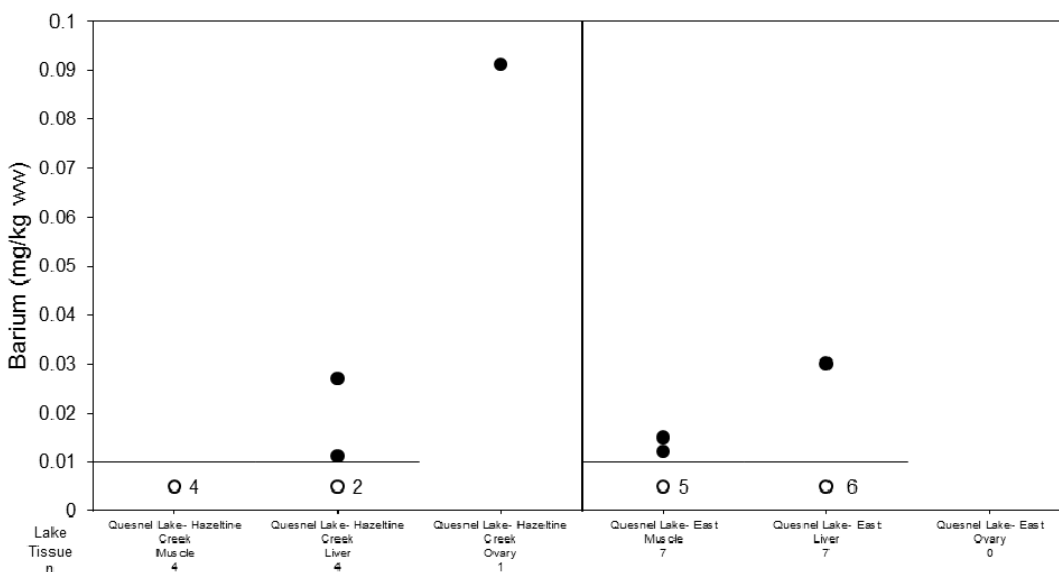
Figure 7: Barium Concentrations in Burbot Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 8: Barium Concentrations in Burbot Tissues Collected in 2015



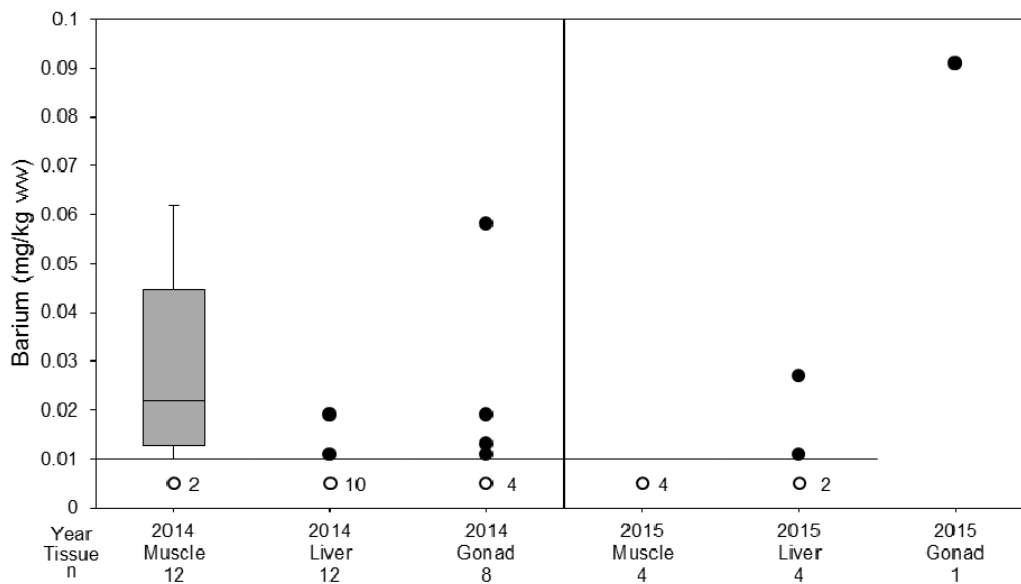
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 9: Barium Concentrations in Burbot Tissues Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015

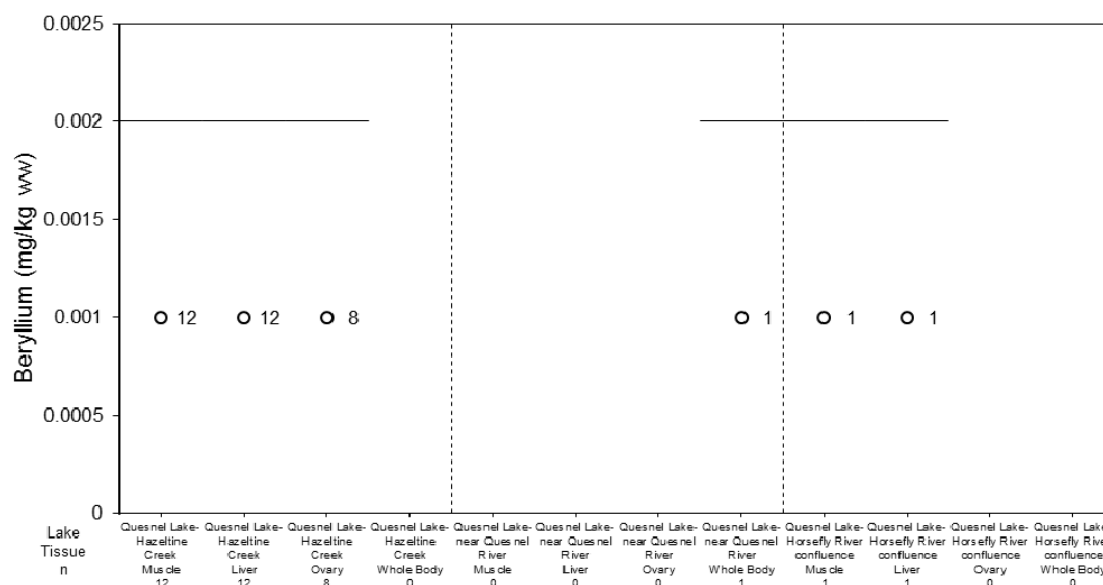


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (—) indicate the separation of exposure and reference or separation of years.

1.4 Beryllium

Figure 10: Beryllium Concentrations in Burbot Tissues Collected in 2014



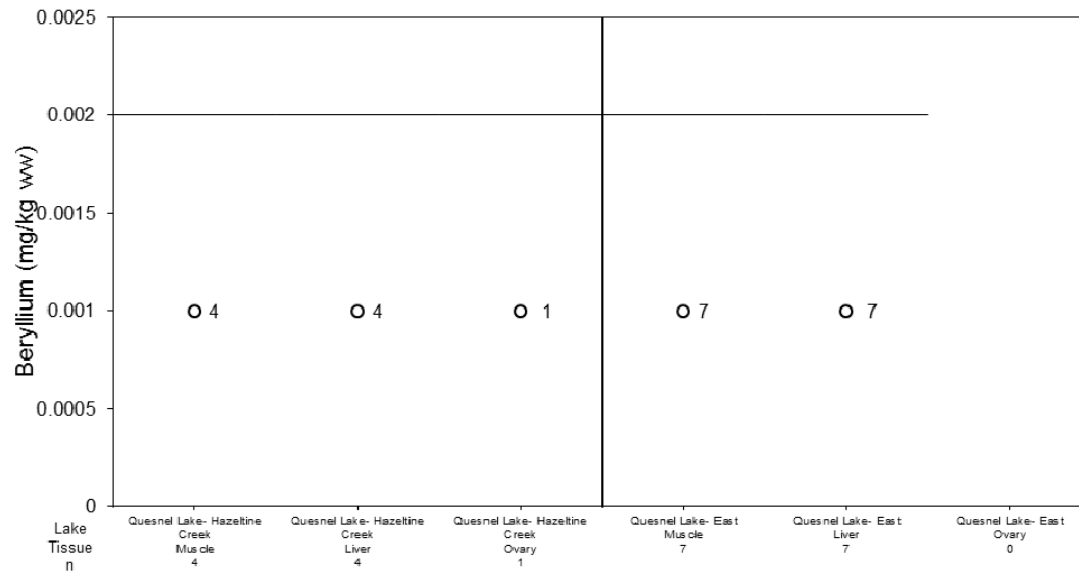
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (—) indicate the separation of exposure and reference or separation of years.



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Figure 11: Beryllium Concentrations in Burbot Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 12: Beryllium Concentrations in Burbot Tissues Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015

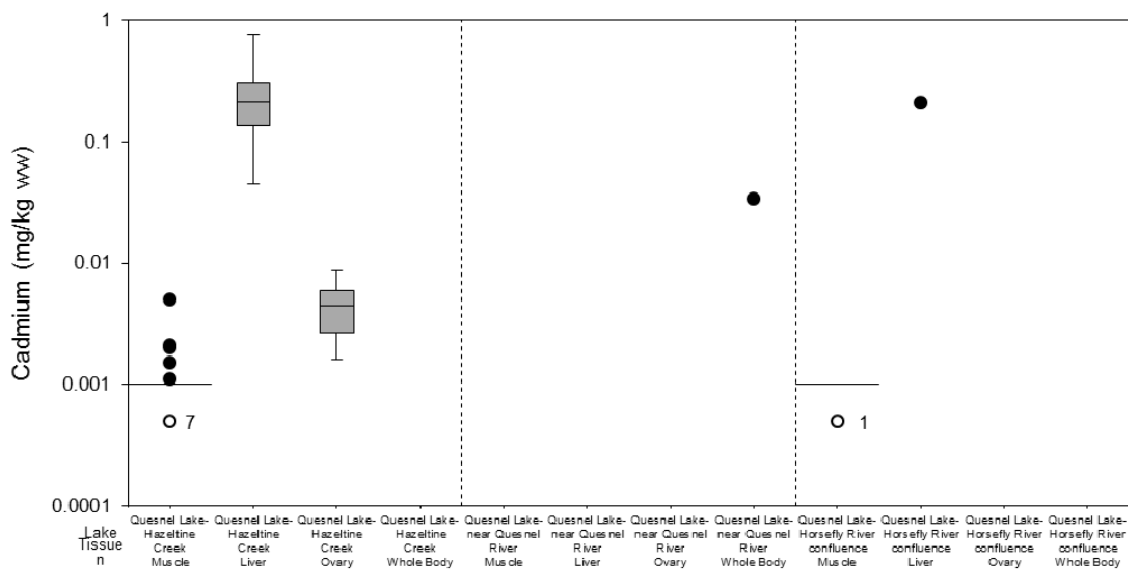


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



1.5 Cadmium

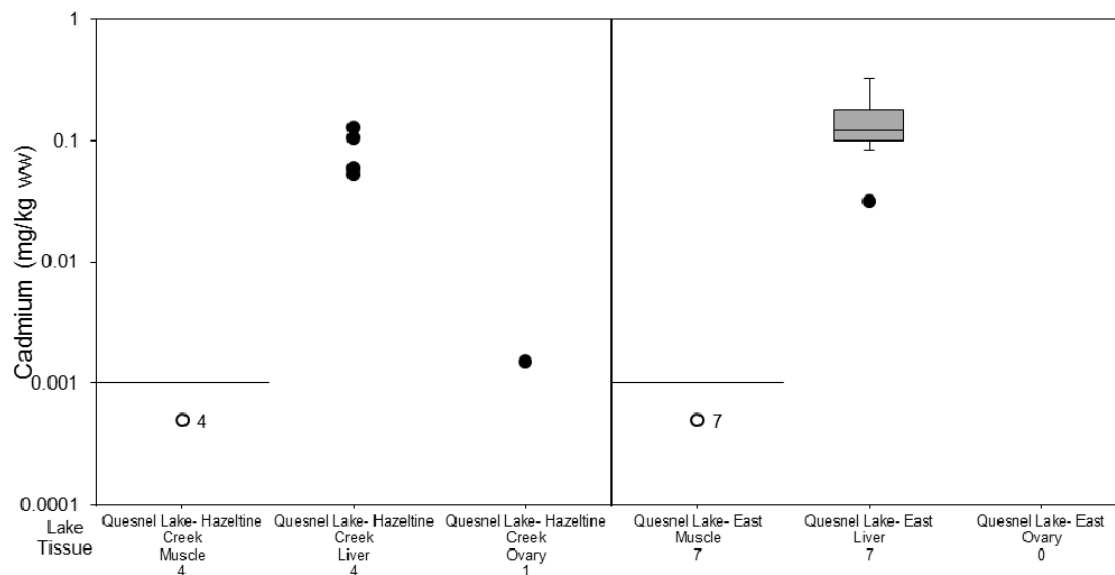
Figure 13: Cadmium Concentrations in Burbot Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 14: Cadmium Concentrations in Burbot Tissues Collected in 2015



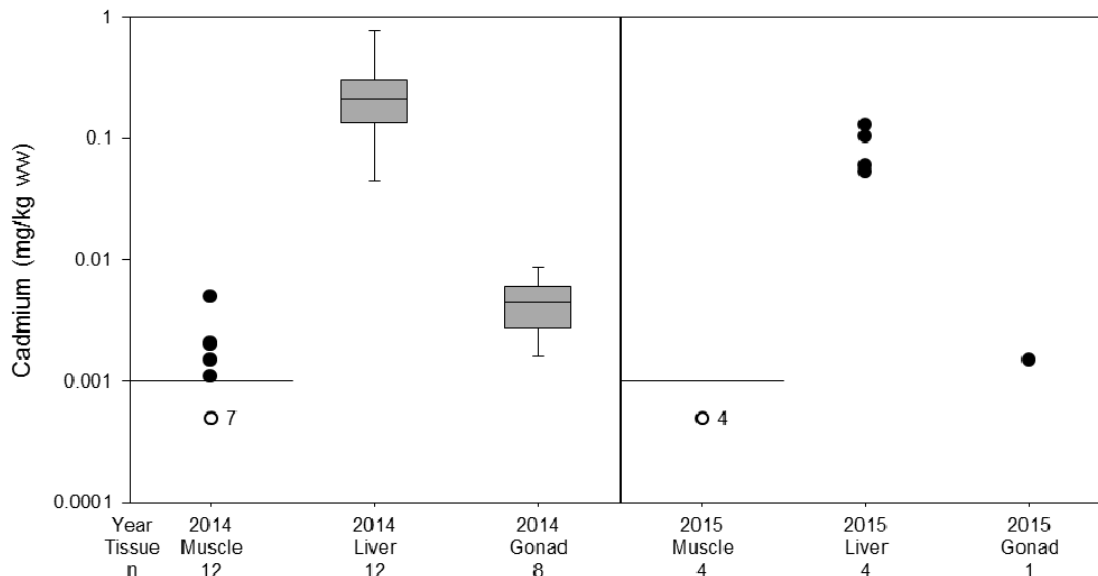
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



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Figure 15: Cadmium Concentrations in Burbot Tissues Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015

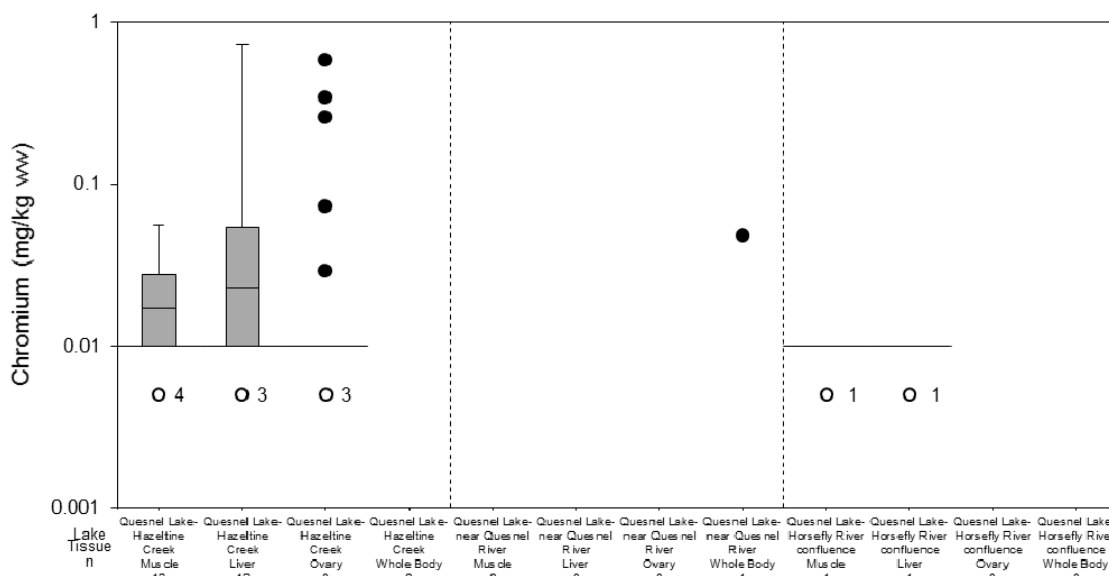


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (—) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

1.6 Chromium

Figure 16: Chromium Concentrations in Burbot Tissues Collected in 2014



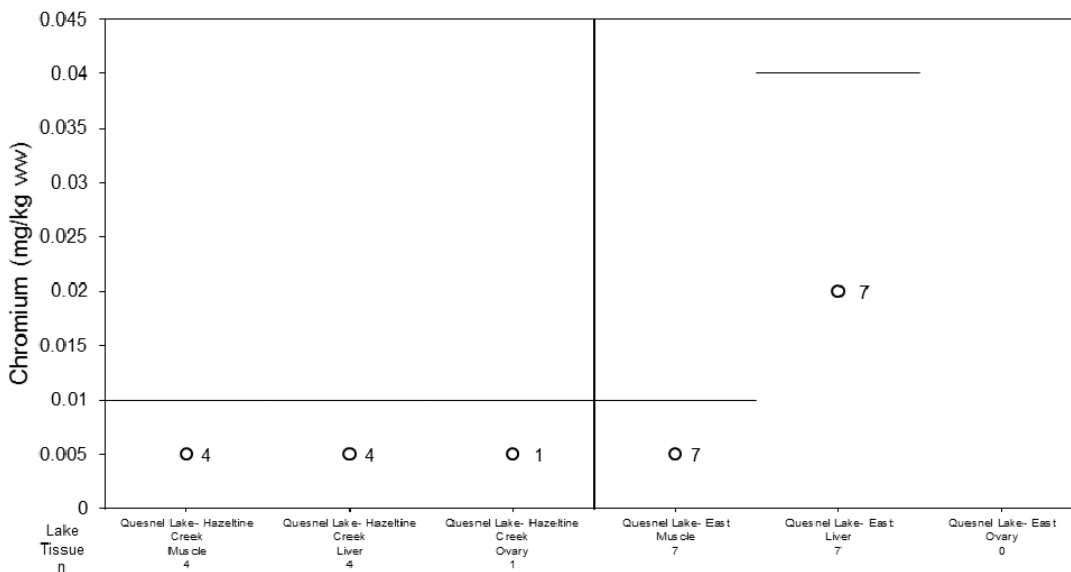
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (—) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



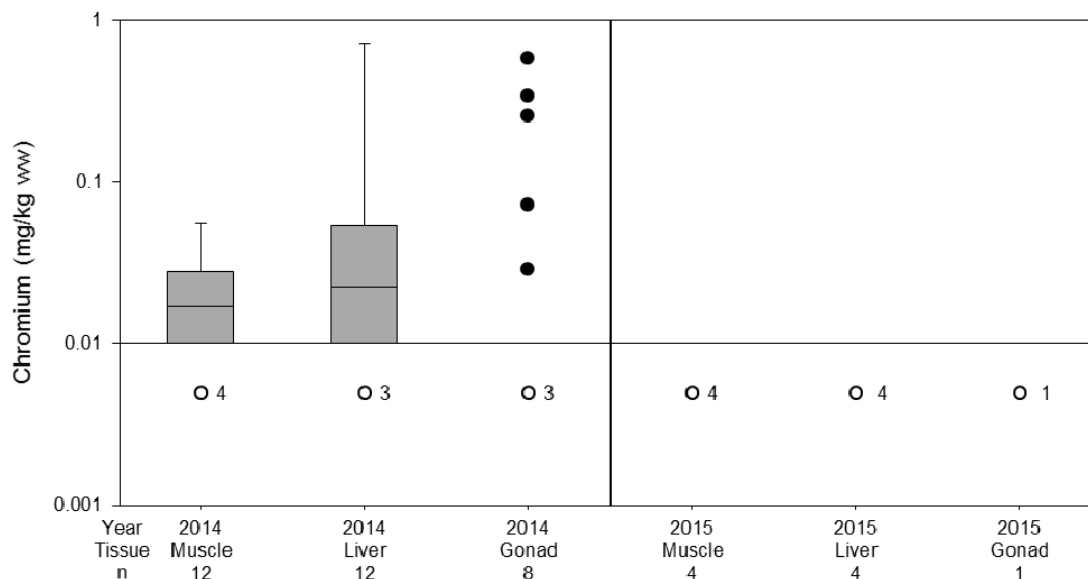
ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 17: Chromium Concentrations in Burbot Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 18: Chromium Concentrations in Burbot Tissues Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015

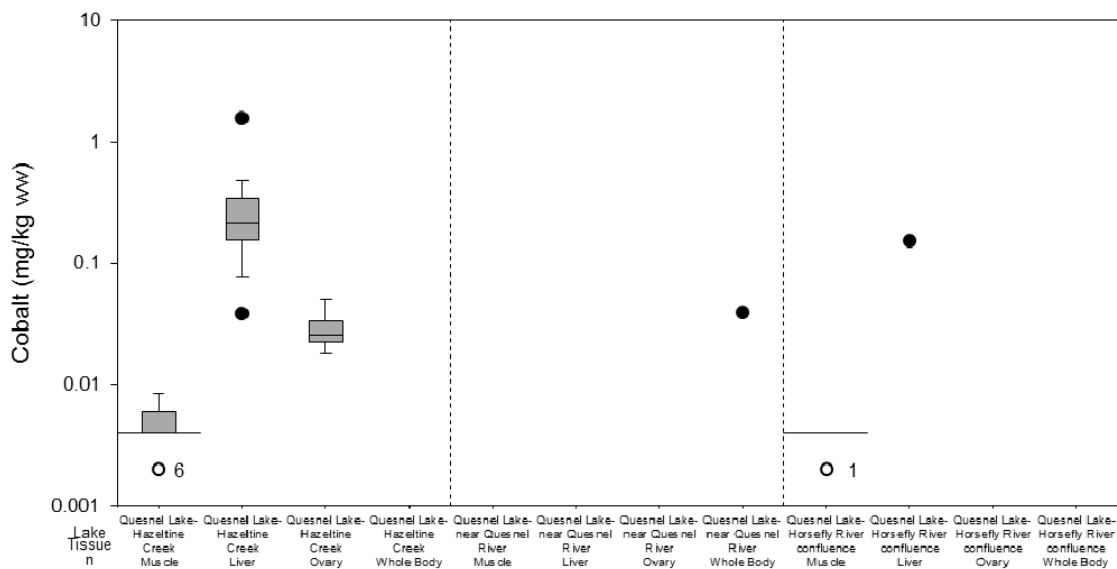


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



1.7 Cobalt

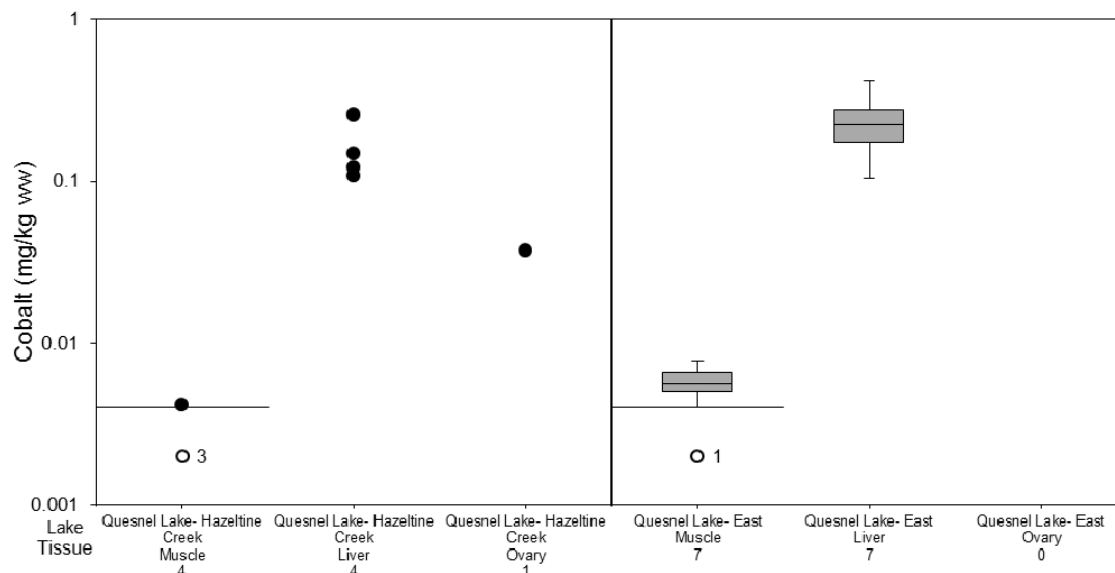
Figure 19: Cobalt Concentrations in Burbot Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (—) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 20: Cobalt Concentrations in Burbot Tissues Collected in 2015



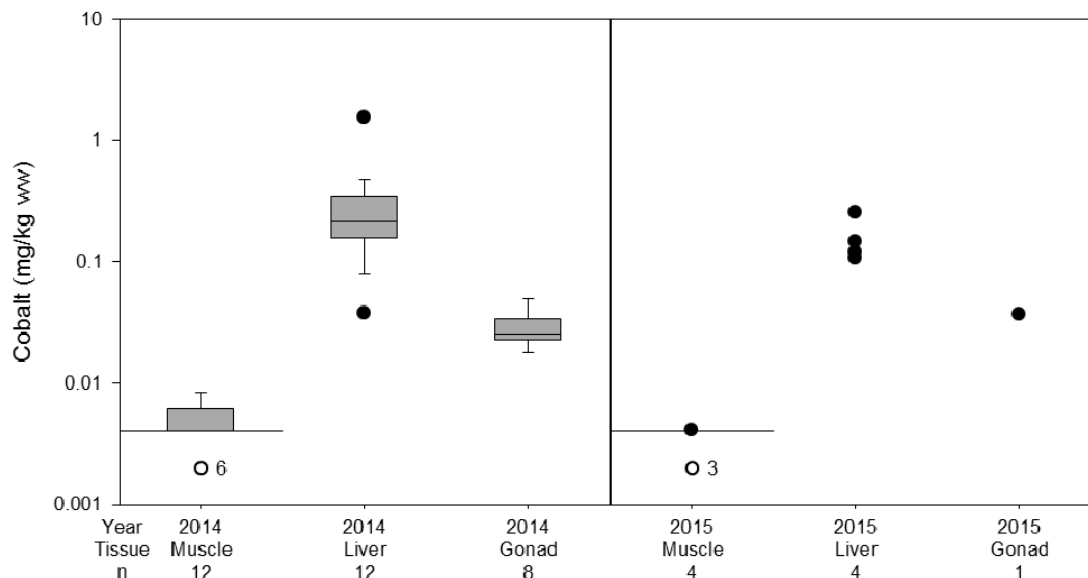
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (—) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



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Figure 21: Cobalt Concentrations in Burbot Tissues Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015

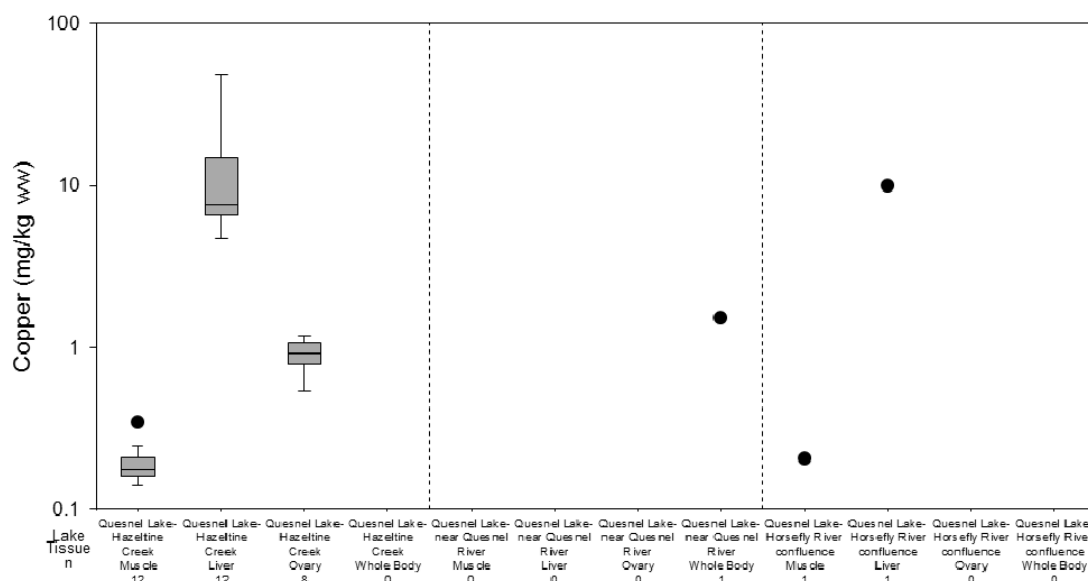


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (—) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

1.8 Copper

Figure 22: Copper Concentrations in Burbot Tissues Collected in 2014



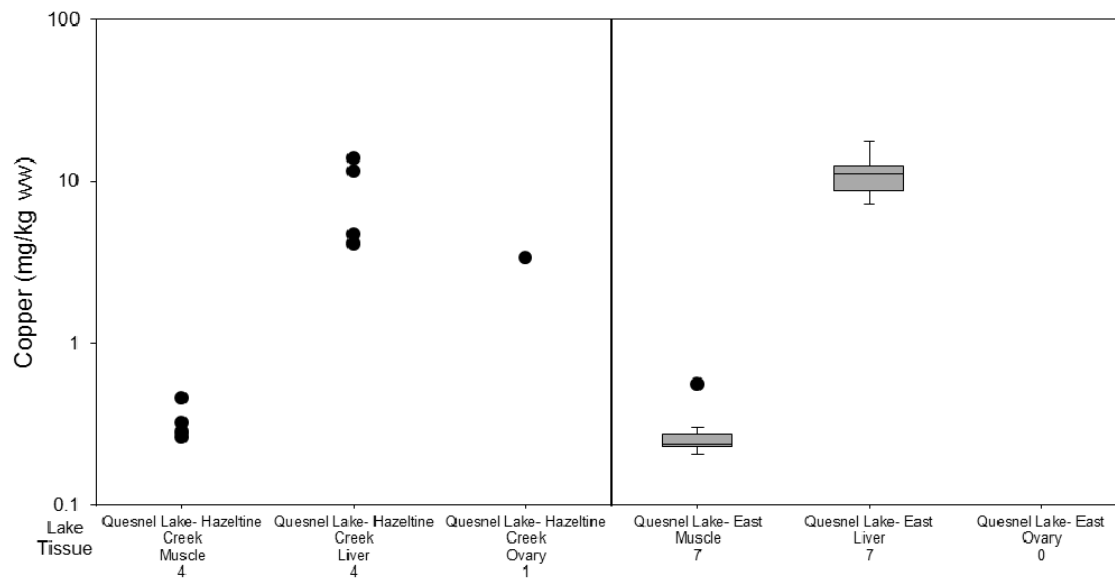
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (—) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



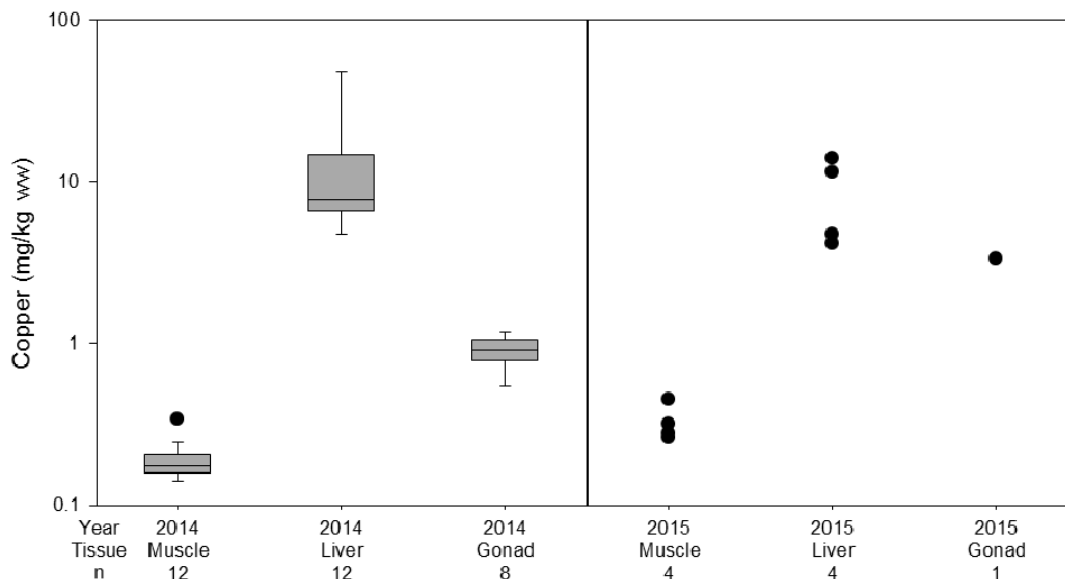
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Figure 23: Copper Concentrations in Burbot Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 24: Copper Concentrations in Burbot Tissues Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015

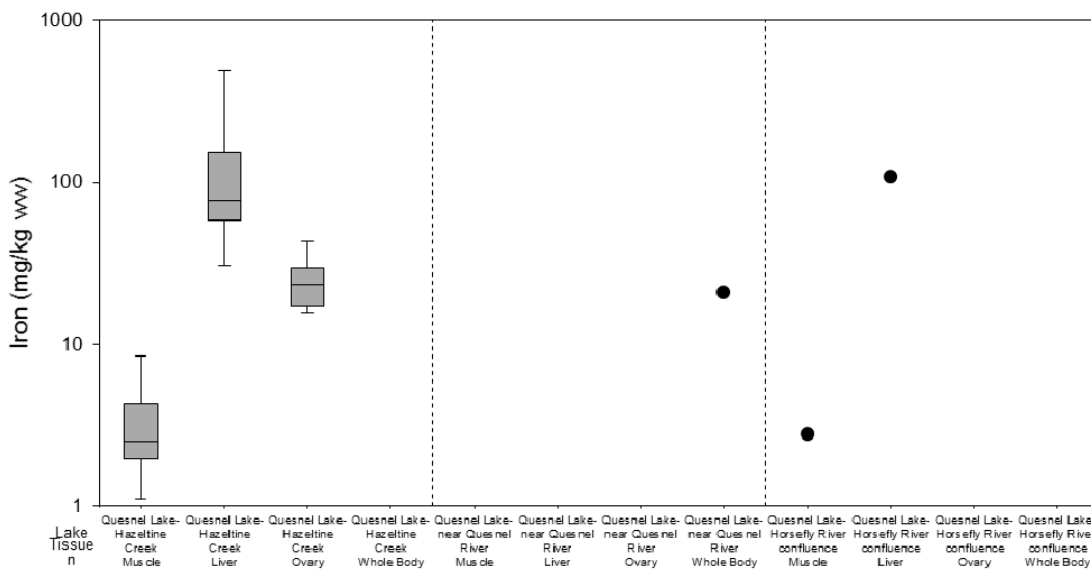


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



1.9 Iron

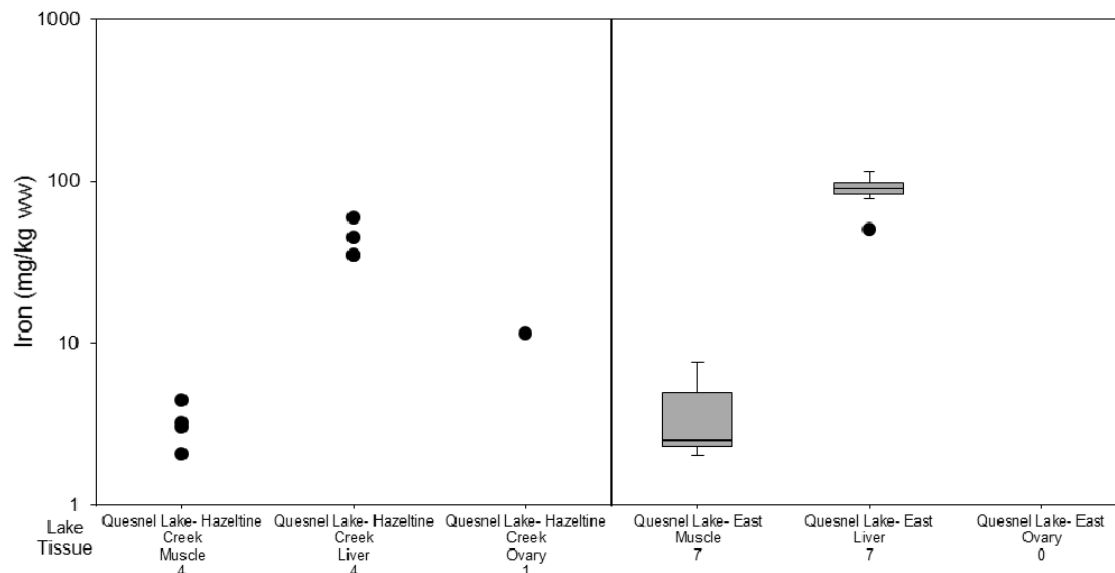
Figure 25: Iron Concentrations in Burbot Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (—) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 26: Iron Concentrations in Burbot Tissues Collected in 2015



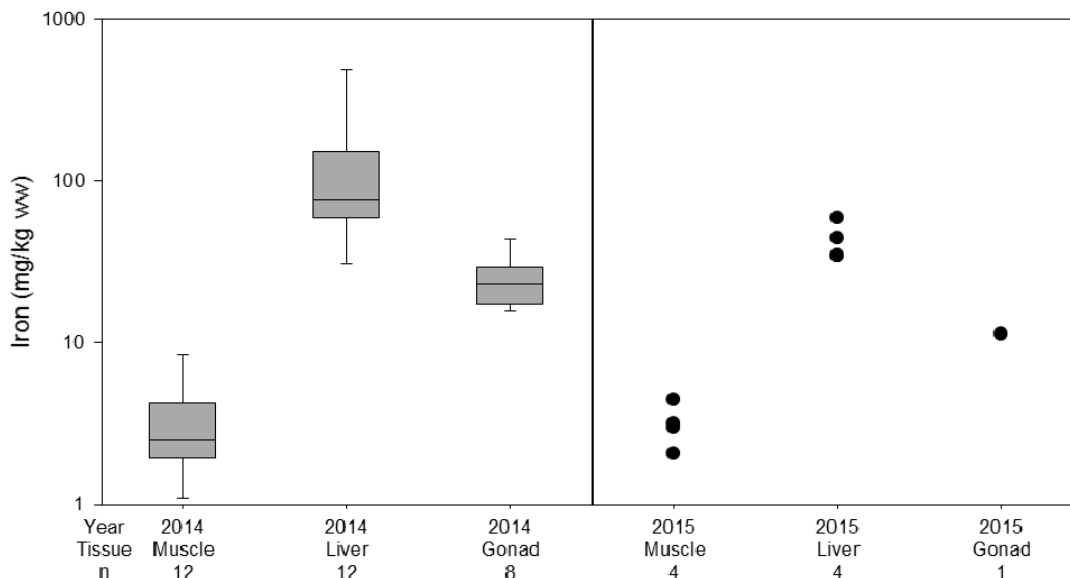
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (—) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



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Figure 27: Iron Concentrations in Burbot Tissues Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015

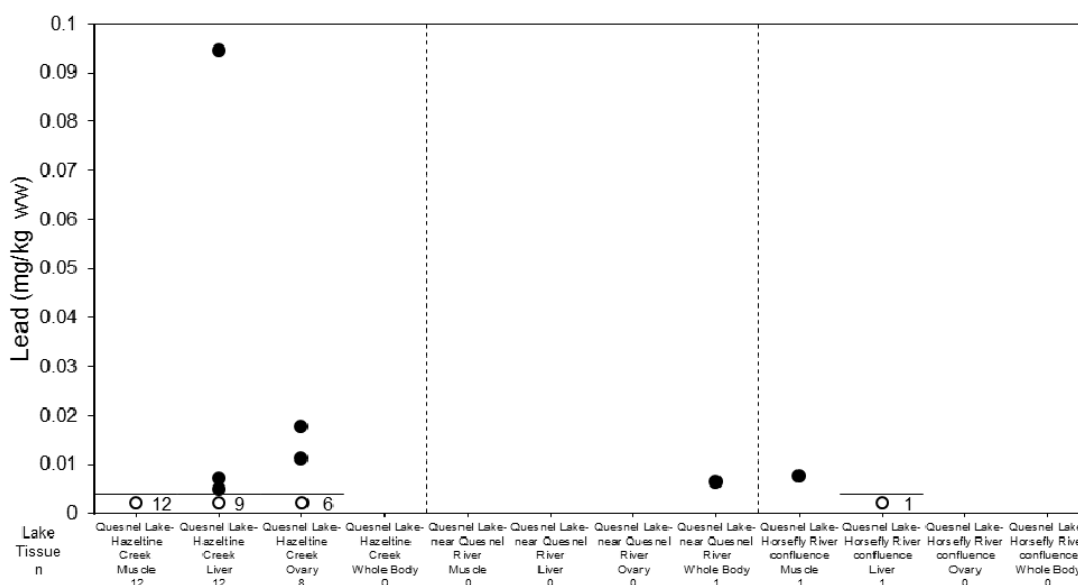


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

1.10 Lead

Figure 28: Lead Concentrations in Burbot Tissues Collected in 2014



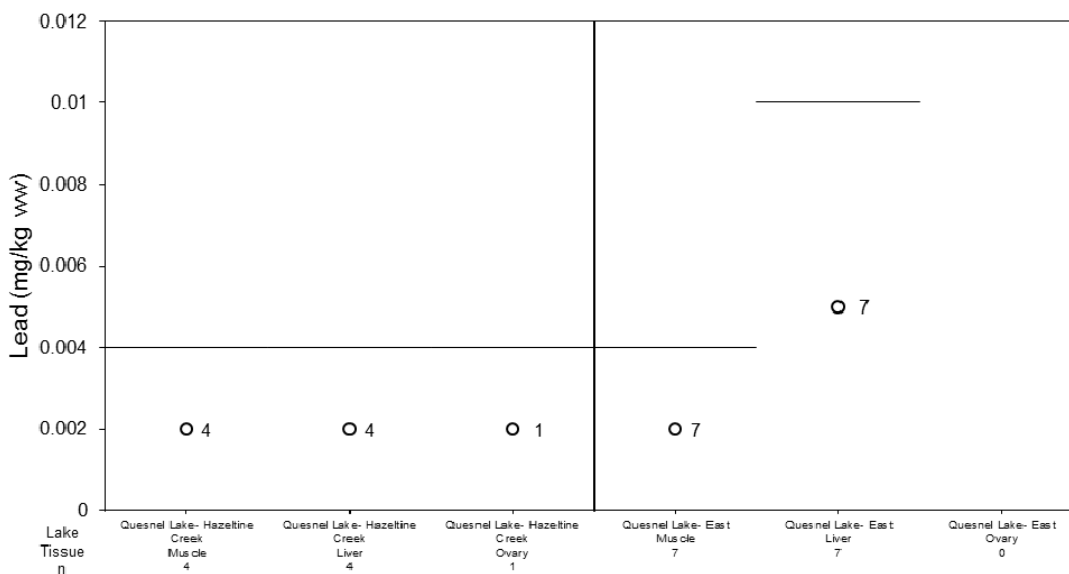
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



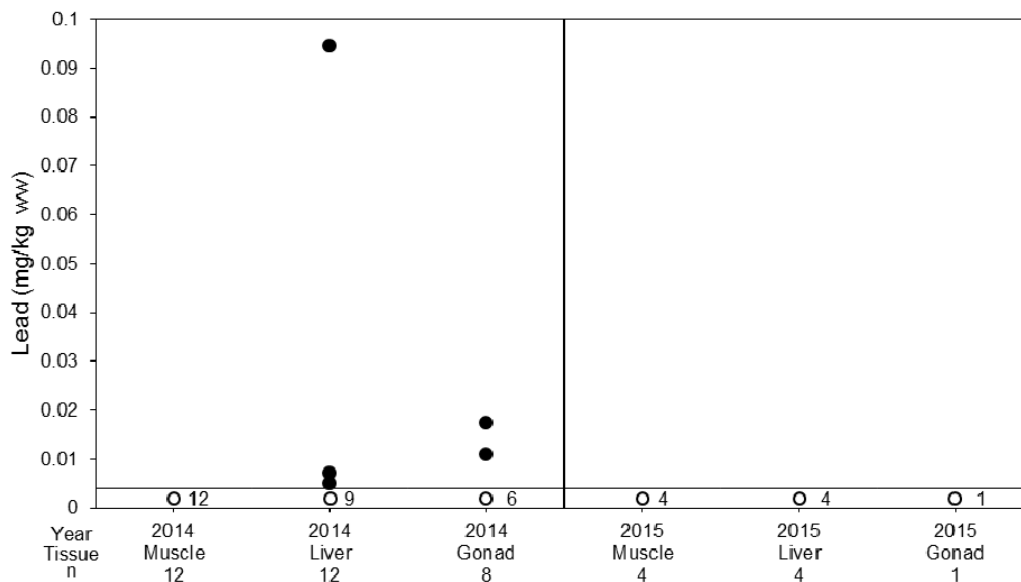
ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 29: Lead Concentrations in Burbot Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 30: Lead Concentrations in Burbot Tissues Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015

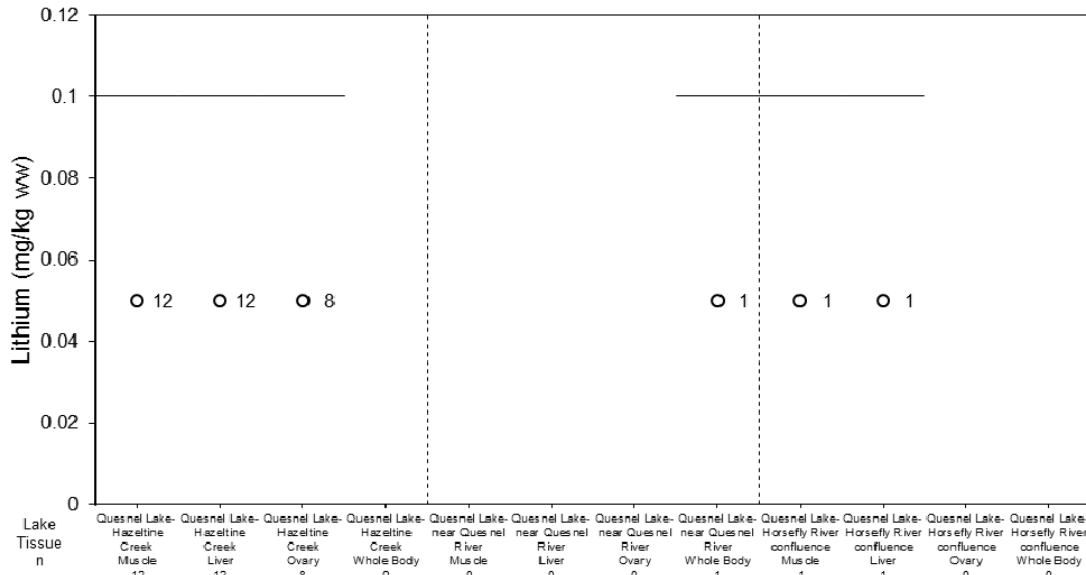


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



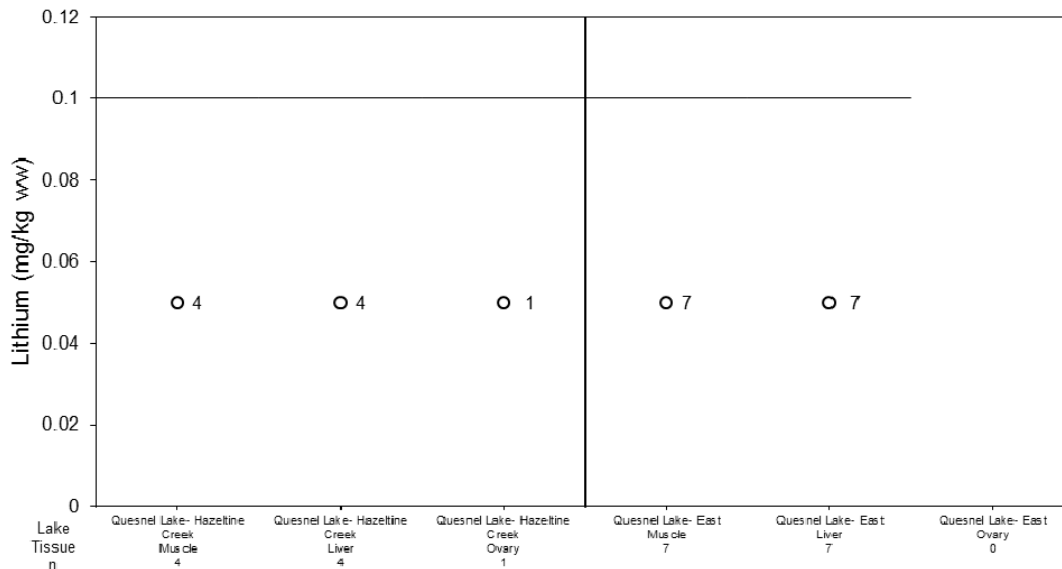
1.11 Lithium

Figure 31: Lithium Concentrations in Burbot Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
 mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 32: Lithium Concentrations in Burbot Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
 mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



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Figure 33: Lithium Concentrations in Burbot Tissues Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015

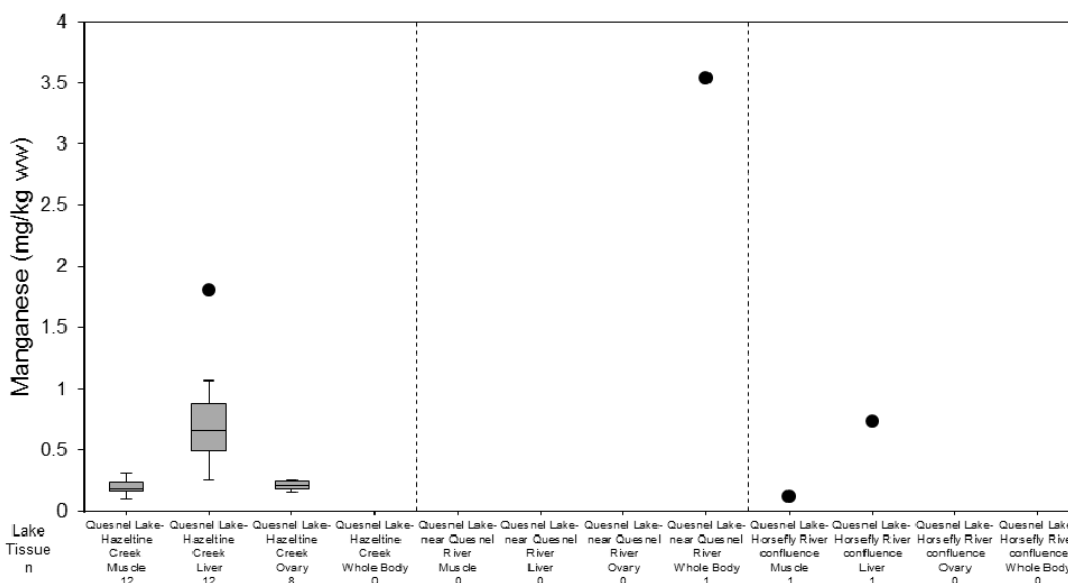


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

1.12 Manganese

Figure 34: Manganese Concentrations in Burbot Tissues Collected in 2014



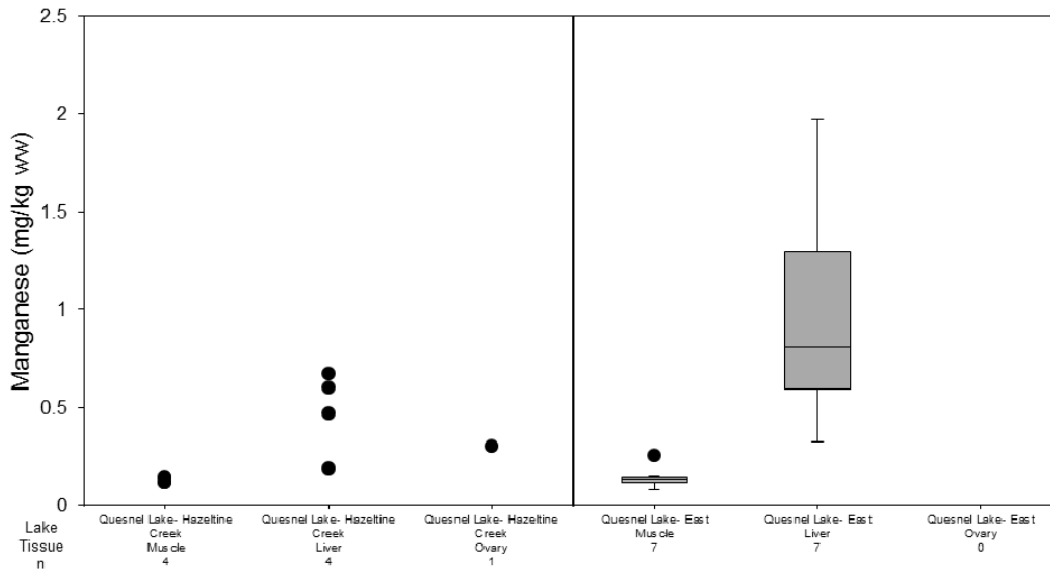
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



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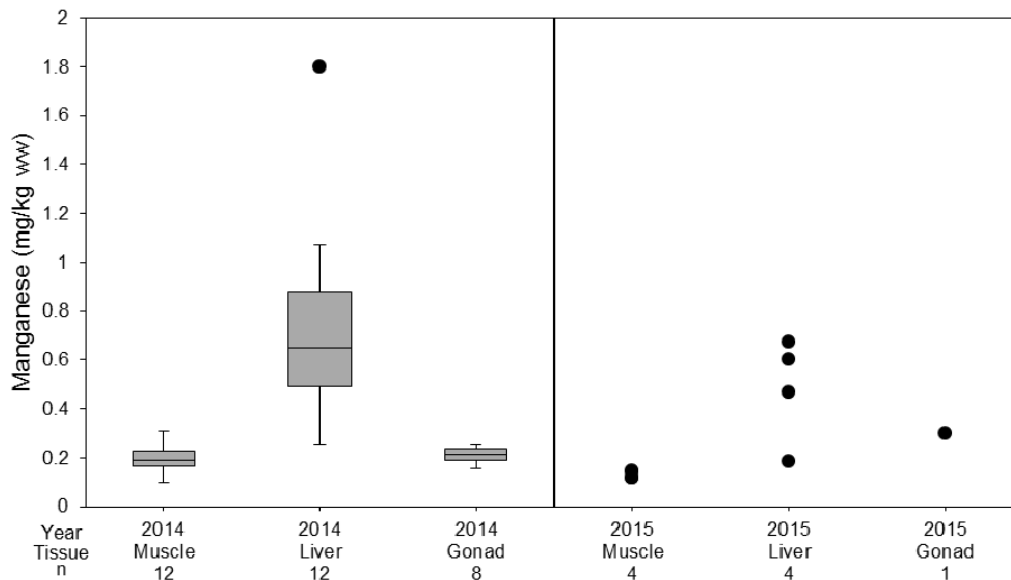
Figure 35: Manganese Concentrations in Burbot Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 36: Manganese Concentrations in Burbot Tissues Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015



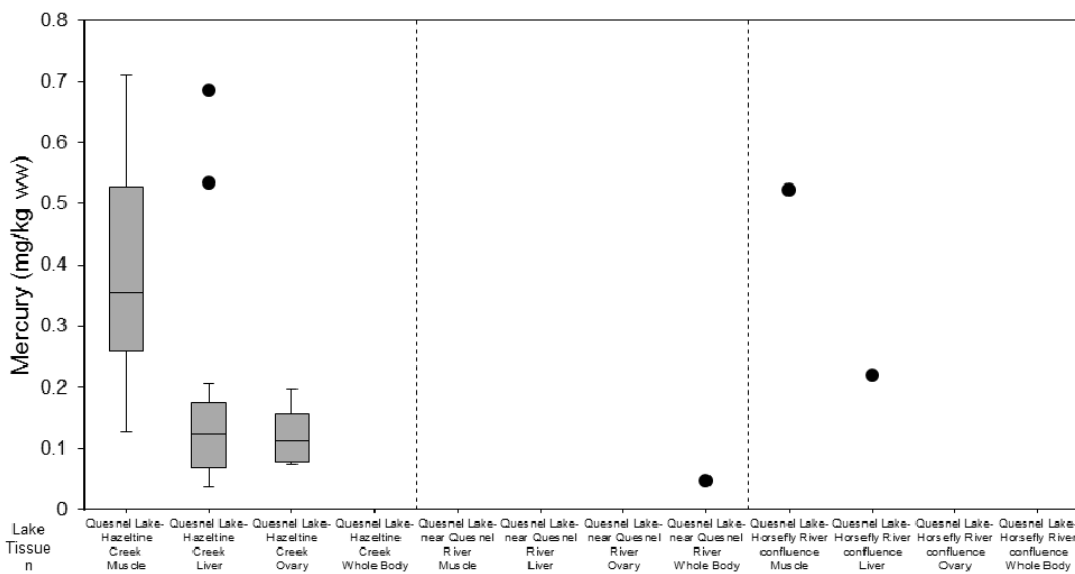
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



1.13 Mercury

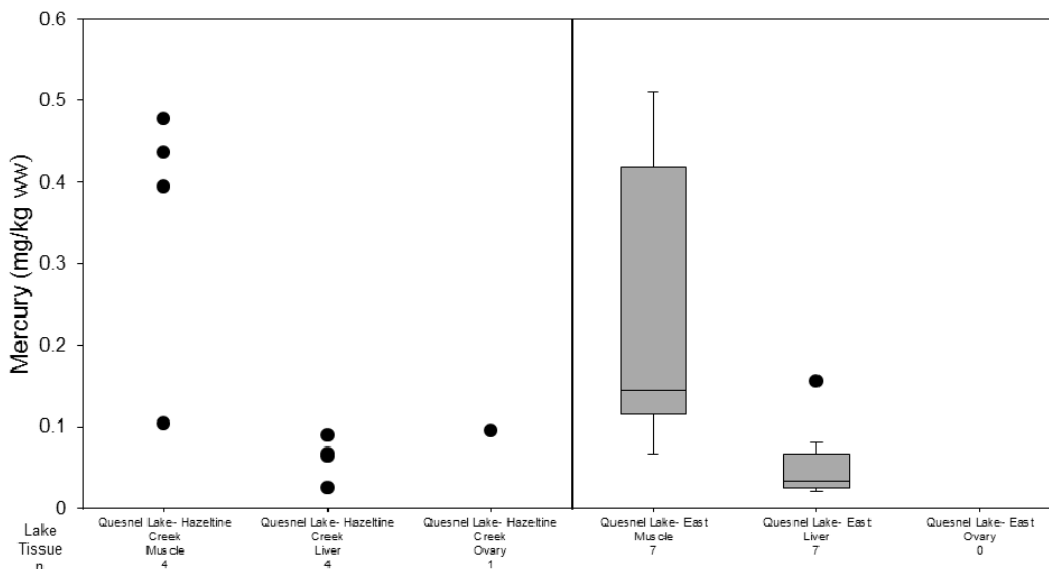
Figure 37: Mercury Concentrations in Burbot Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (—) indicate the separation of exposure and reference or separation of years.

Figure 38: Mercury Concentrations in Burbot Tissues Collected in 2015



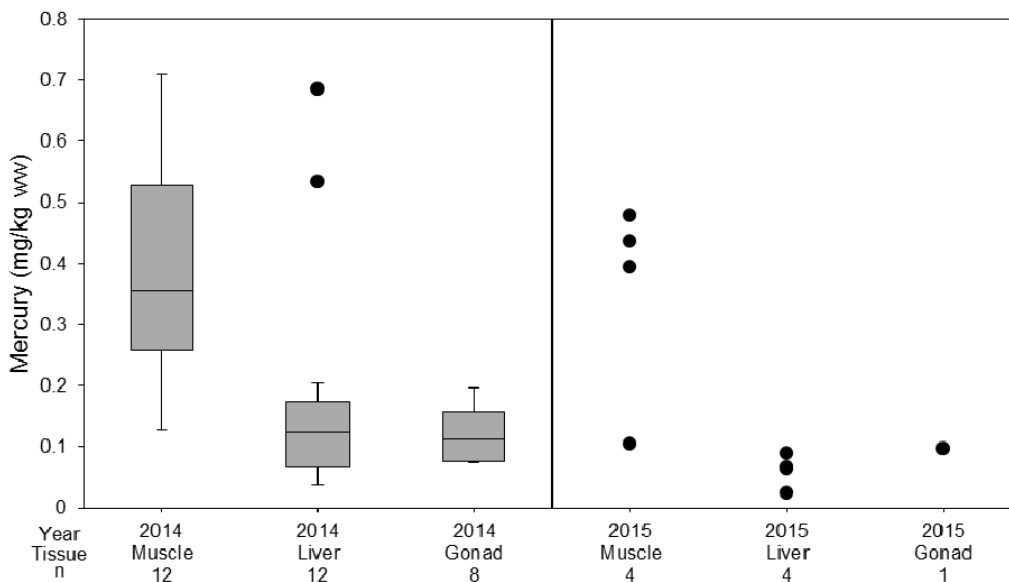
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (—) indicate the separation of exposure and reference or separation of years.



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Figure 39: Mercury Concentrations in Burbot Tissues Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015

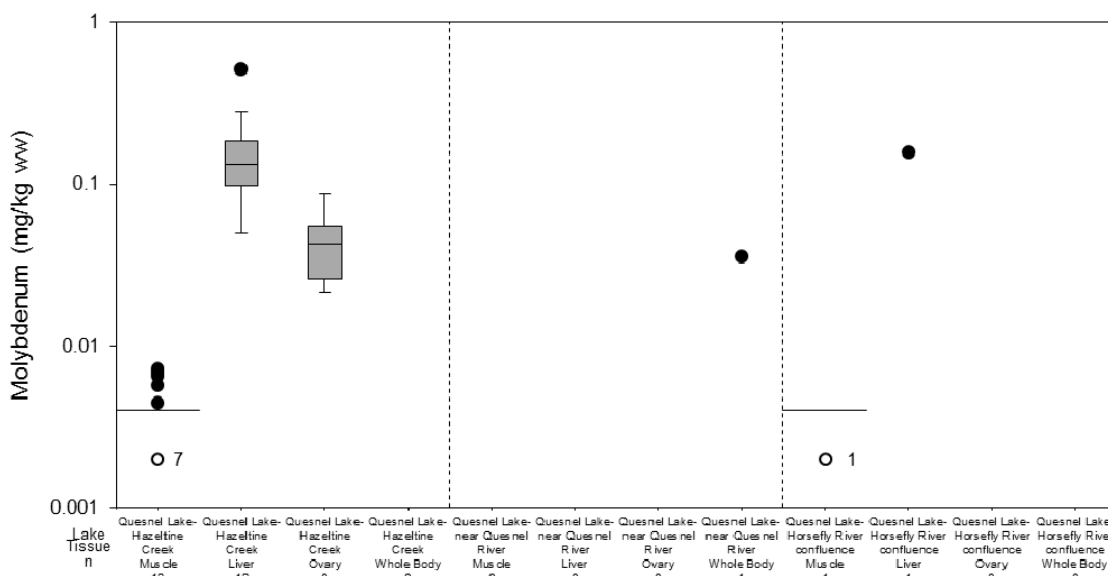


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (—) indicate the separation of exposure and reference or separation of years.

1.14 Molybdenum

Figure 40: Molybdenum Concentrations in Burbot Tissues Collected in 2014



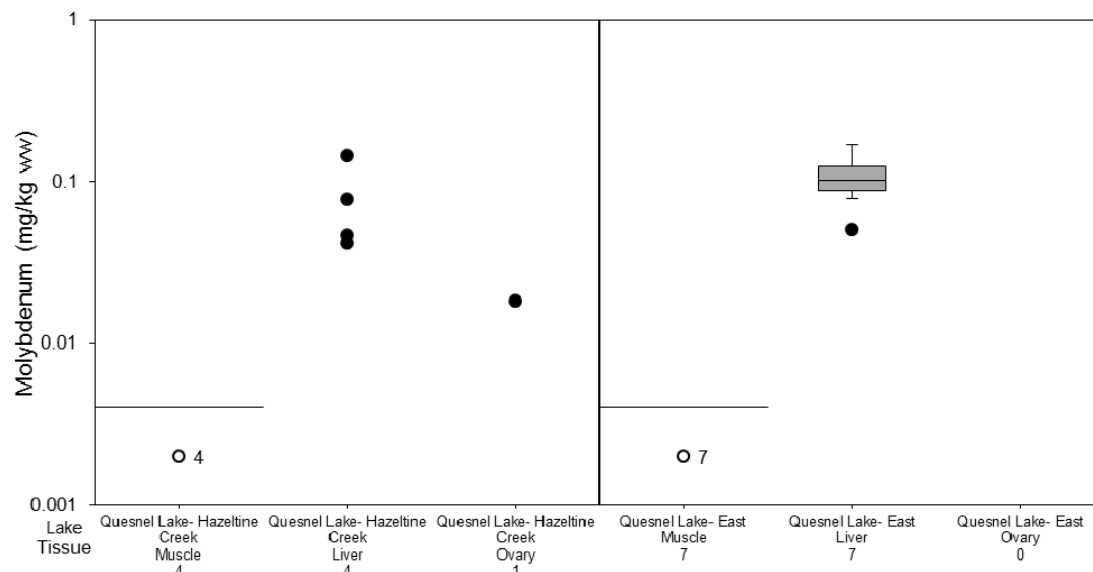
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (—) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



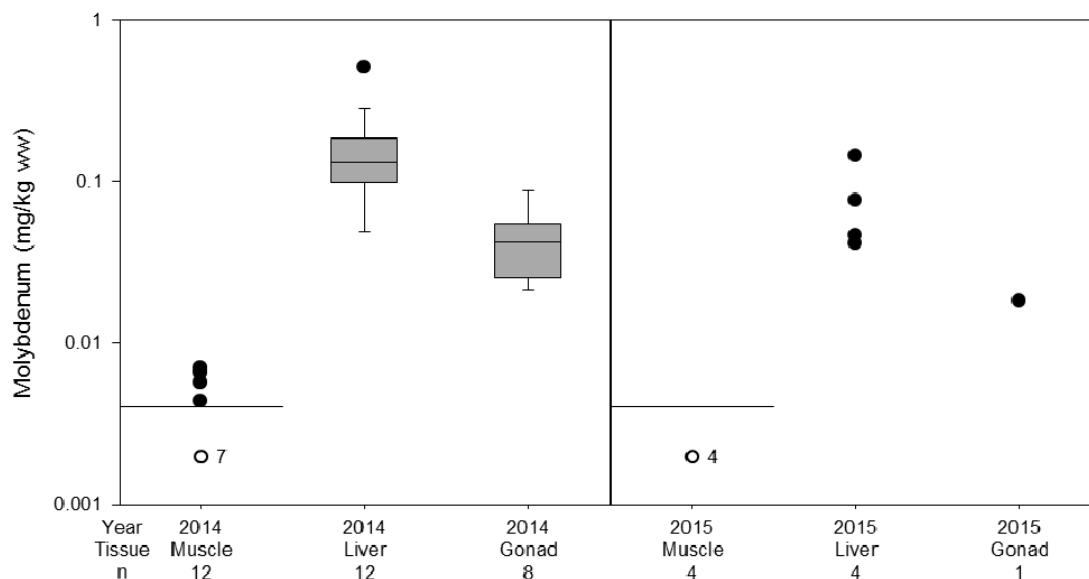
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Figure 41: Molybdenum Concentrations in Burbot Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 42: Molybdenum Concentrations in Burbot Tissues Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015

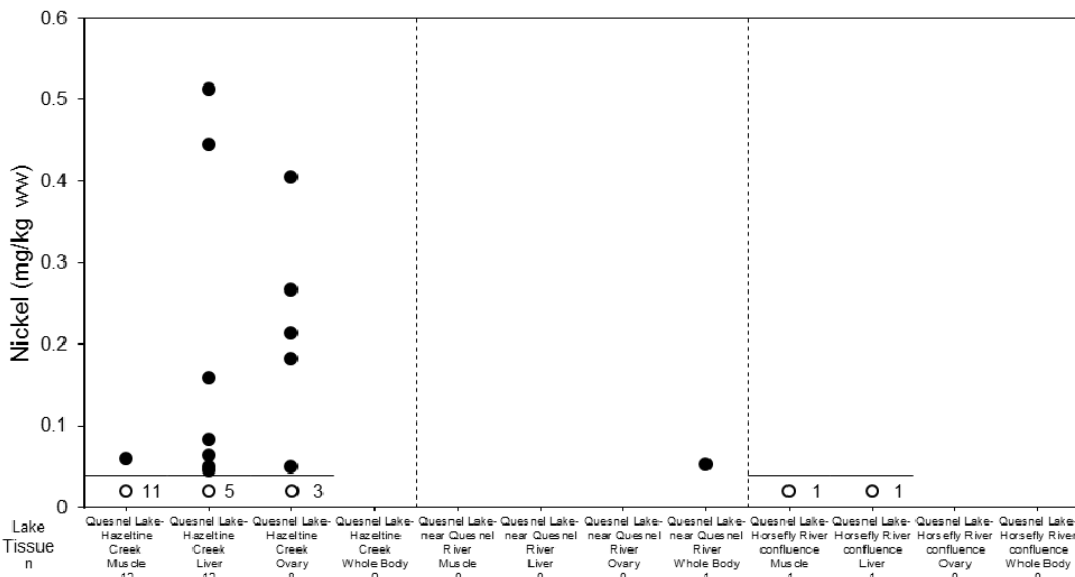


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



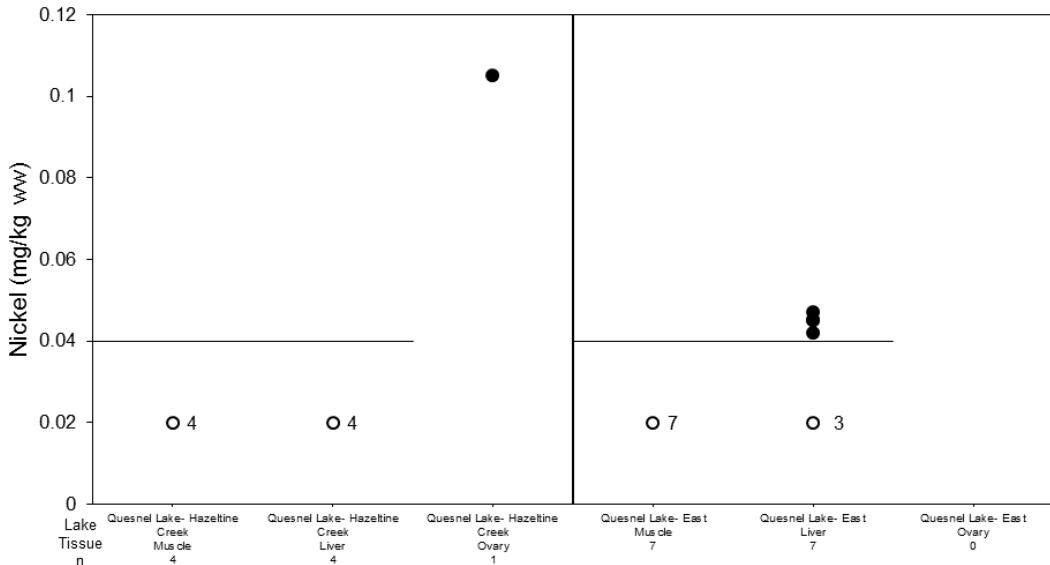
1.15 Nickel

Figure 43: Nickel Concentrations in Burbot Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
 mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 44: Nickel Concentrations in Burbot Tissues Collected in 2015

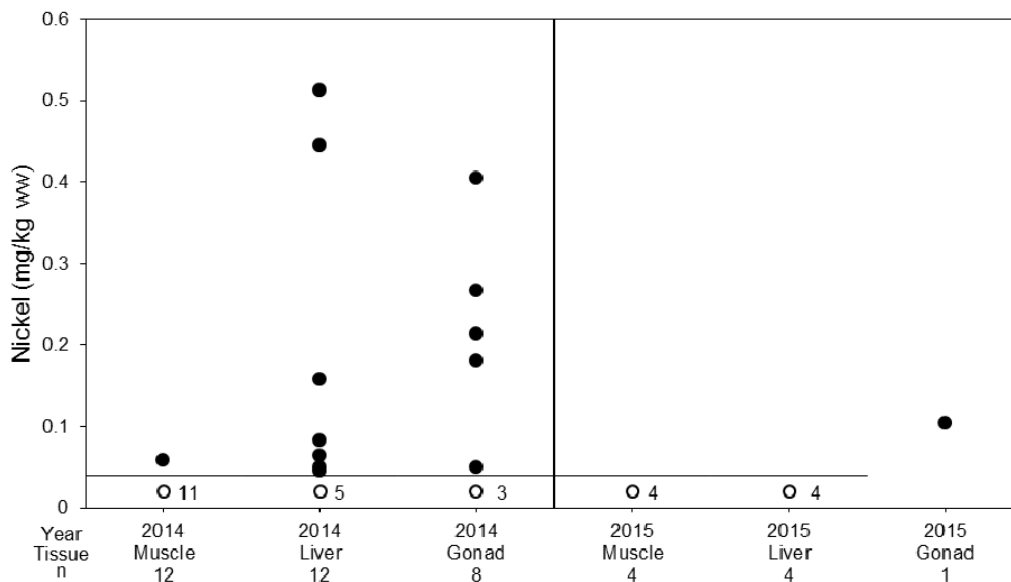


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
 mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



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Figure 45: Nickel Concentrations in Burbot Tissues Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015

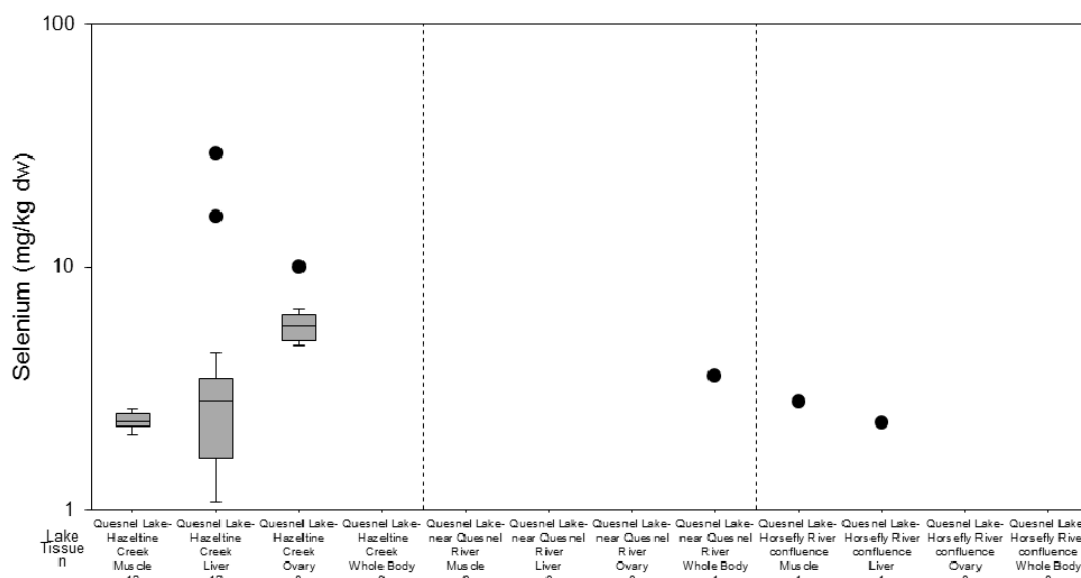


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

1.16 Selenium

Figure 46: Selenium Concentrations in Burbot Tissues Collected in 2014



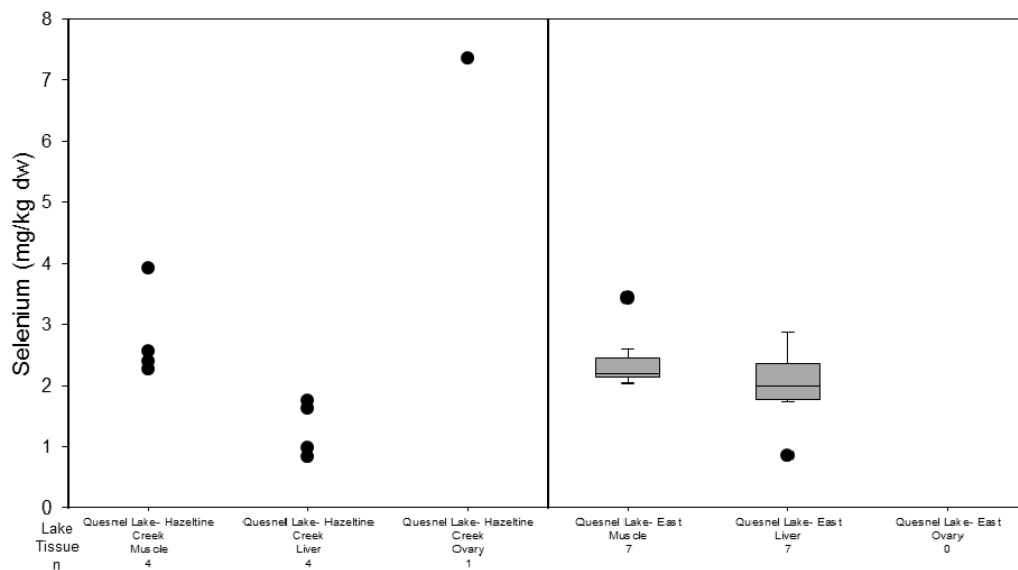
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



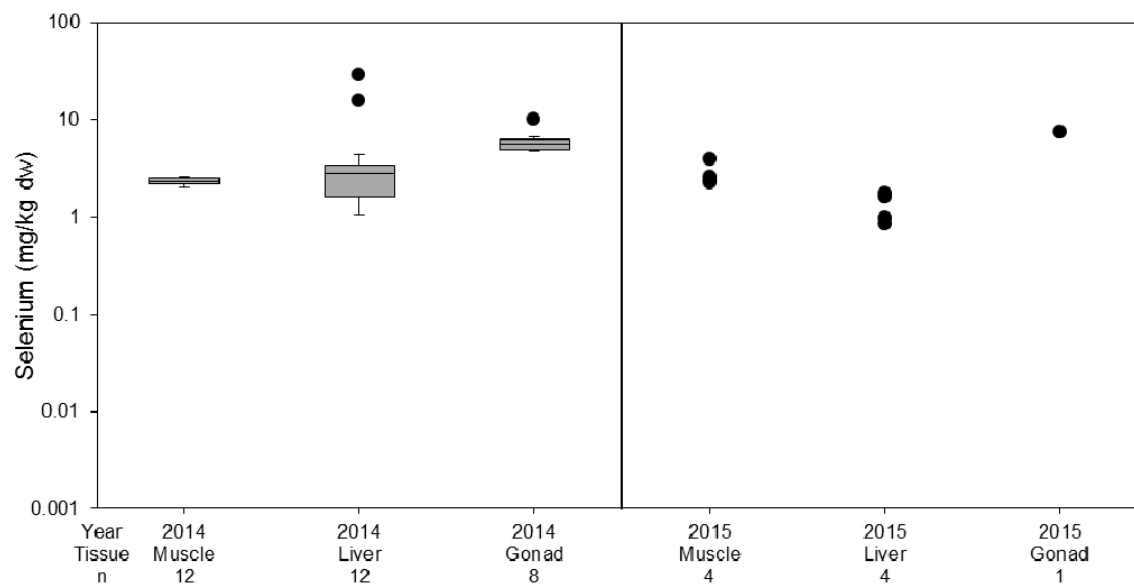
ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 47: Selenium Concentrations in Burbot Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 48: Selenium Concentrations in Burbot Tissues Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015

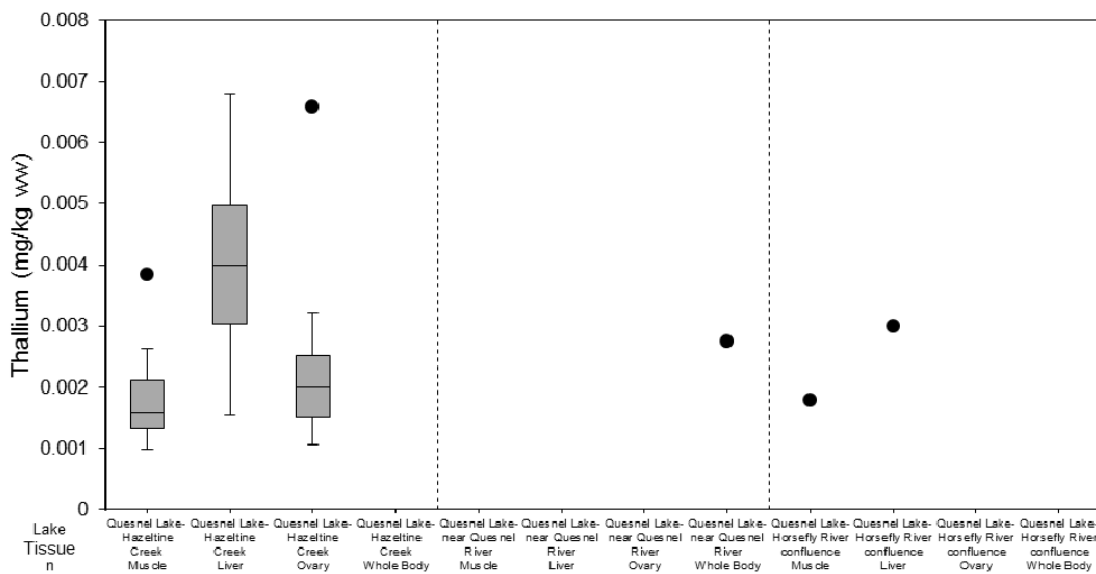


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



1.17 Thallium

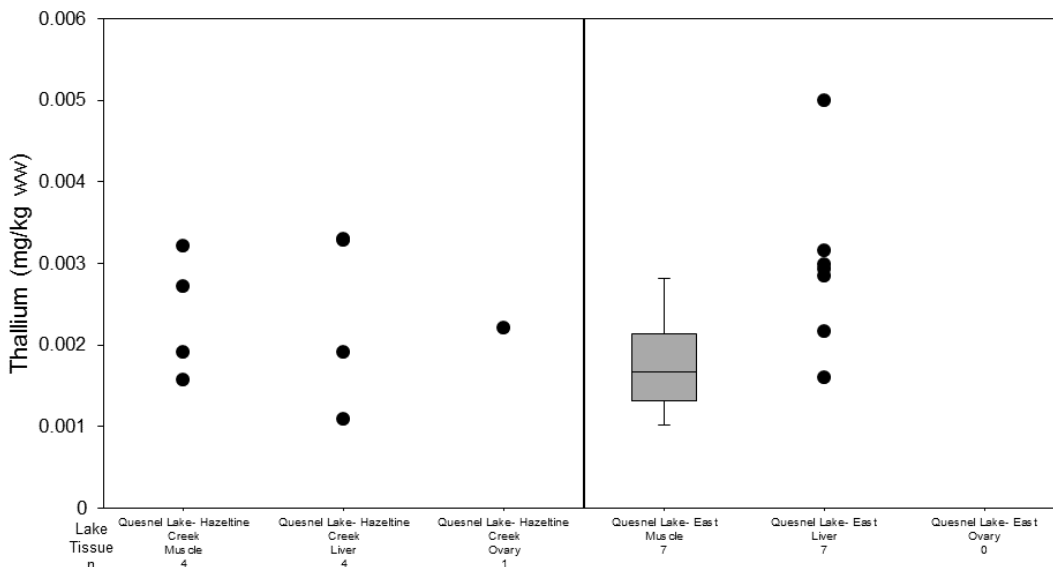
Figure 49: Thallium Concentrations in Burbot Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 50: Thallium Concentrations in Burbot Tissues Collected in 2015



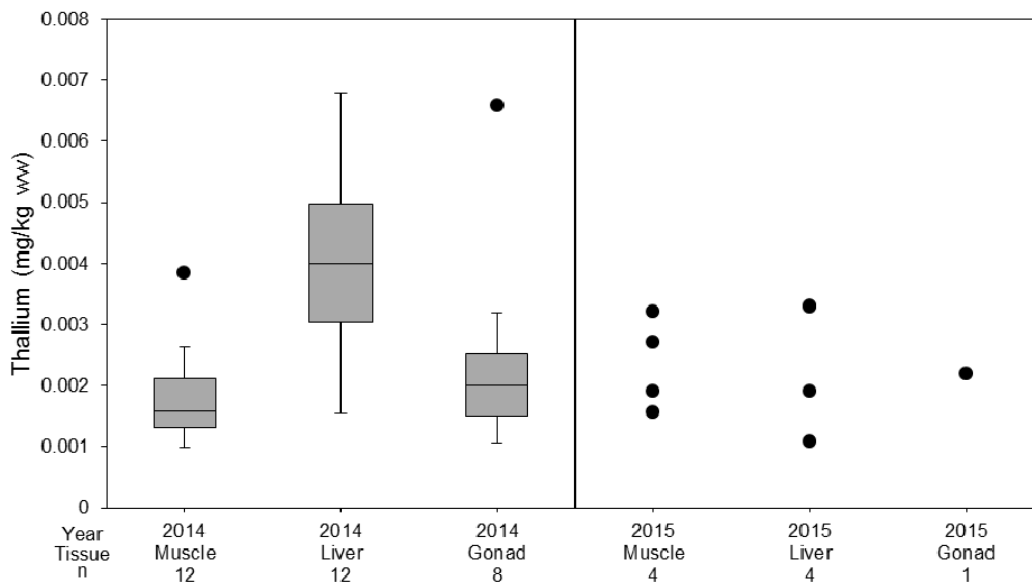
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



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Figure 51: Thallium Concentrations in Burbot Tissues Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015

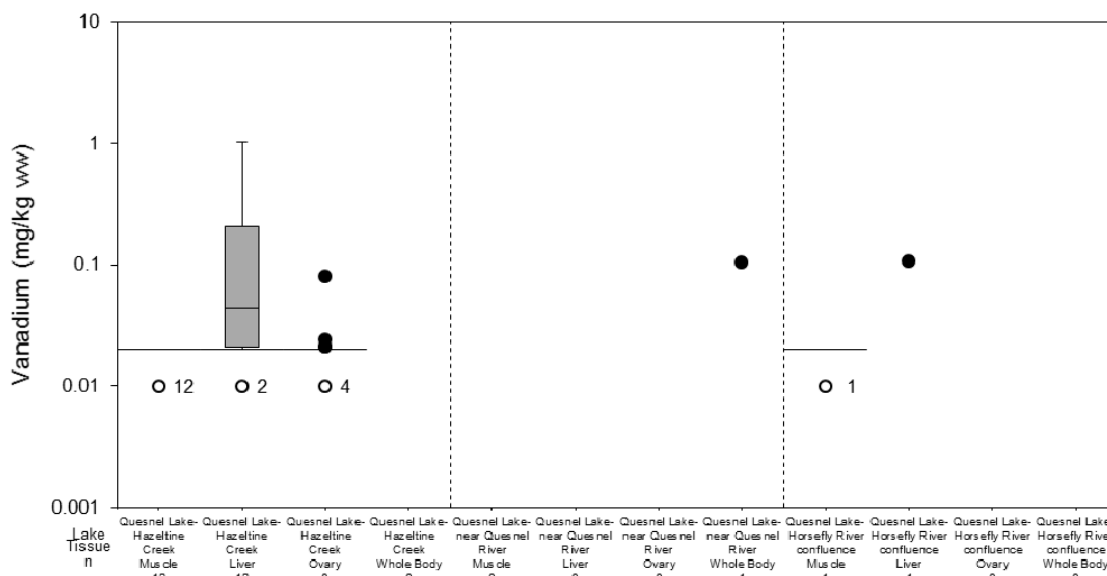


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (—) indicate the separation of exposure and reference or separation of years.

1.18 Vanadium

Figure 52: Vanadium Concentrations in Burbot Tissues Collected in 2014



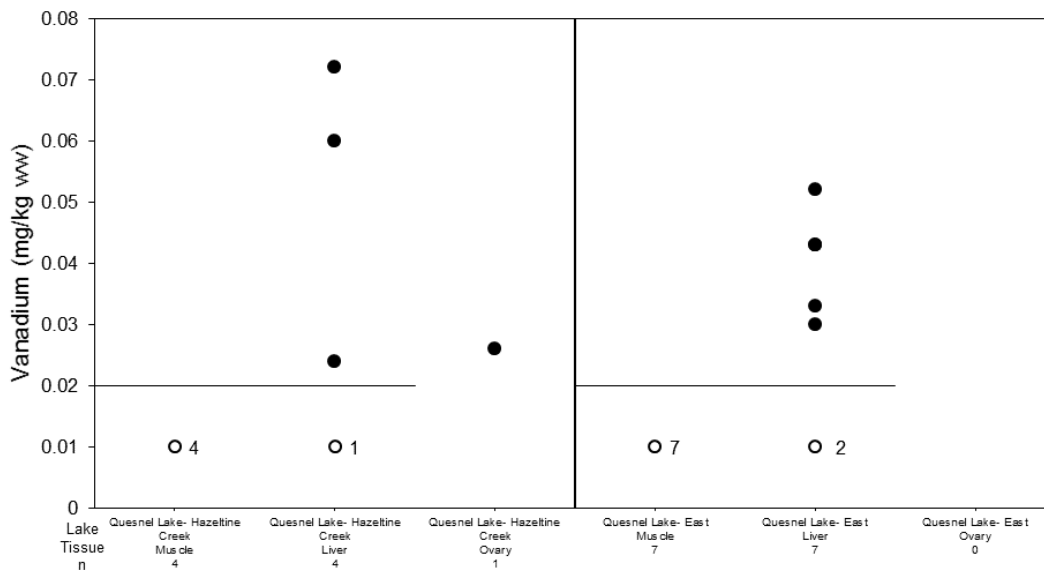
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (—) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



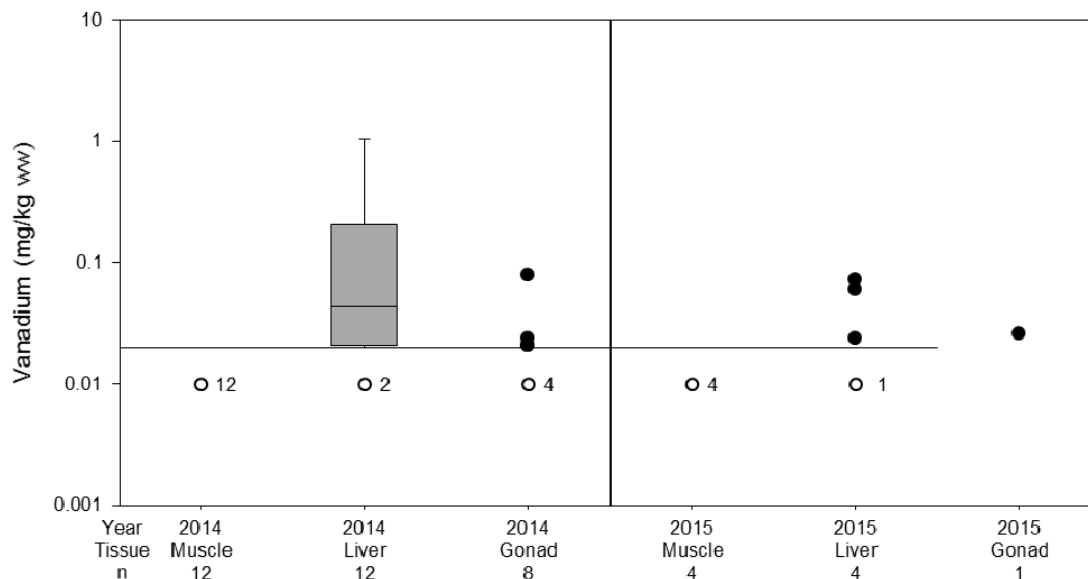
ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 53: Vanadium Concentrations in Burbot Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 54: Vanadium Concentrations in Burbot Tissues Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015

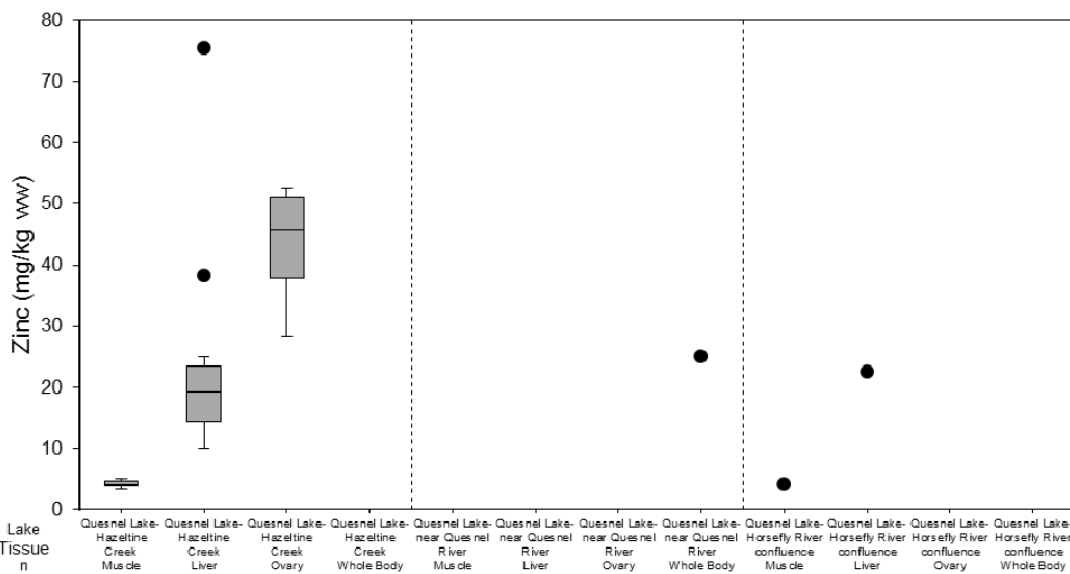


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



1.19 Zinc

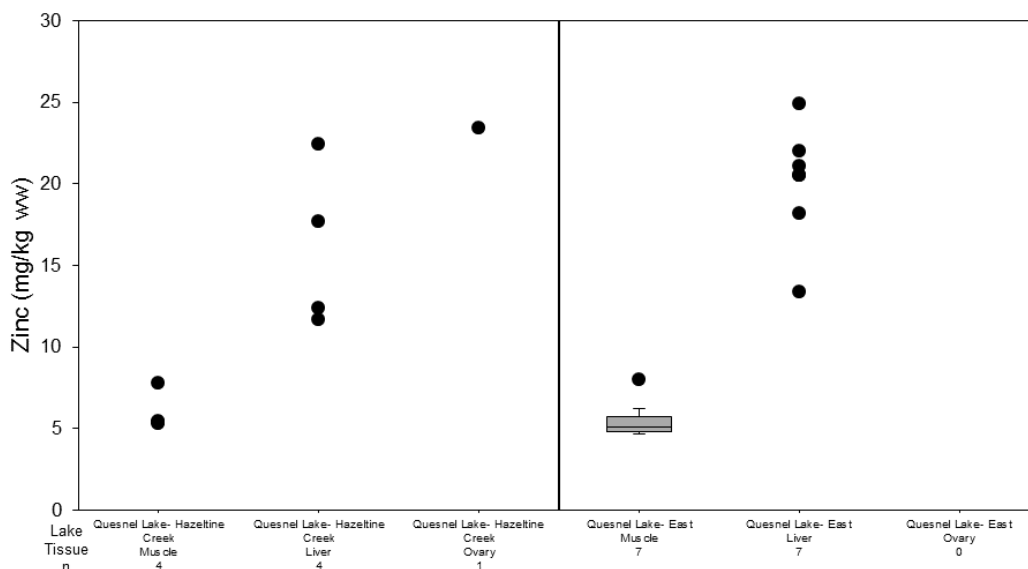
Figure 55: Zinc Concentrations in Burbot Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 56: Zinc Concentrations in Burbot Tissues Collected in 2015



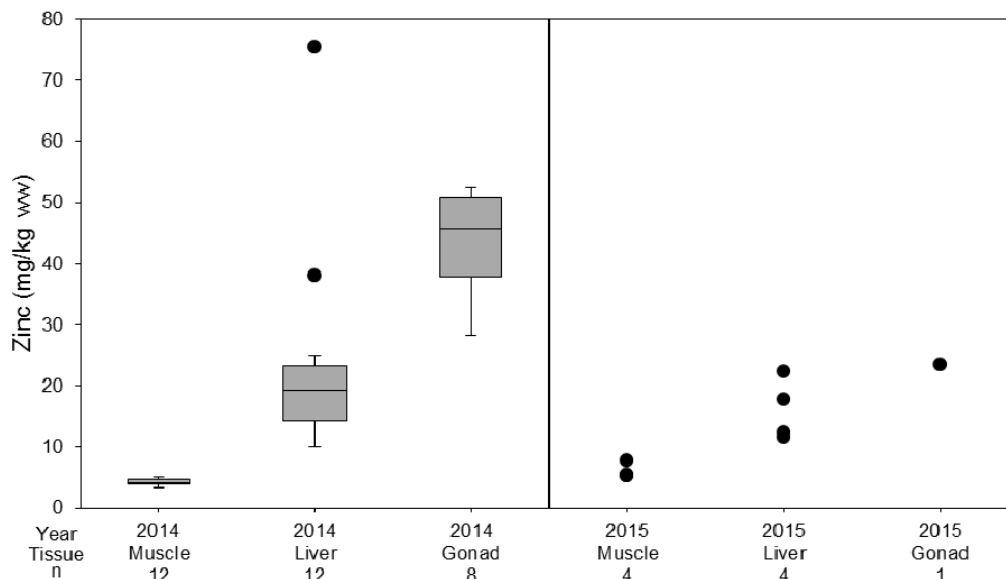
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



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Figure 57: Zinc Concentrations in Burbot Tissues Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015



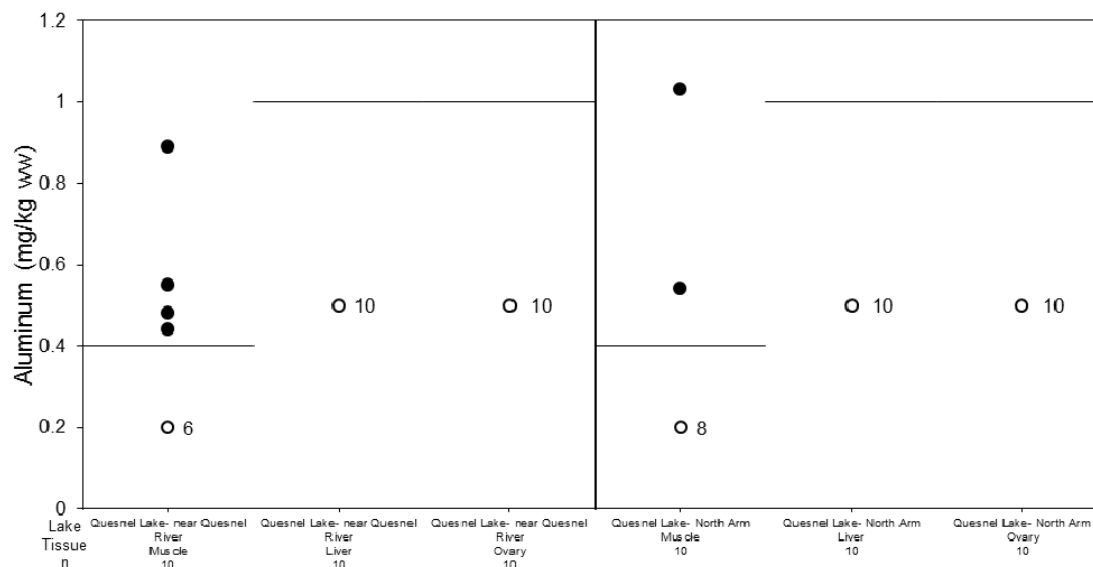
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (—) indicate the separation of exposure and reference or separation of years.

2.0 KOKANEE

2.1 Aluminum

Figure 58: Aluminum Concentrations in Kokanee Tissues Collected in 2014



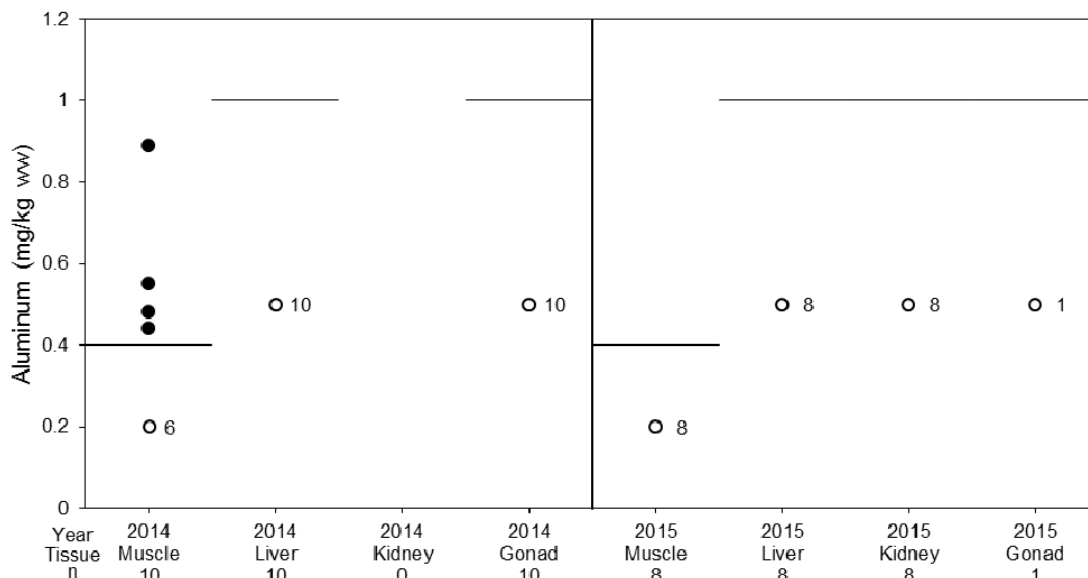
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (—) indicate the separation of exposure and reference or separation of years.



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Figure 59: Aluminum Concentrations in Kokanee Tissues Collected from Quesnel Lake near Quesnel River in 2014 and 2015

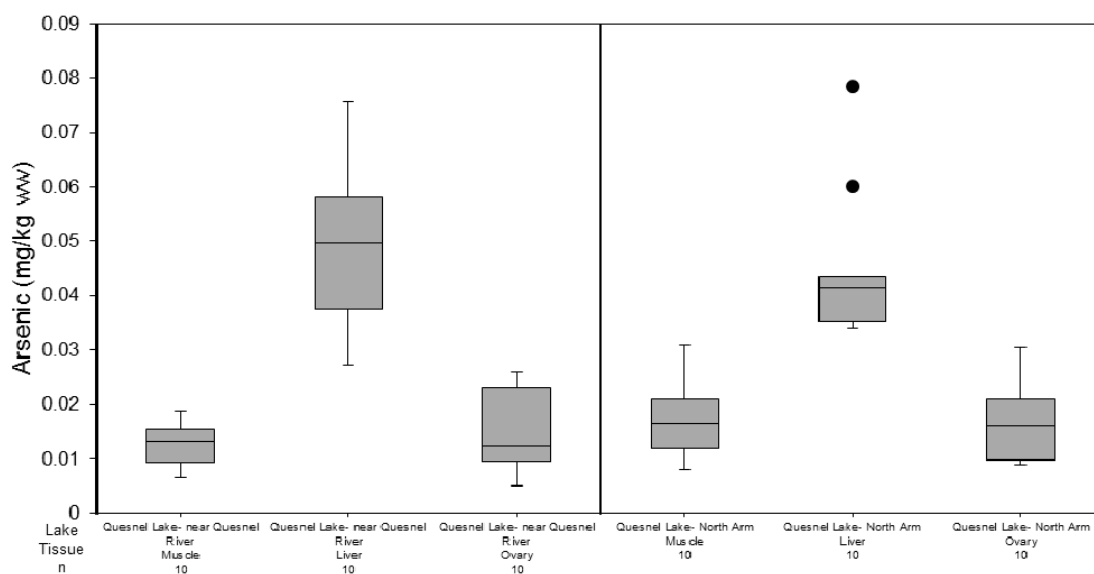


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

2.2 Arsenic

Figure 60: Arsenic Concentrations in Kokanee Tissues Collected in 2014



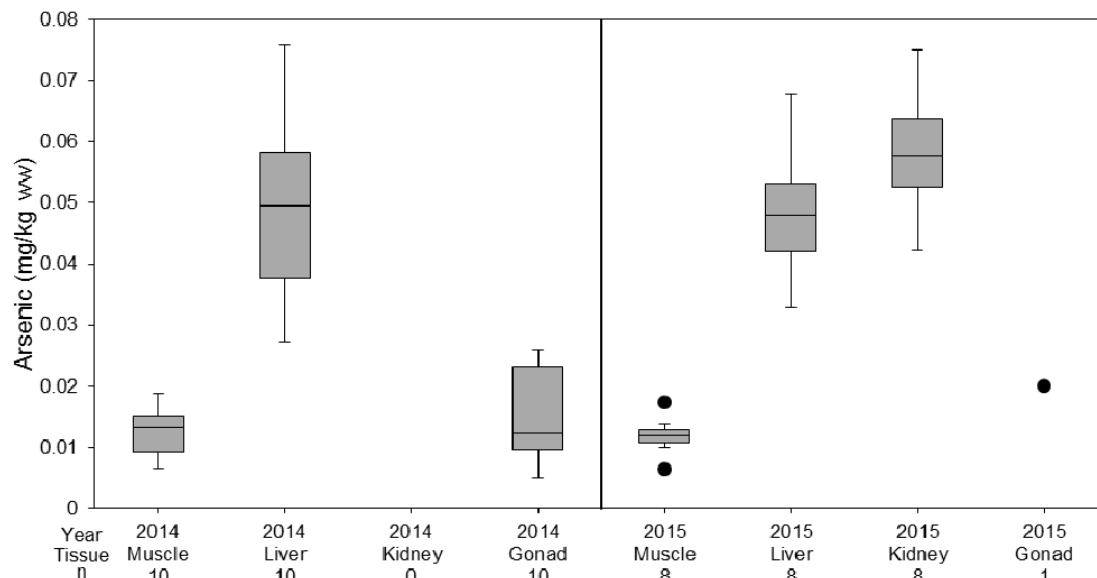
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 61: Arsenic Concentrations in Kokanee Tissues Collected from Quesnel Lake near Quesnel River in 2014 and 2015

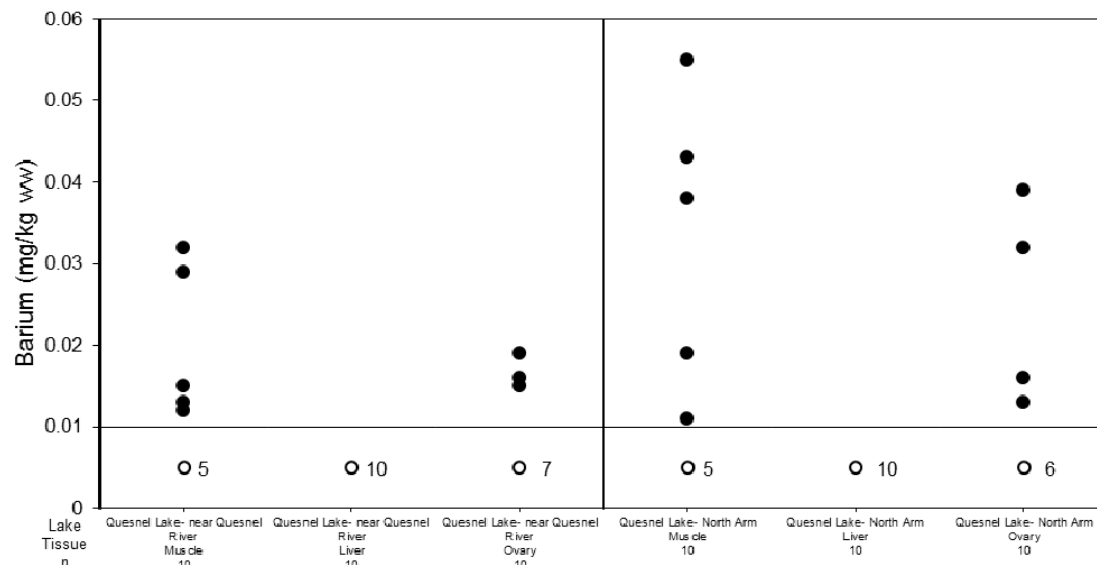


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

2.3 Barium

Figure 62: Barium Concentrations in Kokanee Tissues Collected in 2014



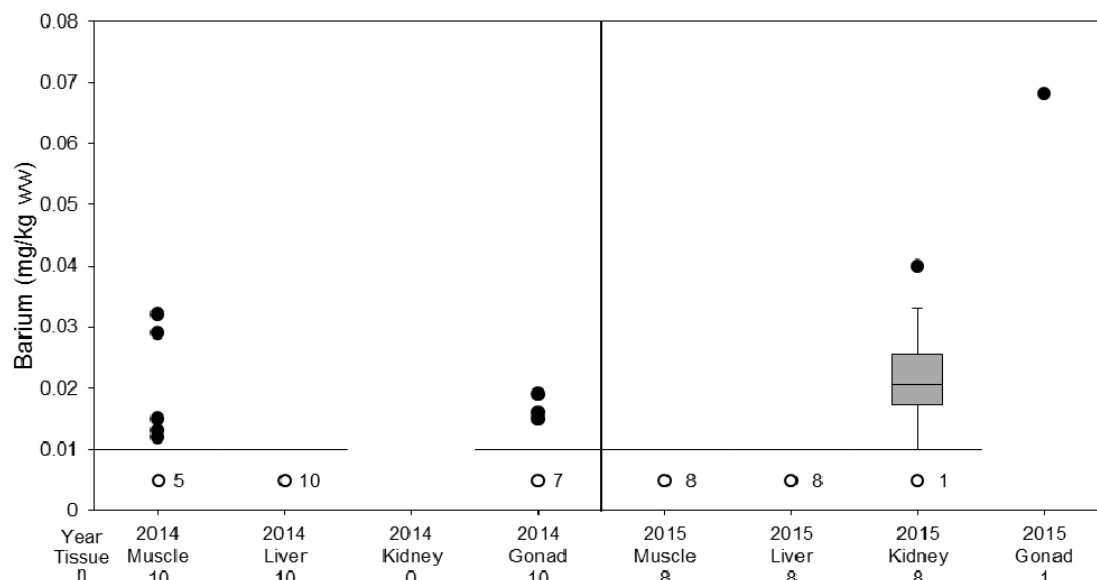
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 63: Barium Concentrations in Kokanee Tissues Collected from Quesnel Lake near Quesnel River in 2014 and 2015

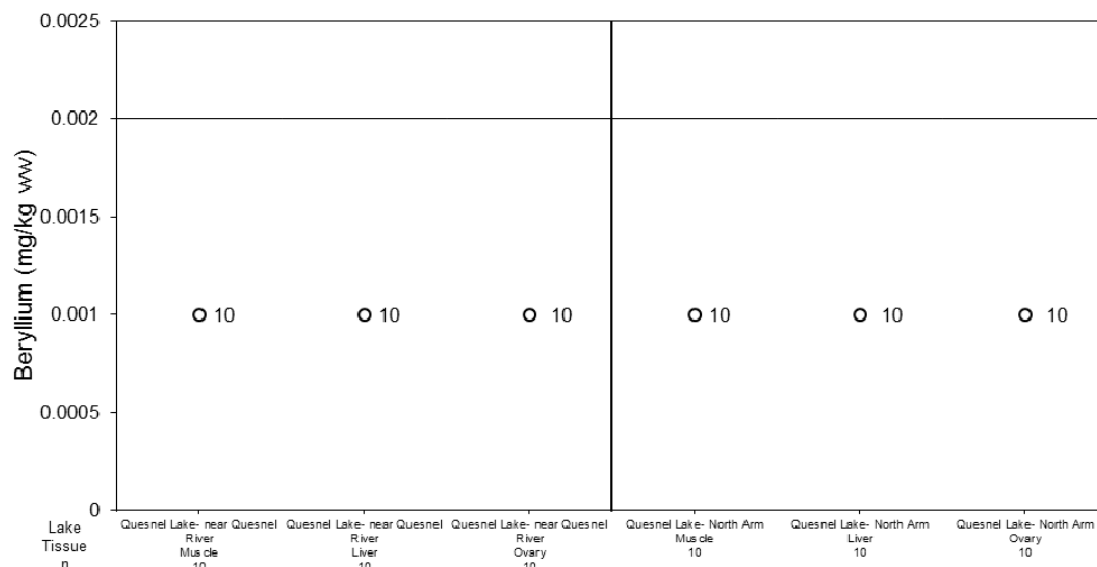


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

2.4 Beryllium

Figure 64: Beryllium Concentrations in Kokanee Tissues Collected in 2014



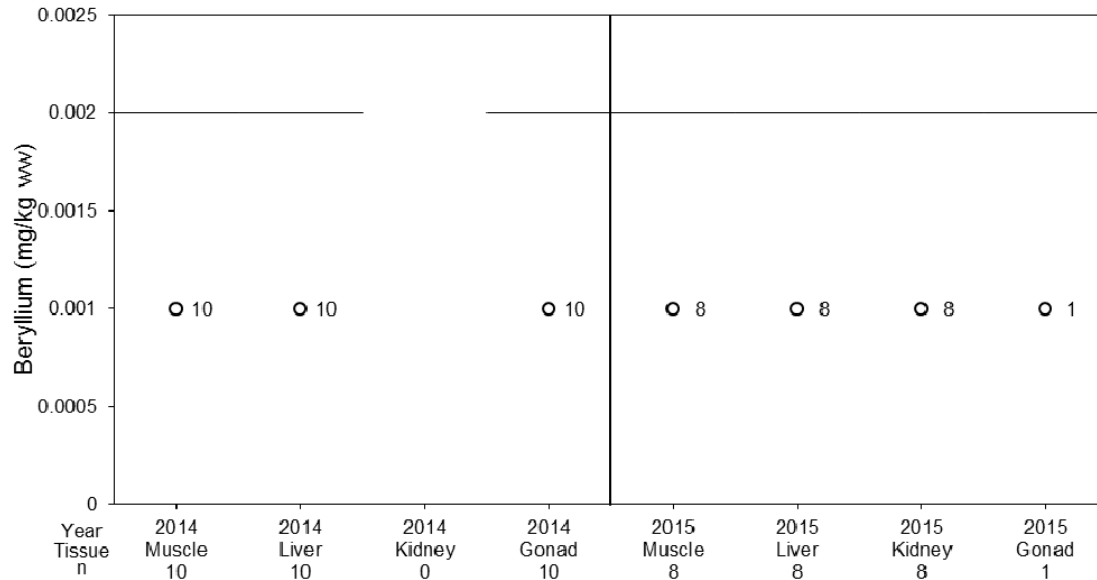
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 65: Beryllium Concentrations in Kokanee Tissues Collected from Quesnel Lake near Quesnel River in 2014 and 2015

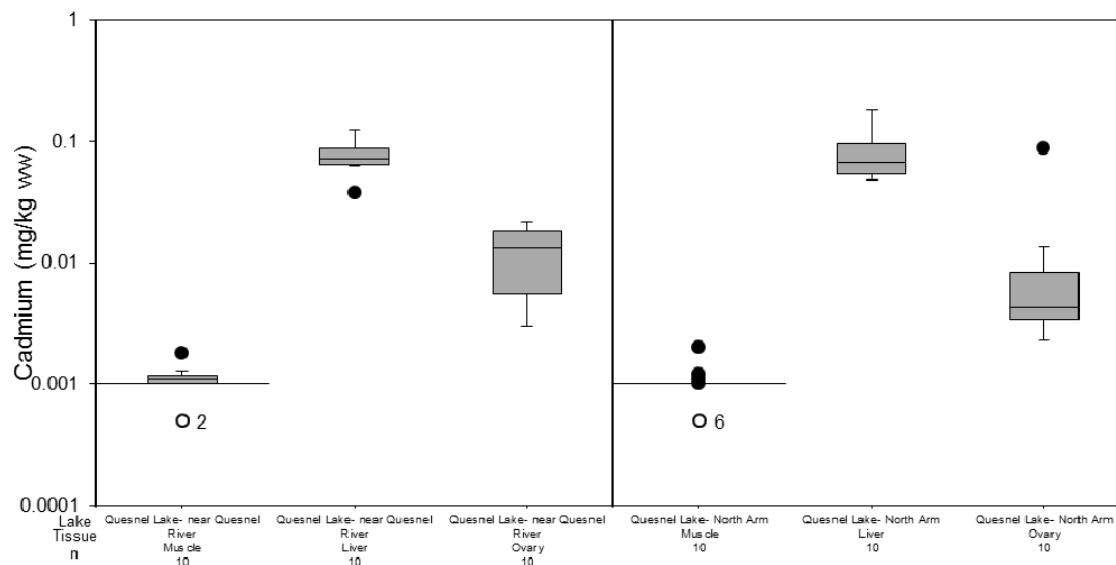


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

2.5 Cadmium

Figure 66: Cadmium Concentrations in Kokanee Tissues Collected in 2014



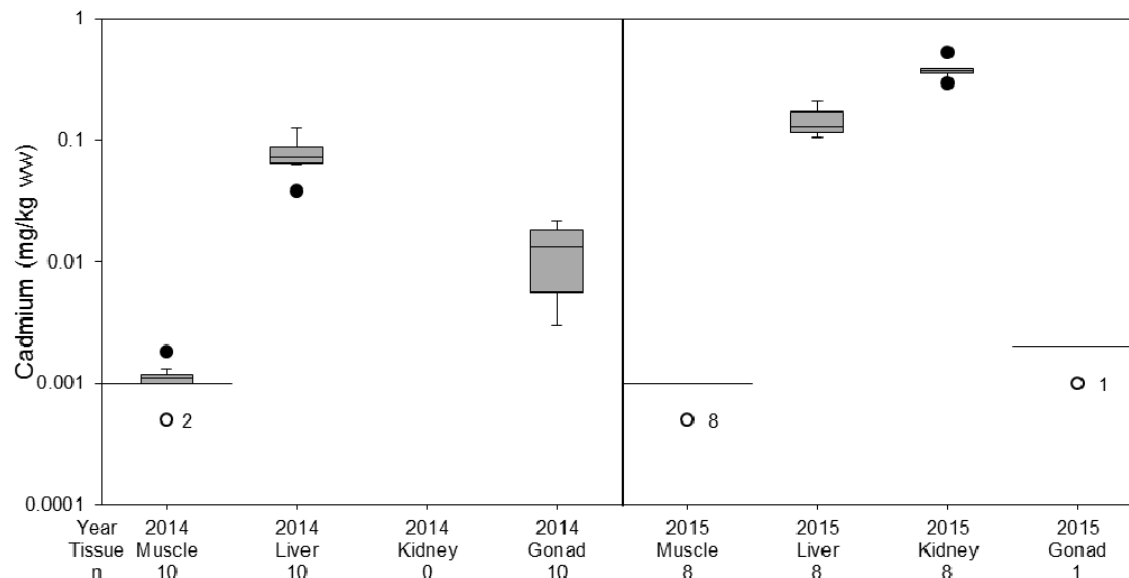
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 67: Cadmium Concentrations in Kokanee Tissues Collected from Quesnel Lake near Quesnel River in 2014 and 2015

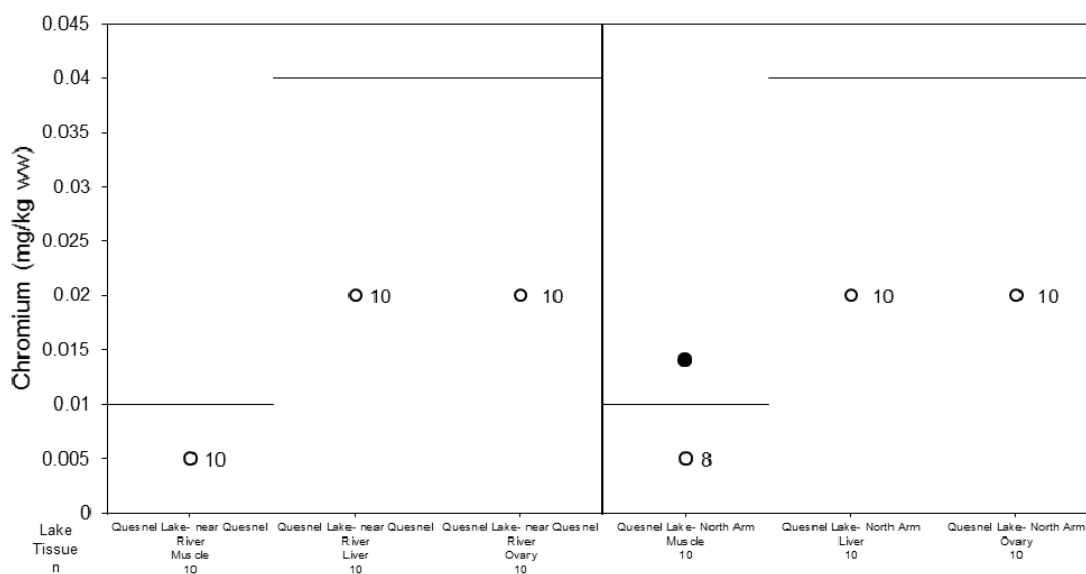


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

2.6 Chromium

Figure 68: Chromium Concentrations in Kokanee Tissues Collected in 2014



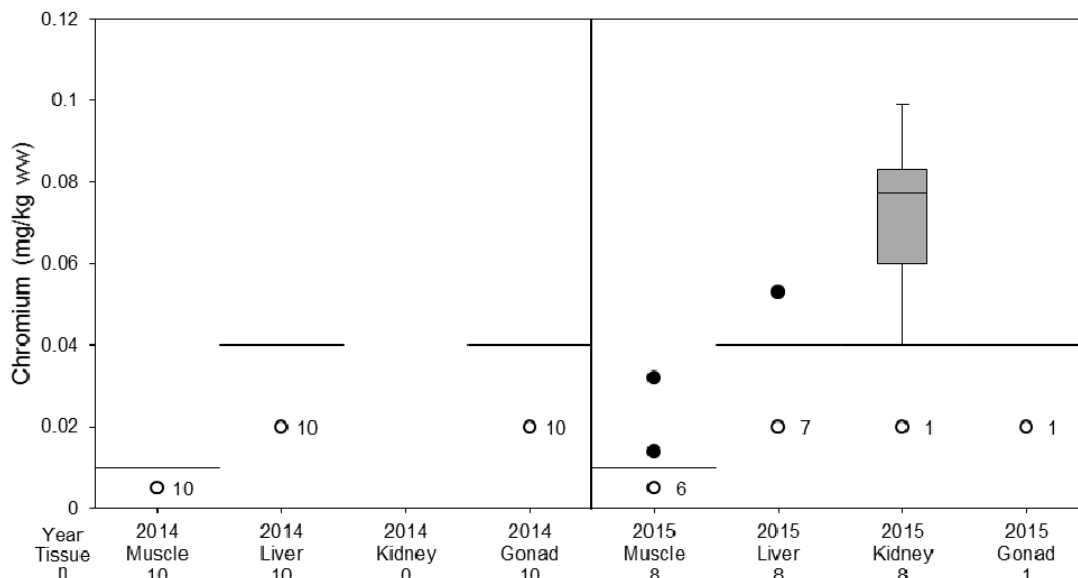
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 69: Chromium Concentrations in Kokanee Tissues Collected from Quesnel Lake near Quesnel River in 2014 and 2015

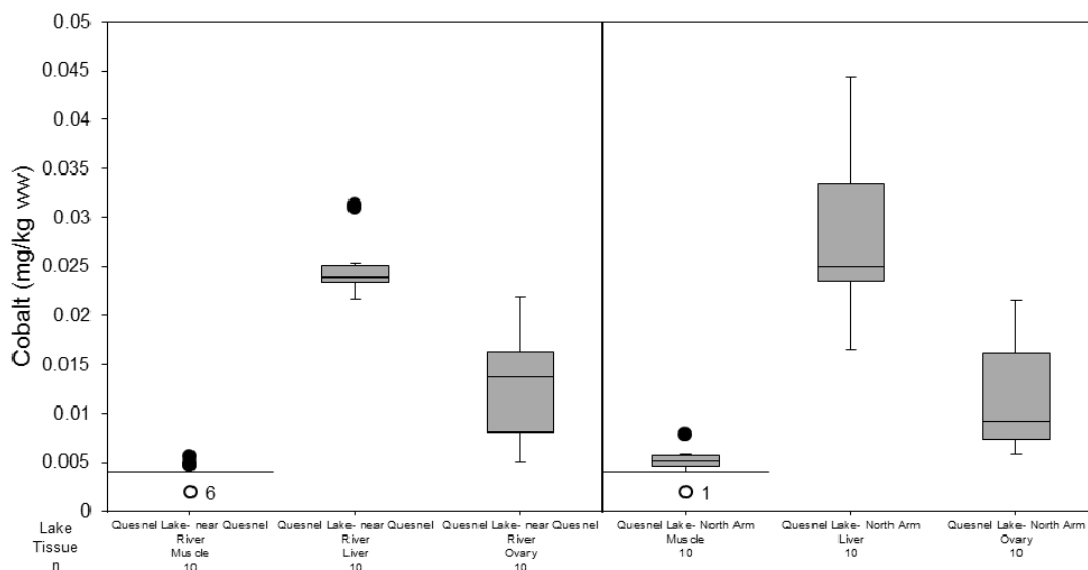


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

2.7 Cobalt

Figure 70: Cobalt Concentrations in Kokanee Tissues Collected in 2014



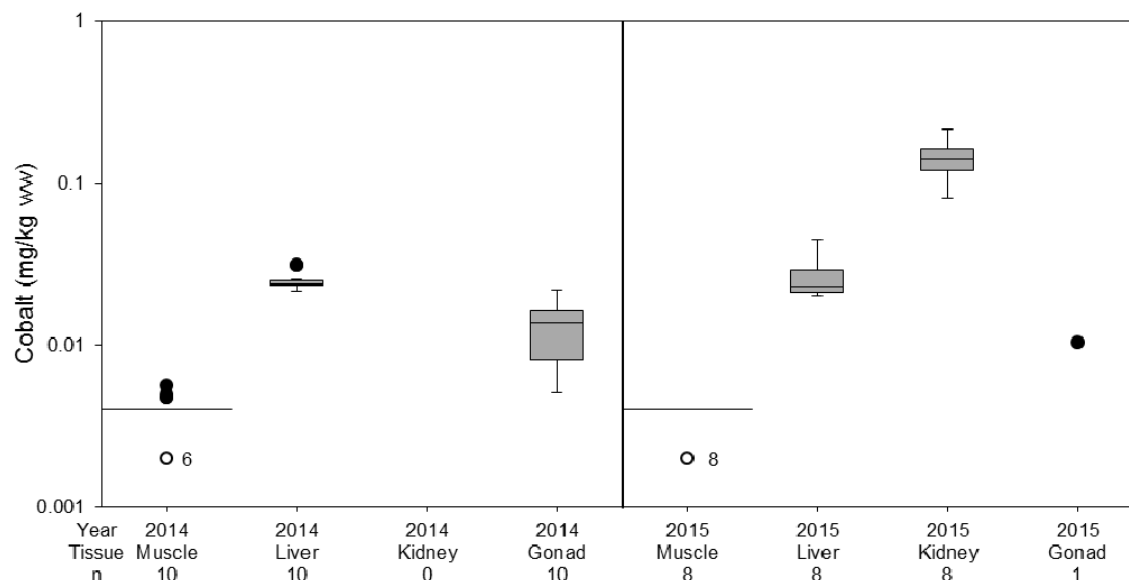
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



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Figure 71: Cobalt Concentrations in Kokanee Tissues Collected from Quesnel Lake near Quesnel River in 2014 and 2015

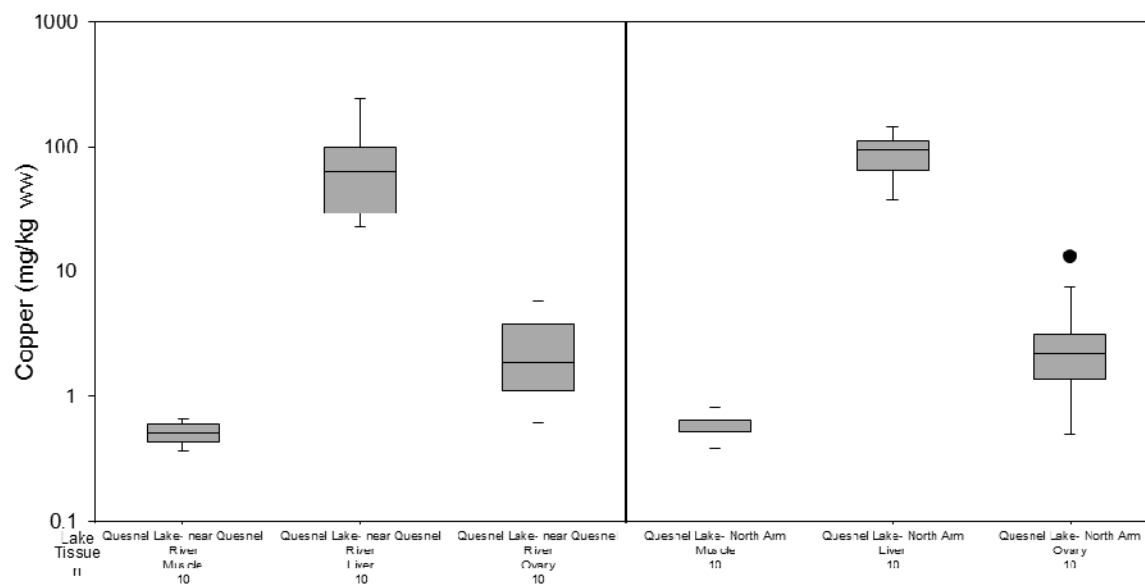


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

2.8 Copper

Figure 72: Copper Concentrations in Kokanee Tissues Collected in 2014



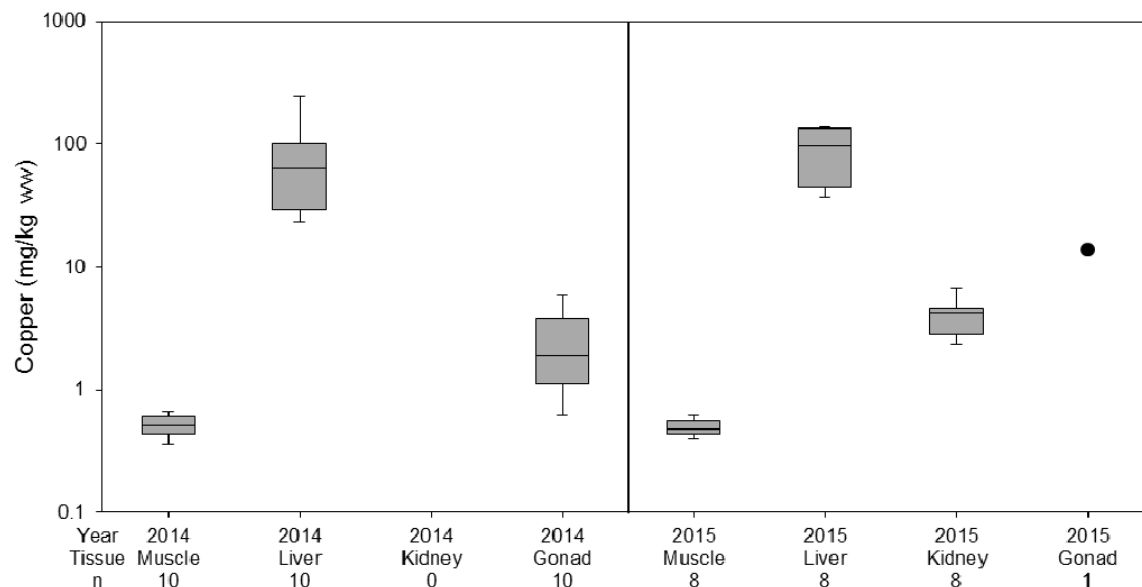
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 73: Copper Concentrations in Kokanee Tissues Collected from Quesnel Lake near Quesnel River in 2014 and 2015

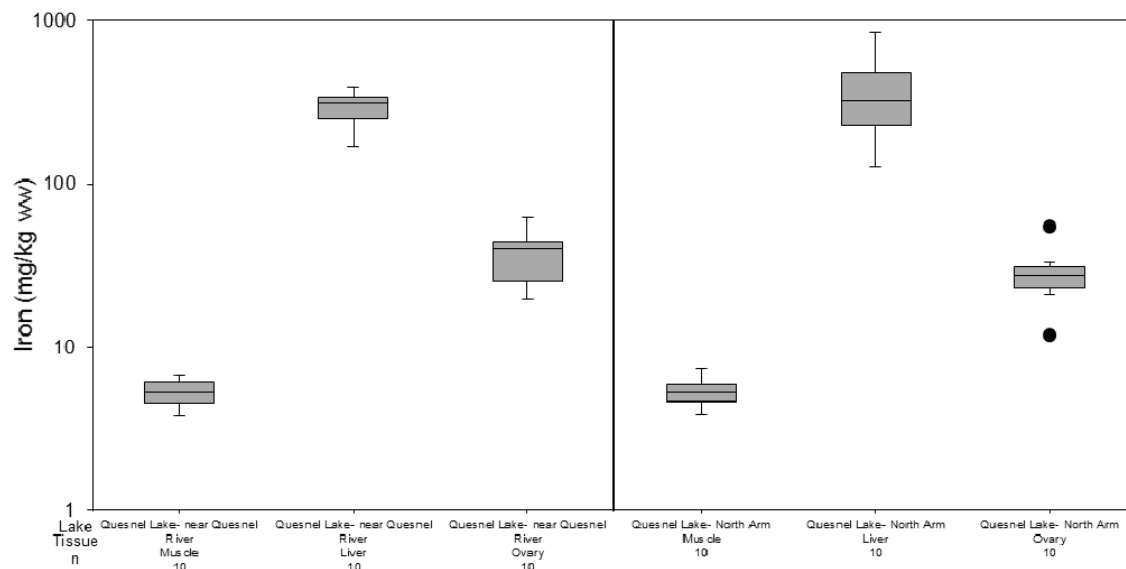


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

2.9 Iron

Figure 74: Iron Concentrations in Kokanee Tissues Collected in 2014



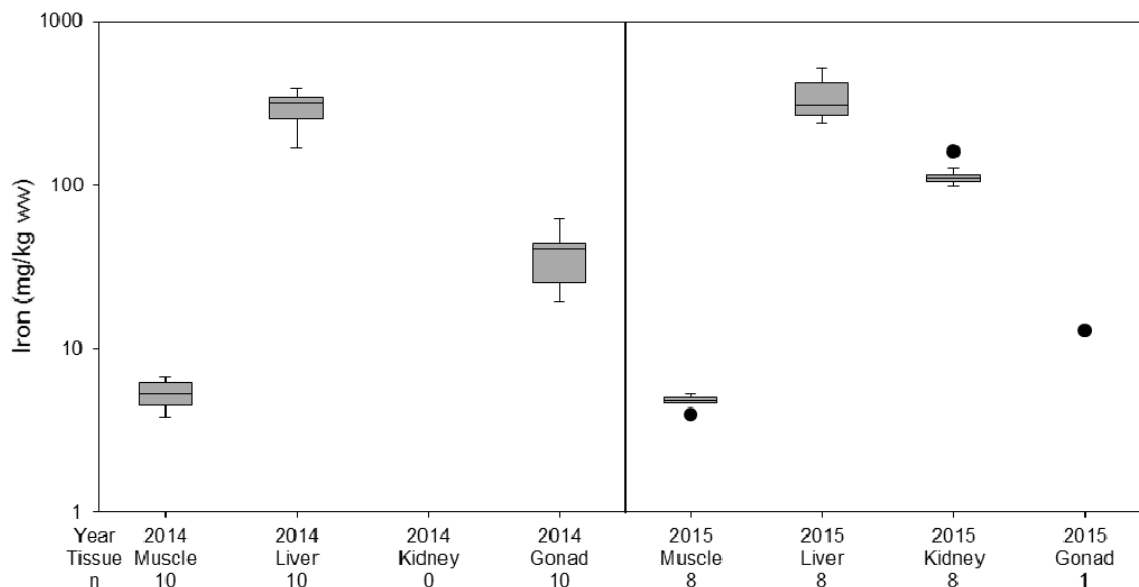
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



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Figure 75: Iron Concentrations in Kokanee Tissues Collected from Quesnel Lake near Quesnel River in 2014 and 2015

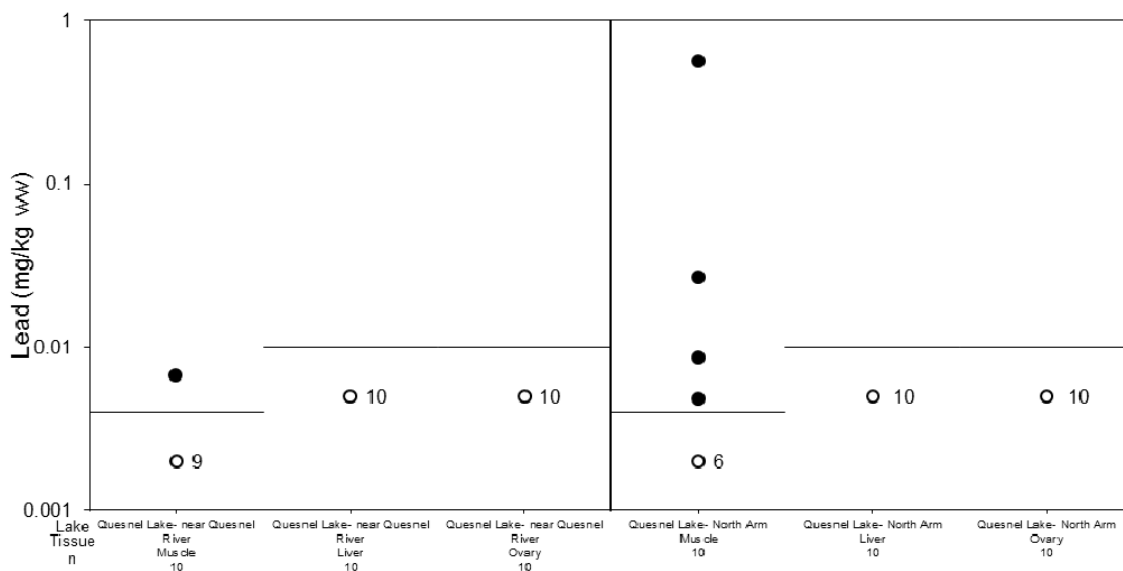


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

2.10 Lead

Figure 76: Lead Concentrations in Kokanee Tissues Collected in 2014



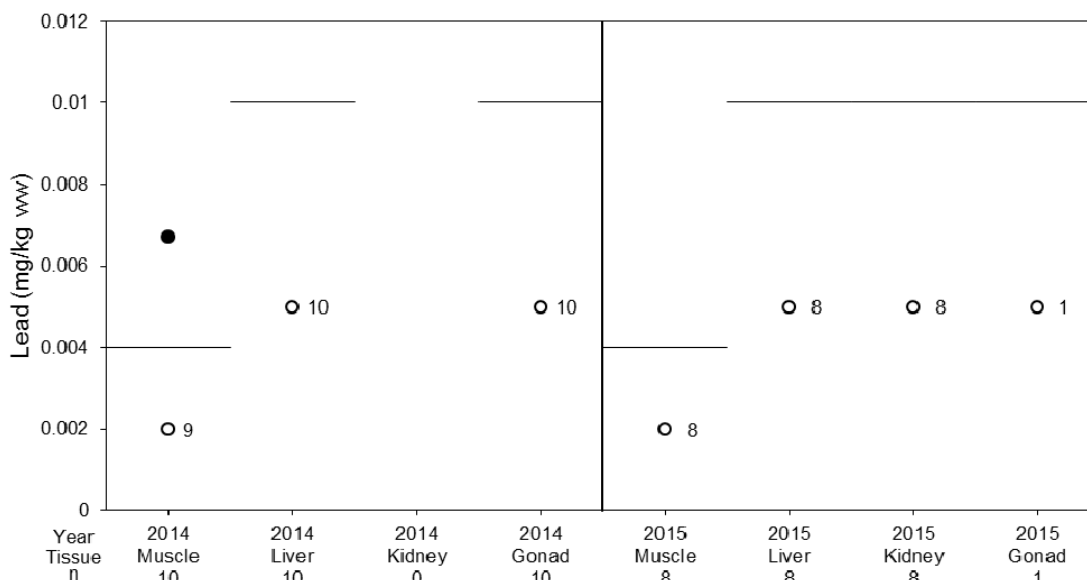
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



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Figure 77: Lead Concentrations in Kokanee Tissues Collected from Quesnel Lake near Quesnel River in 2014 and 2015

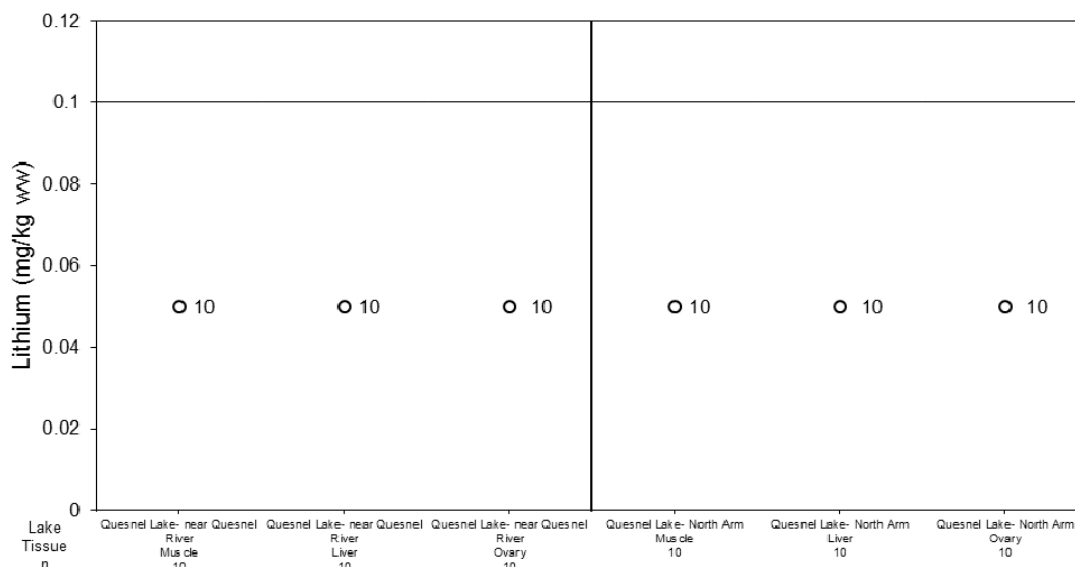


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

2.11 Lithium

Figure 78: Lithium Concentrations in Kokanee Tissues Collected in 2014



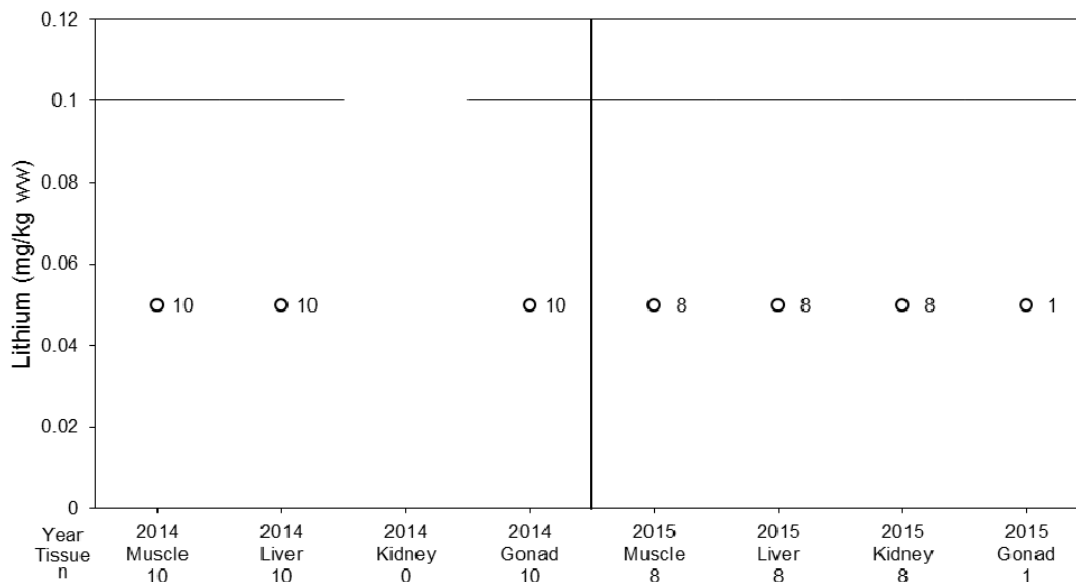
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 79: Lithium Concentrations in Kokanee Tissues Collected from Quesnel Lake near Quesnel River in 2014 and 2015

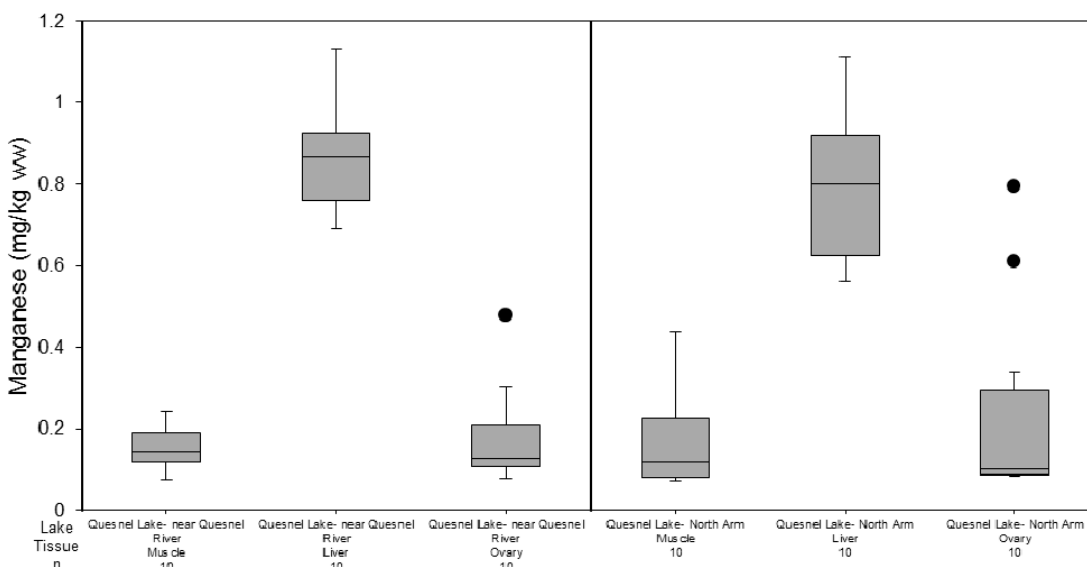


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

2.12 Manganese

Figure 80: Manganese Concentrations in Kokanee Tissues Collected in 2014



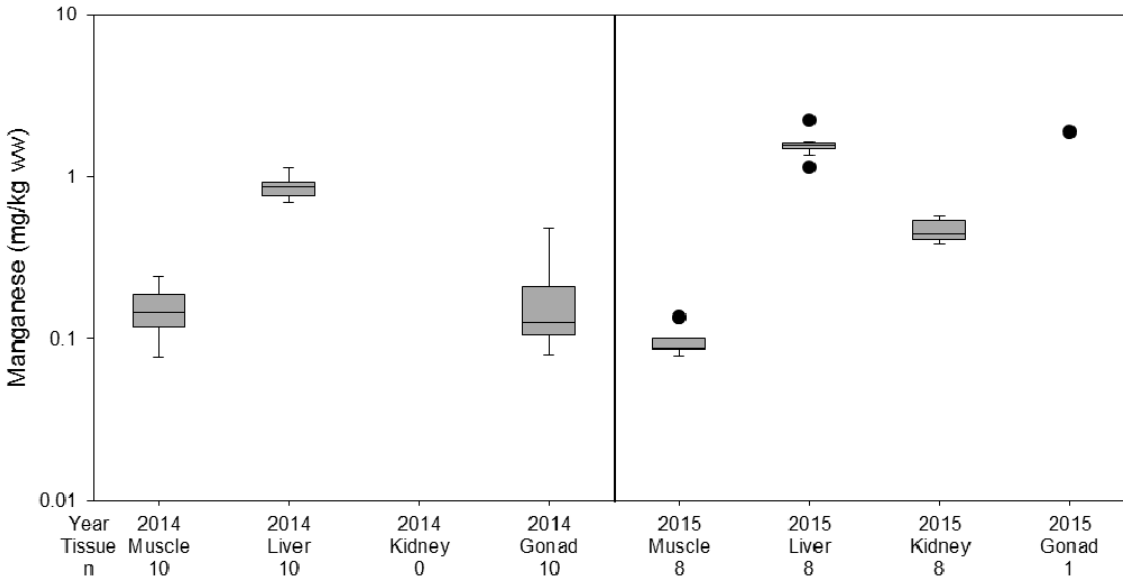
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



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Figure 81: Manganese Concentrations in Kokanee Tissues Collected from Quesnel Lake near Quesnel River in 2014 and 2015

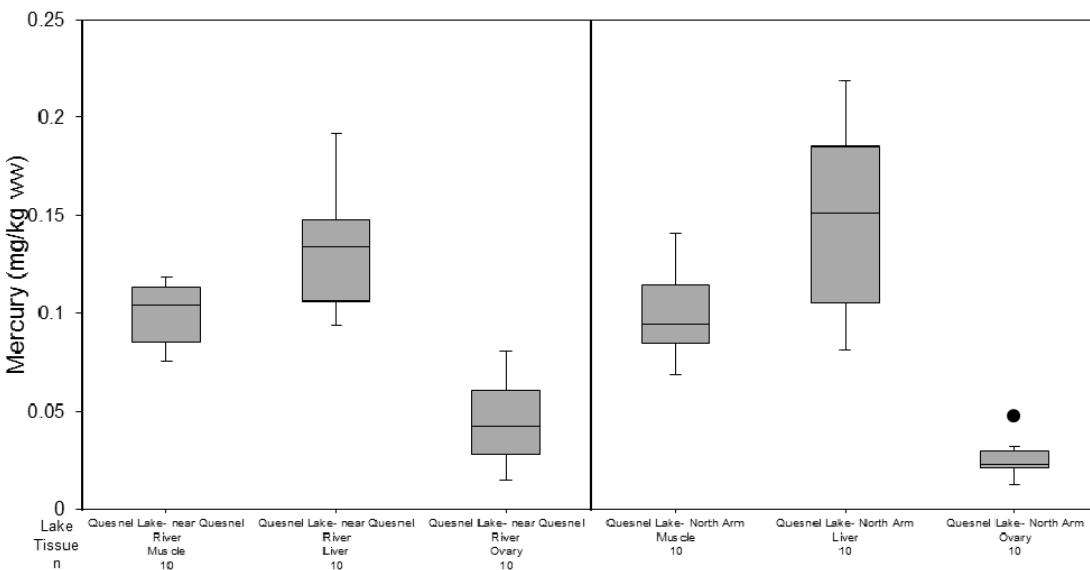


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

2.13 Mercury

Figure 82: Mercury Concentrations in Kokanee Tissues Collected in 2014



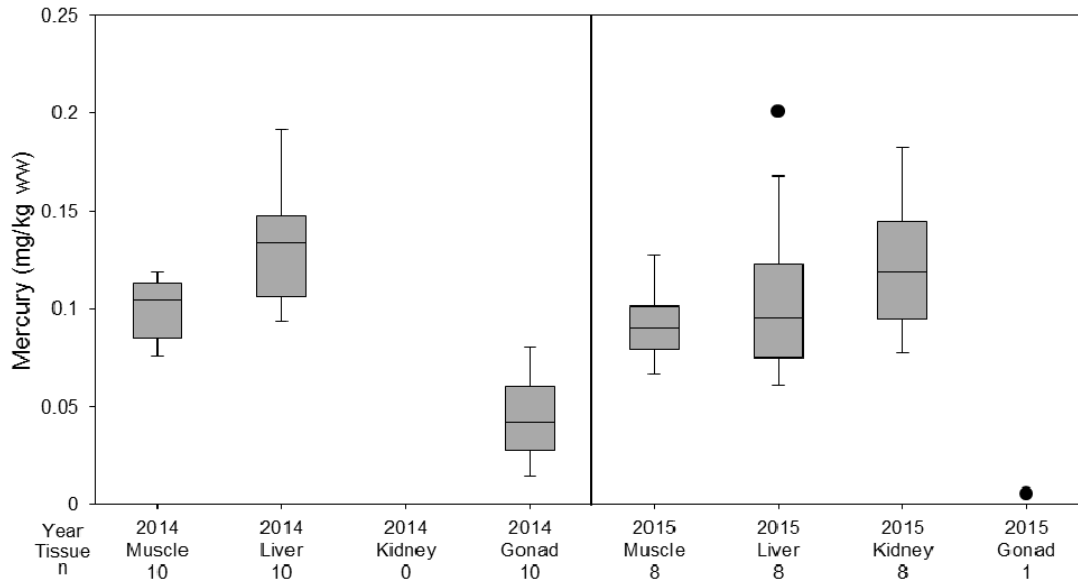
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



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Figure 83: Mercury Concentrations in Kokanee Tissues Collected from Quesnel Lake near Quesnel River in 2014 and 2015

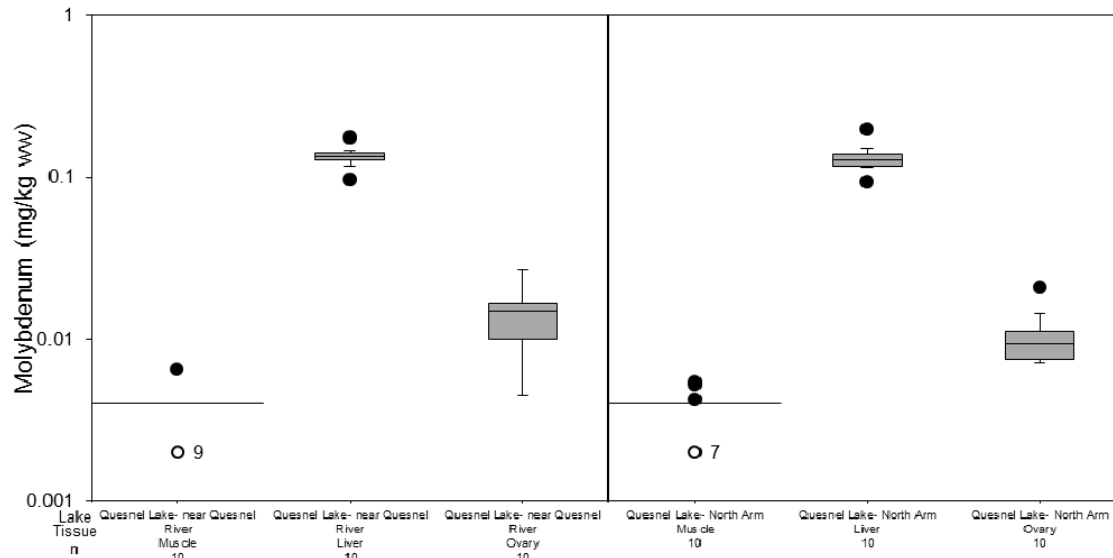


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

2.14 Molybdenum

Figure 84: Molybdenum Concentrations in Kokanee Tissues Collected in 2014



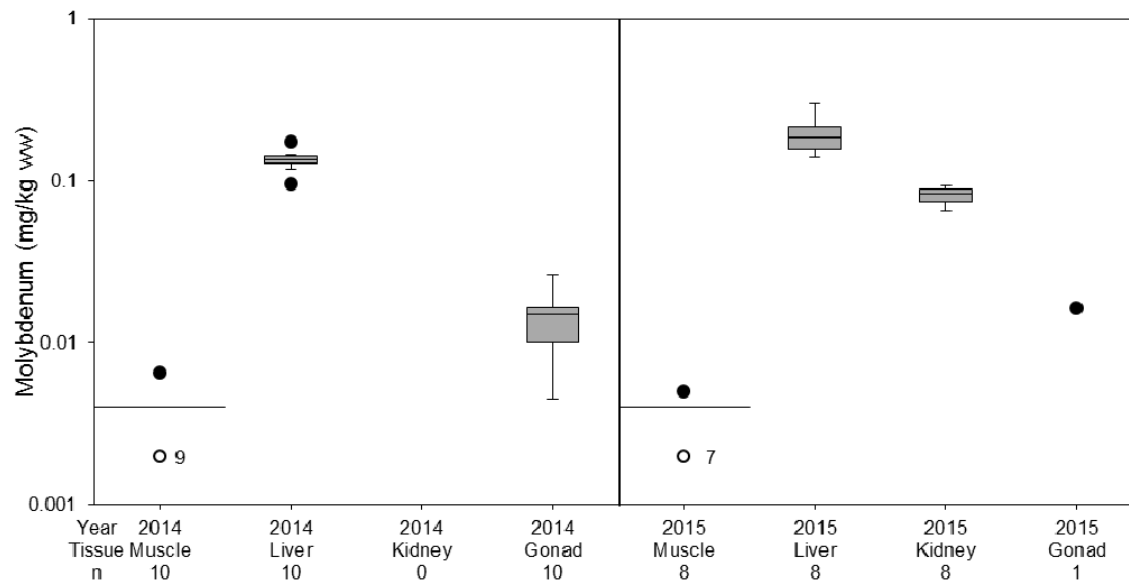
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



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Figure 85: Molybdenum Concentrations in Kokanee Tissues Collected from Quesnel Lake near Quesnel River in 2014 and 2015

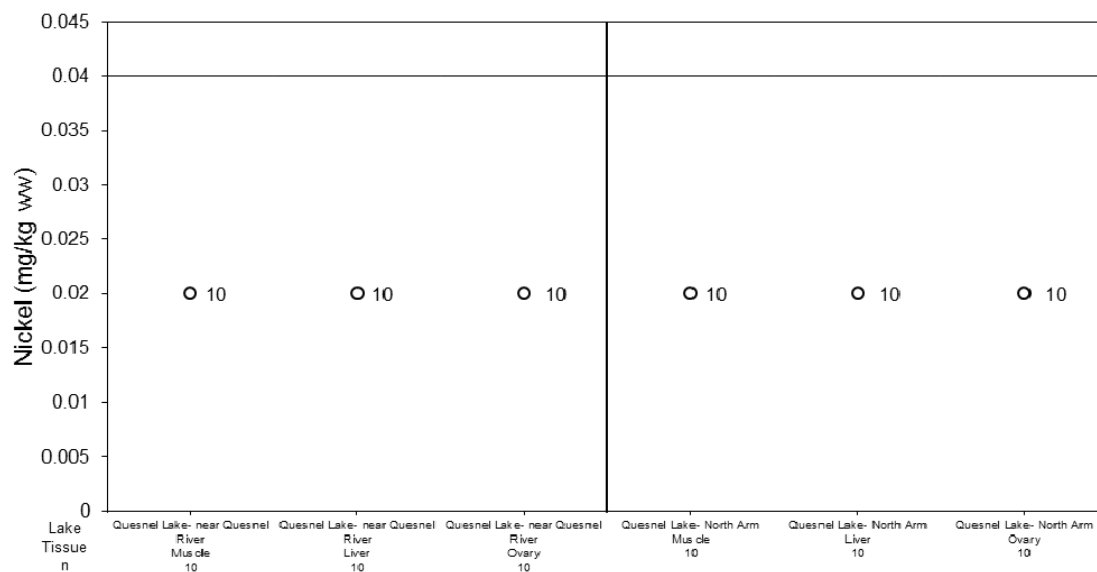


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

2.15 Nickel

Figure 86: Nickel Concentrations in Kokanee Tissues Collected in 2014



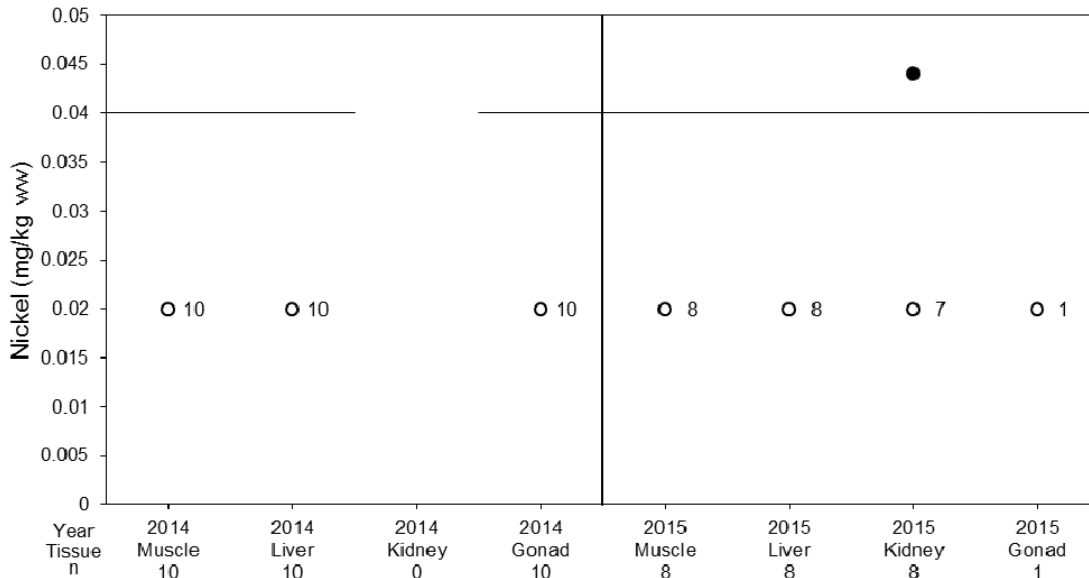
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 87: Nickel Concentrations in Kokanee Tissues Collected from Quesnel Lake near Quesnel River in 2014 and 2015

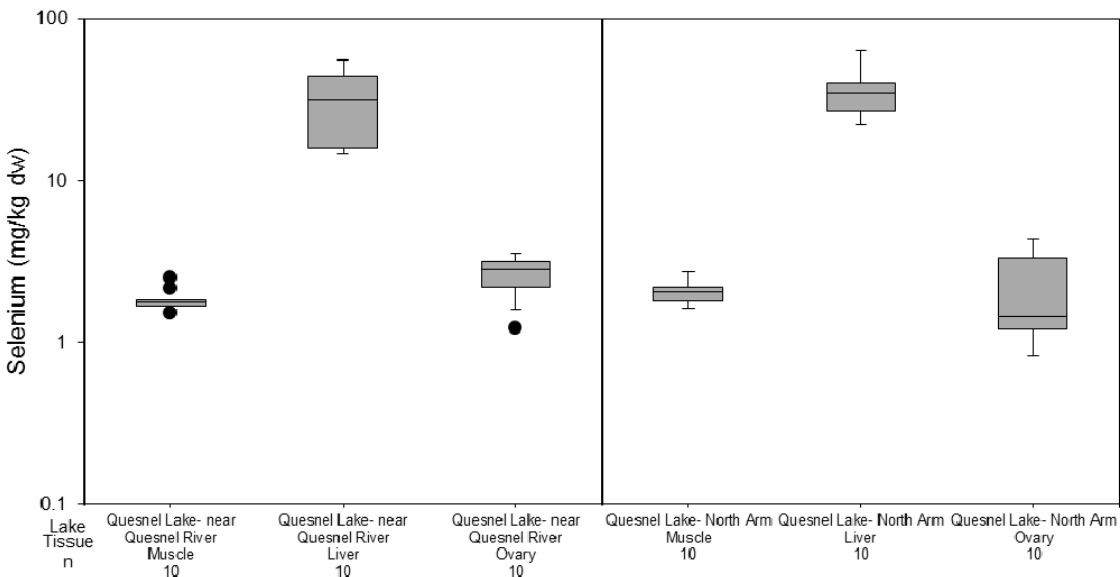


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

2.16 Selenium

Figure 88: Selenium Concentrations in Kokanee Tissues Collected in 2014



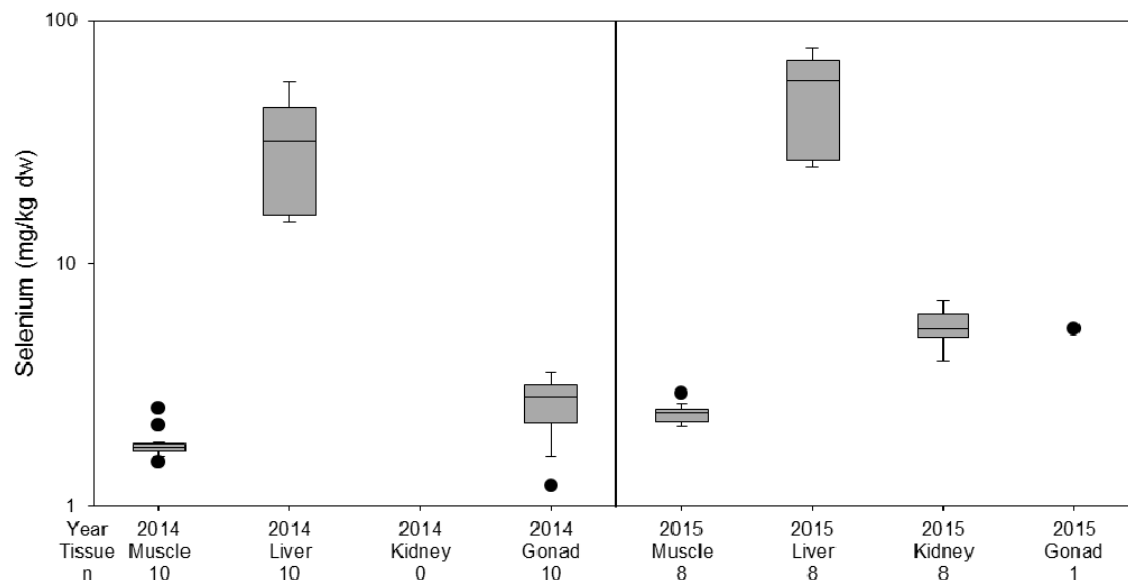
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 89: Selenium Concentrations in Kokanee Tissues Collected from Quesnel Lake near Quesnel River in 2014 and 2015

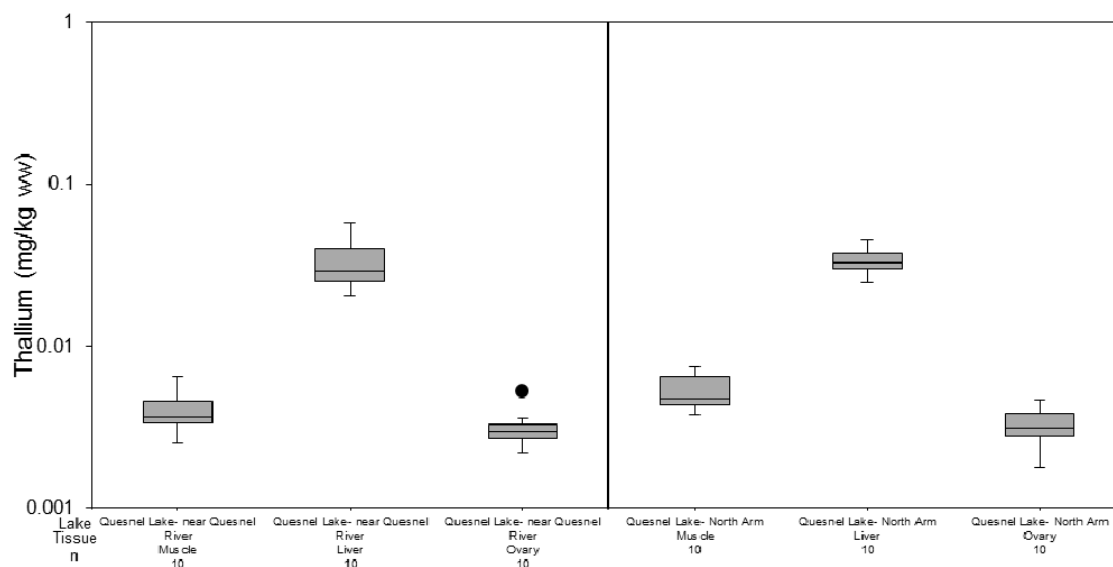


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

2.17 Thallium

Figure 90: Thallium Concentrations in Kokanee Tissues Collected in 2014



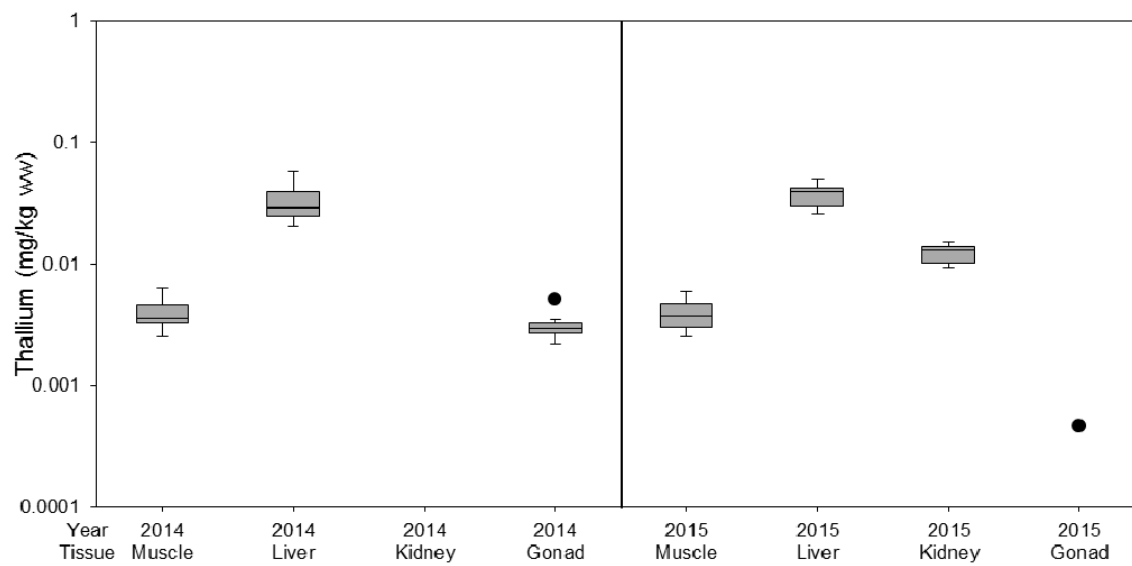
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 91: Thallium Concentrations in Kokanee Tissues Collected from Quesnel Lake near Quesnel River in 2014 and 2015

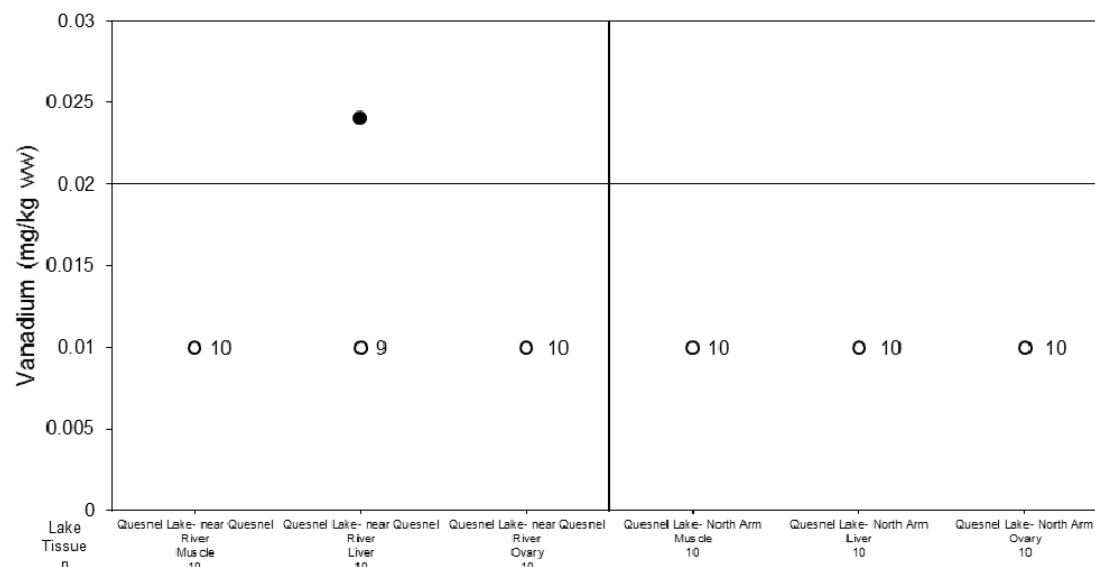


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

2.18 Vanadium

Figure 92: Vanadium Concentrations in Kokanee Tissues Collected in 2014



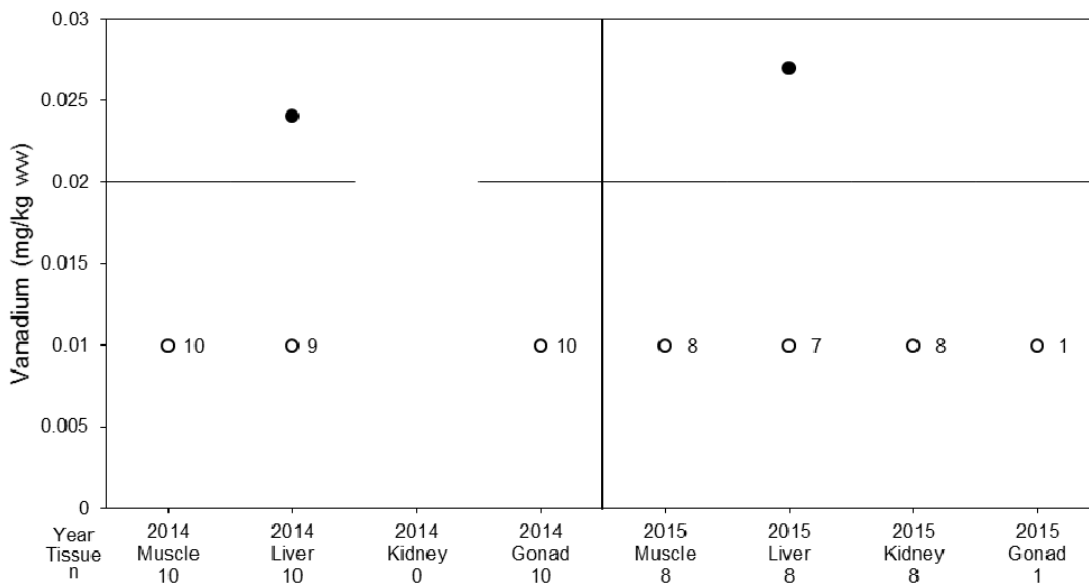
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 93: Vanadium Concentrations in Kokanee Tissues Collected from Quesnel Lake near Quesnel River in 2014 and 2015

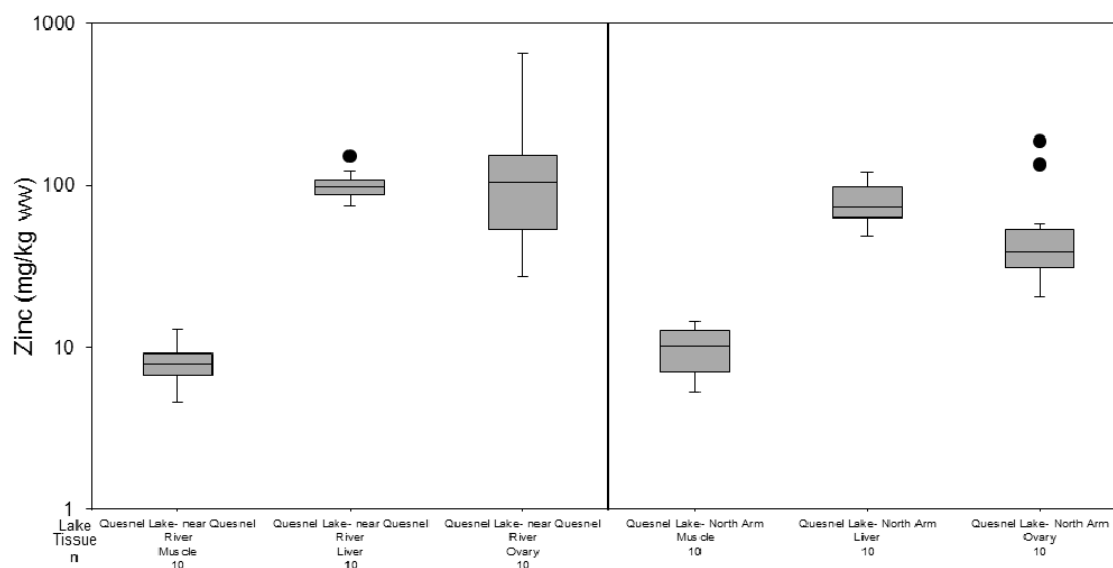


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

2.19 Zinc

Figure 94: Zinc Concentrations in Kokanee Tissues Collected in 2014



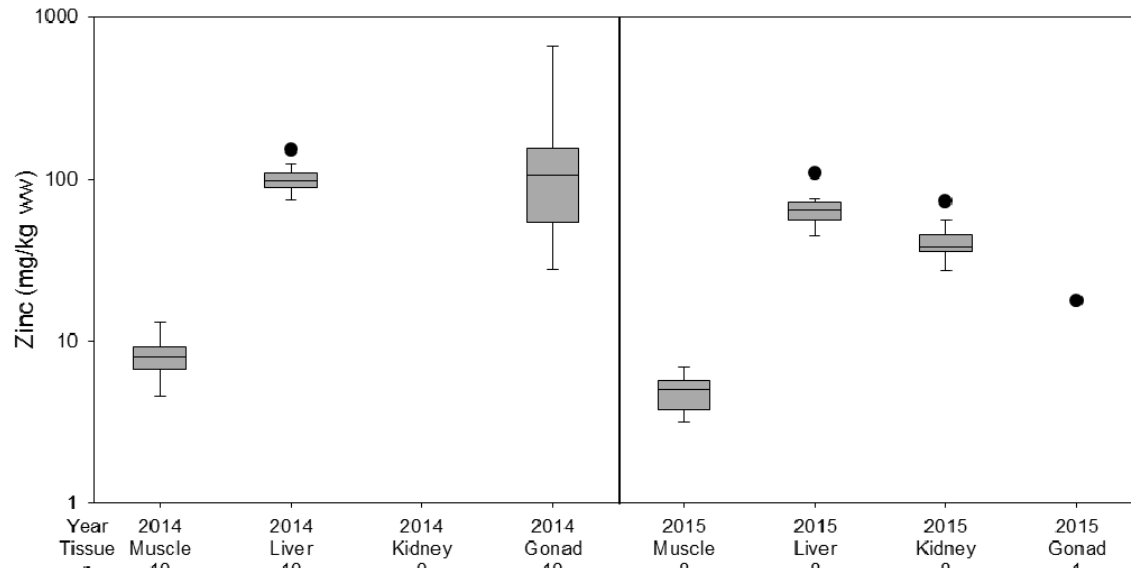
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 95: Zinc Concentrations in Kokanee Tissues Collected from Quesnel Lake near Quesnel River in 2014 and 2015



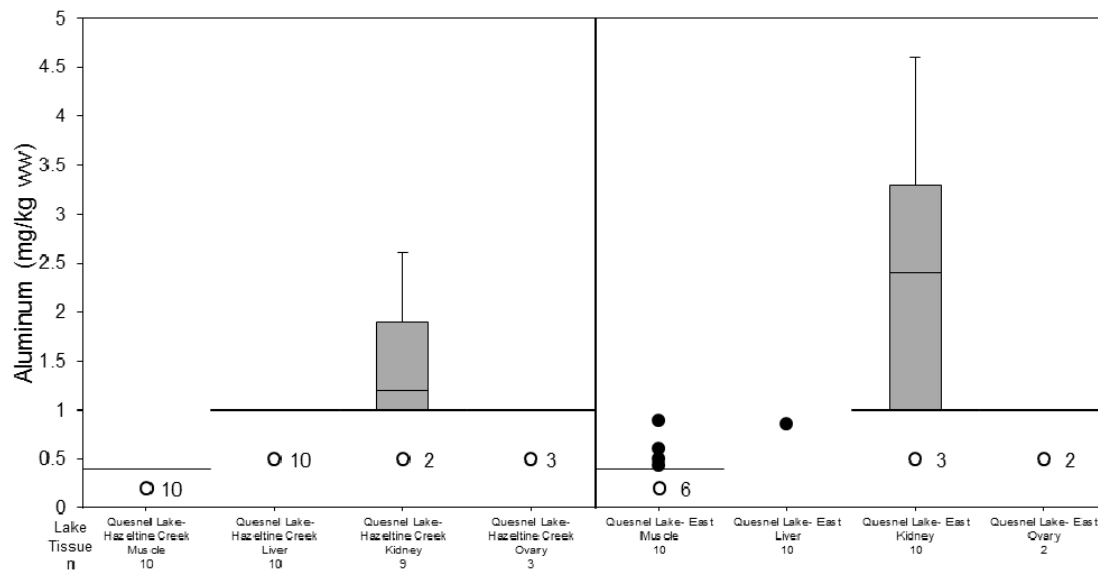
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

3.0 LAKE TROUT

3.1 Aluminum

Figure 96: Aluminum Concentrations in Lake Trout Tissues Collected in 2015



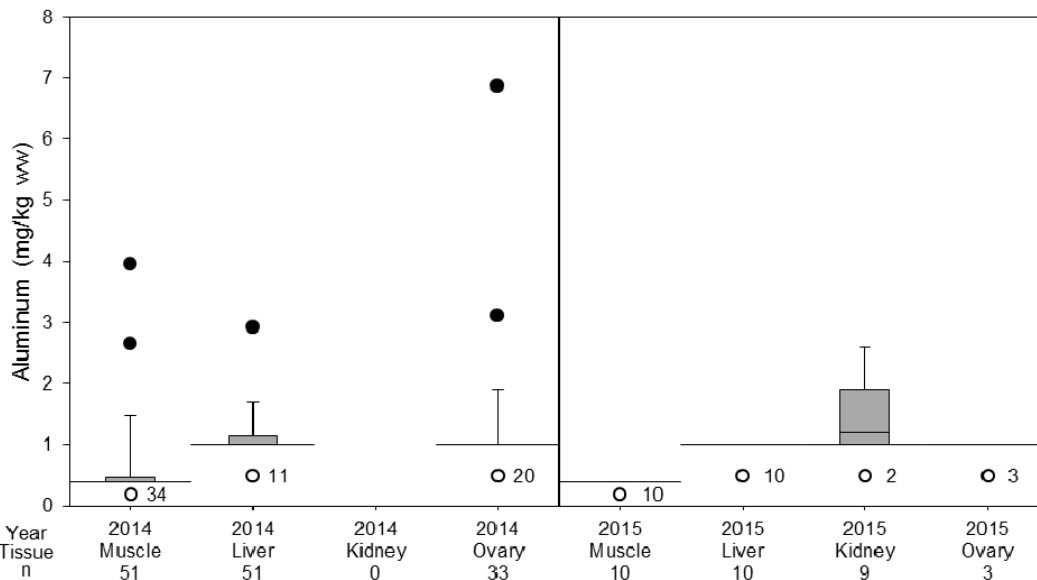
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 97: Aluminum Concentrations in Lake Trout Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

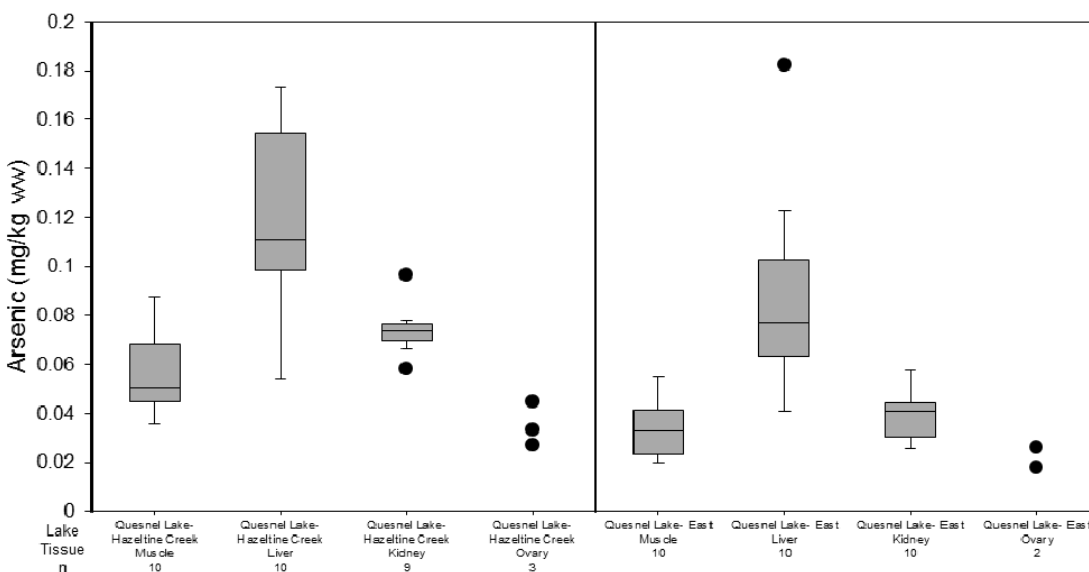


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

3.2 Arsenic

Figure 98: Arsenic Concentrations in Lake Trout Tissues Collected in 2015



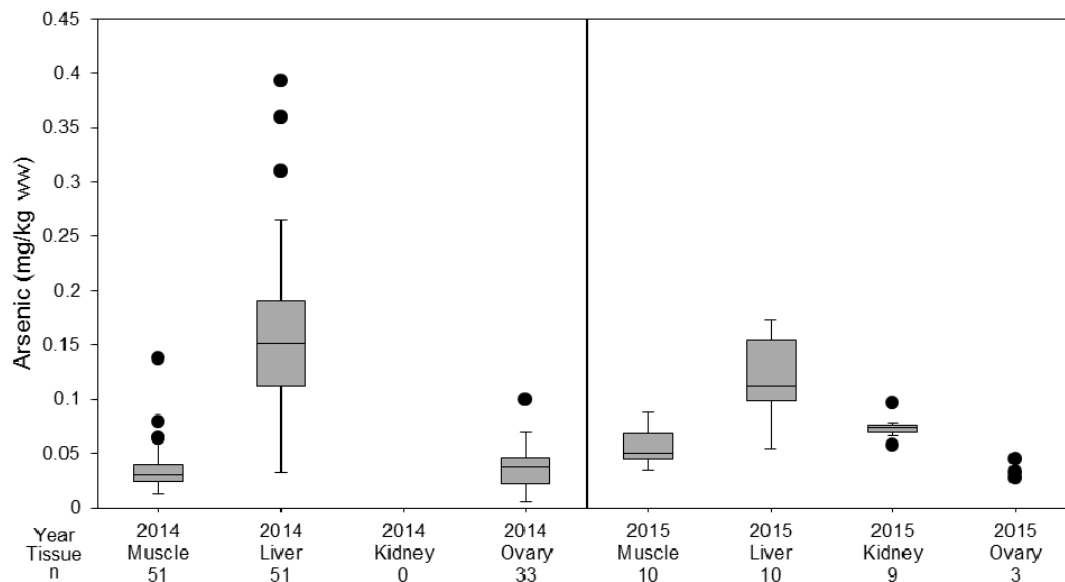
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 99: Arsenic Concentrations in Lake Trout Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

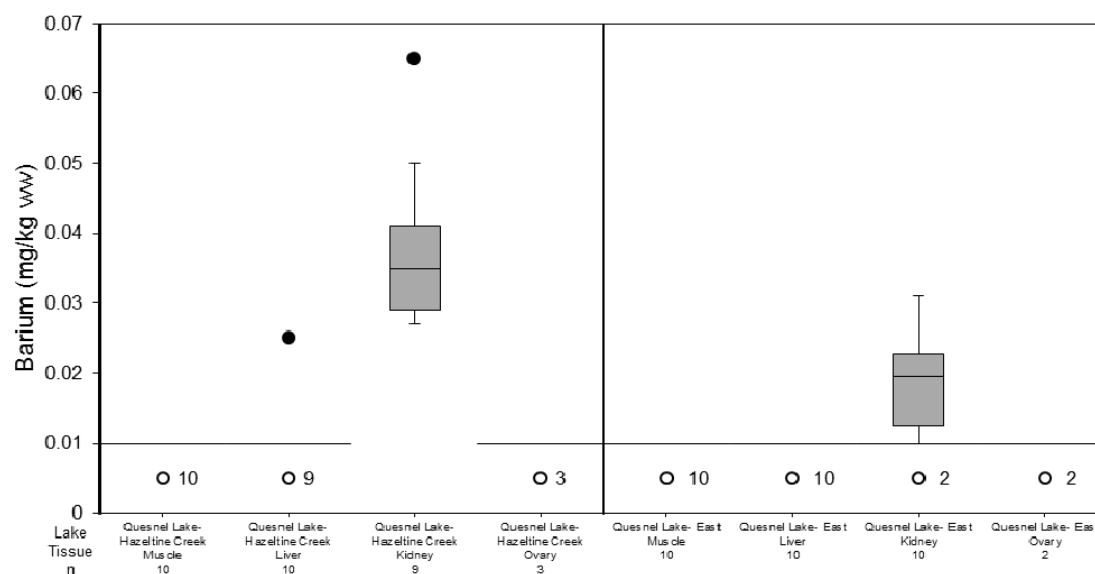


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

3.3 Barium

Figure 100: Barium Concentrations in Lake Trout Tissues Collected in 2015



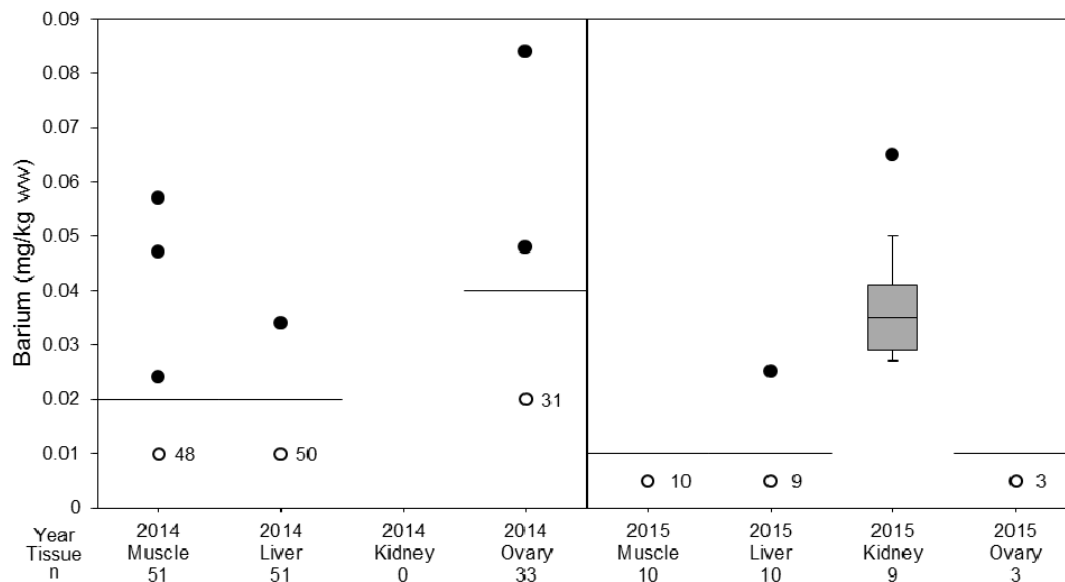
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 101: Barium Concentrations in Lake Trout Tissues Collected from the Quesnel Lake - Hazeltime Creek Confluence in 2014 and 2015

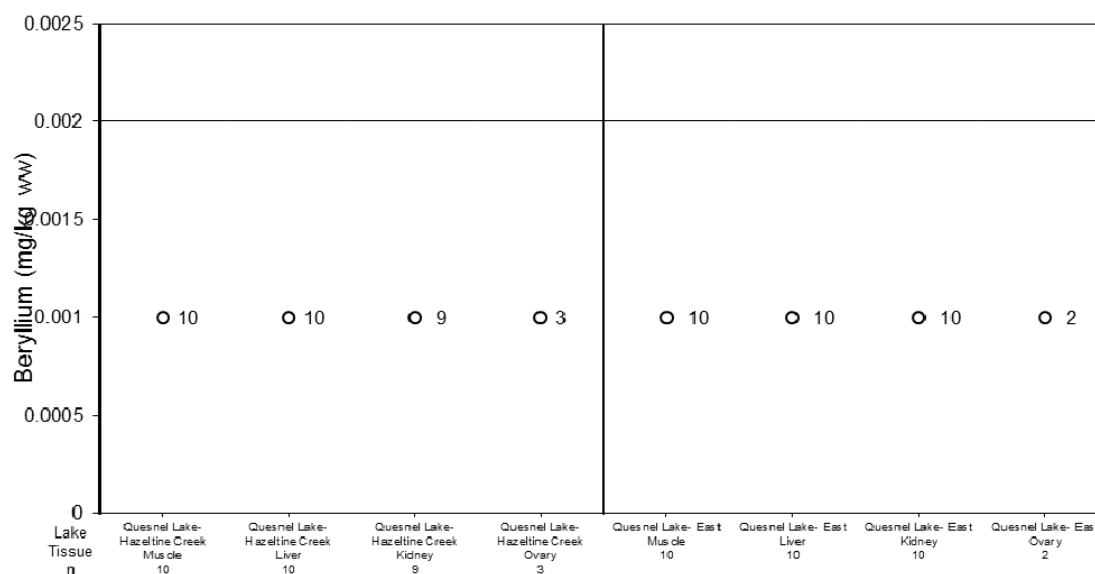


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

3.4 Beryllium

Figure 102: Beryllium Concentrations in Lake Trout Tissues Collected in 2015



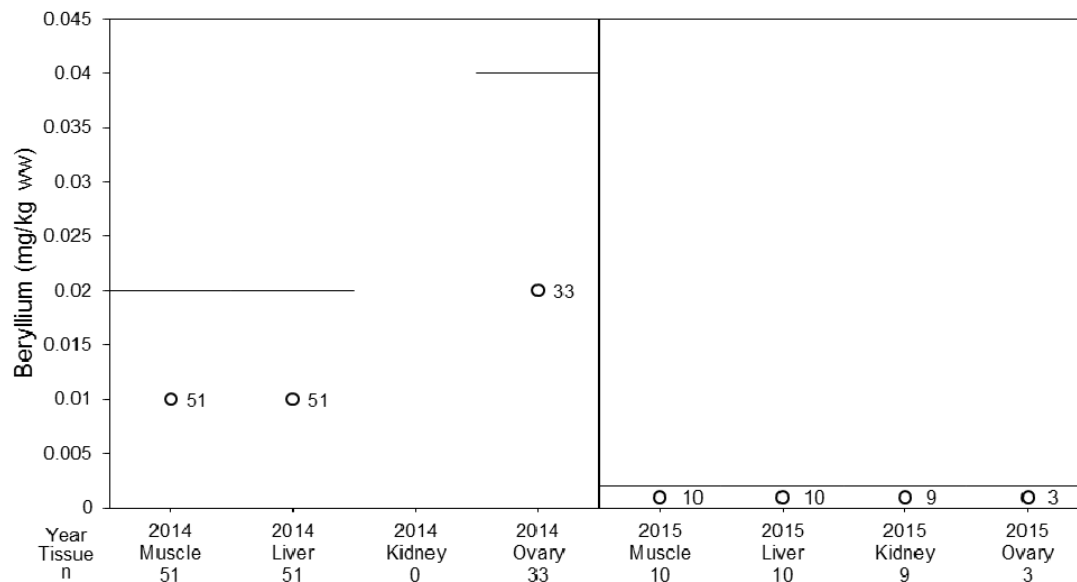
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 103: Beryllium Concentrations in Lake Trout Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

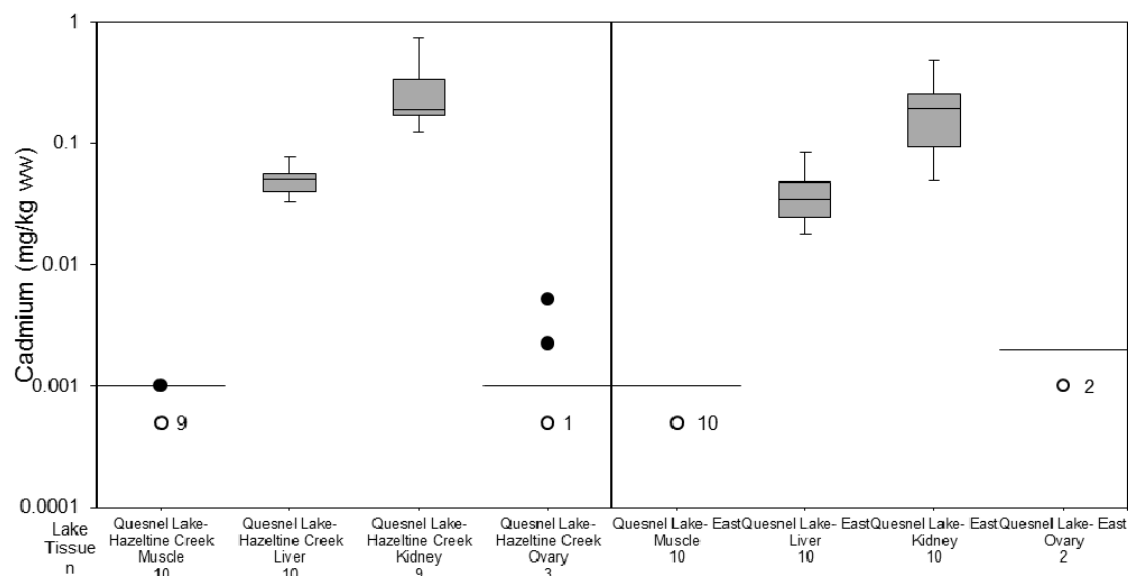


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

3.5 Cadmium

Figure 104: Cadmium Concentrations in Lake Trout Tissues Collected in 2015



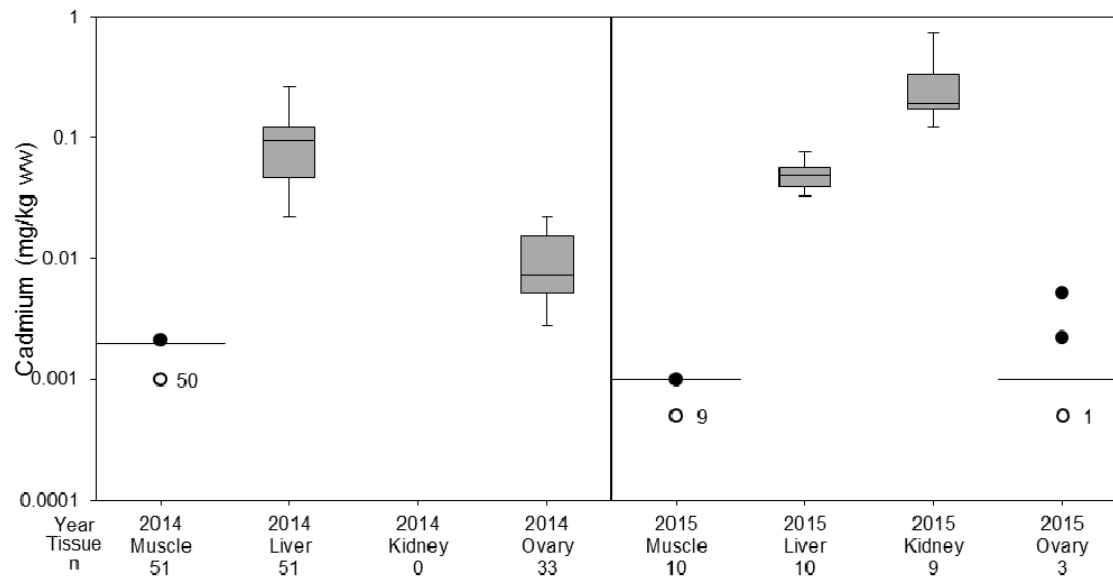
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 105: Cadmium Concentrations in Lake Trout Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

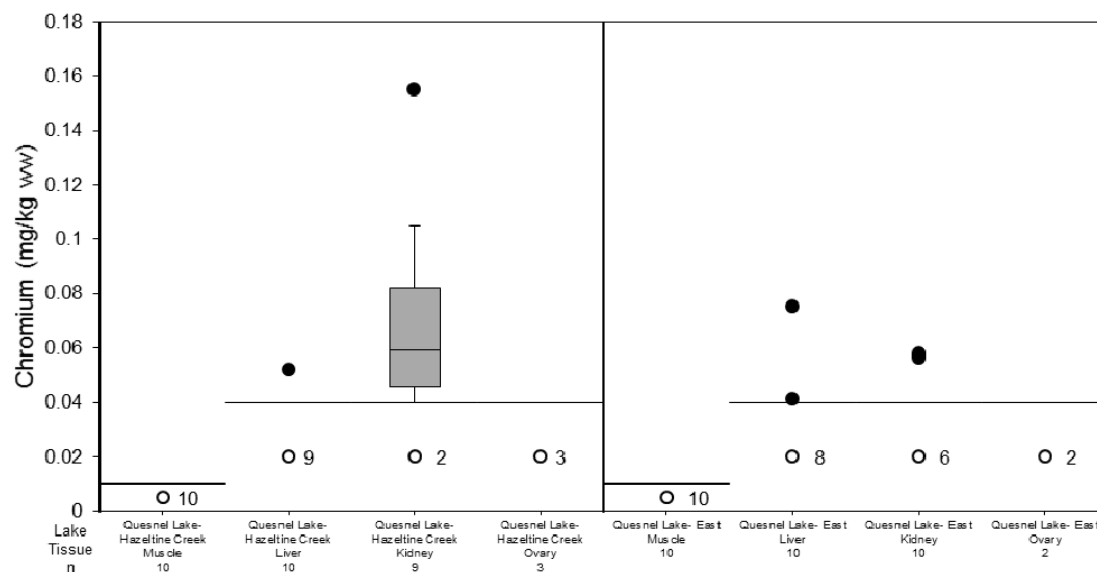


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

3.6 Chromium

Figure 106: Chromium Concentrations in Lake Trout Tissues Collected in 2015



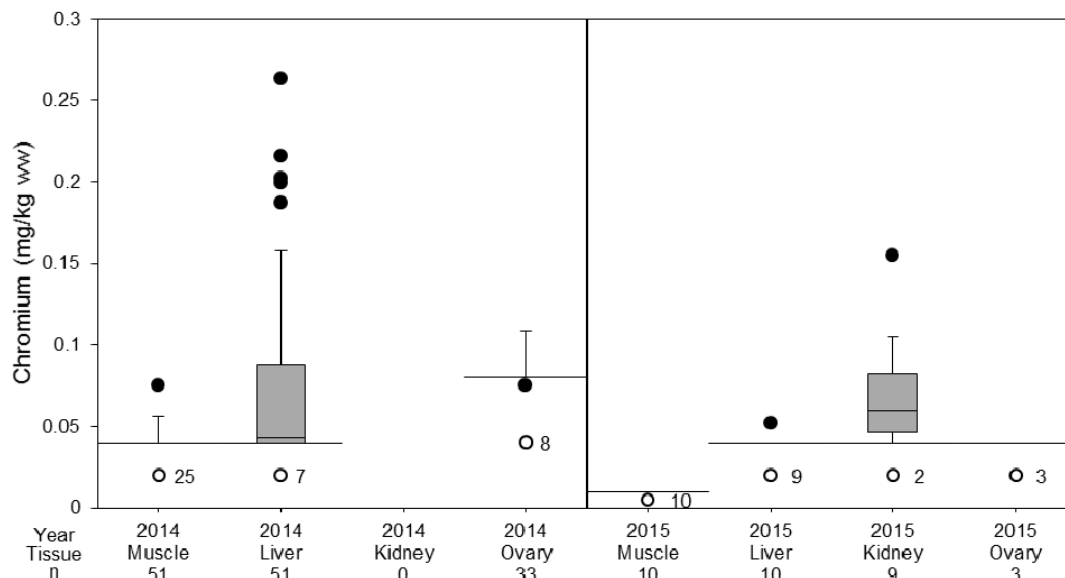
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 107: Chromium Concentrations in Lake Trout Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

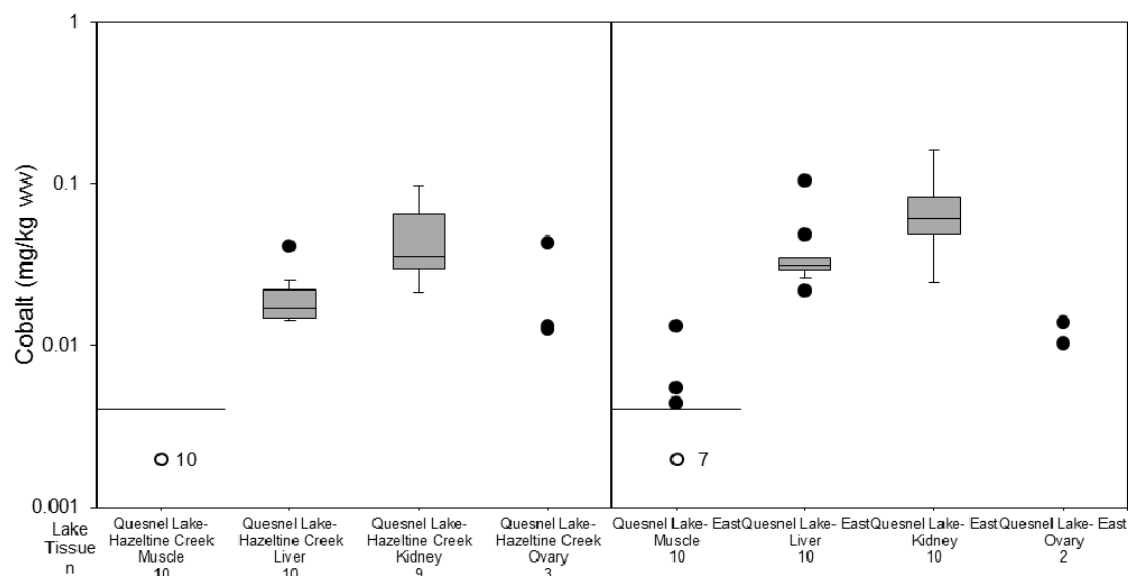


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

3.7 Cobalt

Figure 108: Cobalt Concentrations in Lake Trout Tissues Collected in 2015



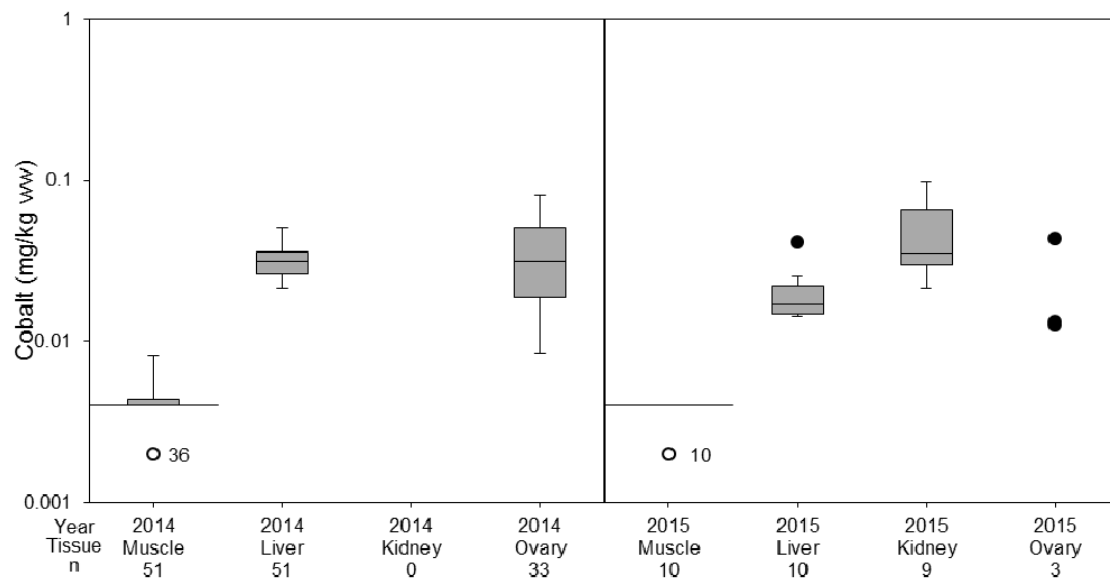
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 109: Cobalt Concentrations in Lake Trout Tissues Collected from the Quesnel Lake - Hazeline Creek Confluence in 2014 and 2015

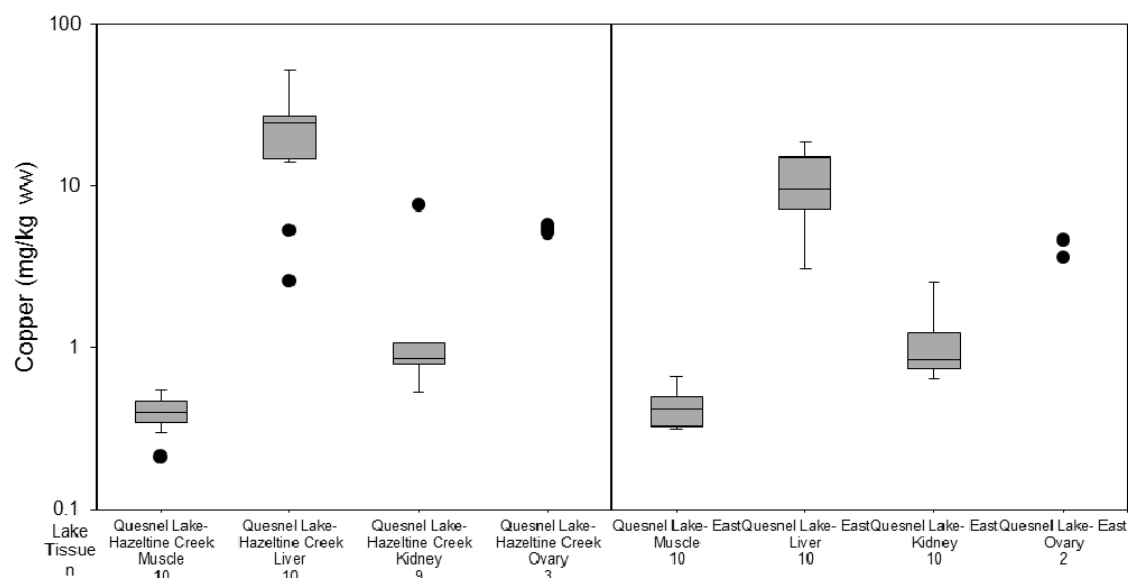


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

3.8 Copper

Figure 110: Copper Concentrations in Lake Trout Tissues Collected in 2015



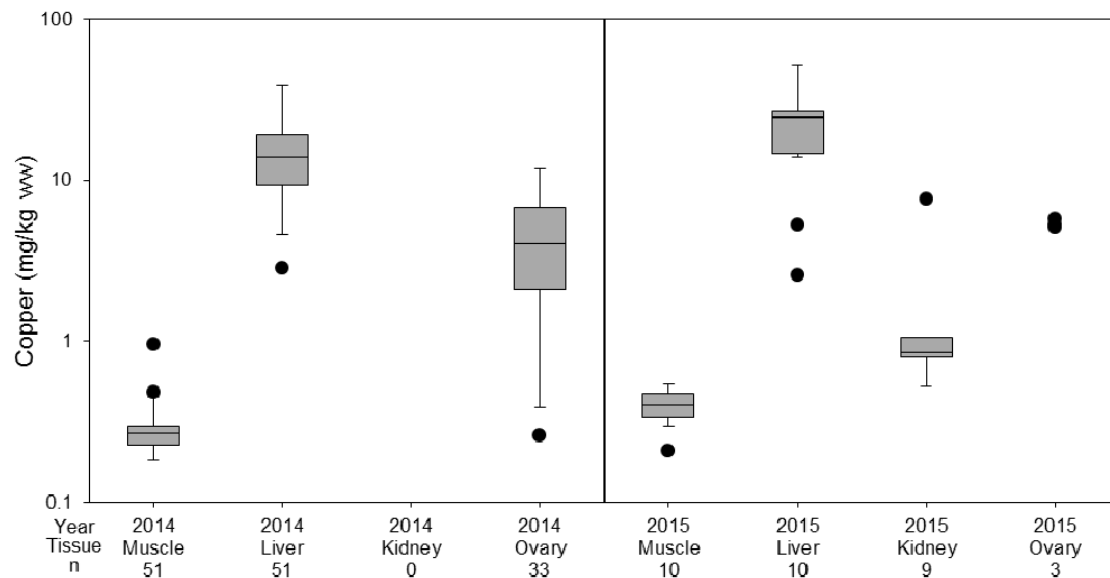
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 111: Copper Concentrations in Lake Trout Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

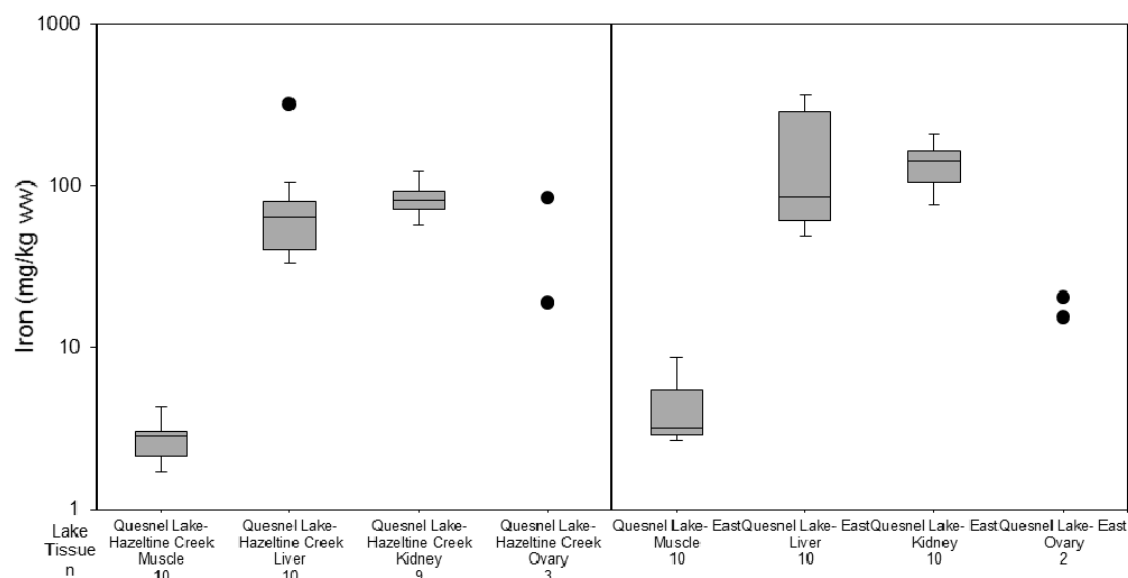


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

3.9 Iron

Figure 112: Iron Concentrations in Lake Trout Tissues Collected in 2015



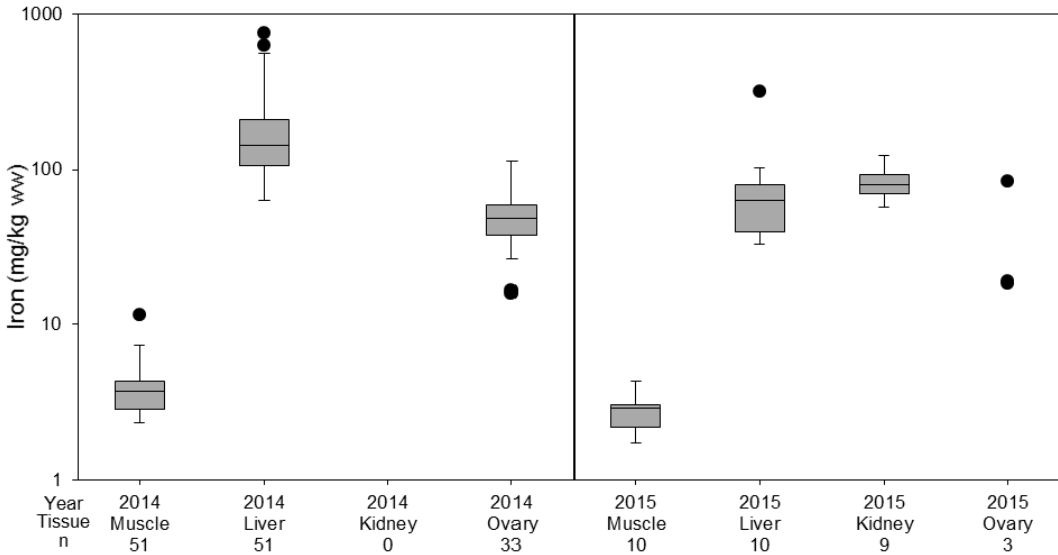
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 113: Iron Concentrations in Lake Trout Tissues Collected from the Quesnel Lake - Hazeltiline Creek Confluence in 2014 and 2015

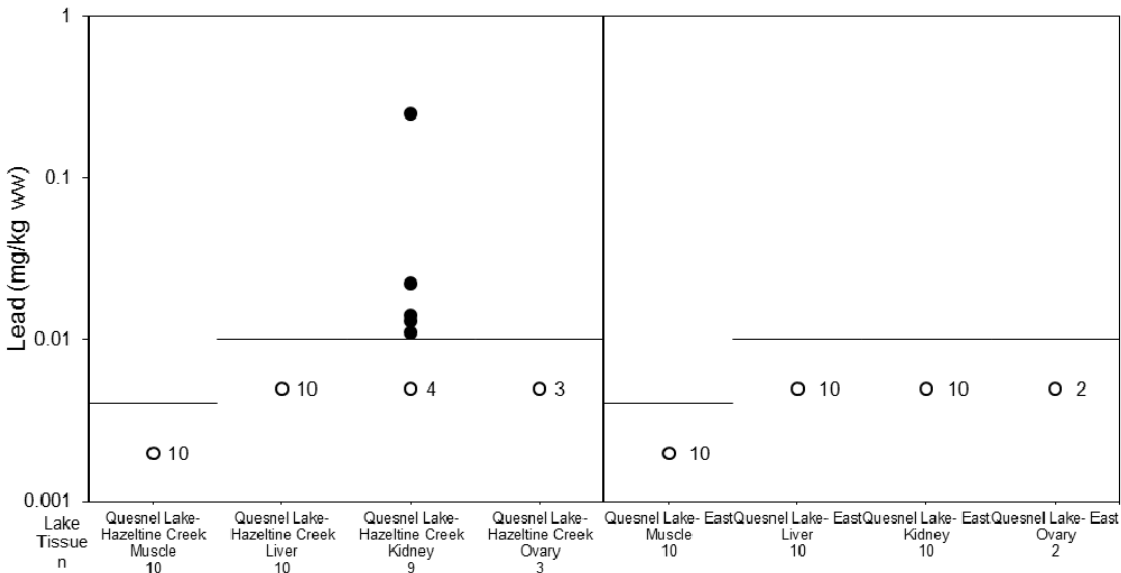


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

3.10 Lead

Figure 114: Lead Concentrations in Lake Trout Tissues Collected in 2015



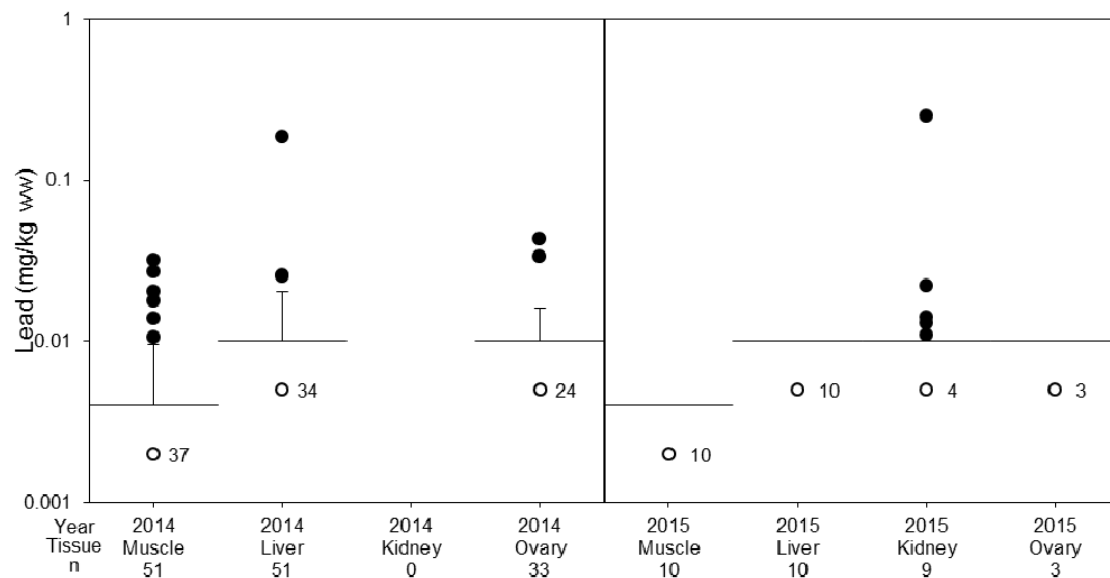
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 115: Lead Concentrations in Lake Trout Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

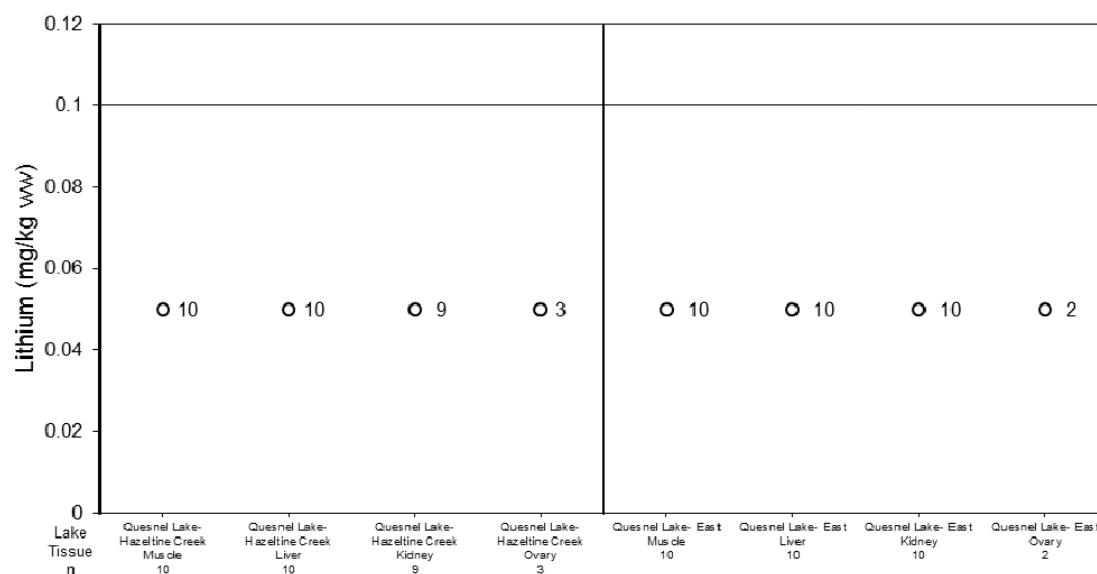


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (—) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

3.11 Lithium

Figure 116: Lithium Concentrations in Lake Trout Tissues Collected in 2015



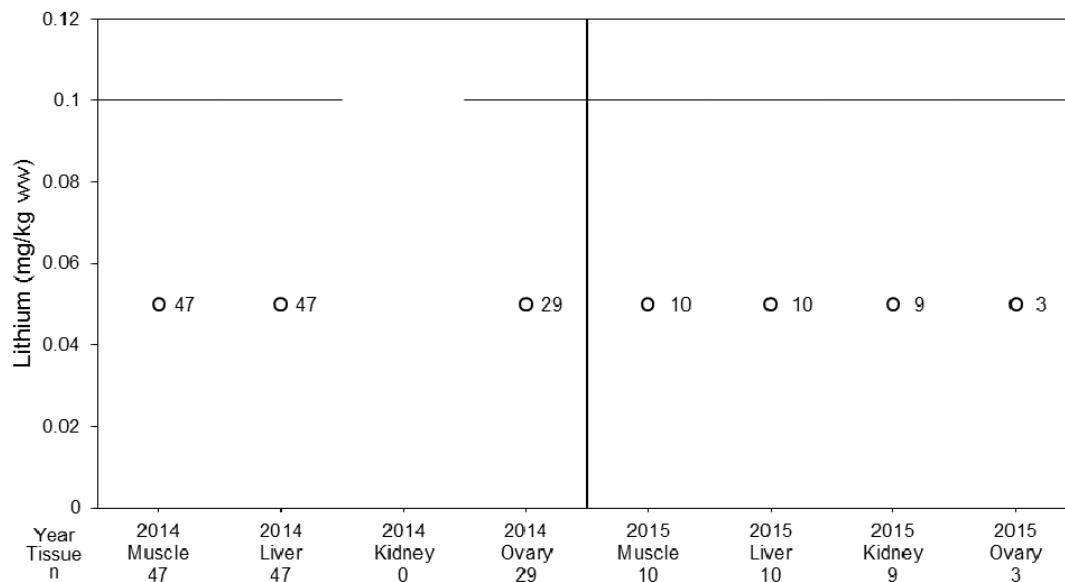
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (—) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 117: Lithium Concentrations in Lake Trout Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

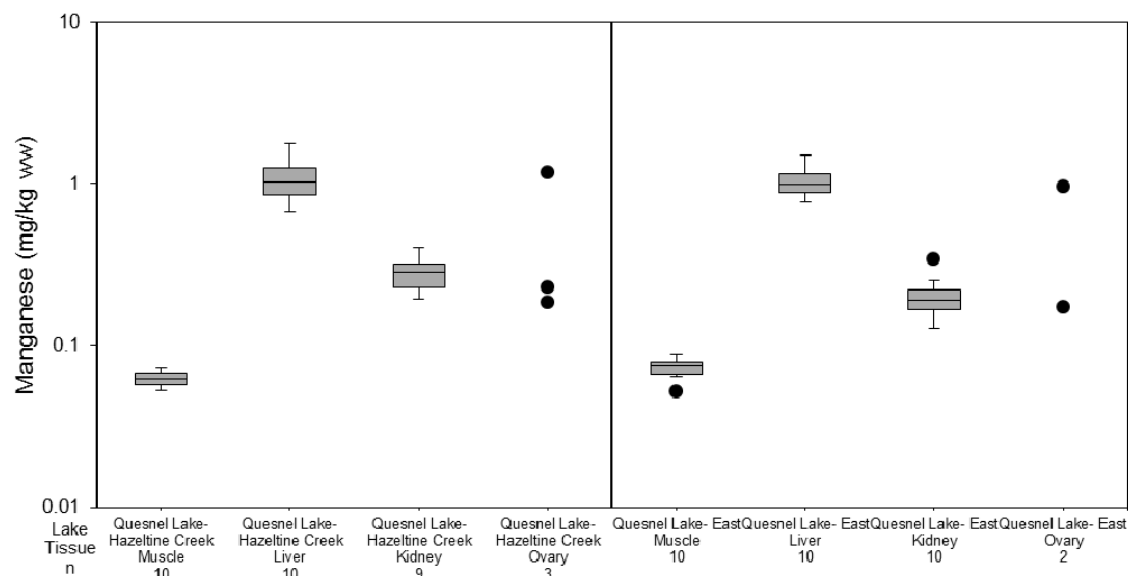


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

3.12 Manganese

Figure 118: Manganese Concentrations in Lake Trout Tissues Collected in 2015



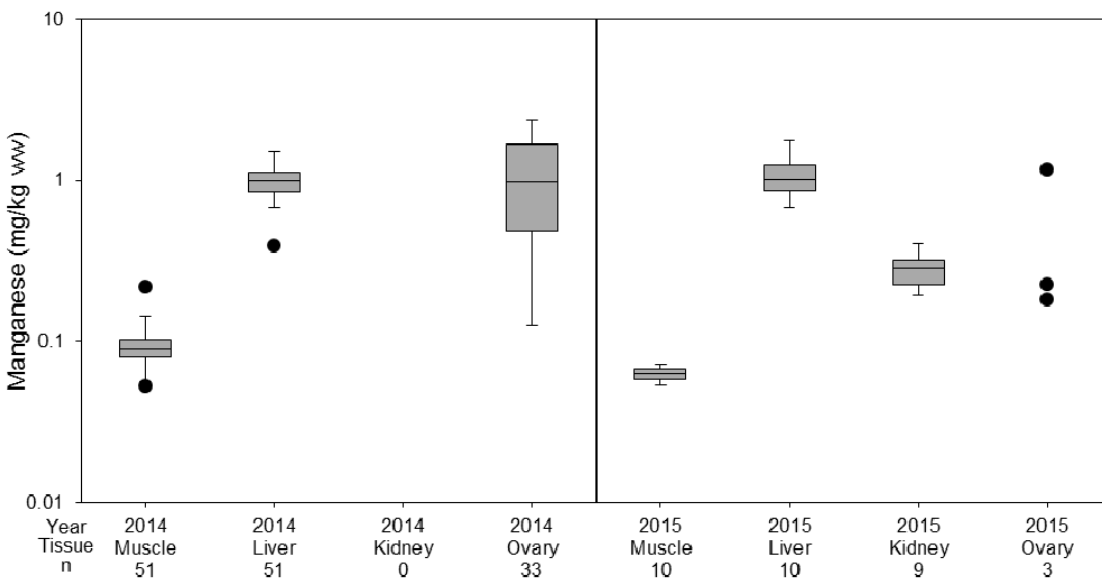
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 119: Manganese Concentrations in Lake Trout Tissues Collected from the Quesnel Lake - Hazeltime Creek Confluence in 2014 and 2015

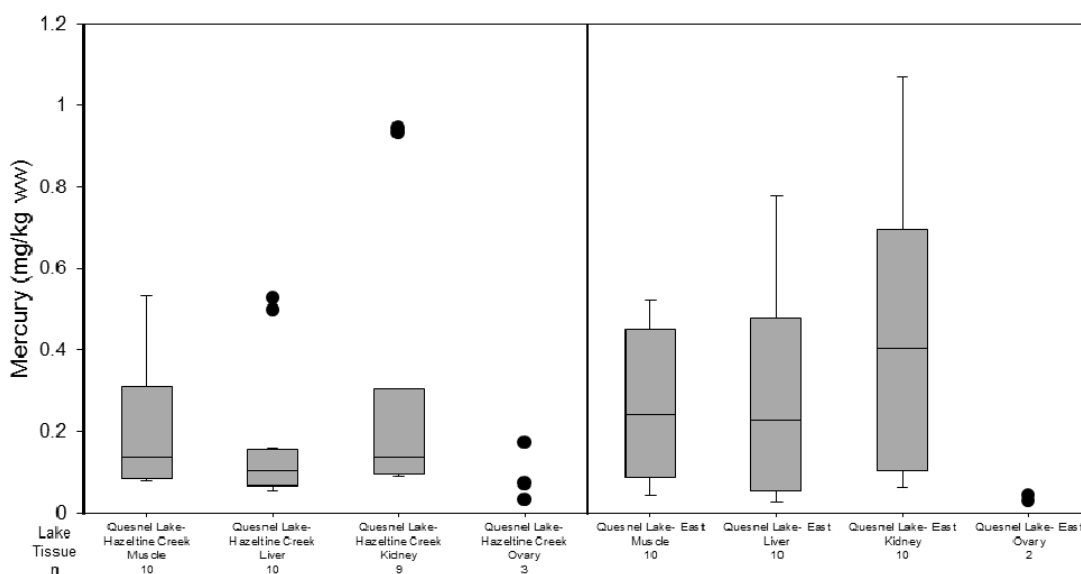


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

3.13 Mercury

Figure 120: Mercury Concentrations in Lake Trout Tissues Collected in 2015



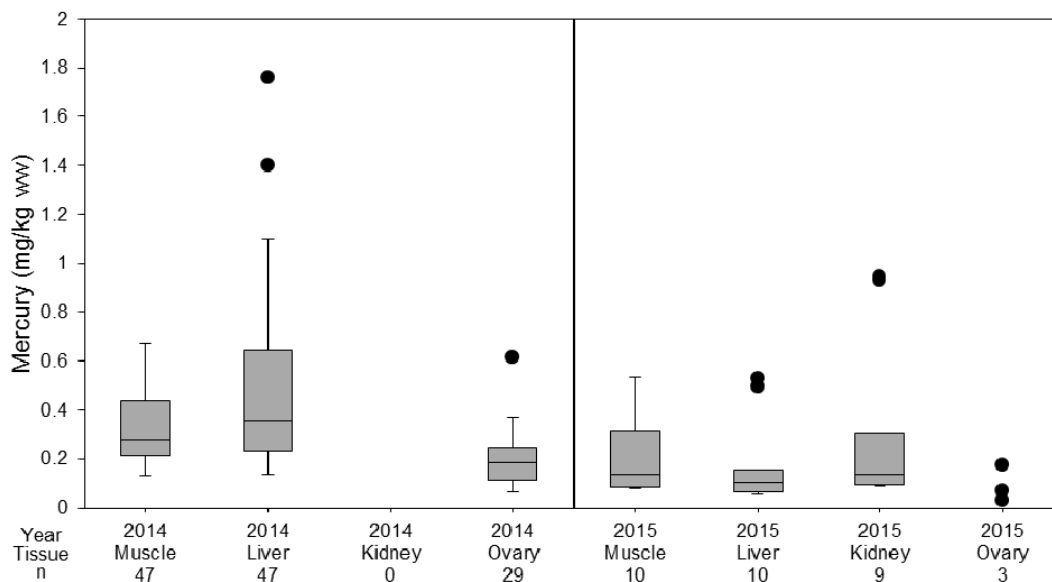
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 121: Mercury Concentrations in Lake Trout Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

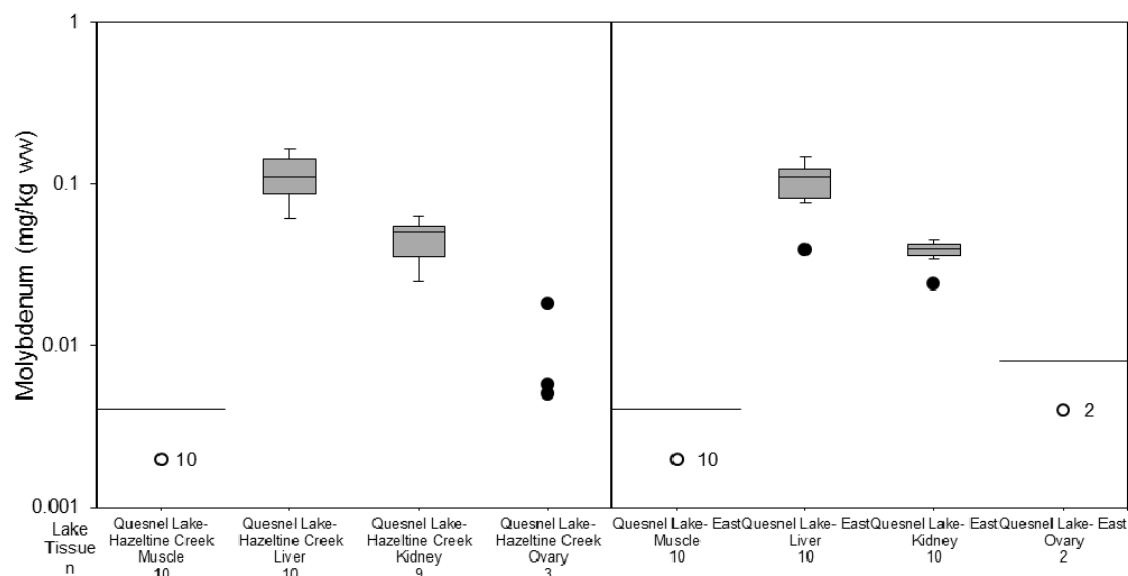


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

3.14 Molybdenum

Figure 122: Molybdenum Concentrations in Lake Trout Tissues Collected in 2015



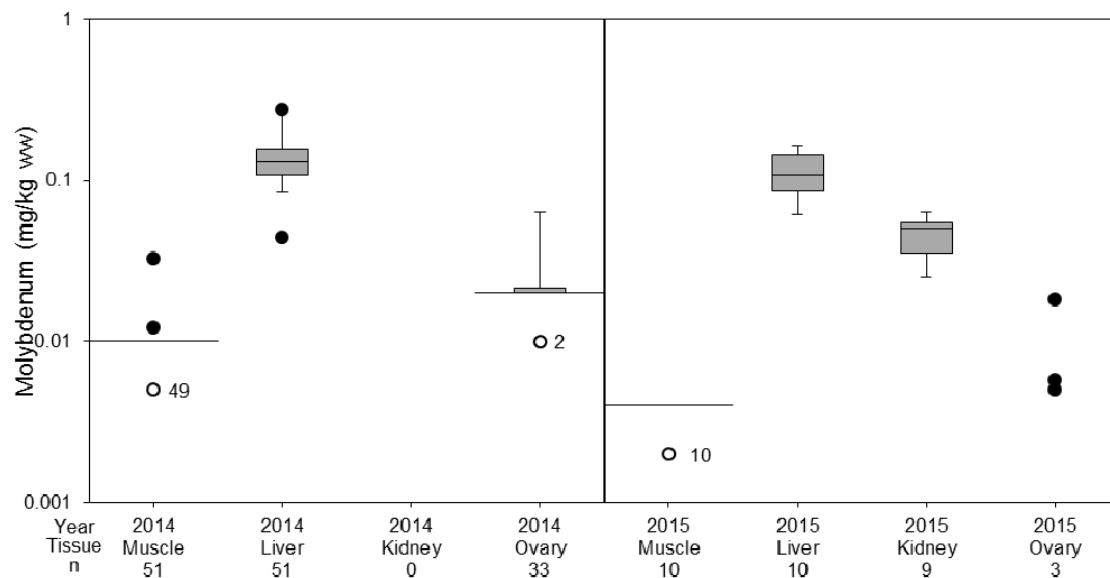
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 123: Molybdenum Concentrations in Lake Trout Tissues Collected from the Quesnel Lake - Hazeline Creek Confluence in 2014 and 2015

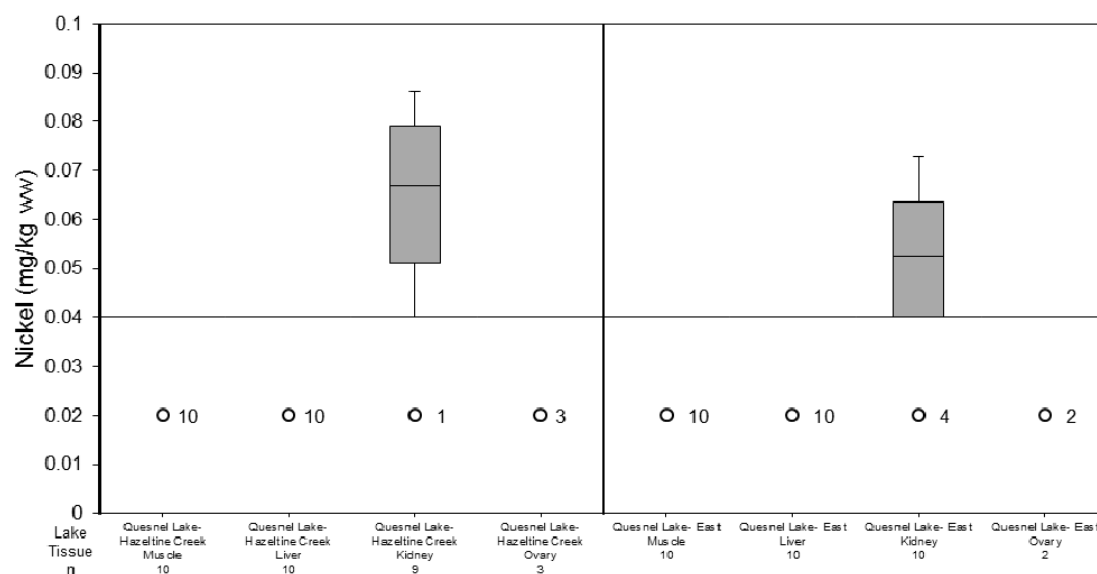


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

3.15 Nickel

Figure 124: Nickel Concentrations in Lake Trout Tissues Collected in 2015



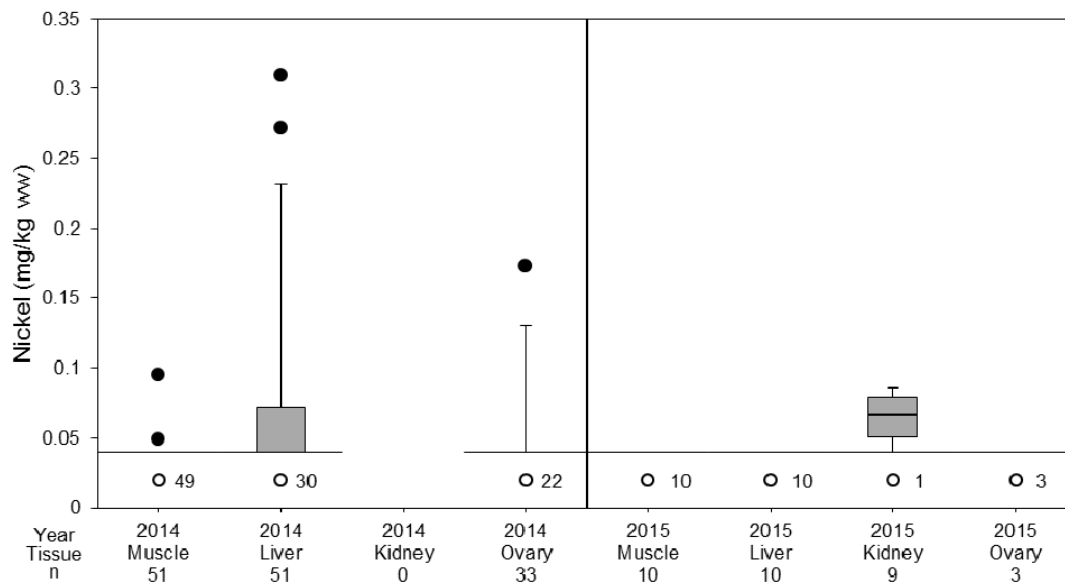
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 125: Nickel Concentrations in Lake Trout Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

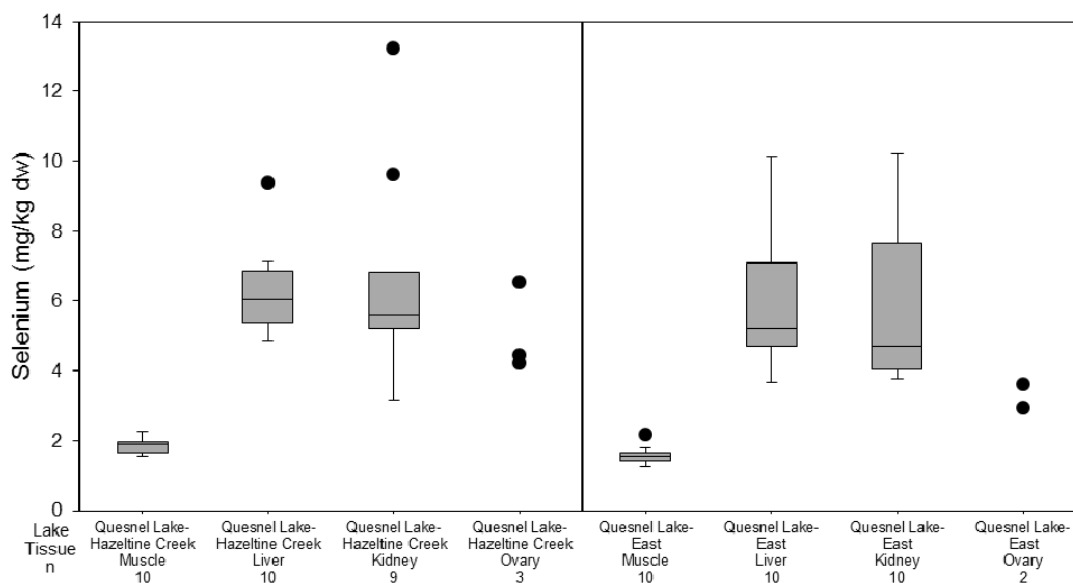


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

3.16 Selenium

Figure 126: Selenium Concentrations in Lake Trout Tissues Collected in 2015



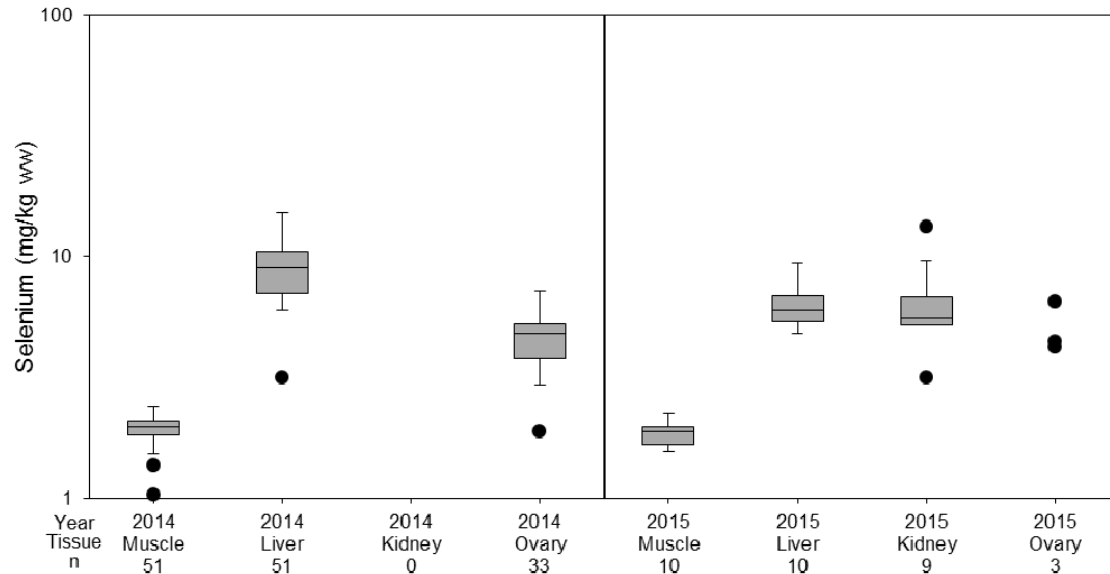
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 127: Selenium Concentrations in Lake Trout Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

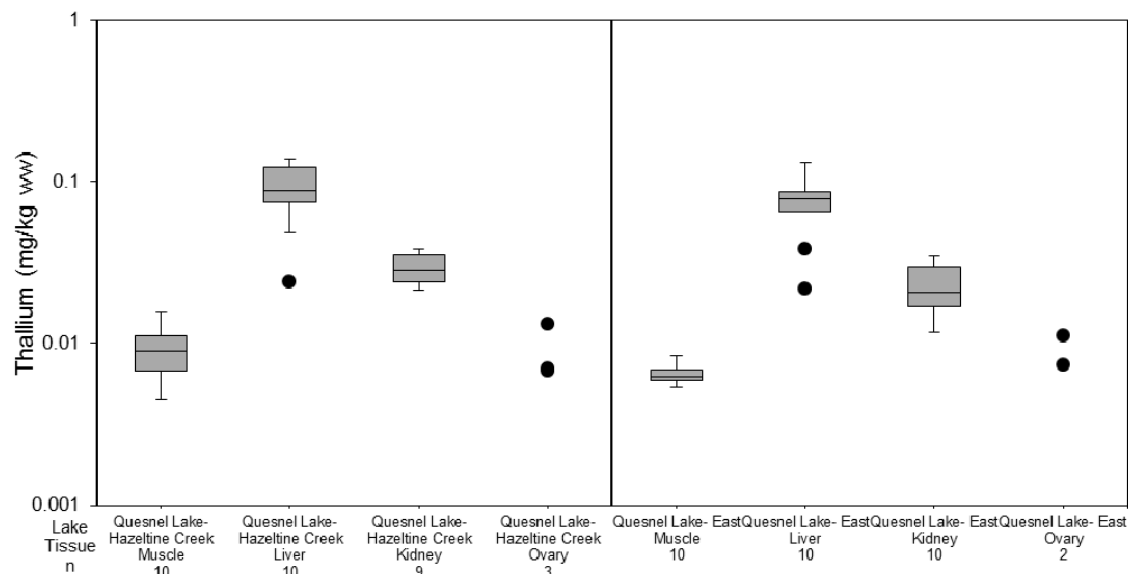


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

3.17 Thallium

Figure 128: Thallium Concentrations in Lake Trout Tissues Collected in 2015



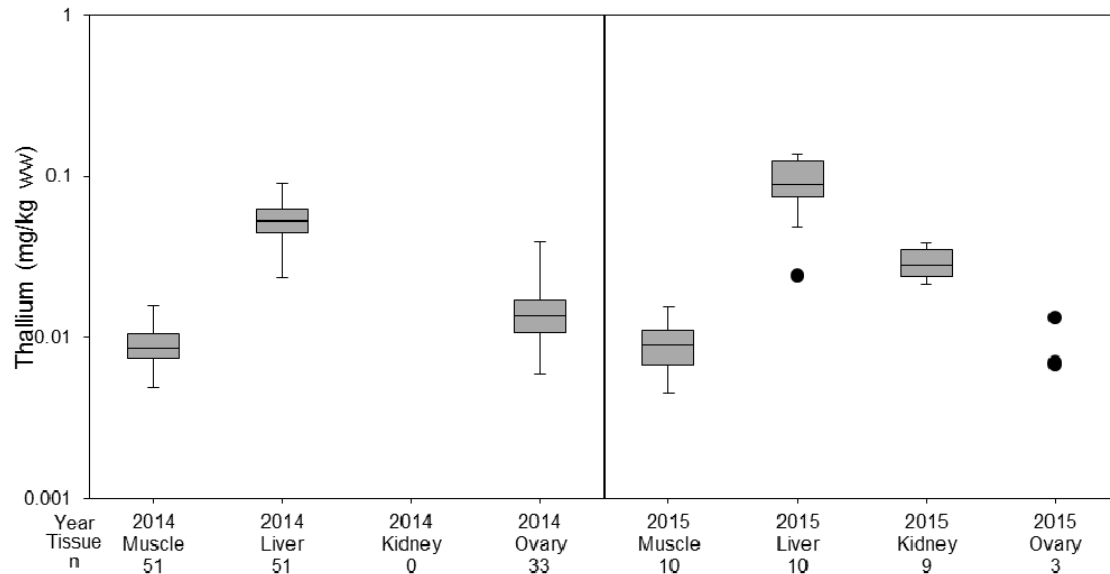
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 129: Thallium Concentrations in Lake Trout Tissues Collected from the Quesnel Lake - Hazeltime Creek Confluence in 2014 and 2015

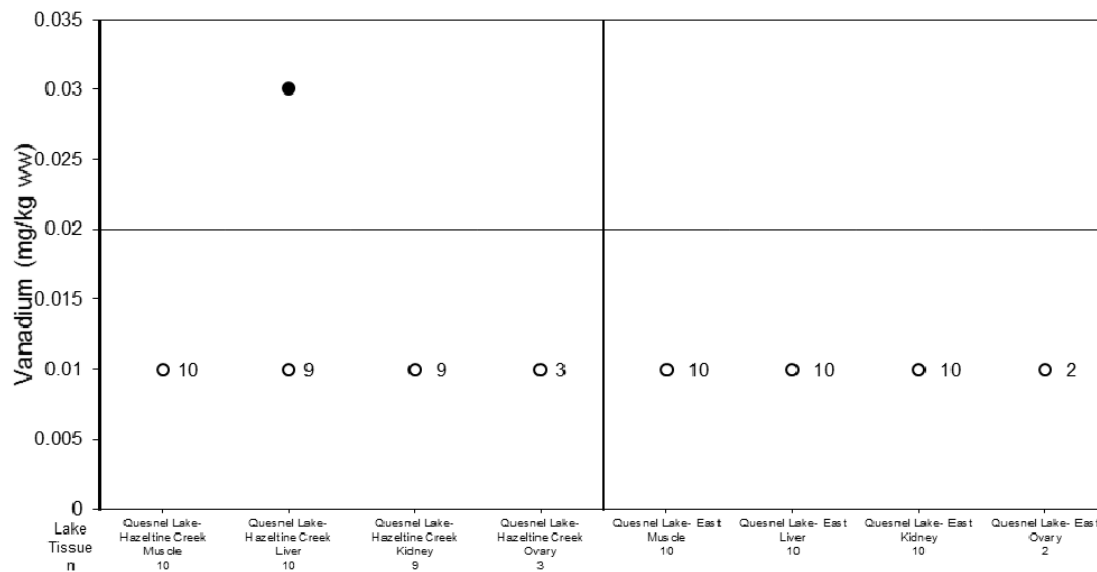


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

3.18 Vanadium

Figure 130: Vanadium Concentrations in Lake Trout Tissues Collected in 2015



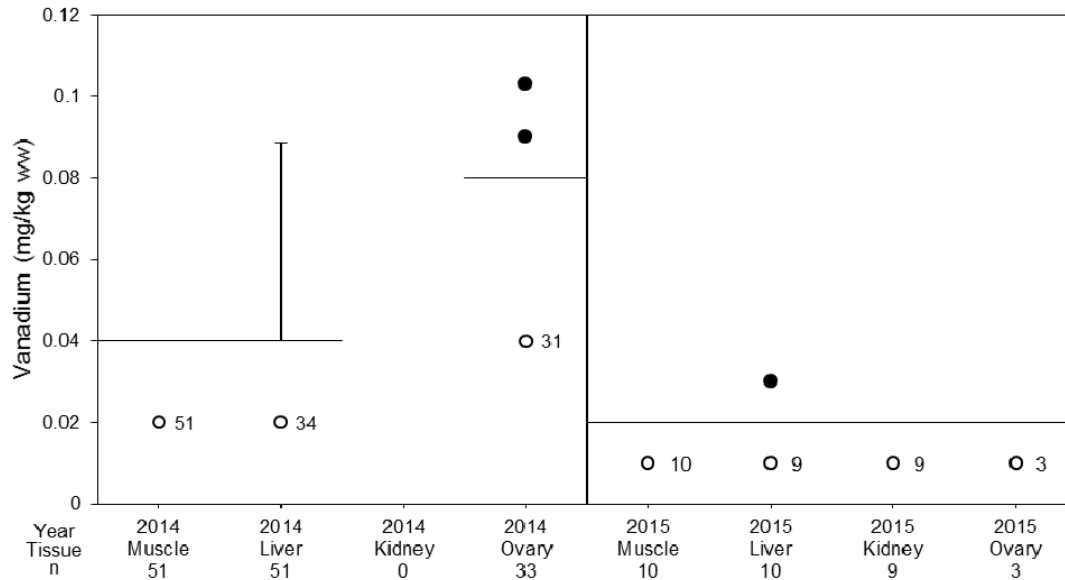
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 131: Vanadium Concentrations in Lake Trout Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

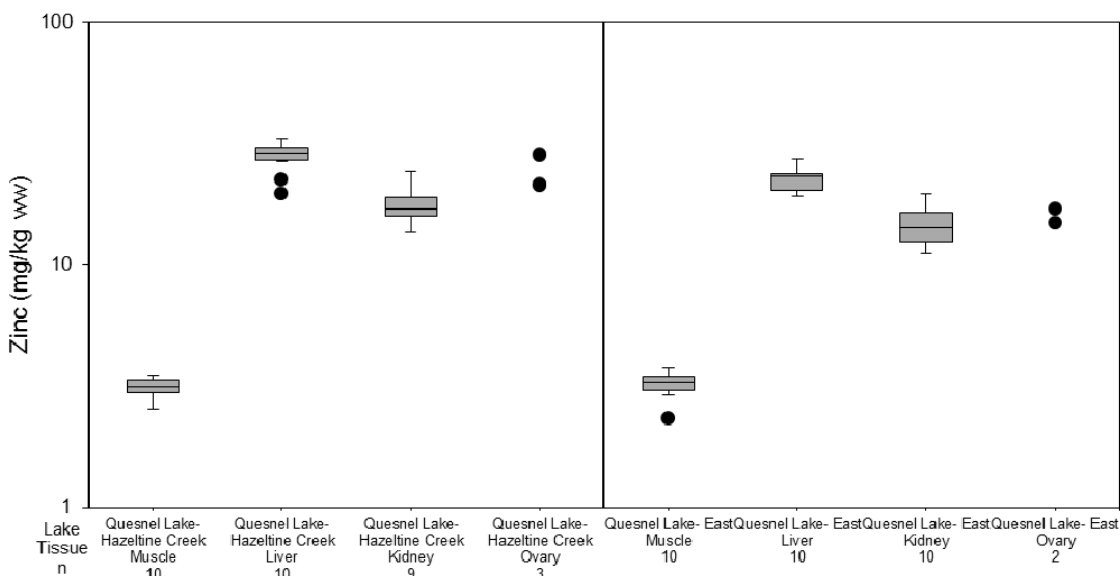


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

3.19 Zinc

Figure 132: Zinc Concentrations in Lake Trout Tissues Collected in 2015



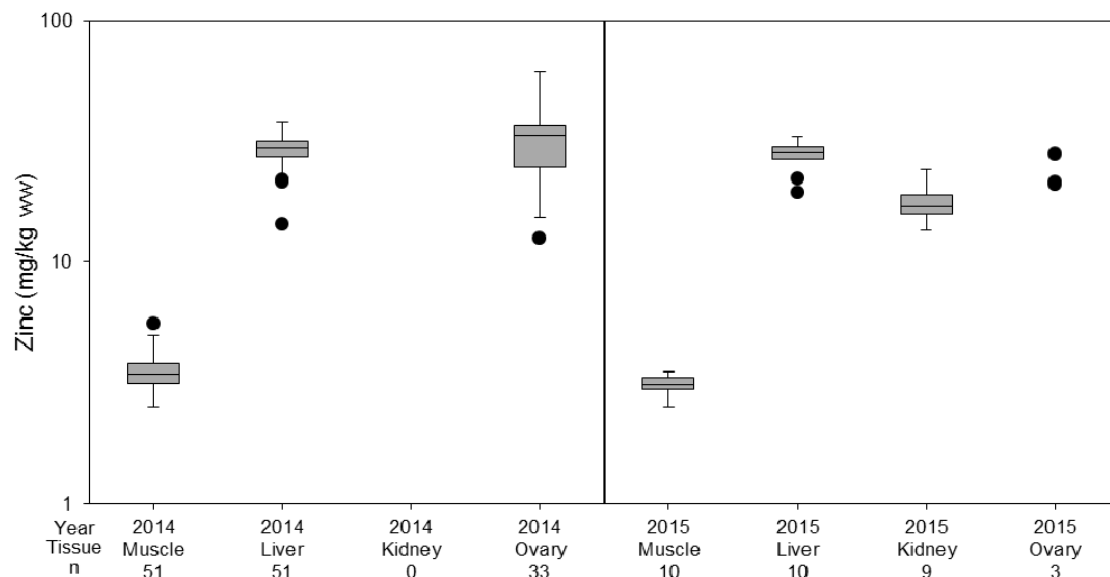
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 133: Zinc Concentrations in Lake Trout Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

4.0 LARGESCALE SUCKER

4.1 Aluminum

Figure 134: Aluminum Concentrations in Largescale Sucker Tissues Collected in 2015



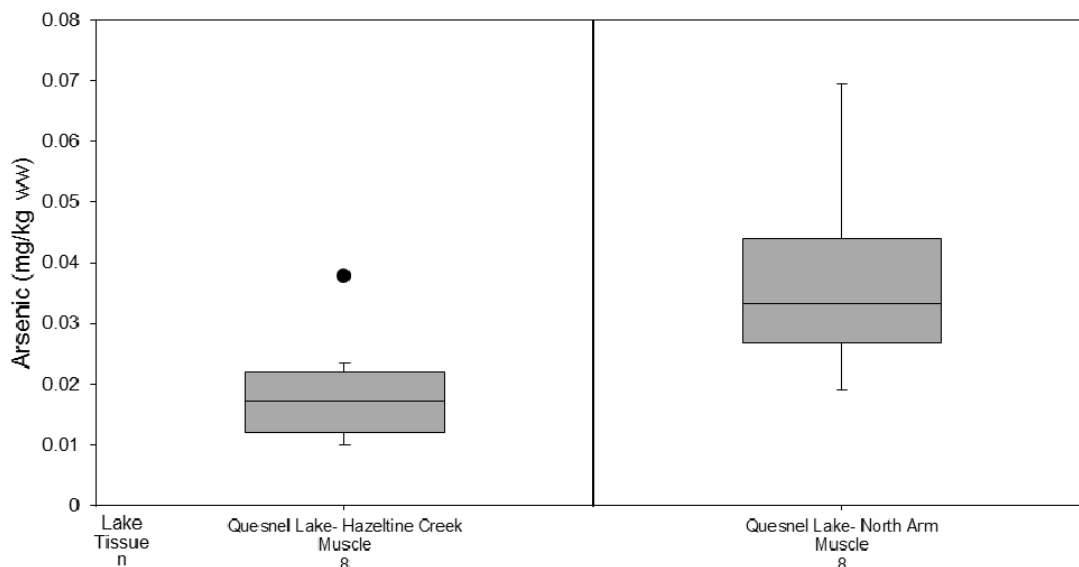
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



4.2 Arsenic

Figure 135: Arsenic Concentrations in Largescale Sucker Tissues Collected in 2015

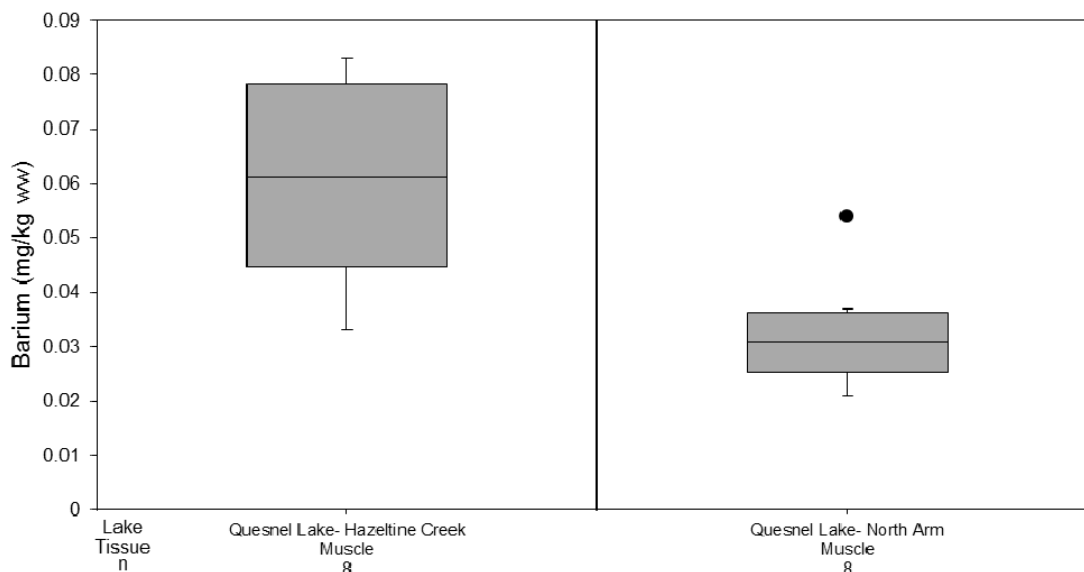


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

4.3 Barium

Figure 136: Barium Concentrations in Largescale Sucker Tissues Collected in 2015



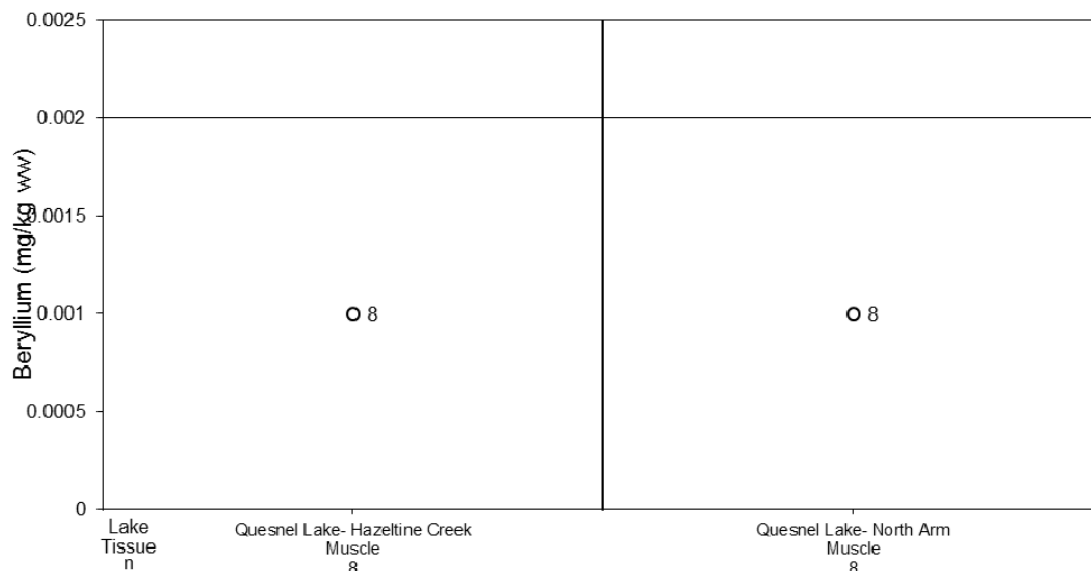
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



4.4 Beryllium

Figure 137: Beryllium Concentrations in Largescale Sucker Tissues Collected in 2015

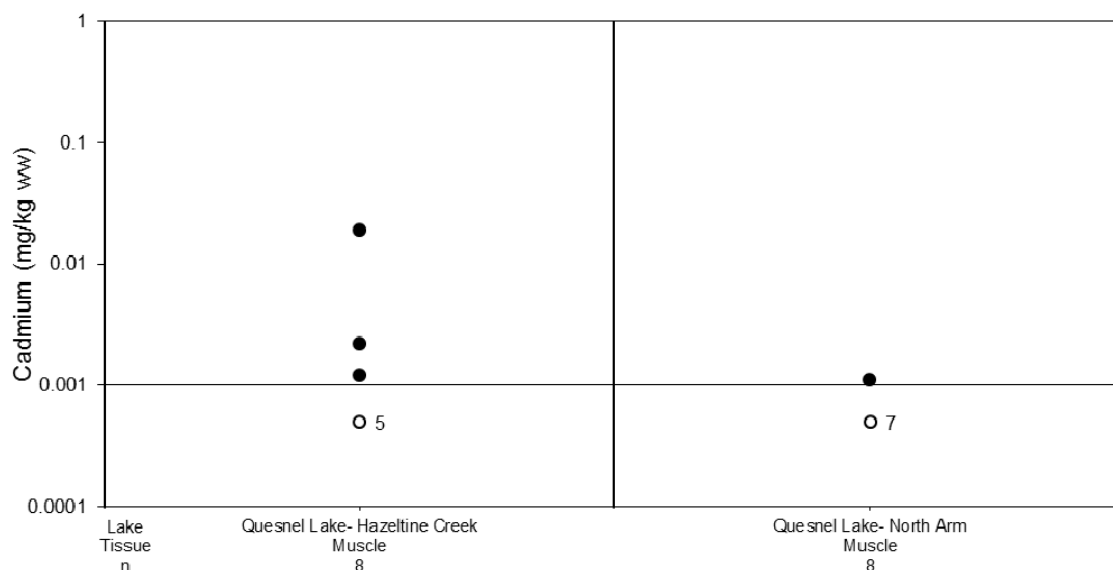


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

4.5 Cadmium

Figure 138: Cadmium Concentrations in Largescale Sucker Tissues Collected in 2015



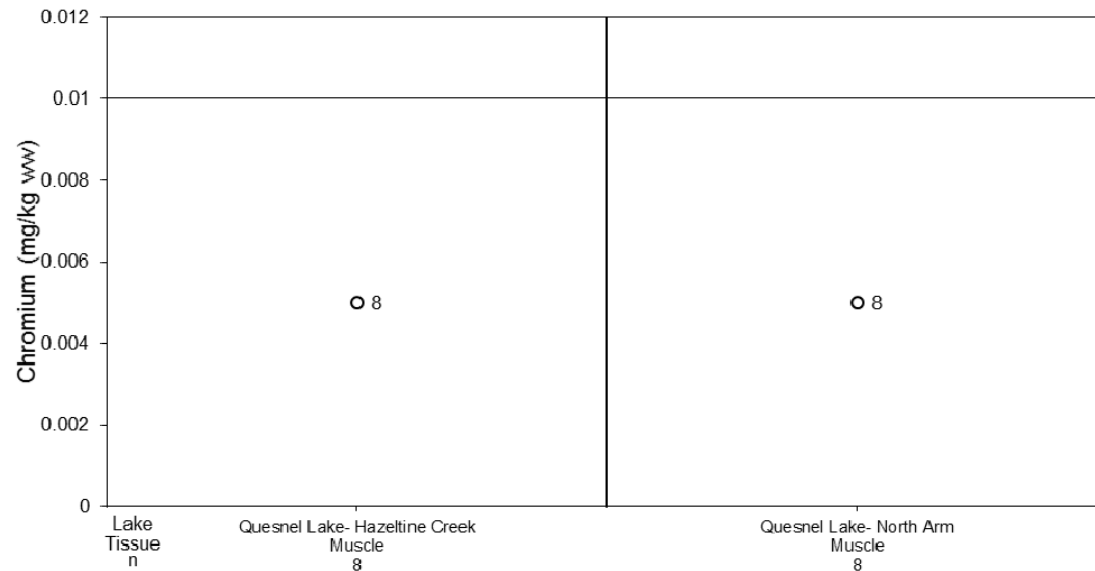
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



4.6 Chromium

Figure 139: Chromium Concentrations in Largescale Sucker Tissues Collected in 2015

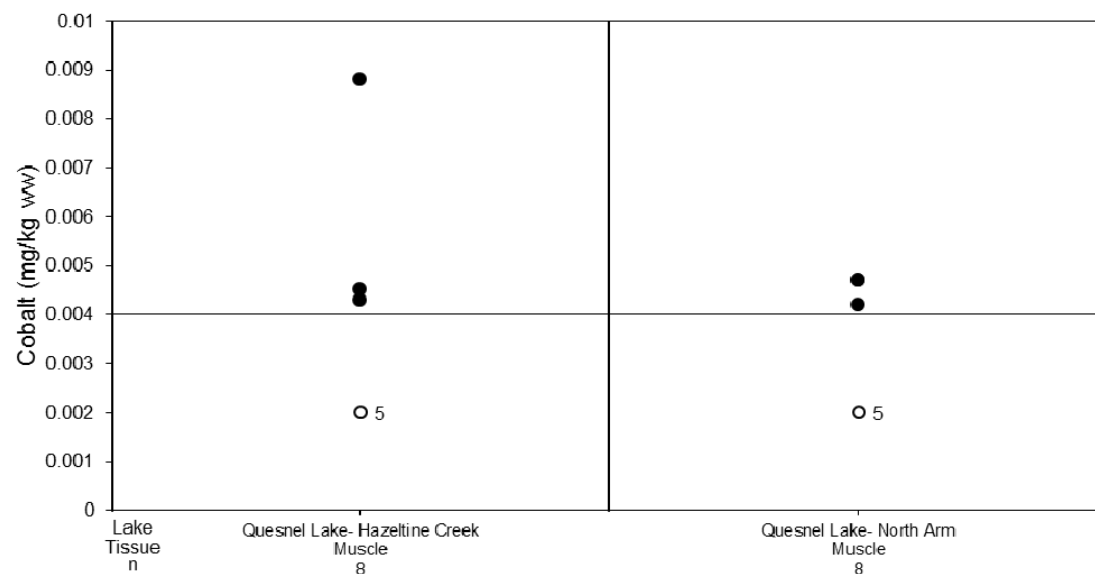


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

4.7 Cobalt

Figure 140: Cobalt Concentrations in Largescale Sucker Tissues Collected in 2015



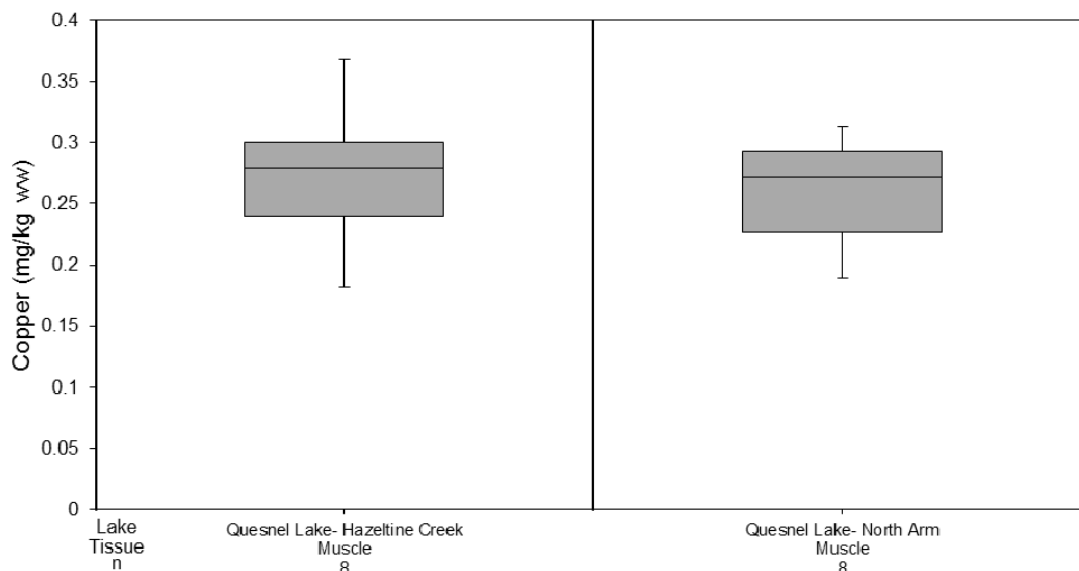
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



4.8 Copper

Figure 141: Copper Concentrations in Largescale Sucker Tissues Collected in 2015

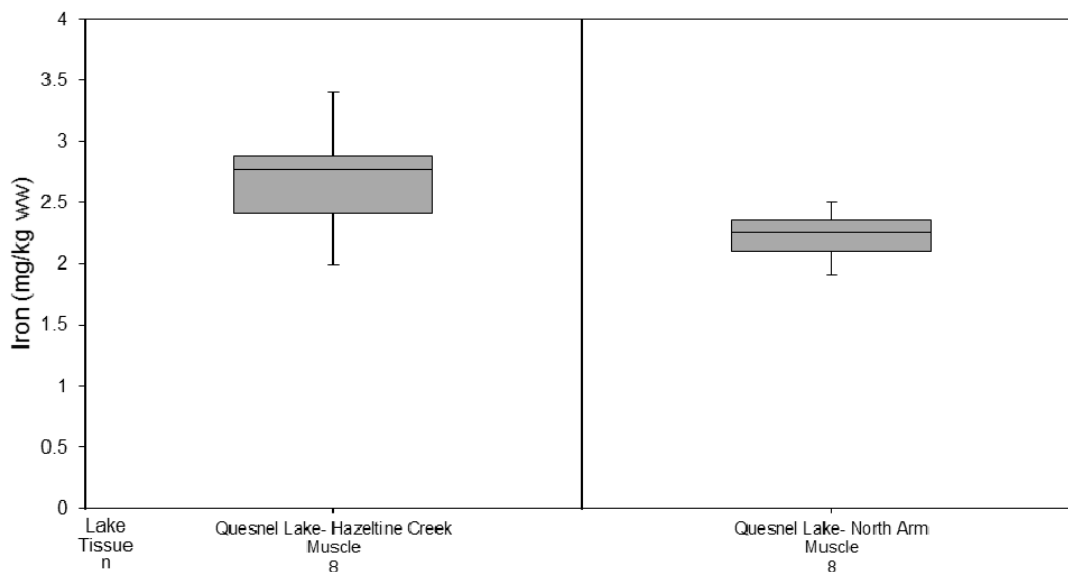


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

4.9 Iron

Figure 142: Iron Concentrations in Largescale Sucker Tissues Collected in 2015



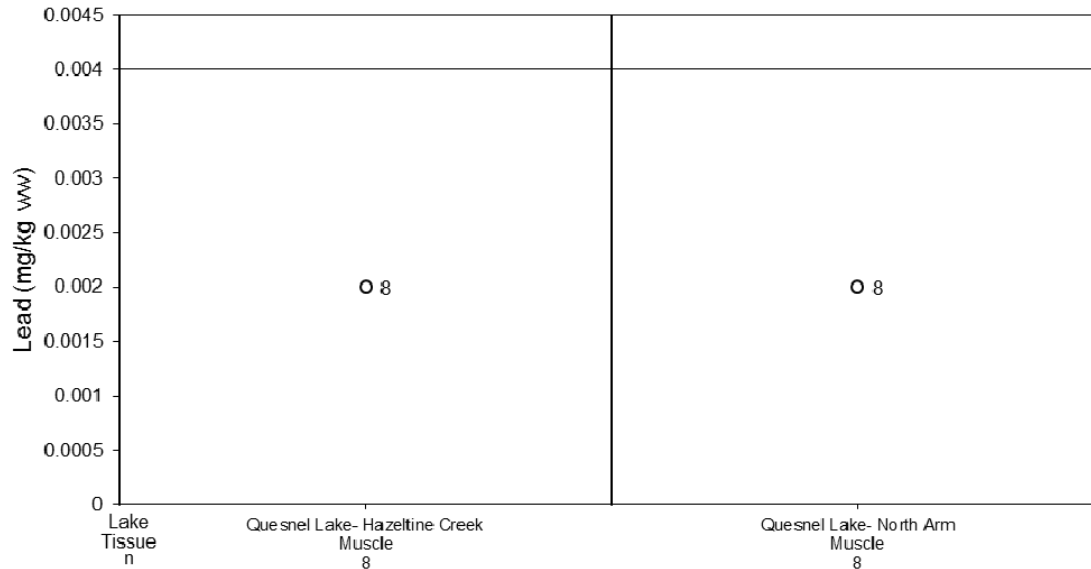
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



4.10 Lead

Figure 143: Lead Concentrations in Largescale Sucker Tissues Collected in 2015

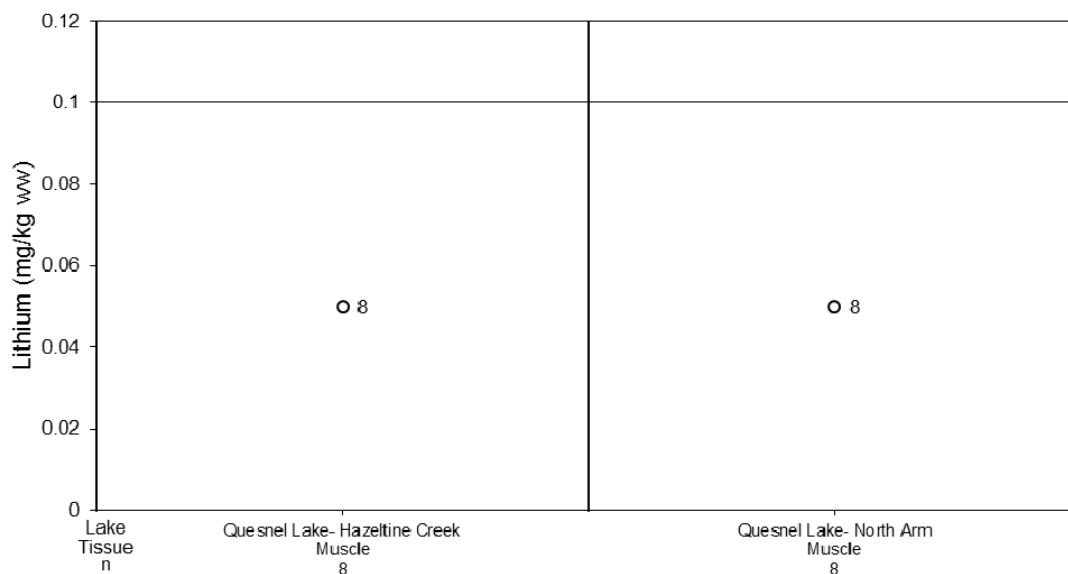


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

4.11 Lithium

Figure 144: Lithium Concentrations in Largescale Sucker Tissues Collected in 2015



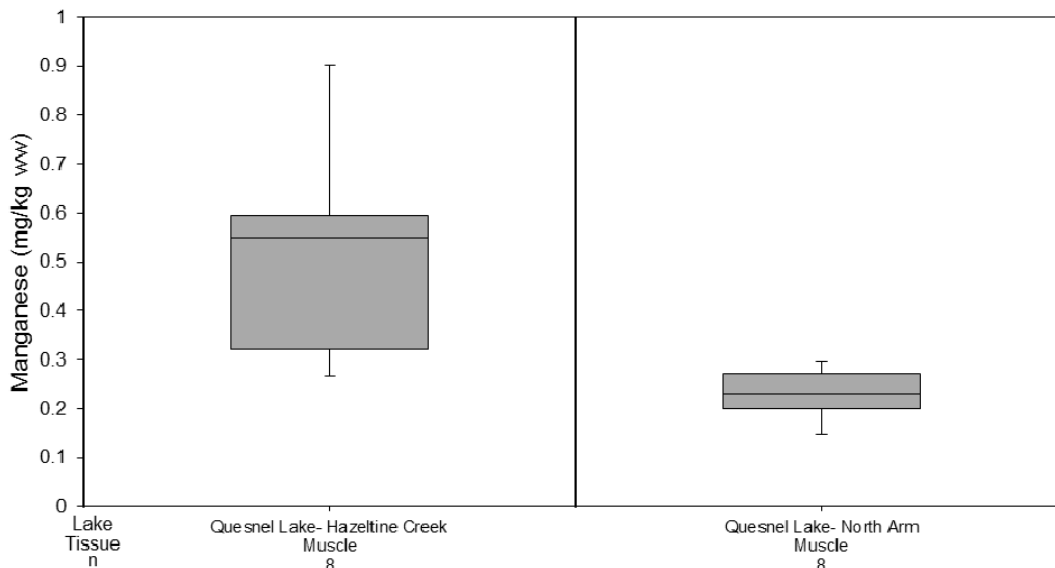
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



4.12 Manganese

Figure 145: Manganese Concentrations in Largescale Sucker Tissues Collected in 2015

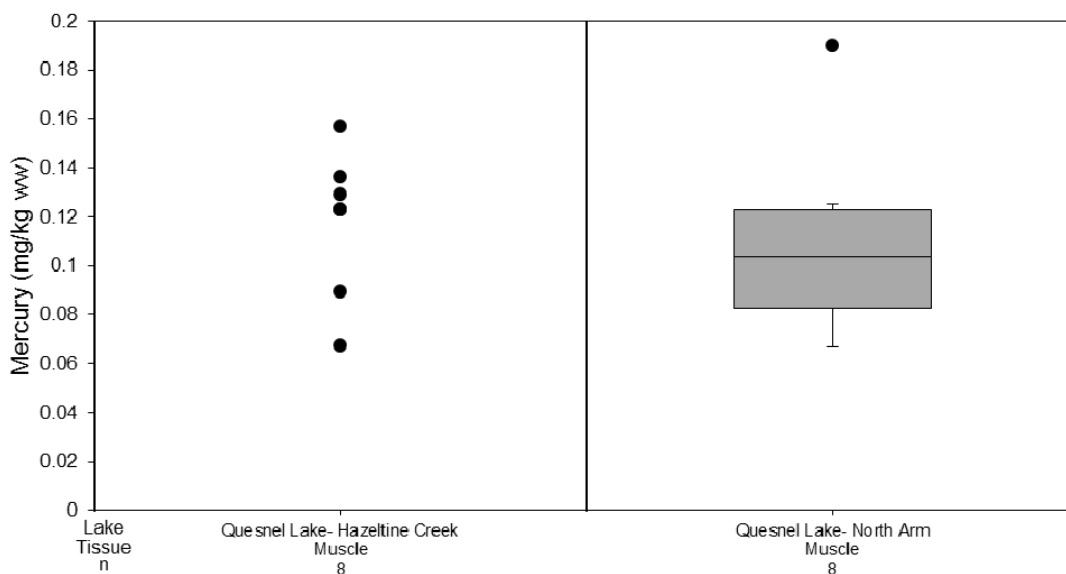


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

4.13 Mercury

Figure 146: Mercury Concentrations in Largescale Sucker Tissues Collected in 2015



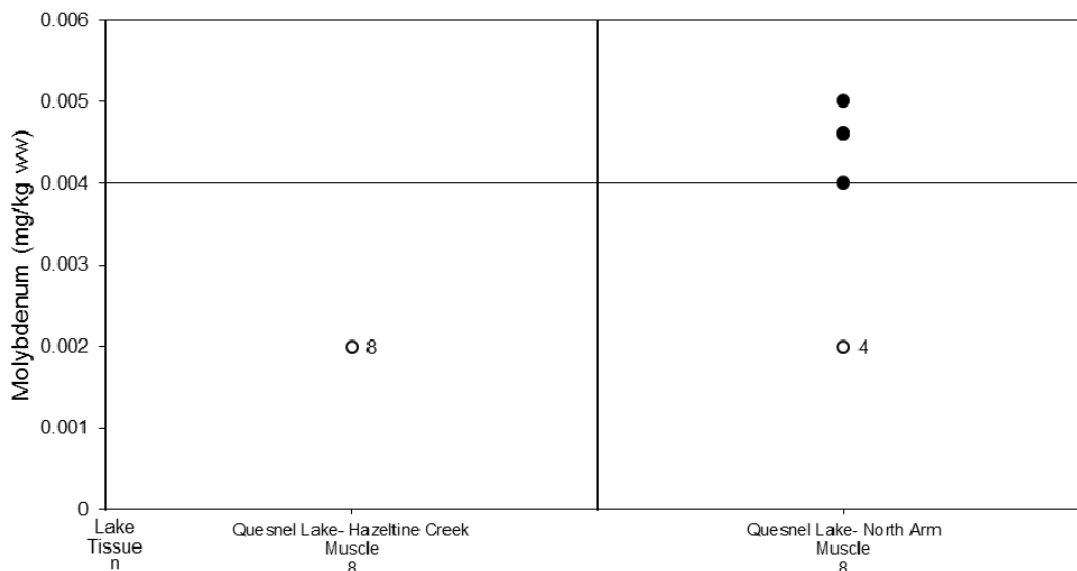
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



4.14 Molybdenum

Figure 147: Molybdenum Concentrations in Largescale Sucker Tissues Collected in 2015

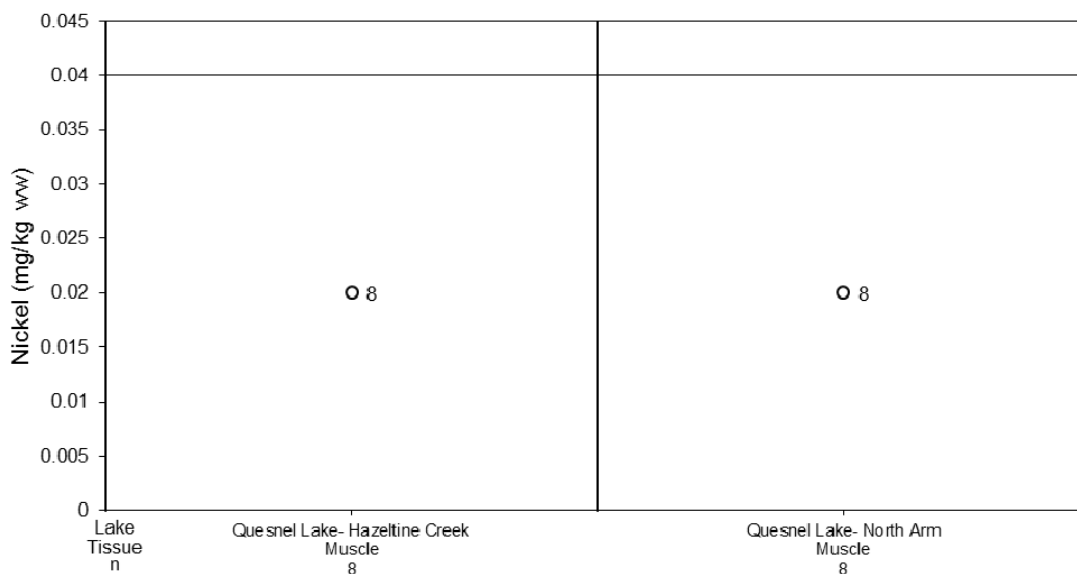


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

4.15 Nickel

Figure 148: Nickel Concentrations in Largescale Sucker Tissues Collected in 2015



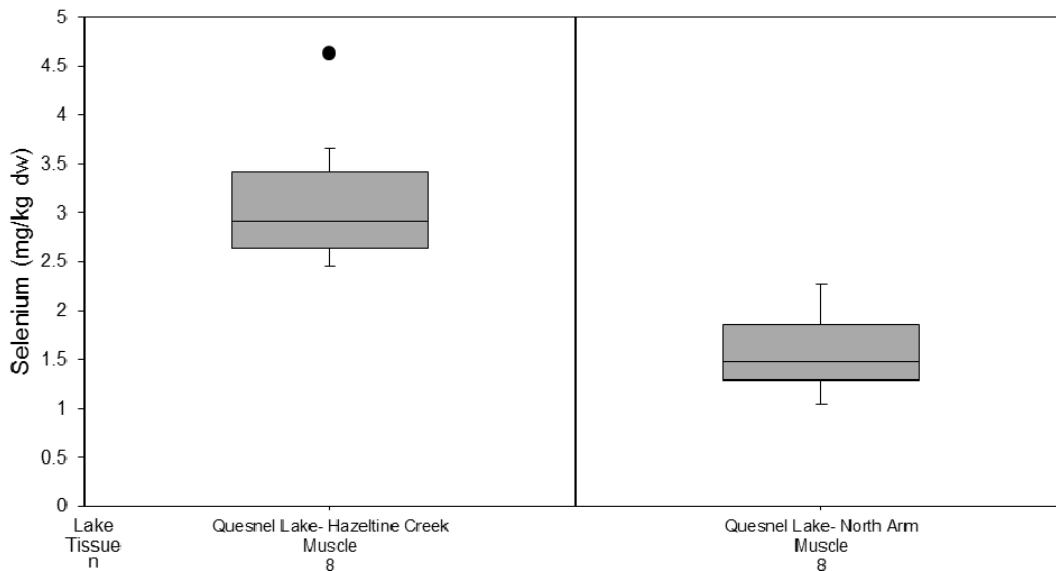
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



4.16 Selenium

Figure 149: Selenium Concentrations in Largescale Sucker Tissues Collected in 2015

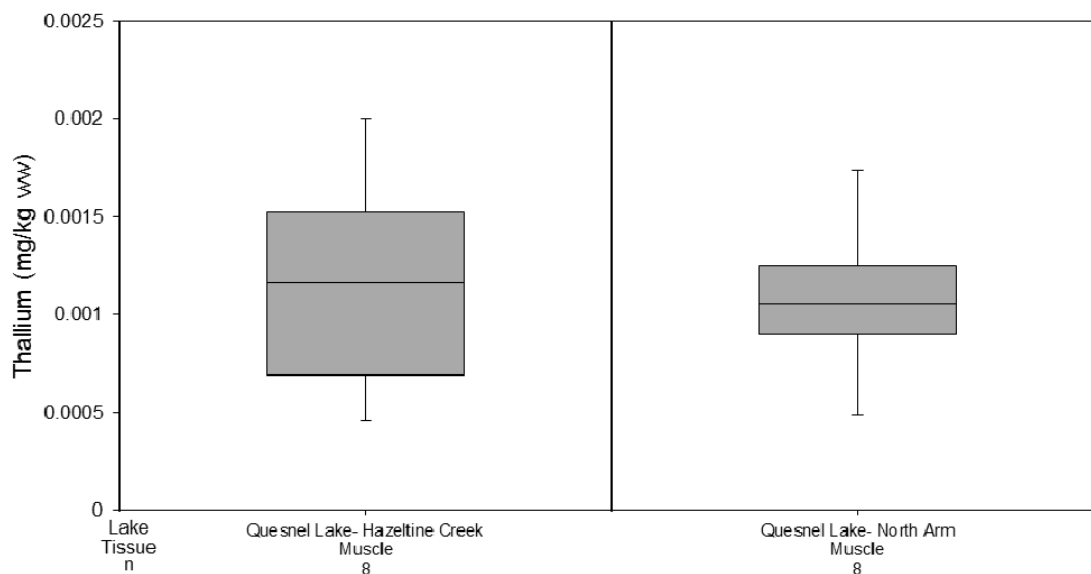


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

4.17 Thallium

Figure 150: Thallium Concentrations in Largescale Sucker Tissues Collected in 2015



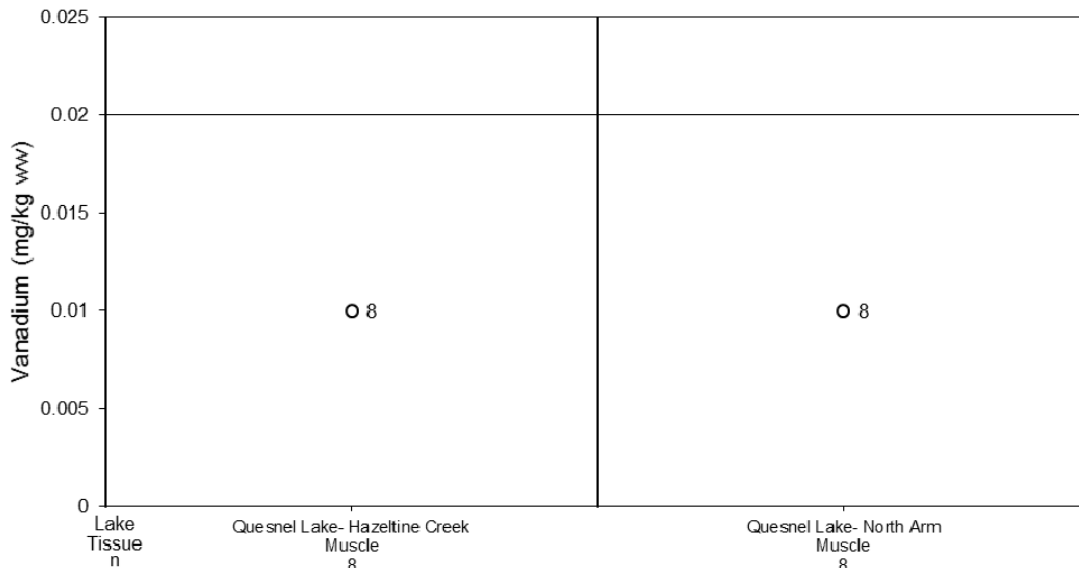
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



4.18 Vanadium

Figure 151: Vanadium Concentrations in Largescale Sucker Tissues Collected in 2015

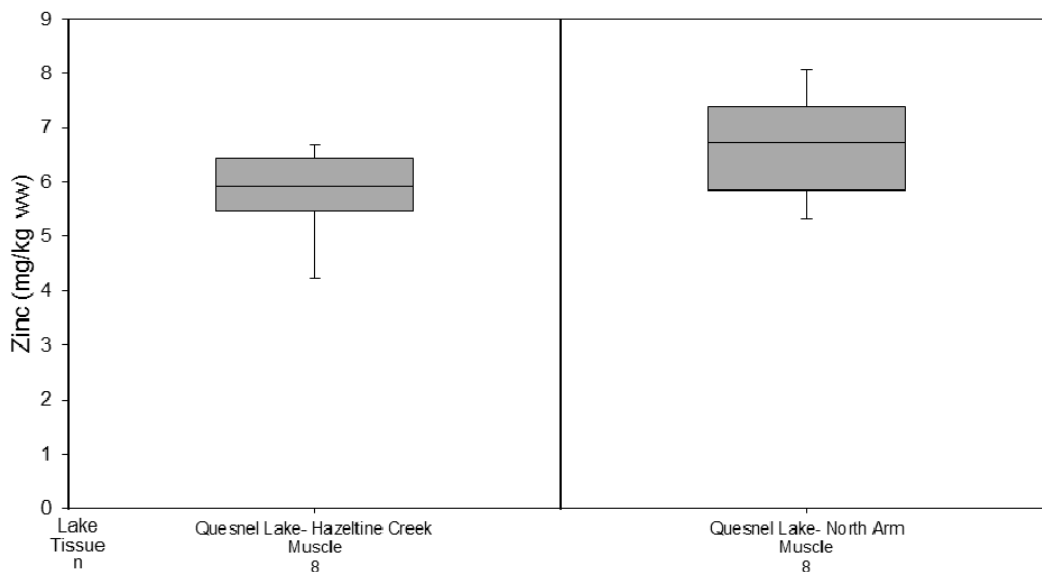


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

4.19 Zinc

Figure 152: Zinc Concentrations in Largescale Sucker Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

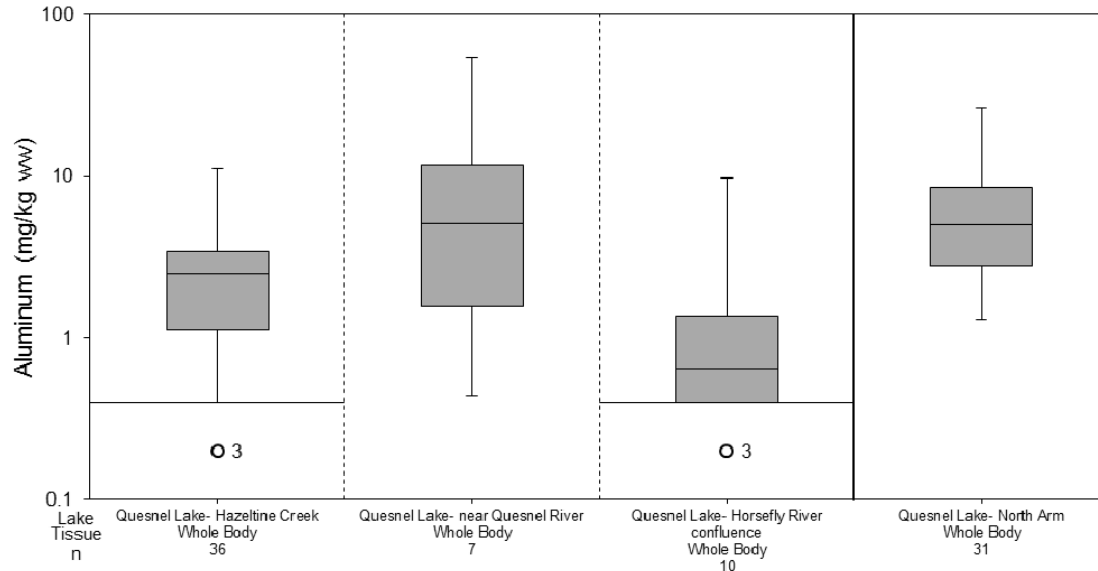
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



5.0 NORTHERN PIKEMINNOW

5.1 Aluminum

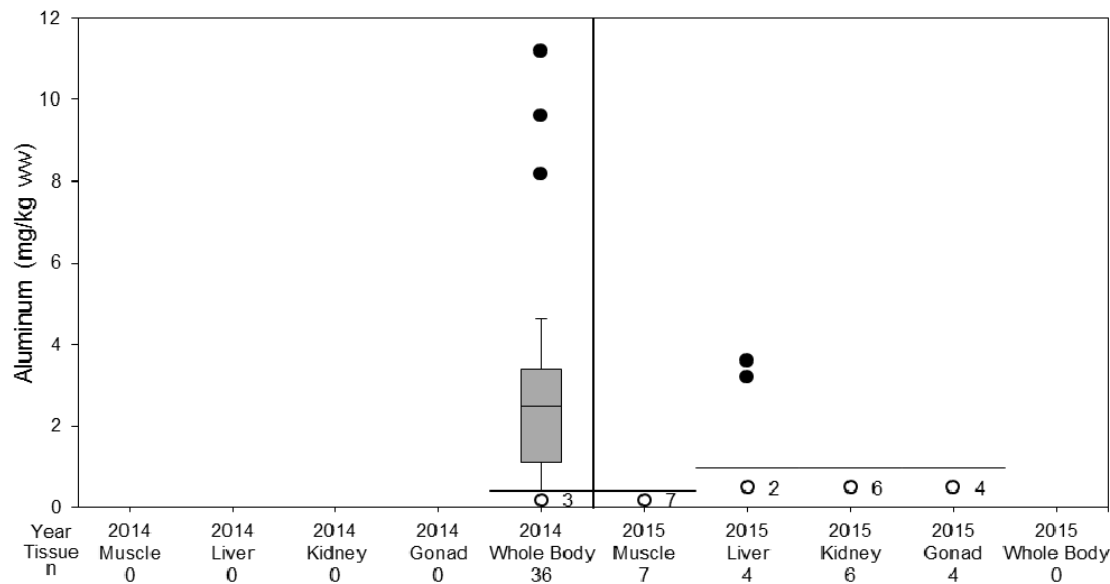
Figure 153: Aluminum Concentrations in Northern Pikeminnow Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 154: Aluminum Concentrations in Northern Pikeminnow Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015



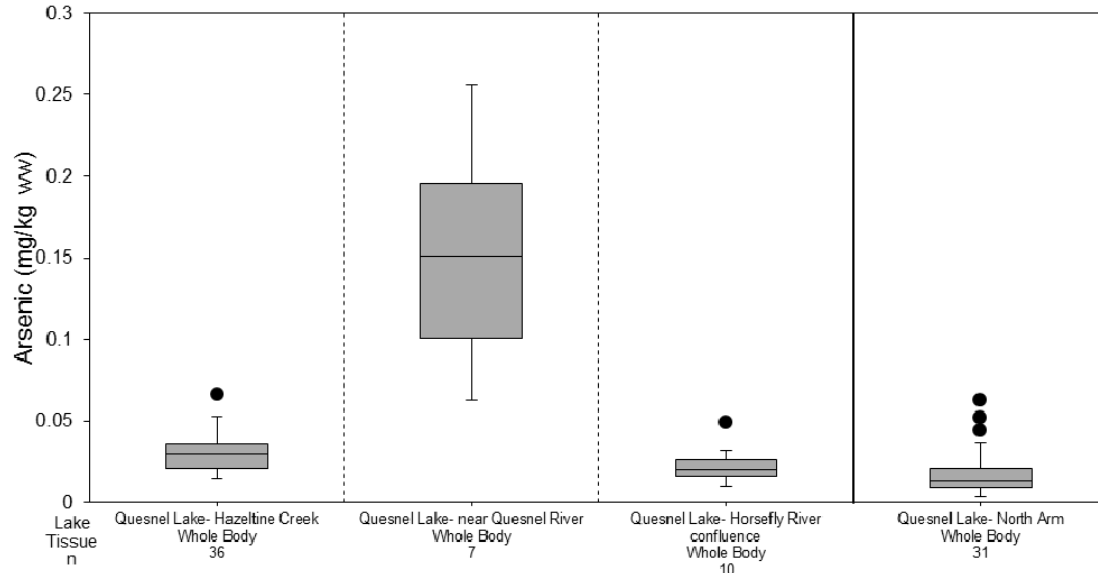
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



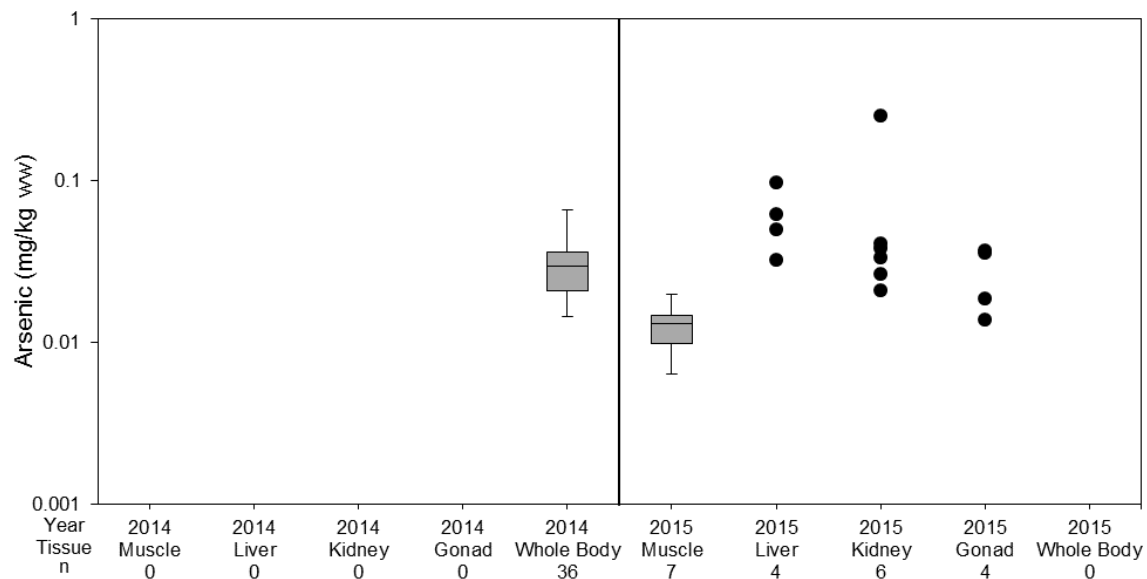
5.2 Arsenic

Figure 155: Arsenic Concentrations in Northern Pikeminnow Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
 mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 156: Arsenic Concentrations in Northern Pikeminnow Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

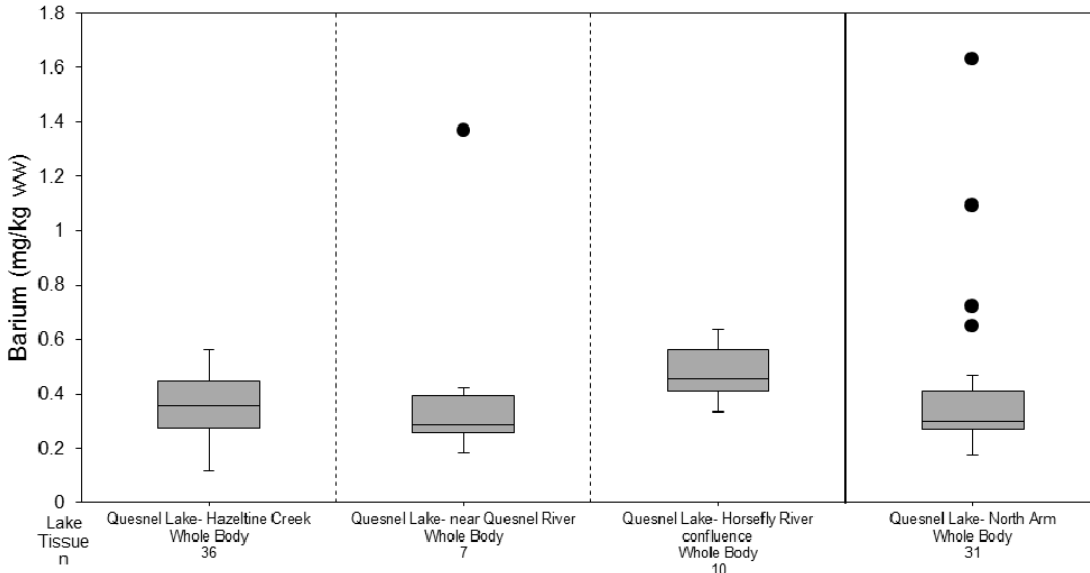


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
 mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



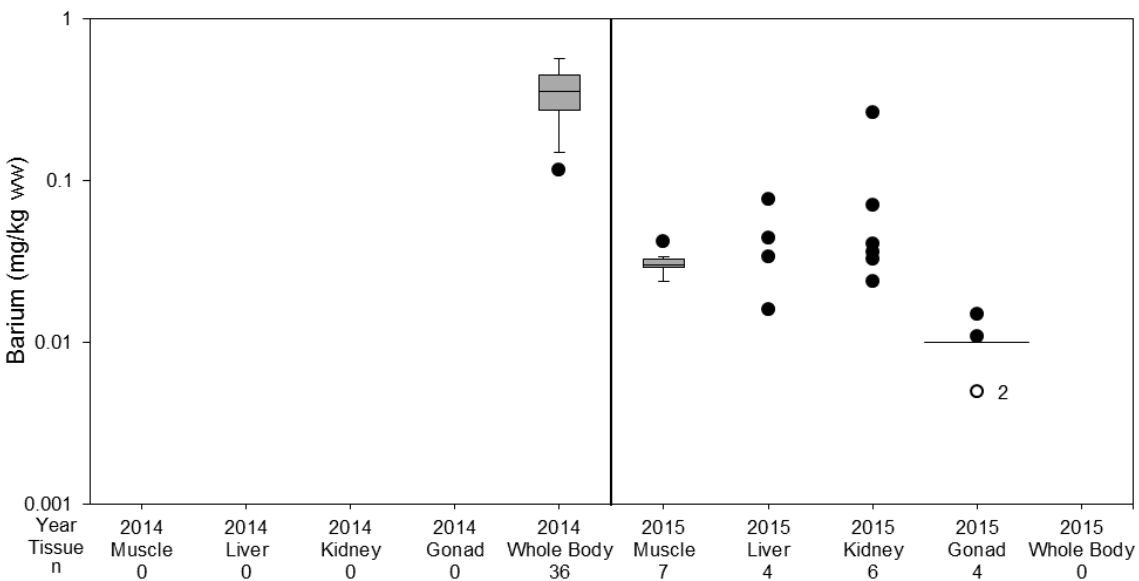
5.3 Barium

Figure 157: Barium Concentrations in Northern Pikeminnow Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
 mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 158: Barium Concentrations in Northern Pikeminnow Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

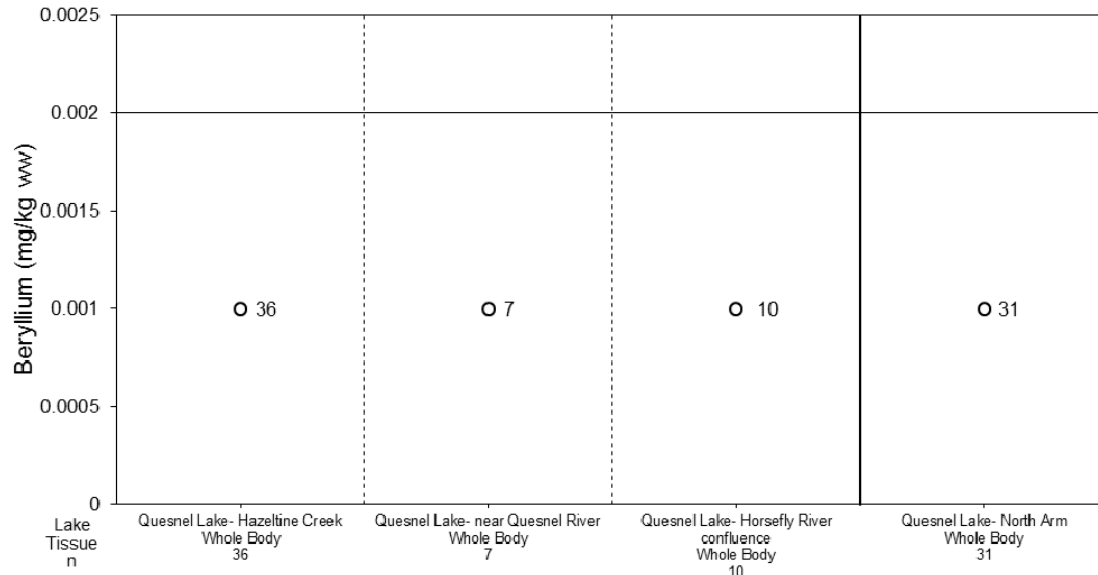


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
 mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



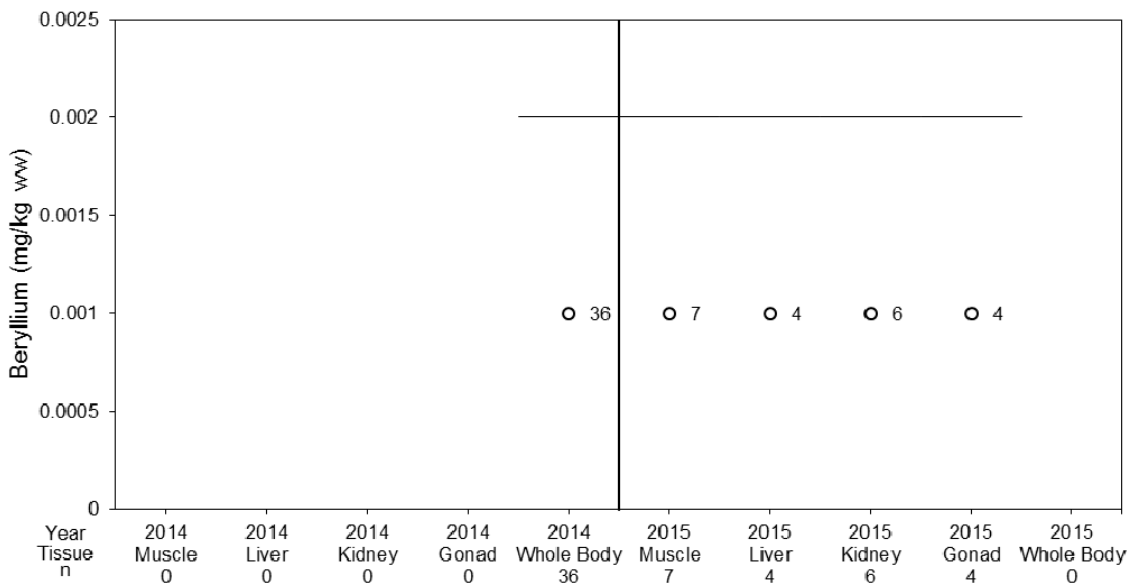
5.4 Beryllium

Figure 159: Beryllium Concentrations in Northern Pikeminnow Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
 mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 160: Beryllium Concentrations in Northern Pikeminnow Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

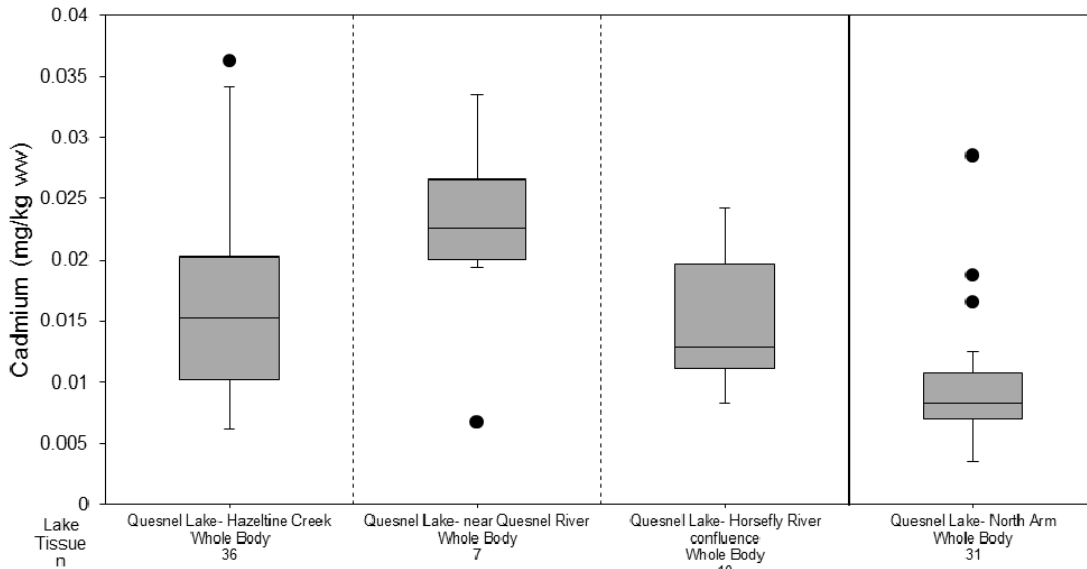


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
 mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



5.5 Cadmium

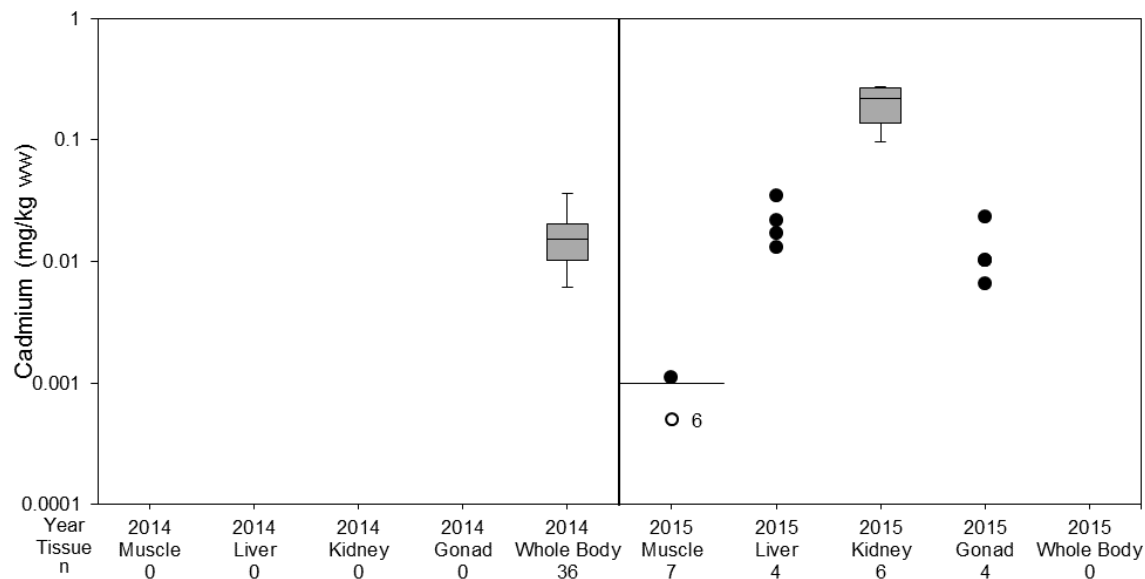
Figure 161: Cadmium Concentrations in Northern Pikeminnow Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 162: Cadmium Concentrations in Northern Pikeminnow Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015



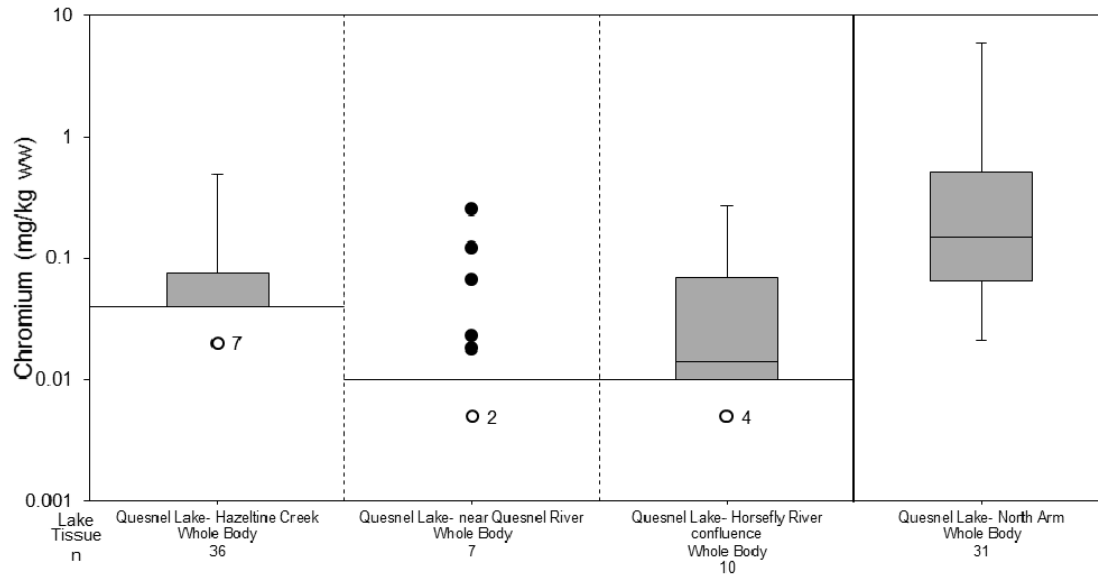
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



5.6 Chromium

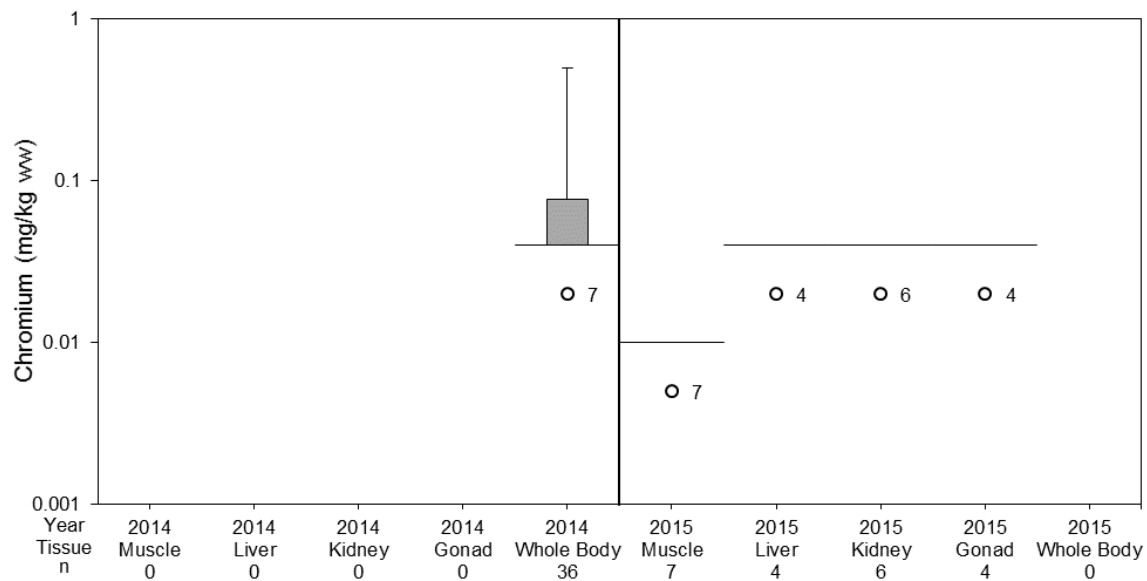
Figure 163: Chromium Concentrations in Northern Pikeminnow Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 164: Chromium Concentrations in Northern Pikeminnow Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015



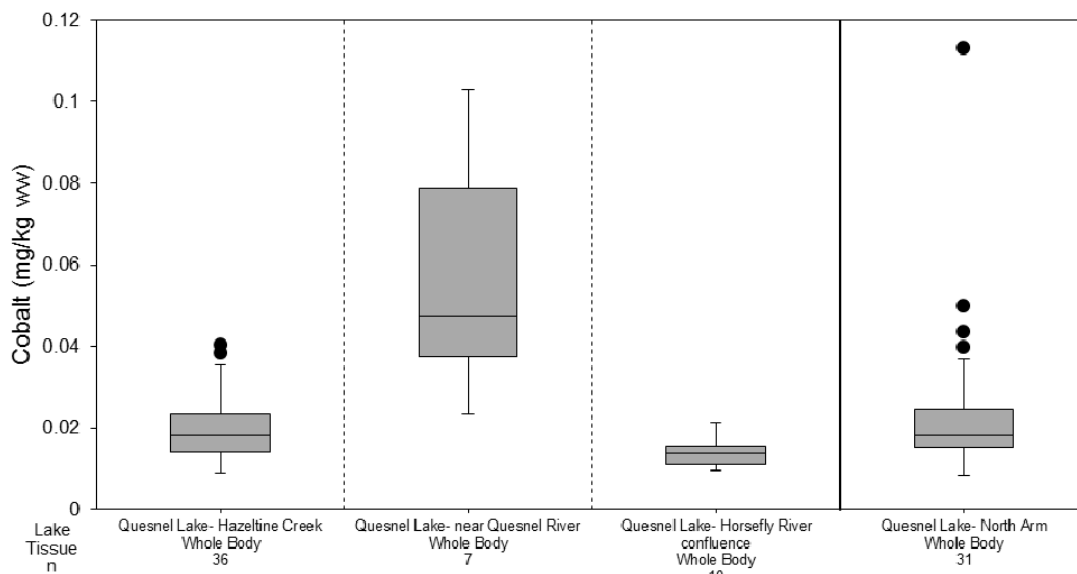
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



5.7 Cobalt

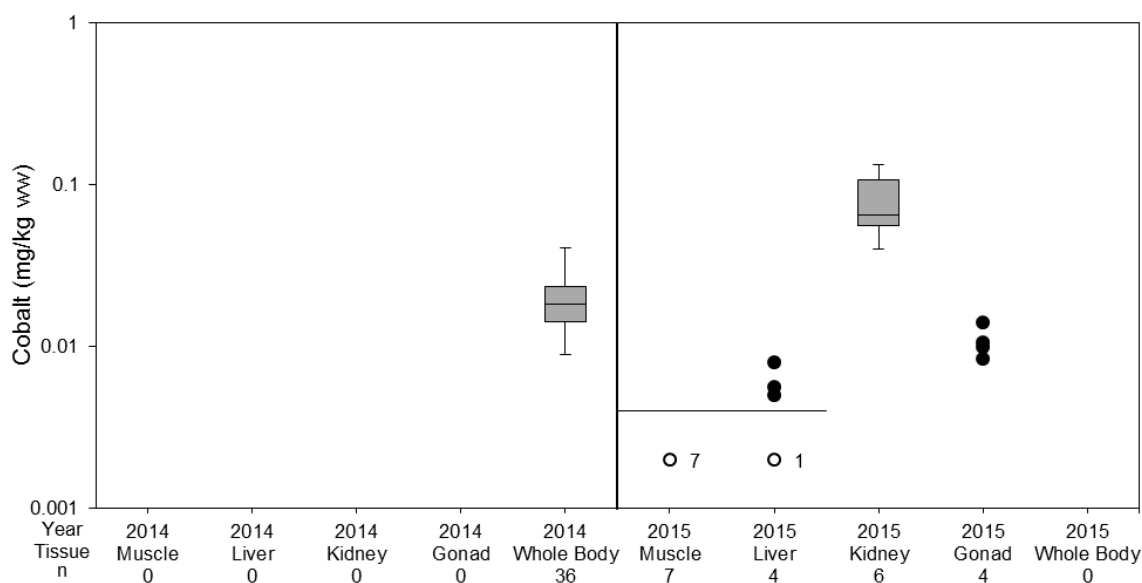
Figure 165: Cobalt Concentrations in Northern Pikeminnow Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 166: Cobalt Concentrations in Northern Pikeminnow Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015



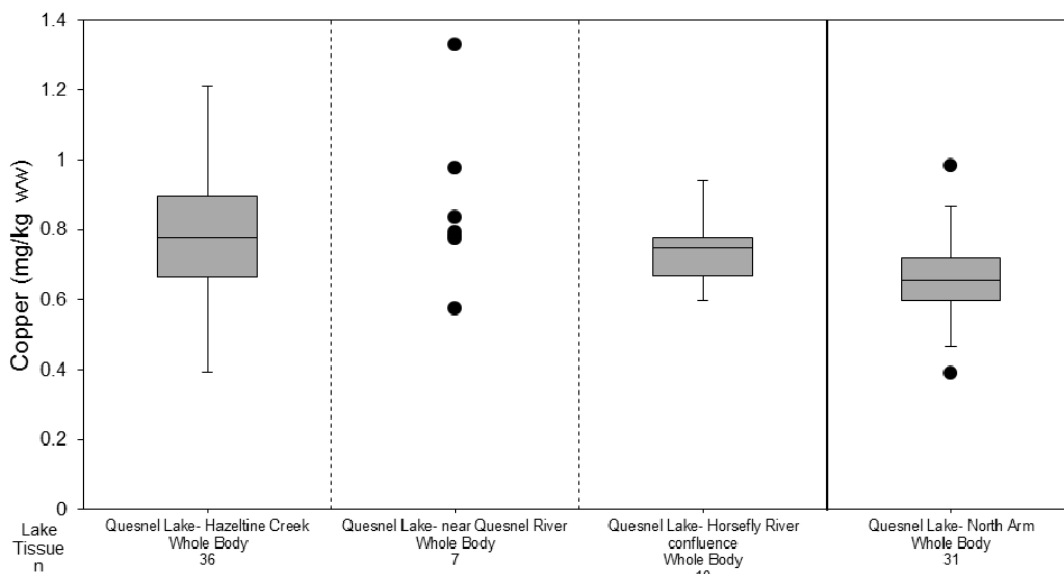
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



5.8 Copper

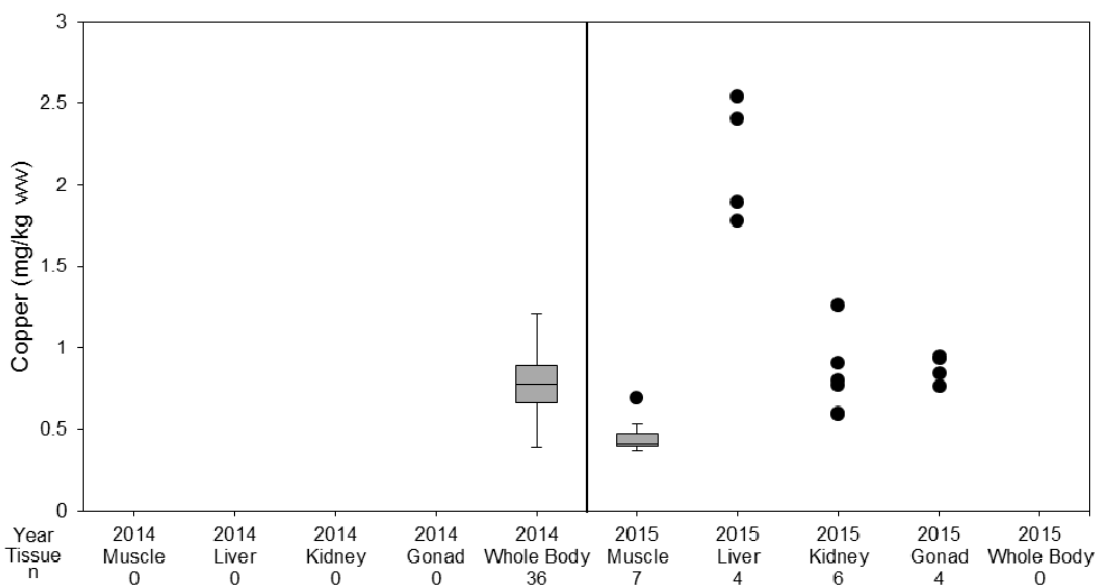
Figure 167: Copper Concentrations in Northern Pikeminnow Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 168: Copper Concentrations in Northern Pikeminnow Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015



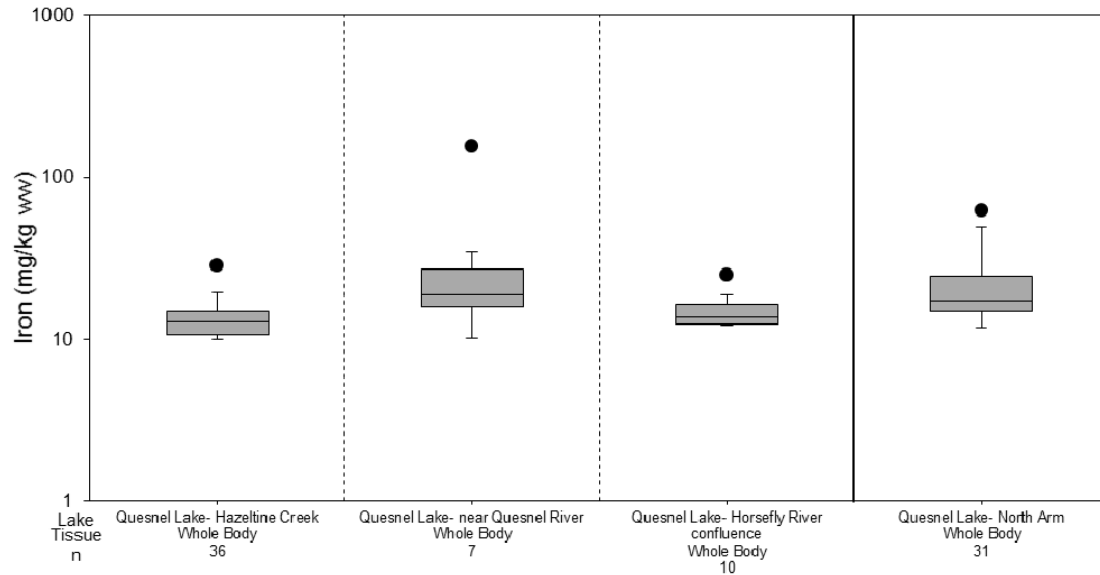
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



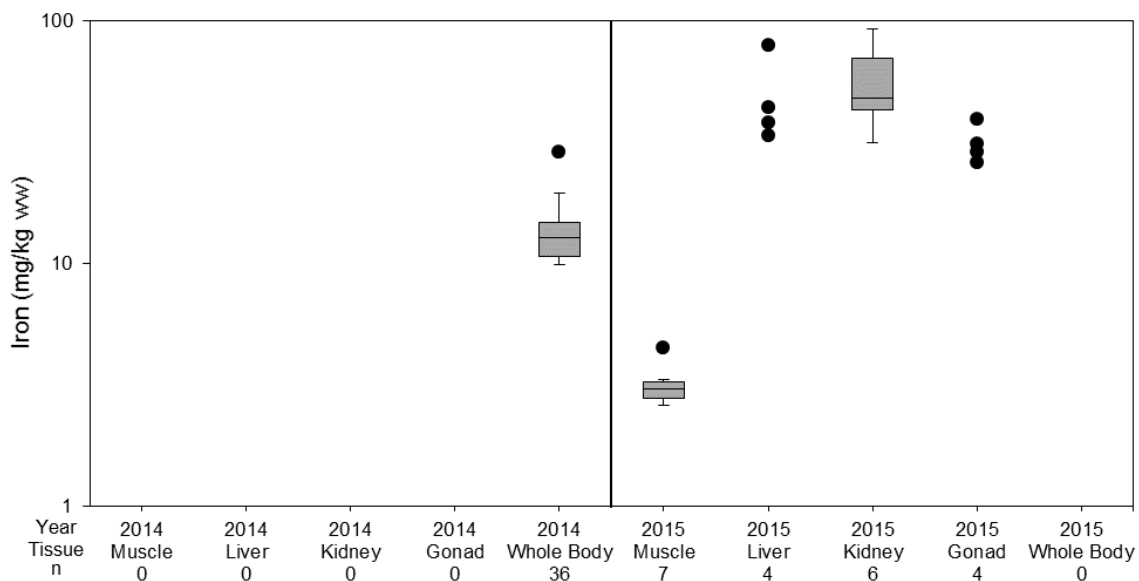
5.9 Iron

Figure 169: Iron Concentrations in Northern Pikeminnow Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 170: Iron Concentrations in Northern Pikeminnow Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

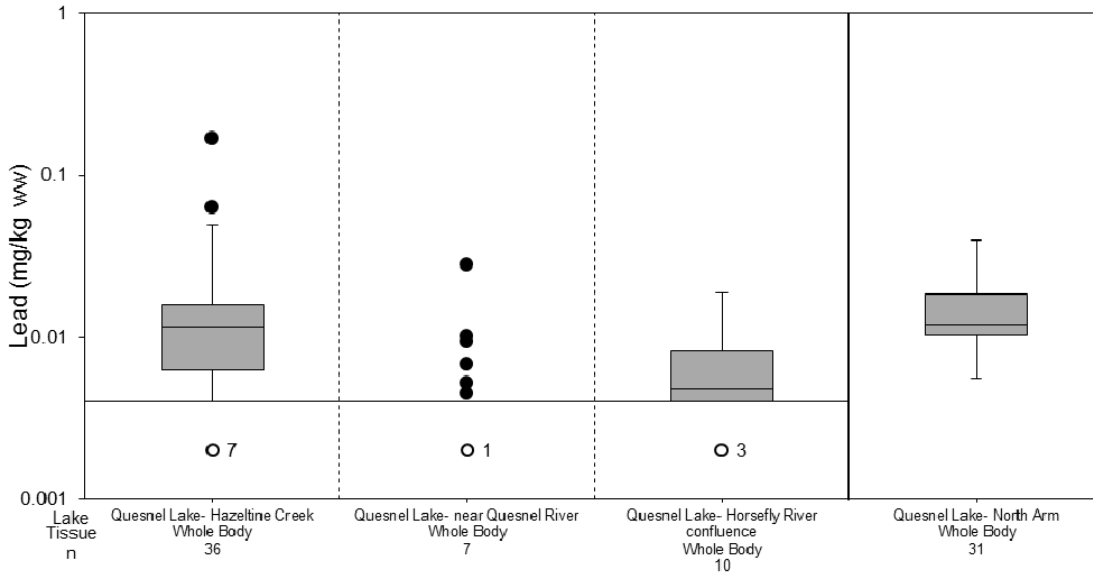


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



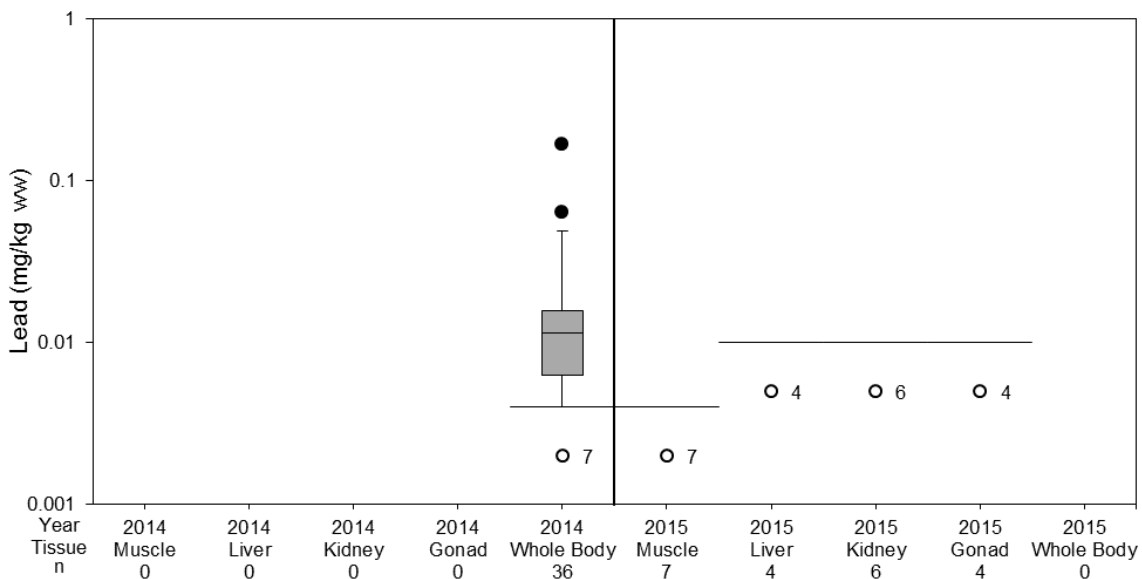
5.10 Lead

Figure 171: Lead Concentrations in Northern Pikeminnow Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
 mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 172: Lead Concentrations in Northern Pikeminnow Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
 mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



5.11 Lithium

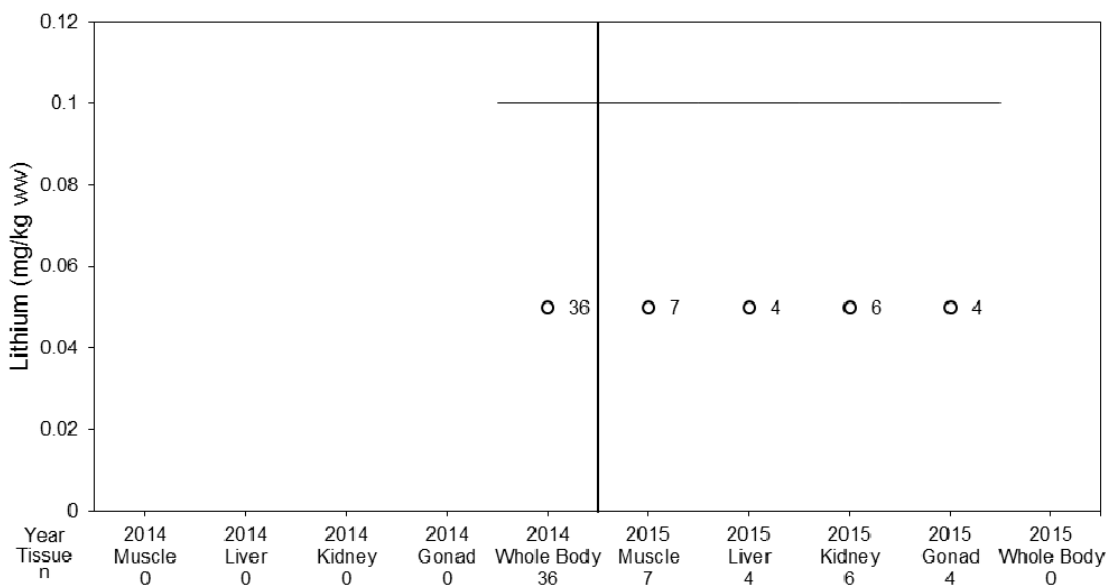
Figure 173: Lithium Concentrations in Northern Pikeminnow Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 174: Lithium Concentrations in Northern Pikeminnow Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015



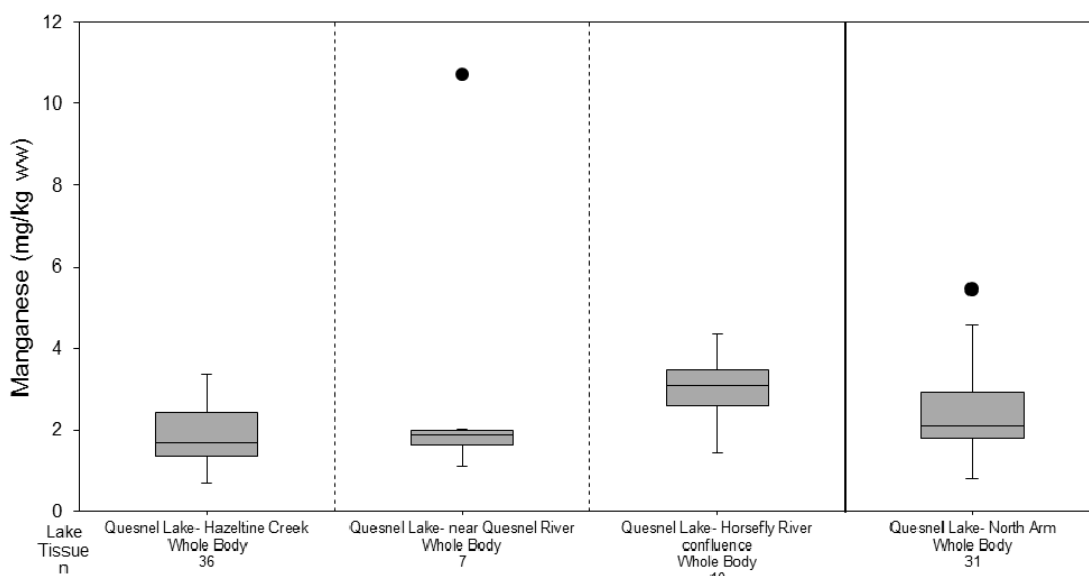
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



5.12 Manganese

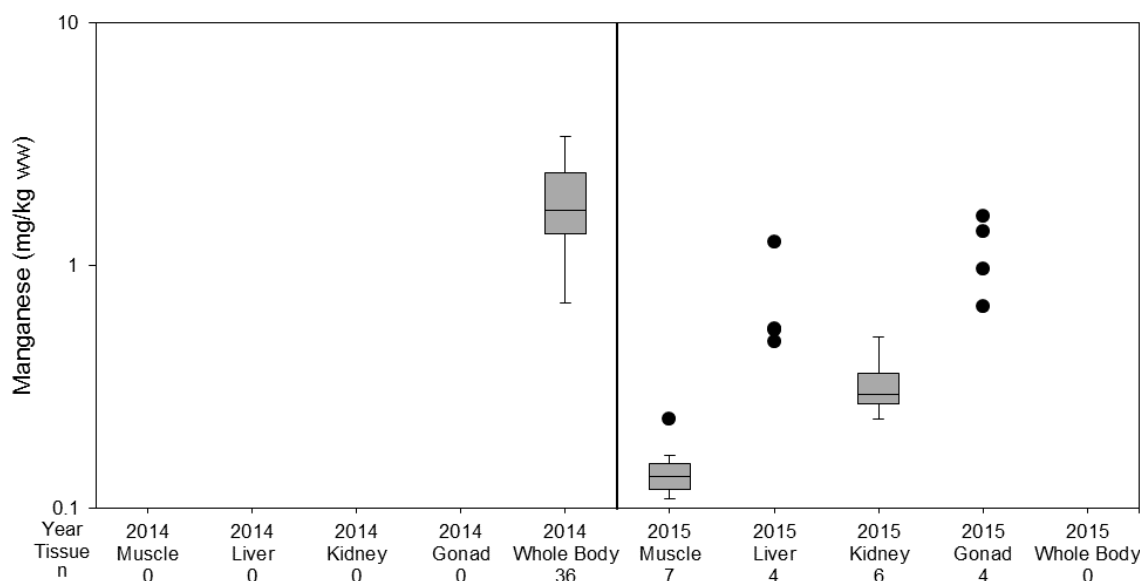
Figure 175: Manganese Concentrations in Northern Pike minnow Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 176: Manganese Concentrations in Northern Pike minnow Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015



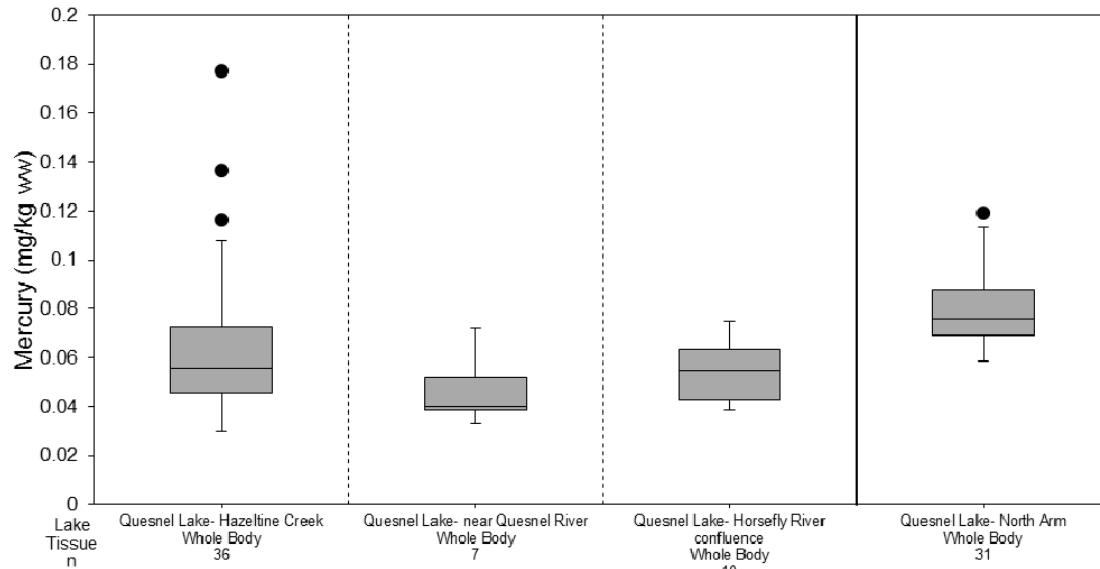
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



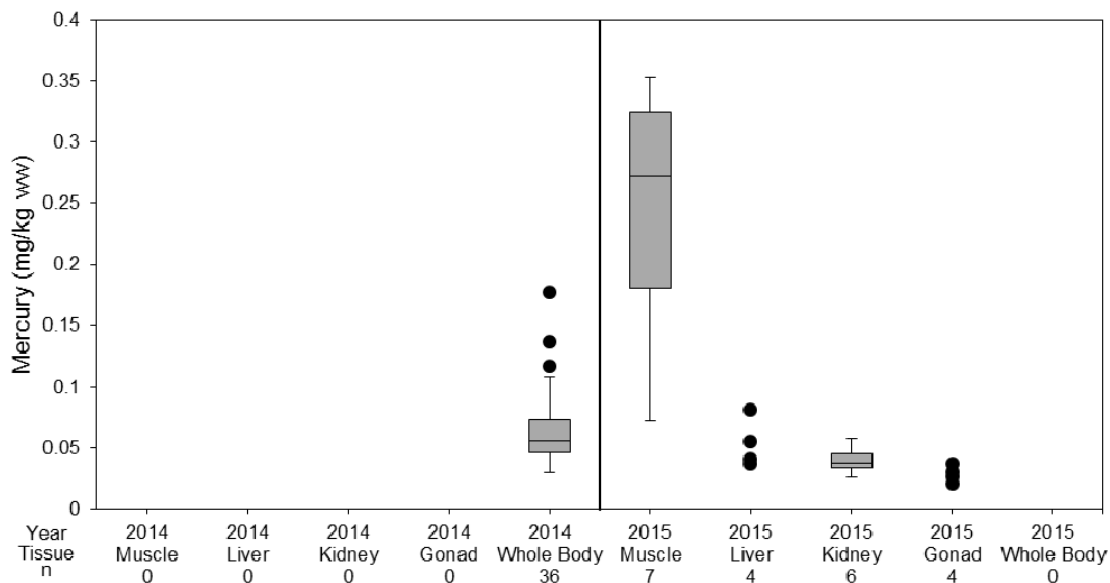
5.13 Mercury

Figure 177: Mercury Concentrations in Northern Pikeminnow Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 178: Mercury Concentrations in Northern Pikeminnow Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

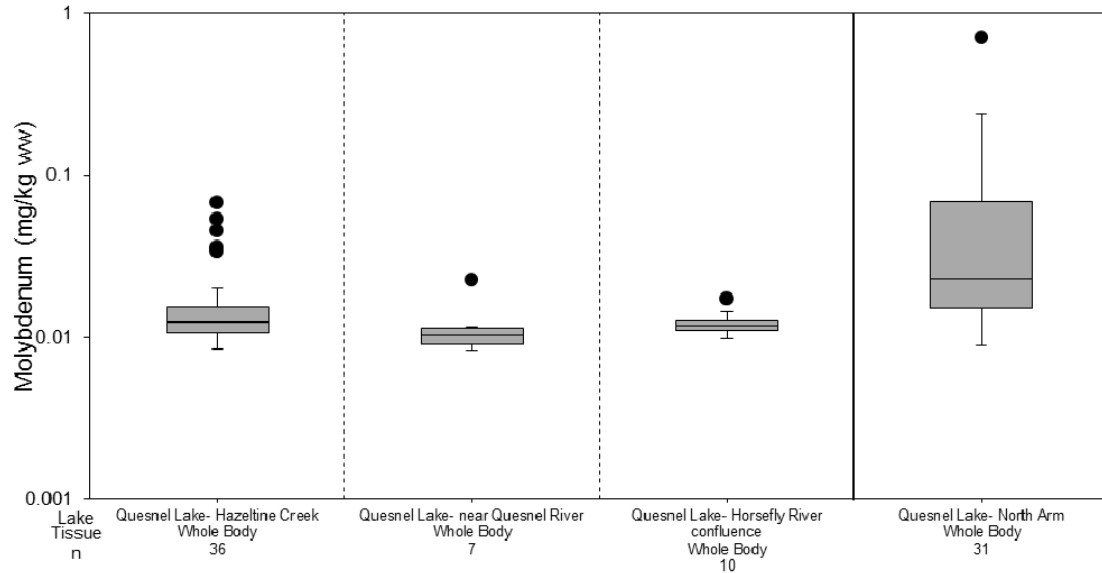


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



5.14 Molybdenum

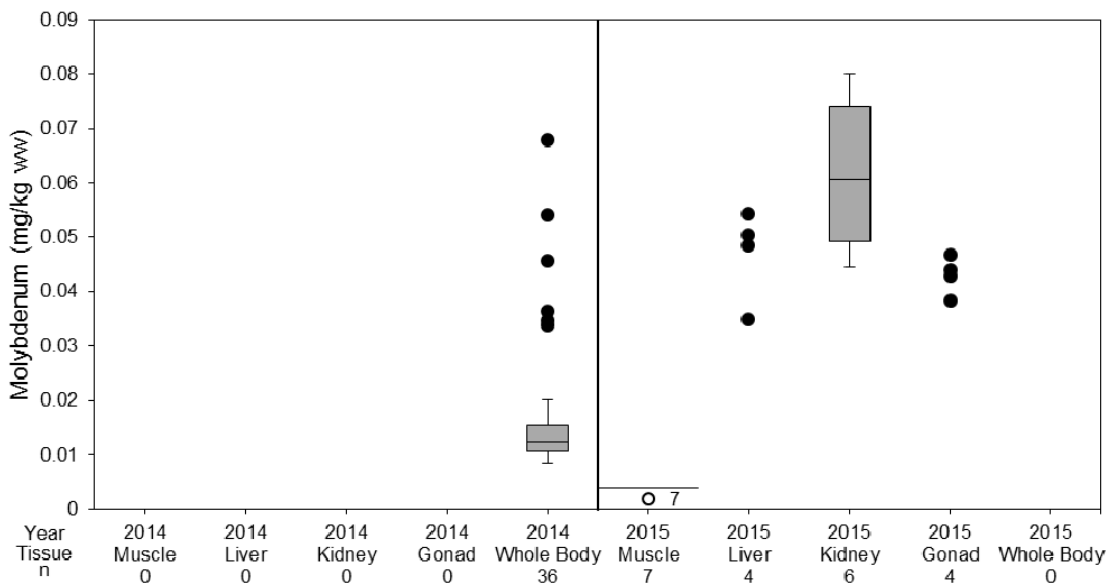
Figure 179: Molybdenum Concentrations in Northern Pikeminnow Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 180: Molybdenum Concentrations in Northern Pikeminnow Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015



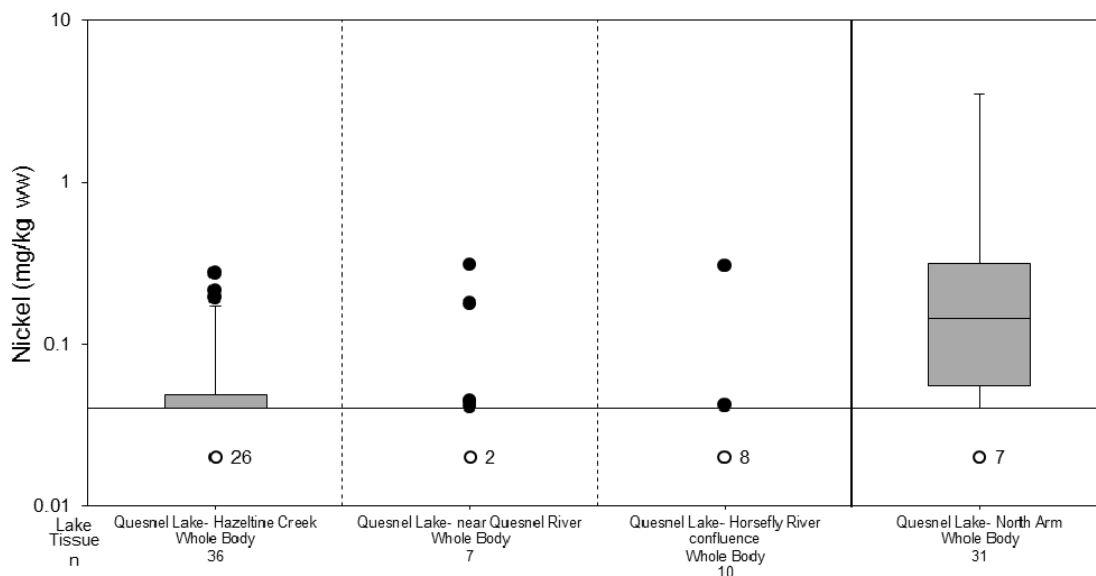
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



5.15 Nickel

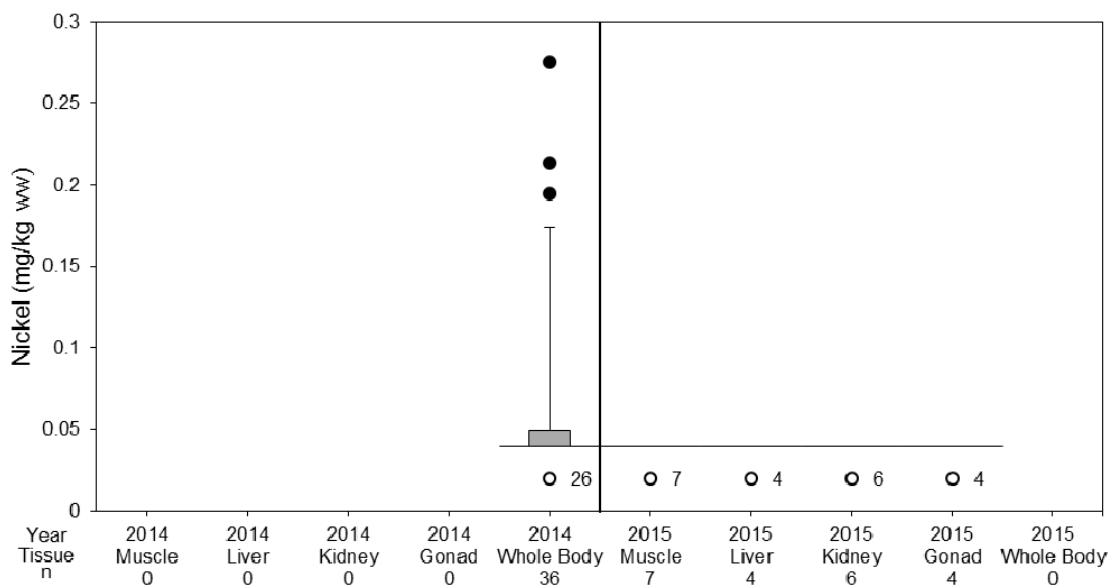
Figure 181: Nickel Concentrations in Northern Pikeminnow Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 182: Nickel Concentrations in Northern Pikeminnow Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015



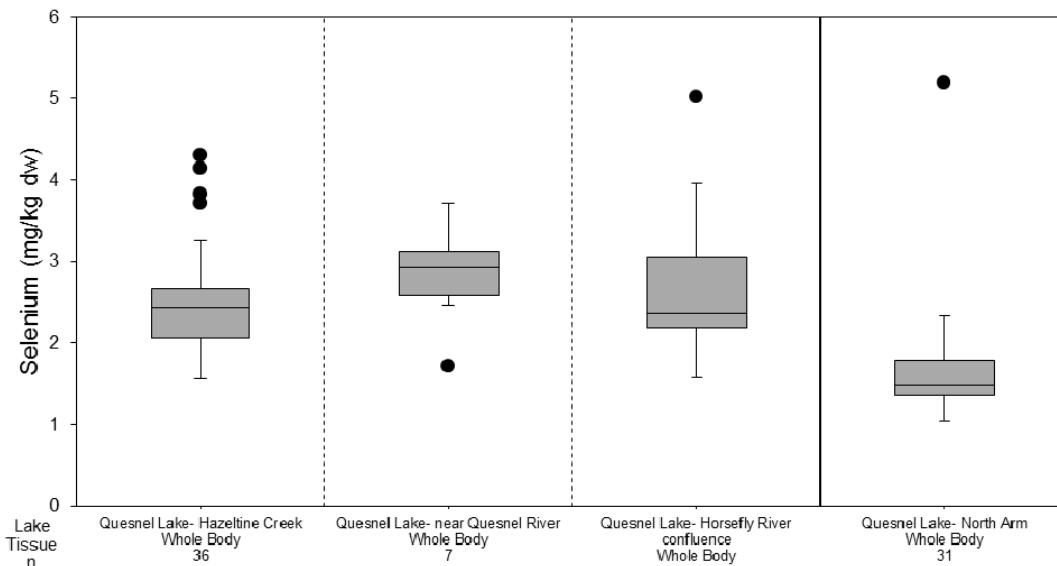
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



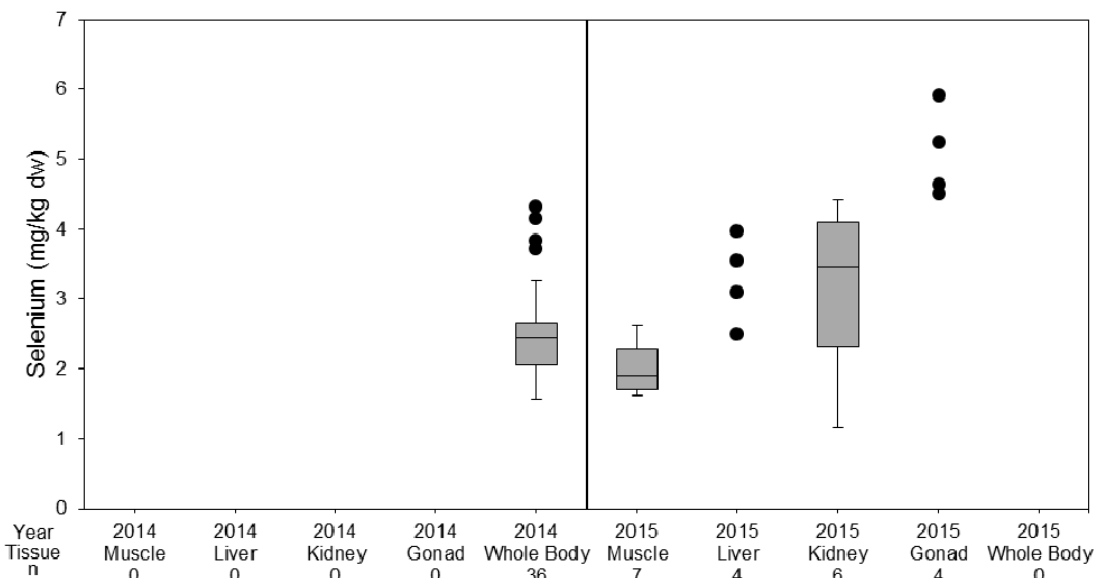
5.16 Selenium

Figure 183: Selenium Concentrations in Northern Pikeminnow Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
 mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 184: Selenium Concentrations in Northern Pikeminnow Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

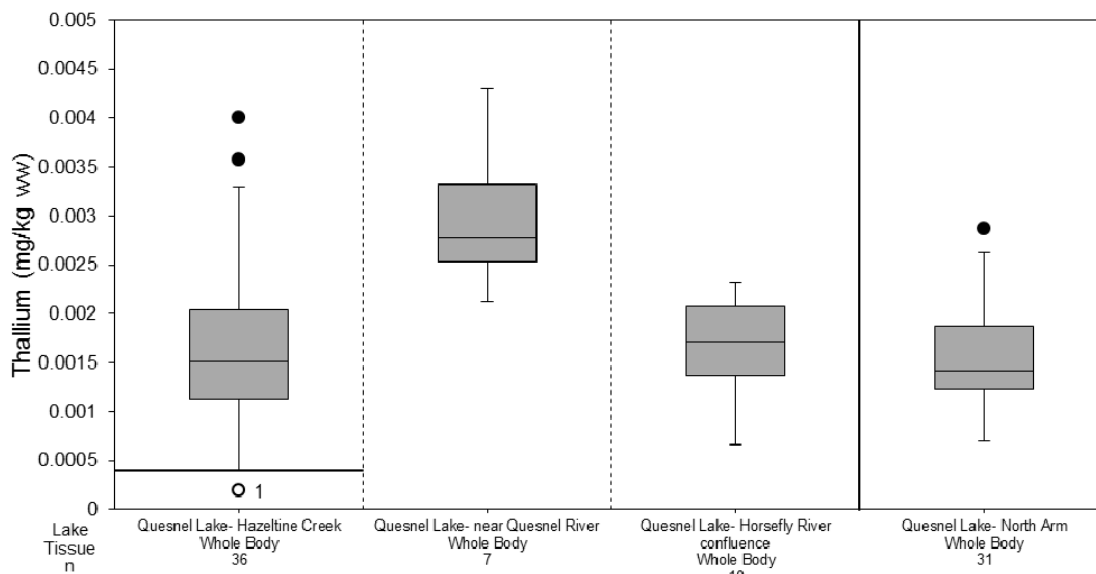


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
 mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



5.17 Thallium

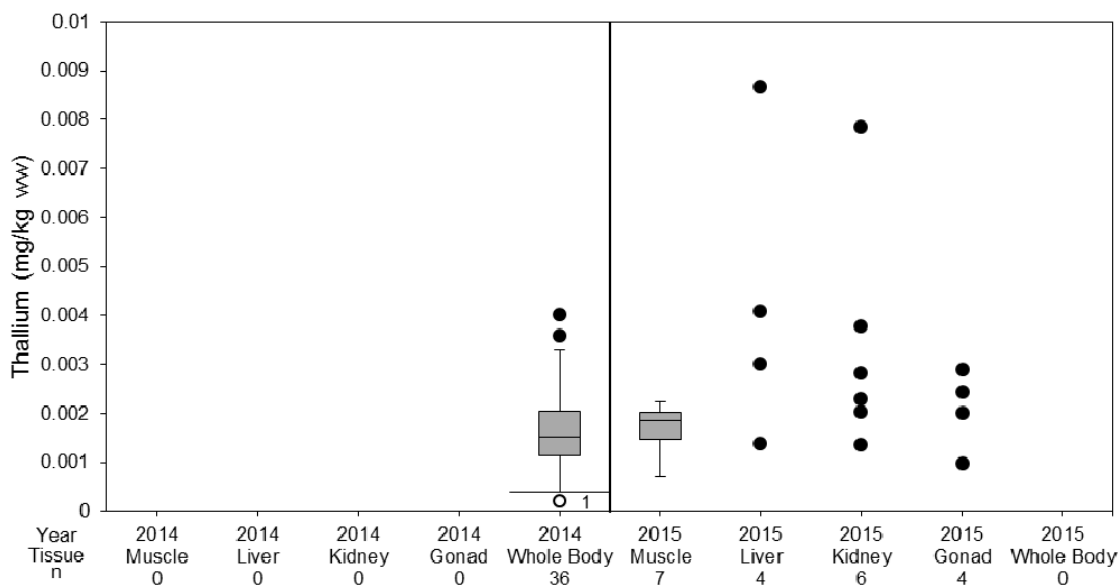
Figure 185: Thallium Concentrations in Northern Pikeminnow Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 186: Thallium Concentrations in Northern Pikeminnow Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015



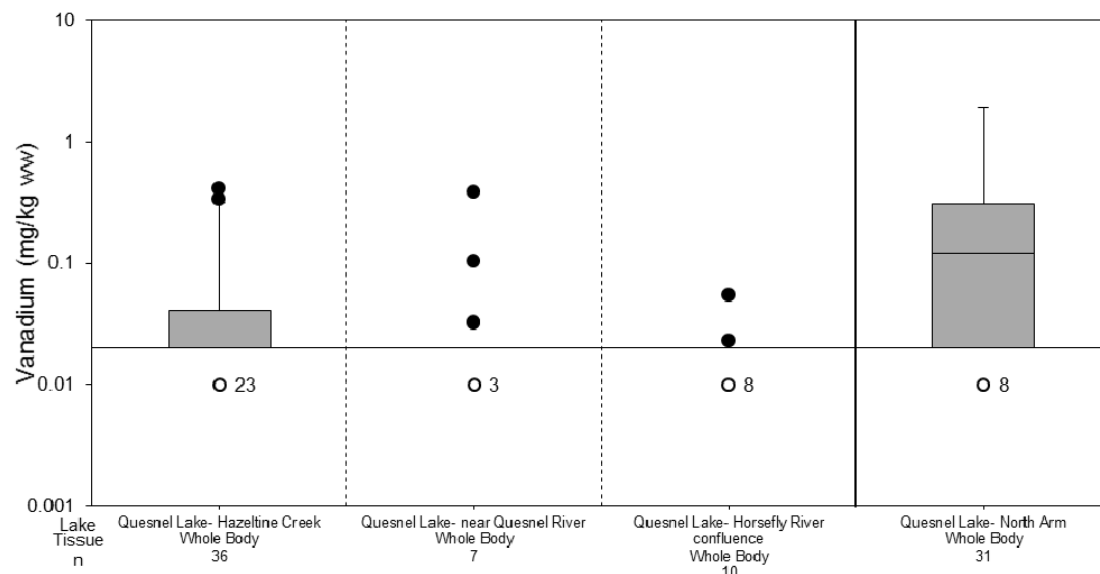
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



5.18 Vanadium

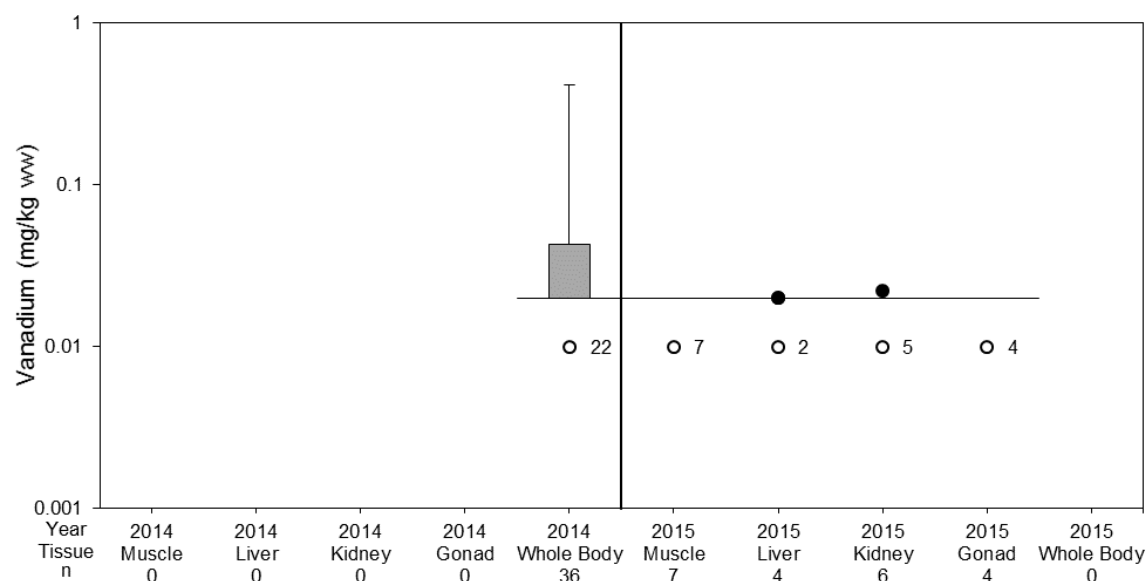
Figure 187: Vanadium Concentrations in Northern Pikeminnow Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 188: Vanadium Concentrations in Northern Pikeminnow Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015



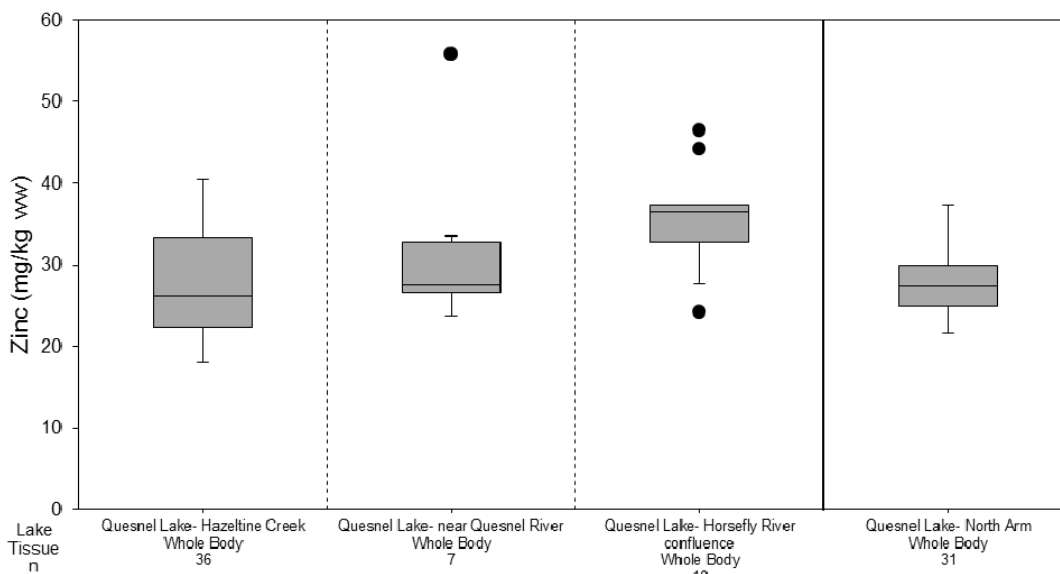
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



5.19 Zinc

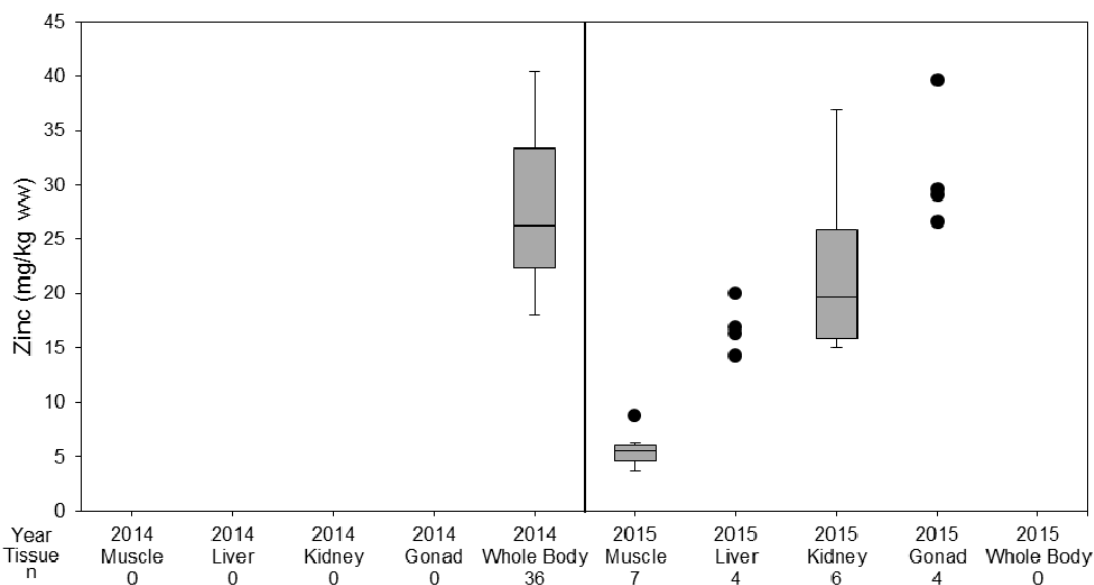
Figure 189: Zinc Concentrations in Northern Pike minnow Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 190: Zinc Concentrations in Northern Pike minnow Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

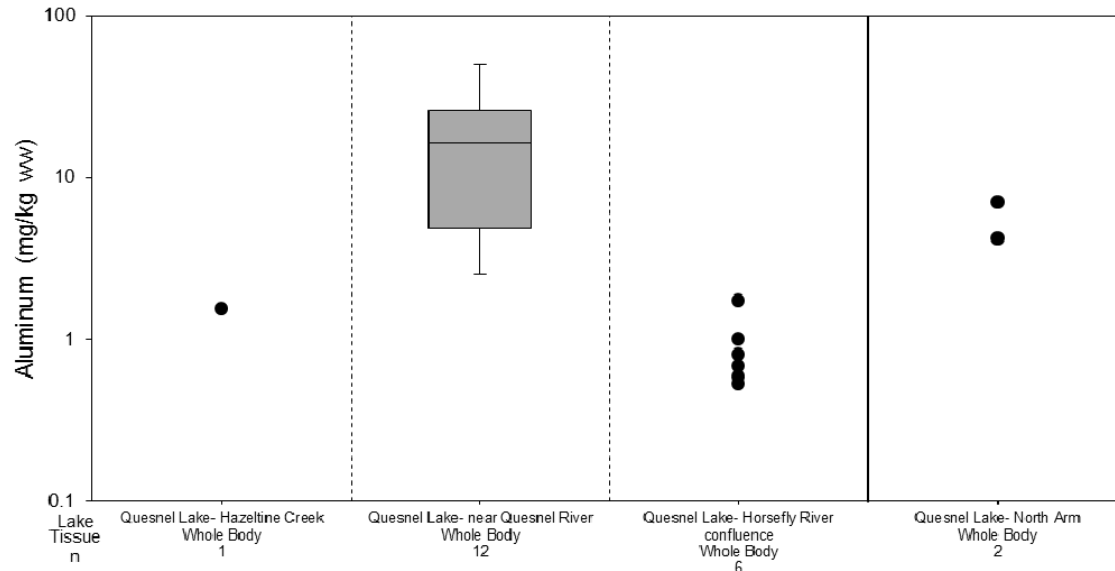
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



6.0 PEAMOUTH CHUB

6.1 Aluminum

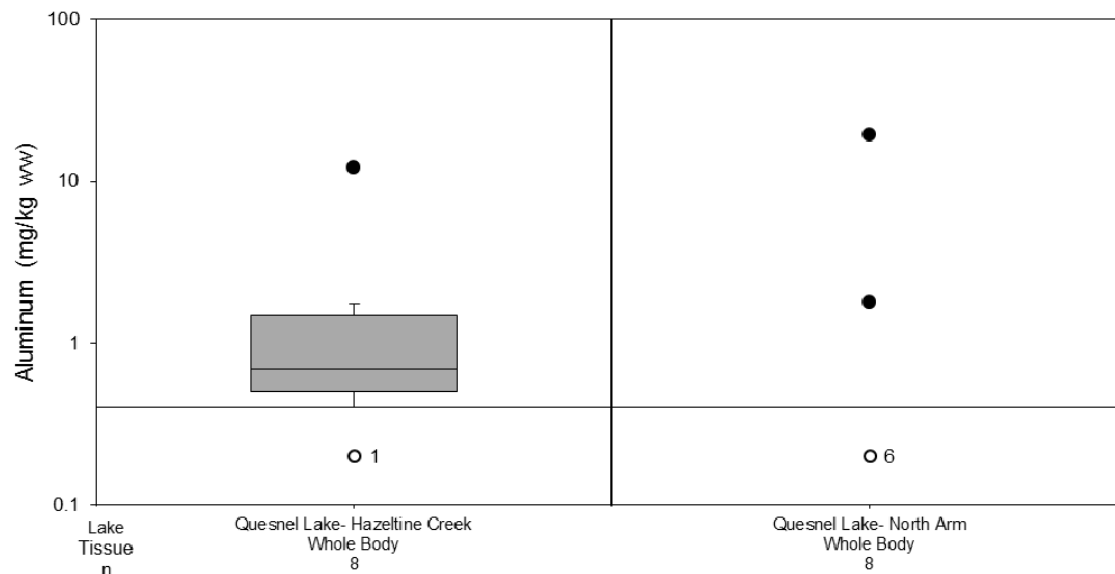
Figure 191: Aluminum Concentrations in Peamouth Chub Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 192: Aluminum Concentrations in Peamouth Chub Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 193: Aluminum Concentrations in Peamouth Chub Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

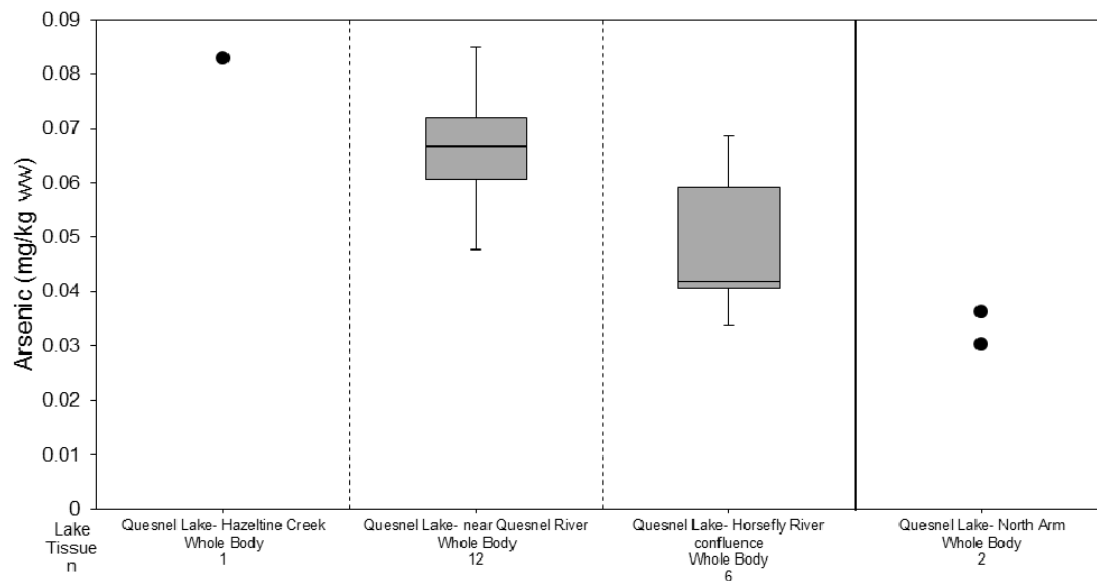


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

6.2 Arsenic

Figure 194: Arsenic Concentrations in Peamouth Chub Tissues Collected in 2014



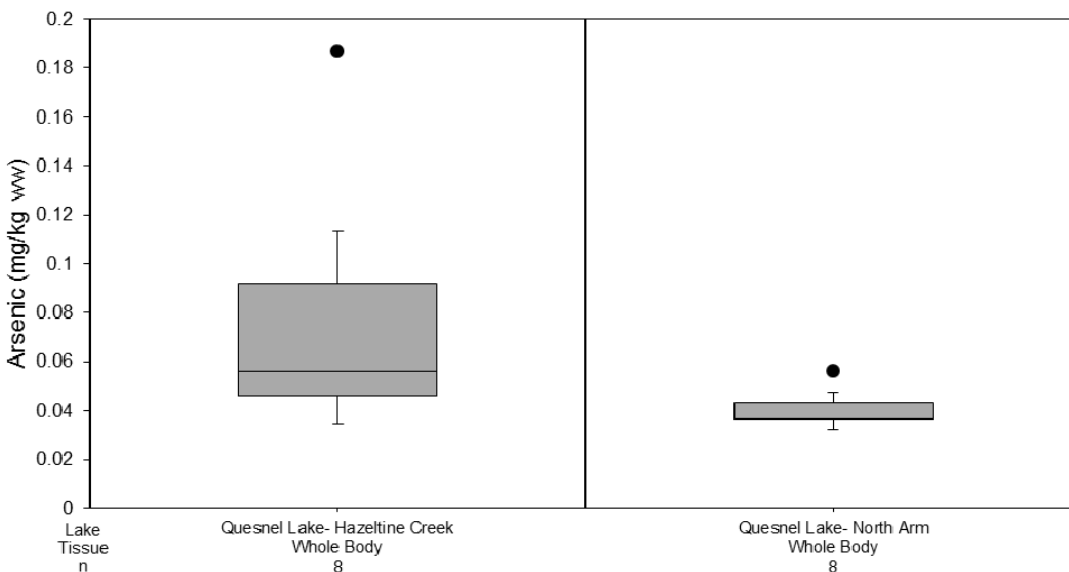
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

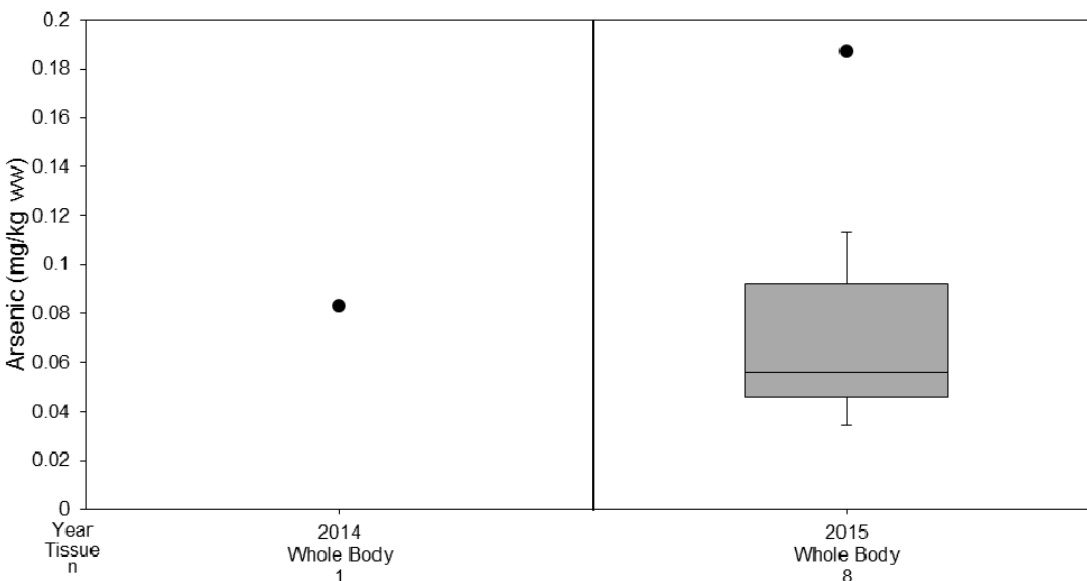
Figure 195: Arsenic Concentrations in Peamouth Chub Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 196: Arsenic Concentrations in Peamouth Chub Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015



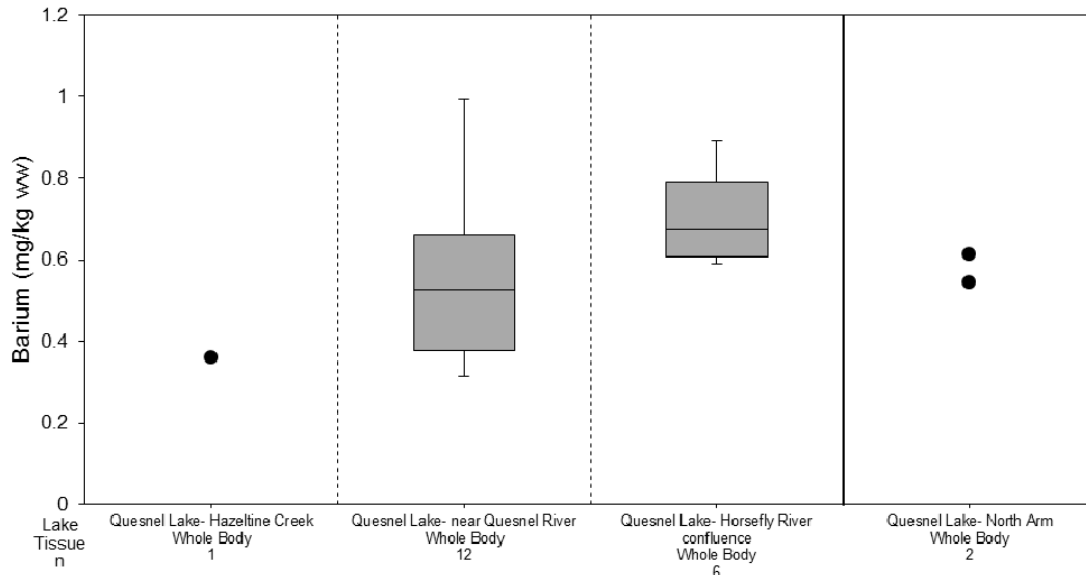
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



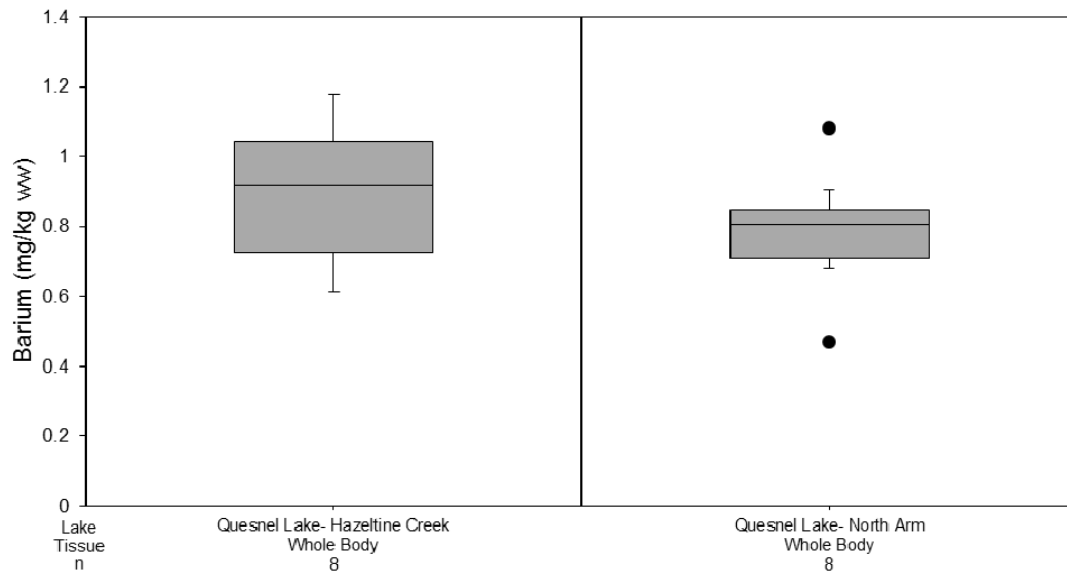
6.3 Barium

Figure 197: Barium Concentrations in Peamouth Chub Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 198: Barium Concentrations in Peamouth Chub Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 199: Barium Concentrations in Peamouth Chub Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

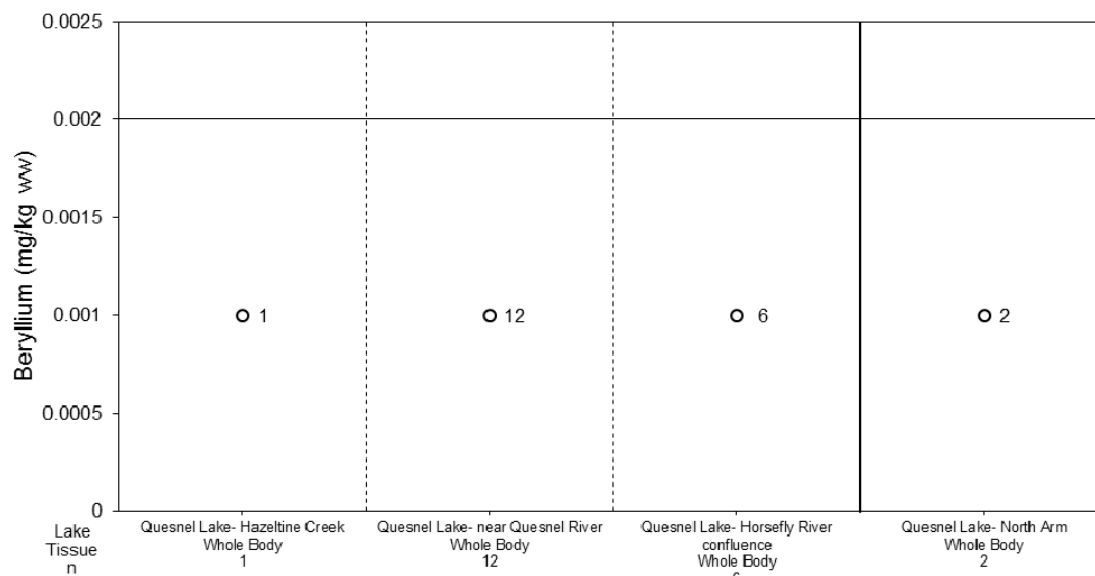


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

6.4 Beryllium

Figure 200: Beryllium Concentrations in Peamouth Chub Tissues Collected in 2014



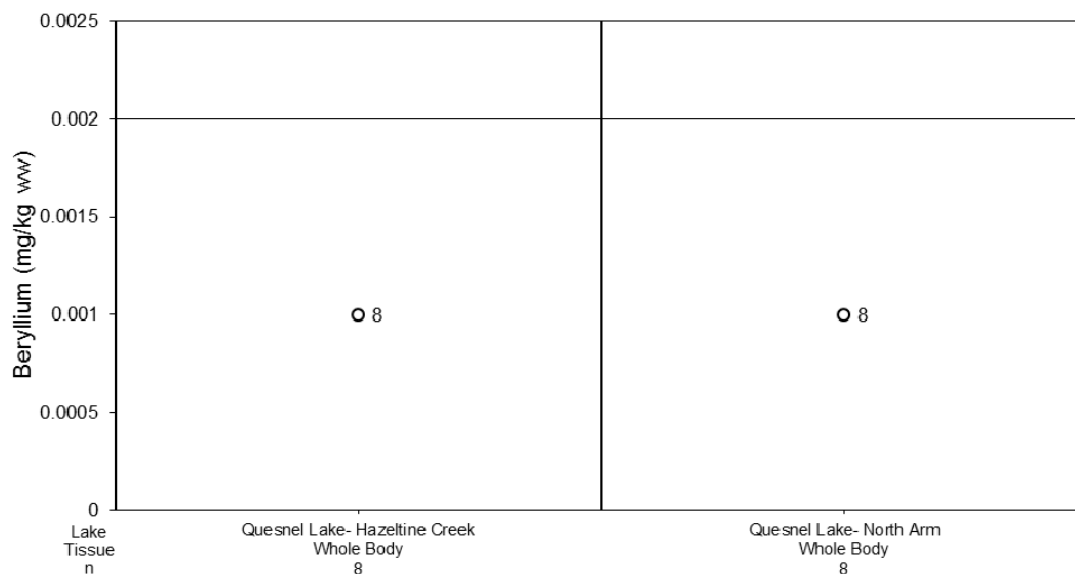
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



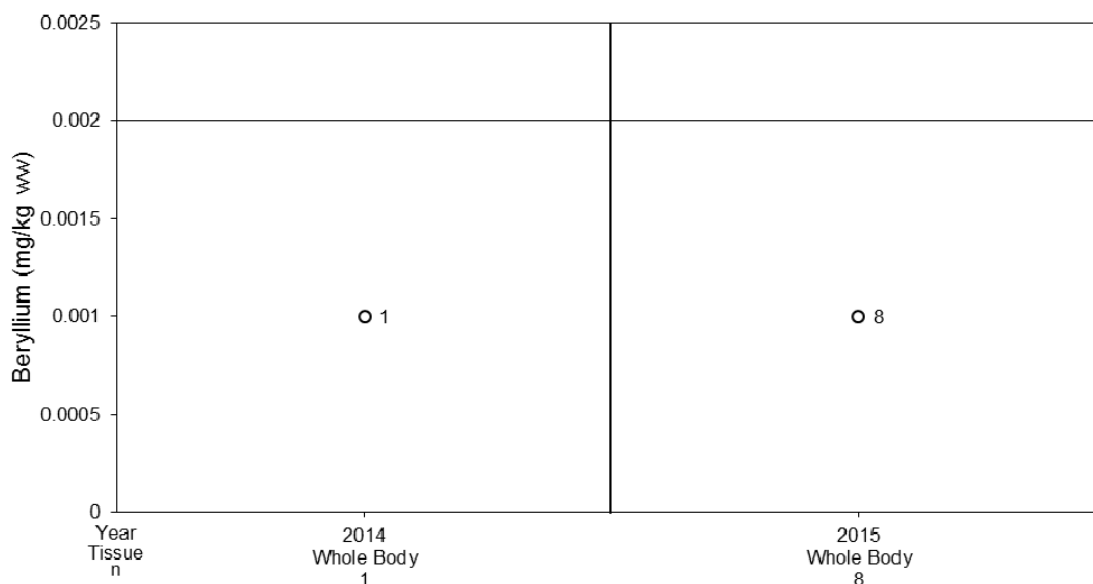
ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 201: Beryllium Concentrations in Peamouth Chub Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 202: Beryllium Concentrations in Peamouth Chub Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

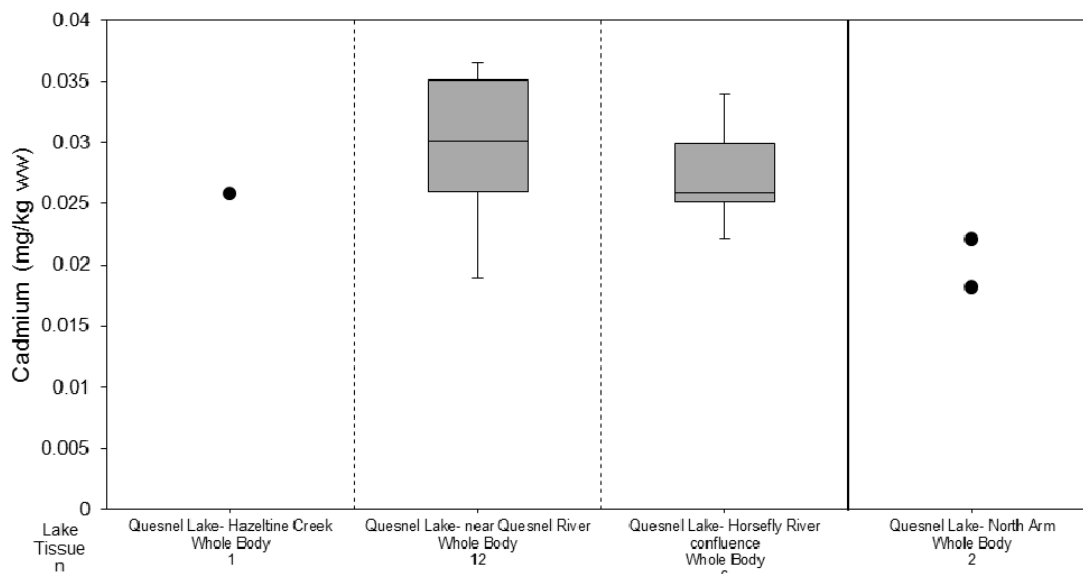


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



6.5 Cadmium

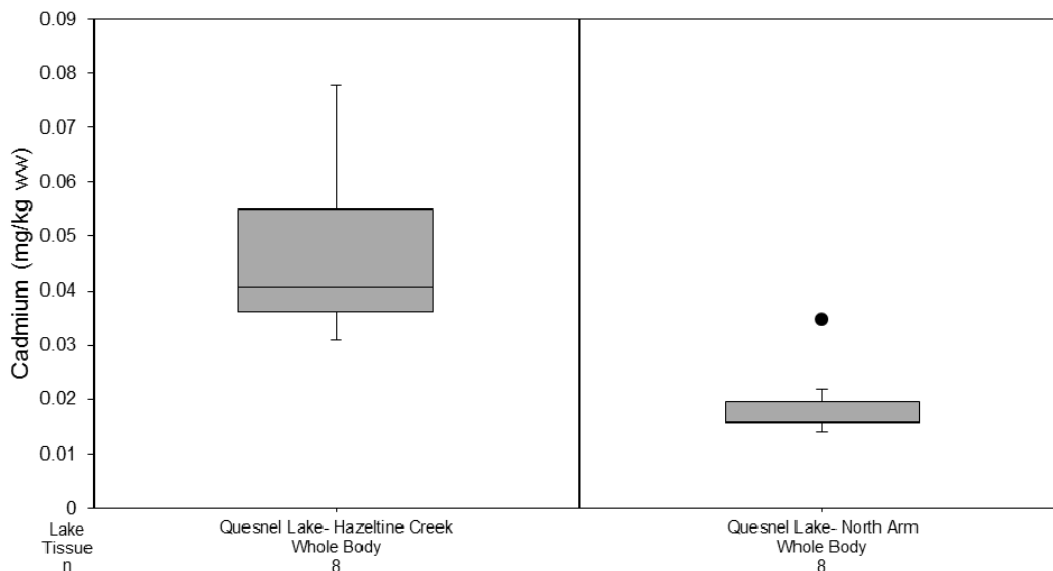
Figure 203: Cadmium Concentrations in Peamouth Chub Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 204: Cadmium Concentrations in Peamouth Chub Tissues Collected in 2015



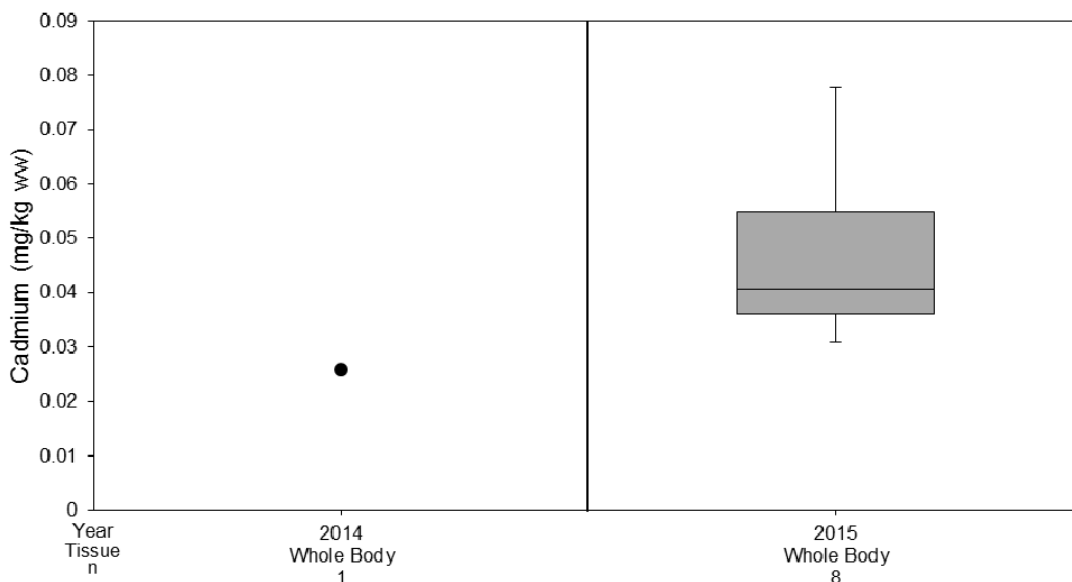
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



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Figure 205: Cadmium Concentrations in Peamouth Chub Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

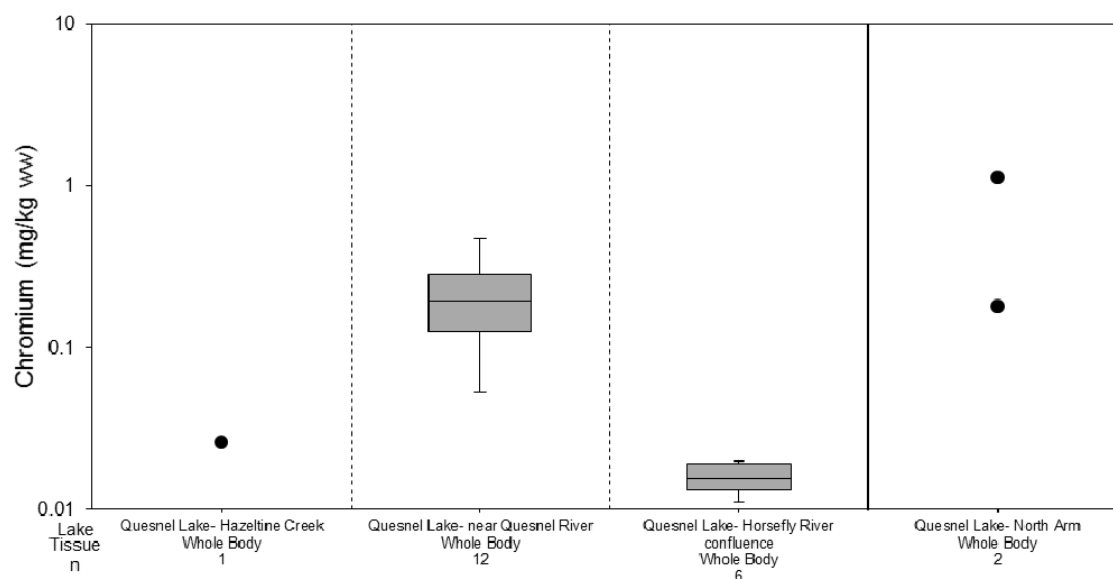


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

6.6 Chromium

Figure 206: Chromium Concentrations in Peamouth Chub Tissues Collected in 2014



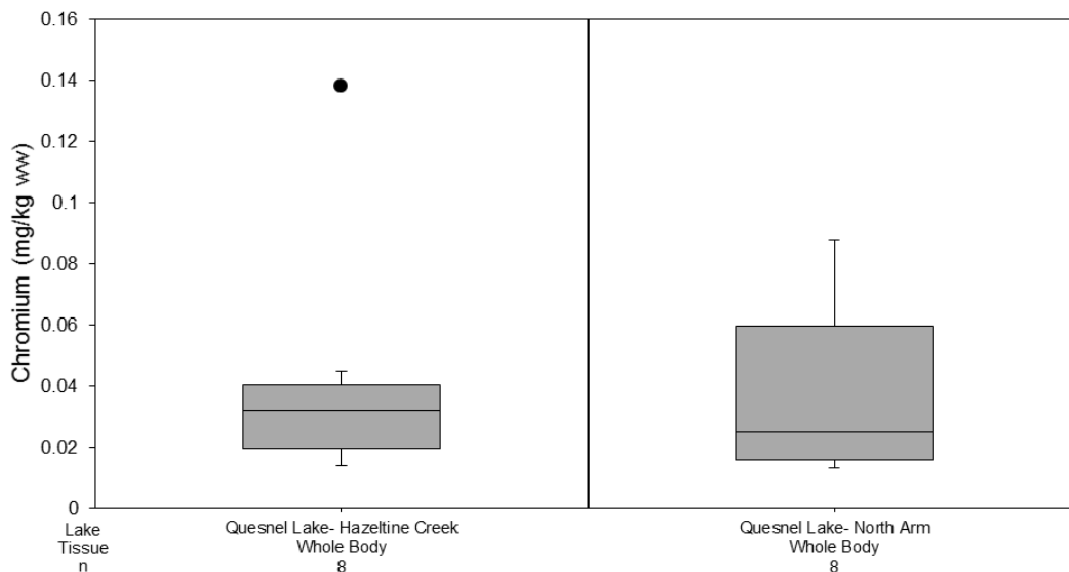
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



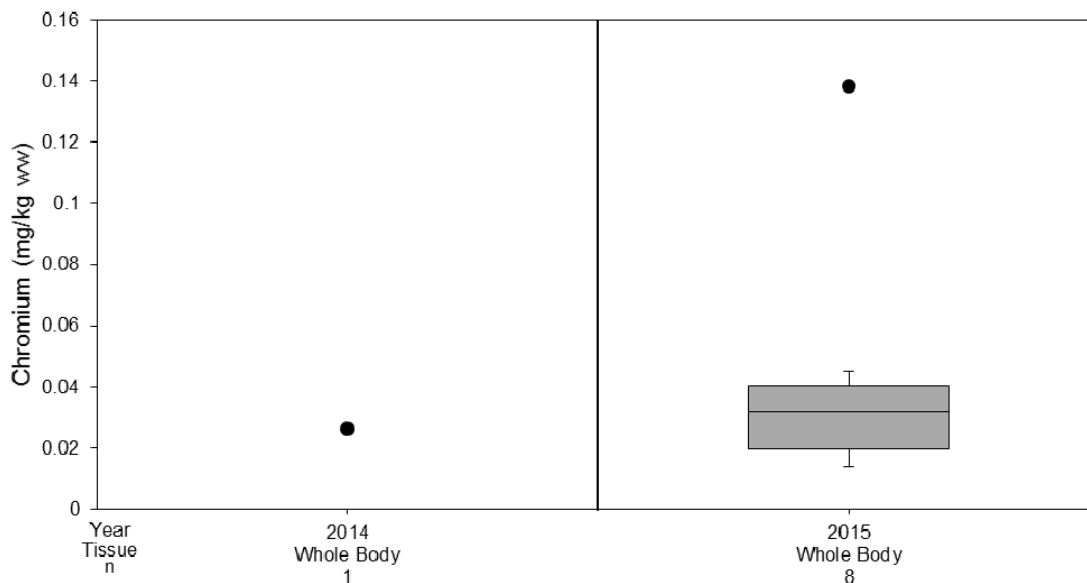
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Figure 207: Chromium Concentrations in Peamouth Chub Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 208: Chromium Concentrations in Peamouth Chub Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

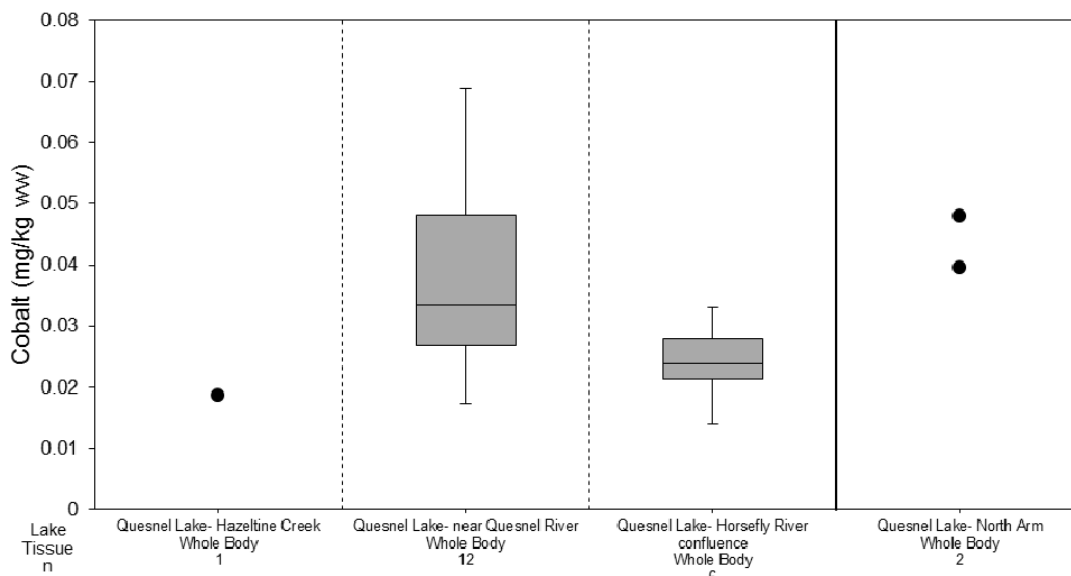


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



6.7 Cobalt

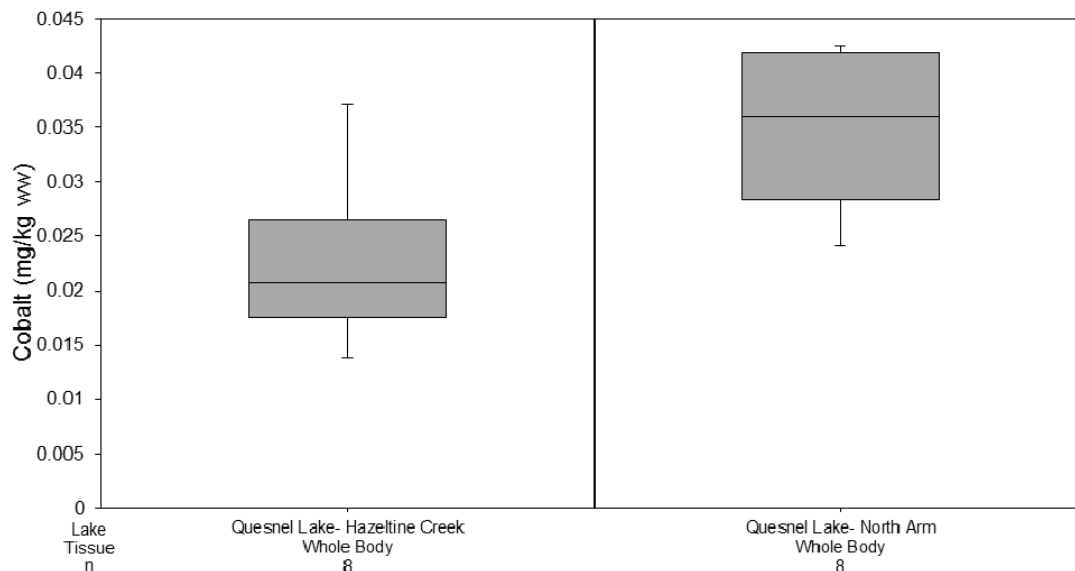
Figure 209: Cobalt Concentrations in Peamouth Chub Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 210: Cobalt Concentrations in Peamouth Chub Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

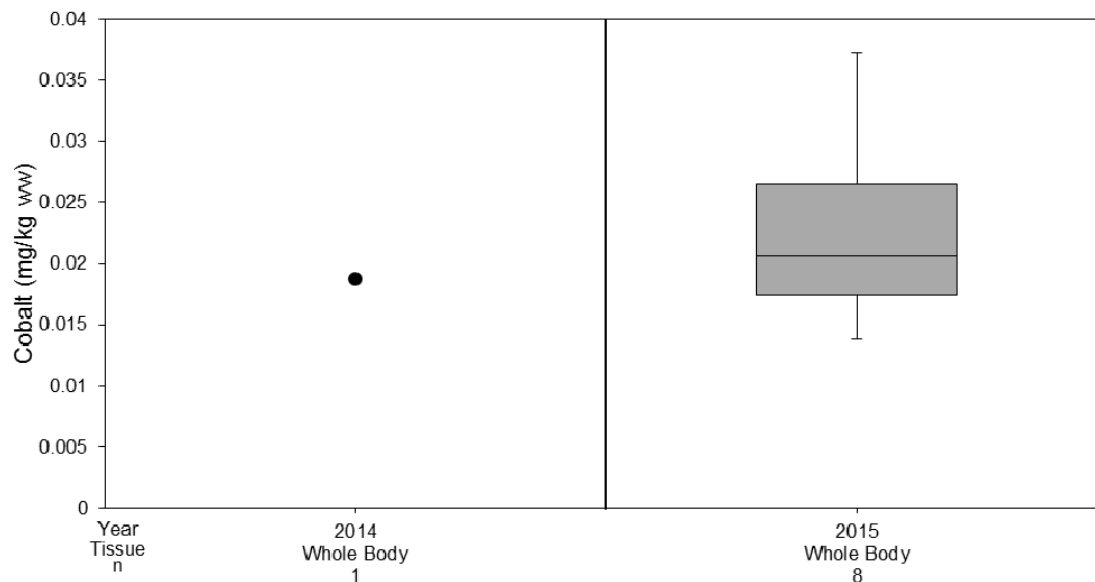
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



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Figure 211: Cobalt Concentrations in Peamouth Chub Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

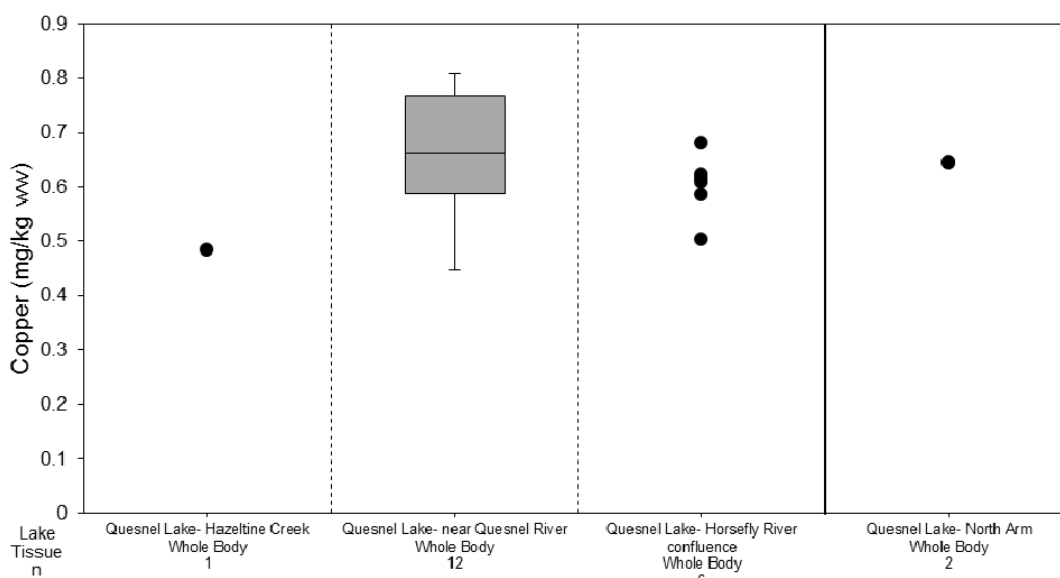


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

6.8 Copper

Figure 212: Copper Concentrations in Peamouth Chub Tissues Collected in 2014



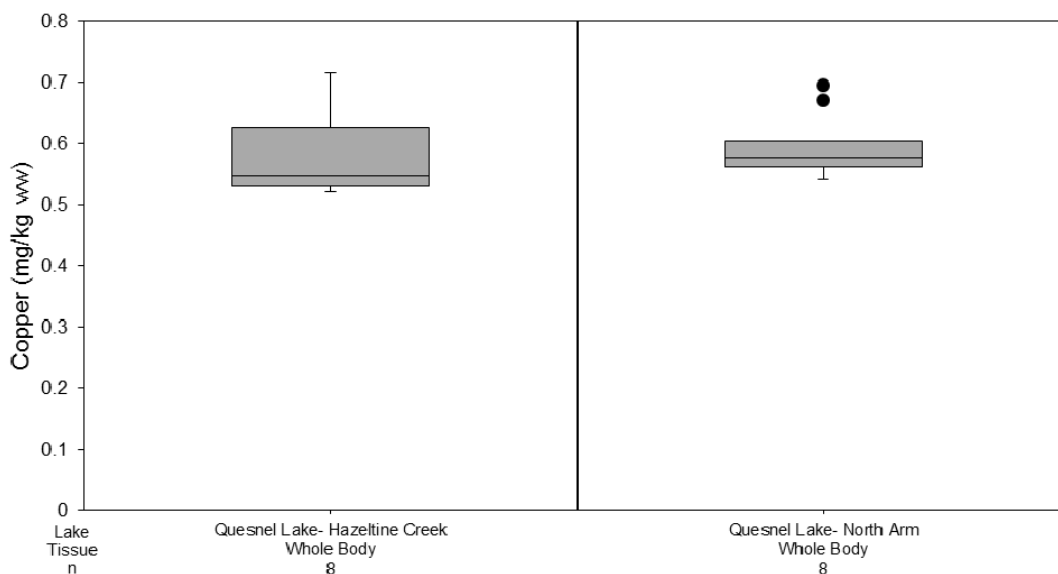
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



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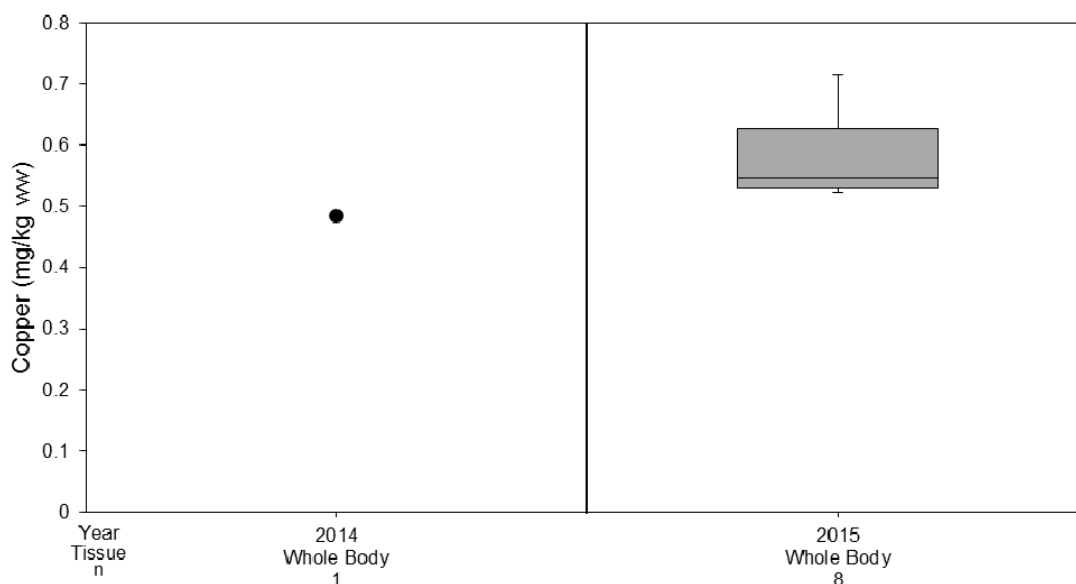
Figure 213: Copper Concentrations in Peamouth Chub Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 214: Copper Concentrations in Peamouth Chub Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015



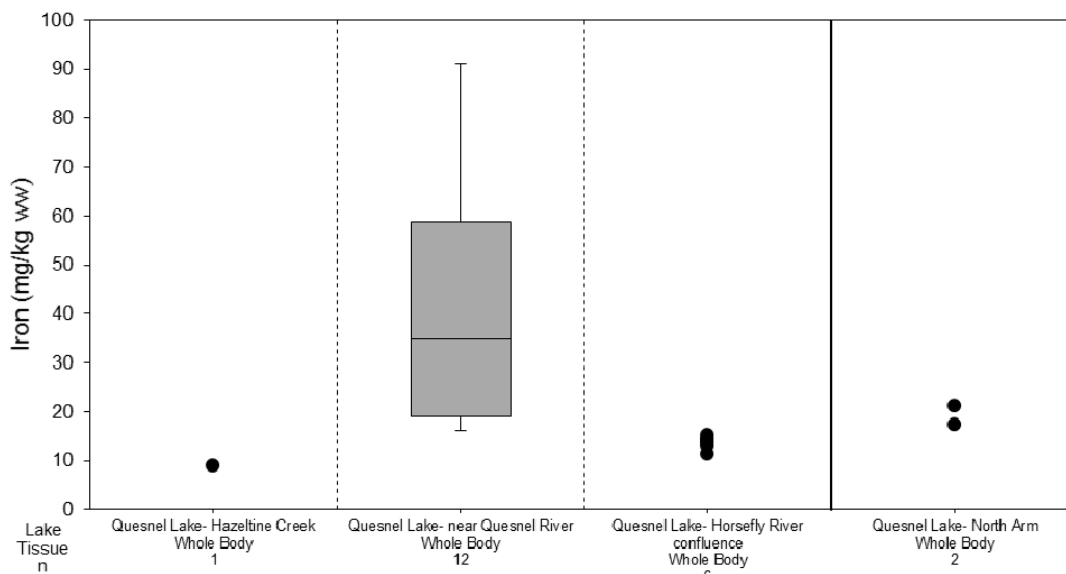
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



6.9 Iron

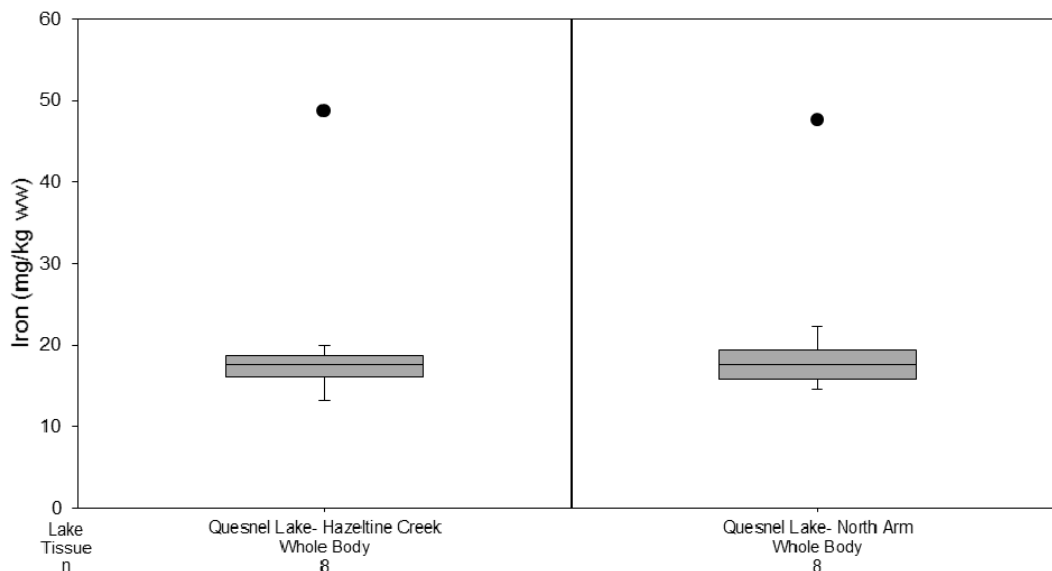
Figure 215: Iron Concentrations in Peamouth Chub Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 216: Iron Concentrations in Peamouth Chub Tissues Collected in 2015



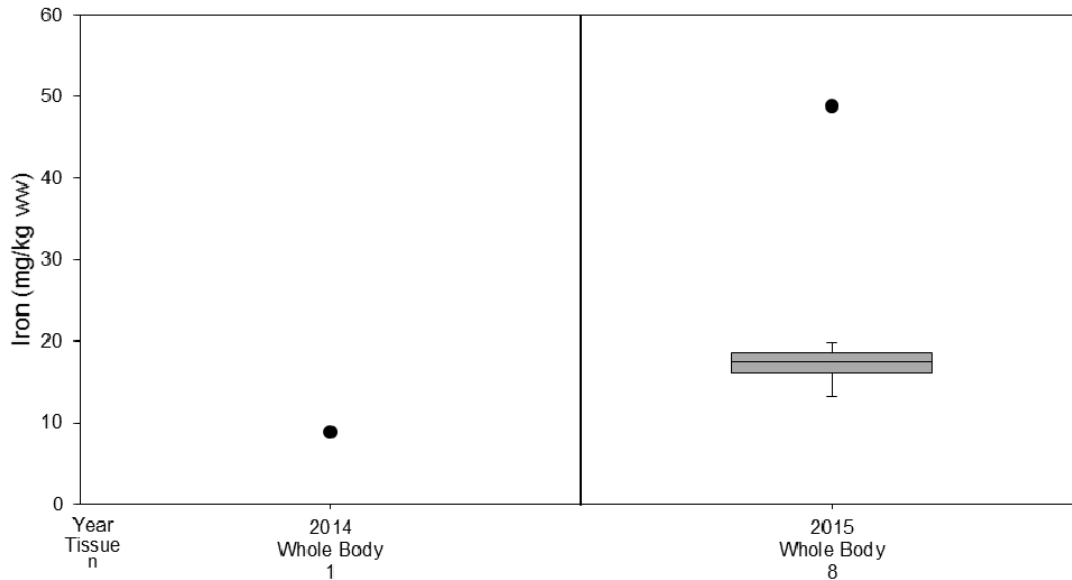
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



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Figure 217: Iron Concentrations in Peamouth Chub Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

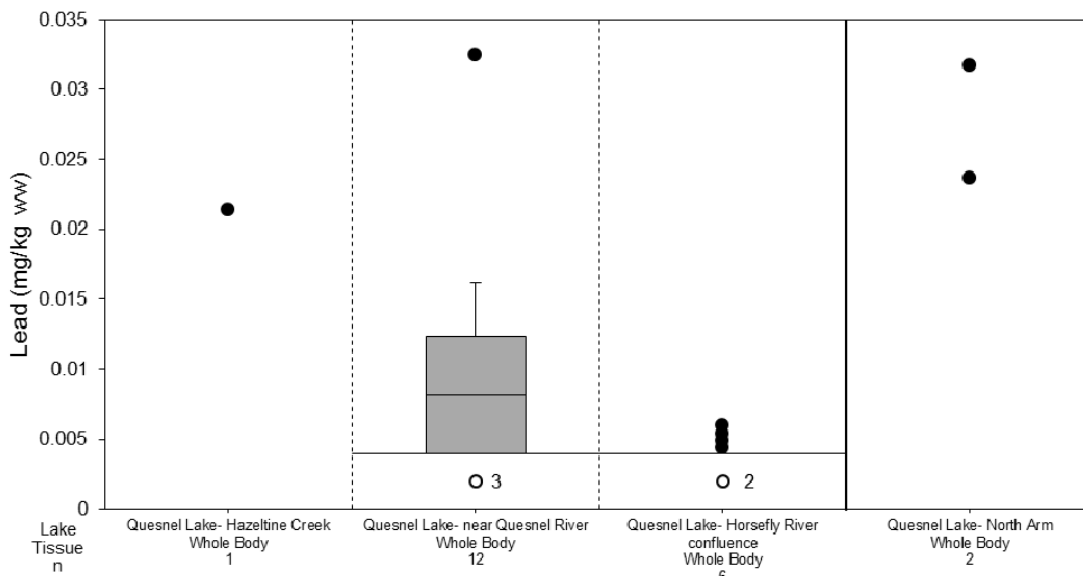


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

6.10 Lead

Figure 218: Lead Concentrations in Peamouth Chub Tissues Collected in 2014



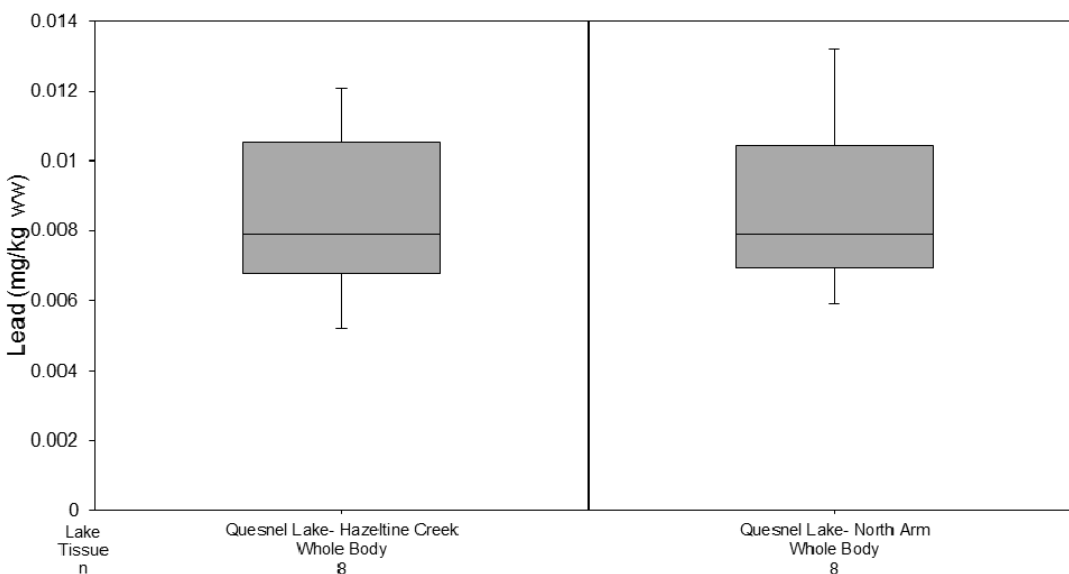
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



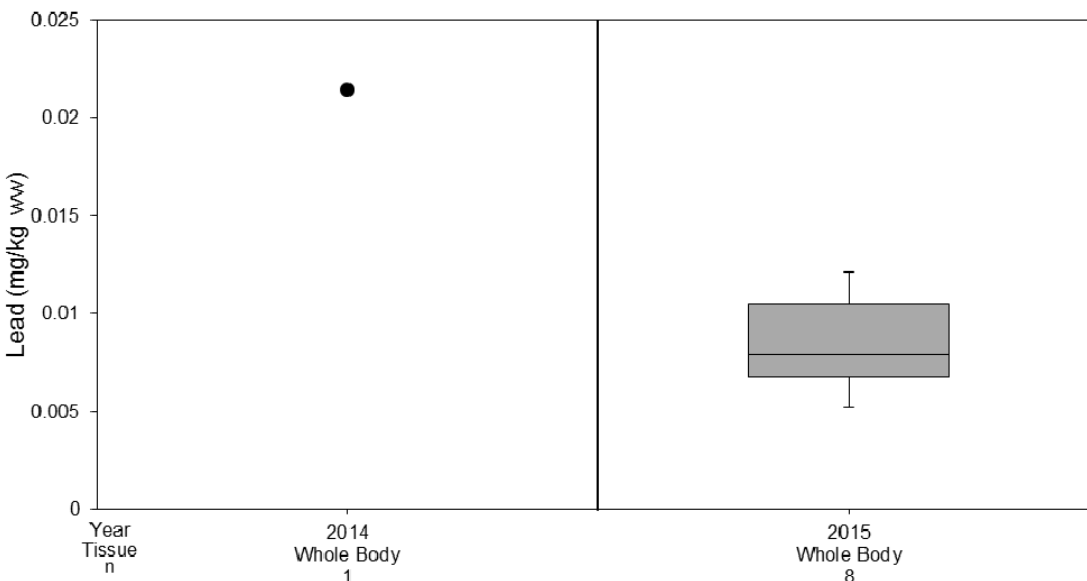
ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 219: Lead Concentrations in Peamouth Chub Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 220: Lead Concentrations in Peamouth Chub Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



6.11 Lithium

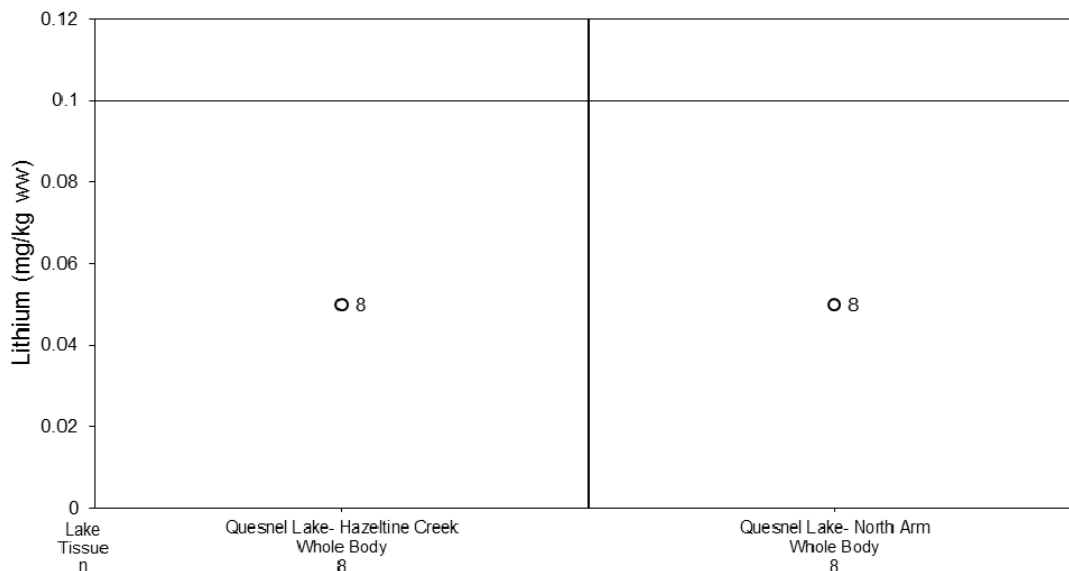
Figure 221: Lithium Concentrations in Peamouth Chub Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 222: Lithium Concentrations in Peamouth Chub Tissues Collected in 2015



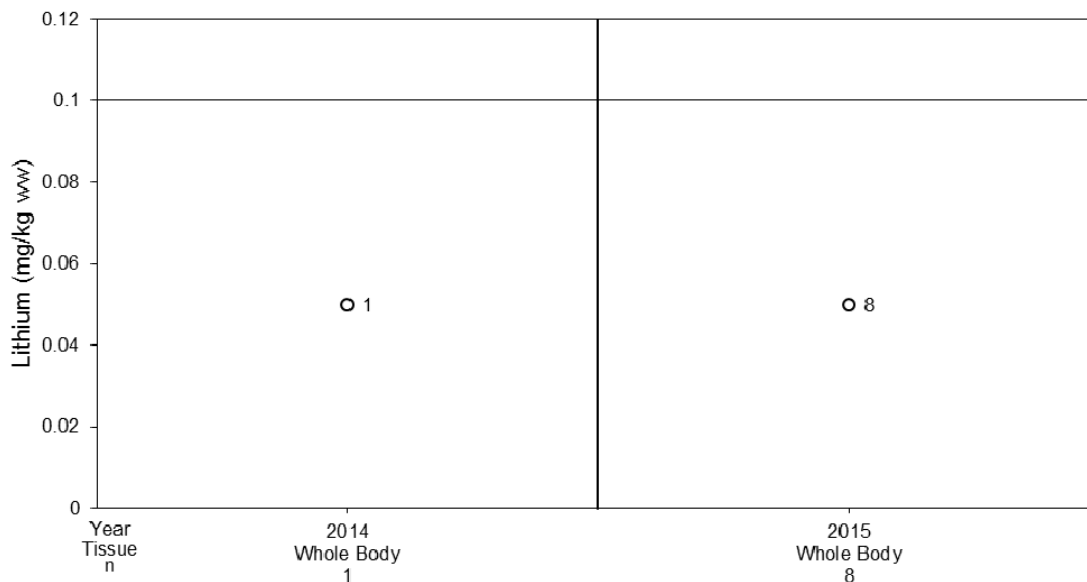
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



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Figure 223: Lithium Concentrations in Peamouth Chub Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

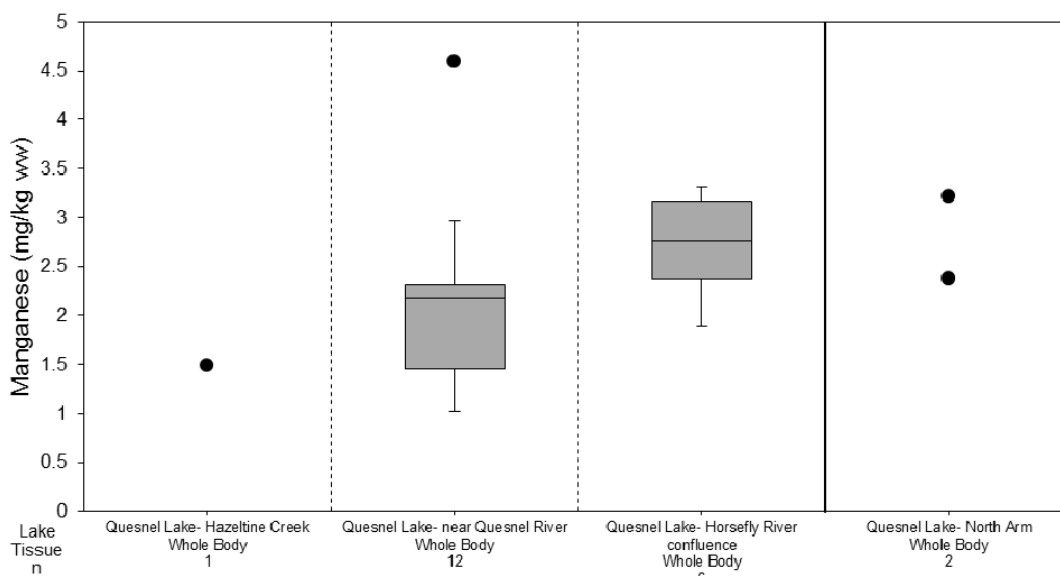


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

6.12 Manganese

Figure 224: Manganese Concentrations in Peamouth Chub Tissues Collected in 2014



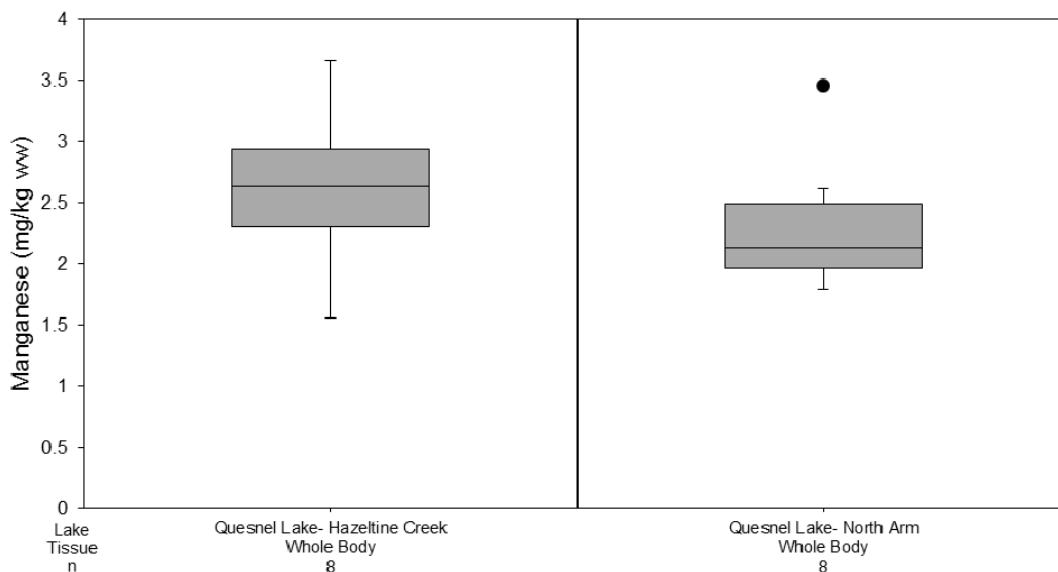
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



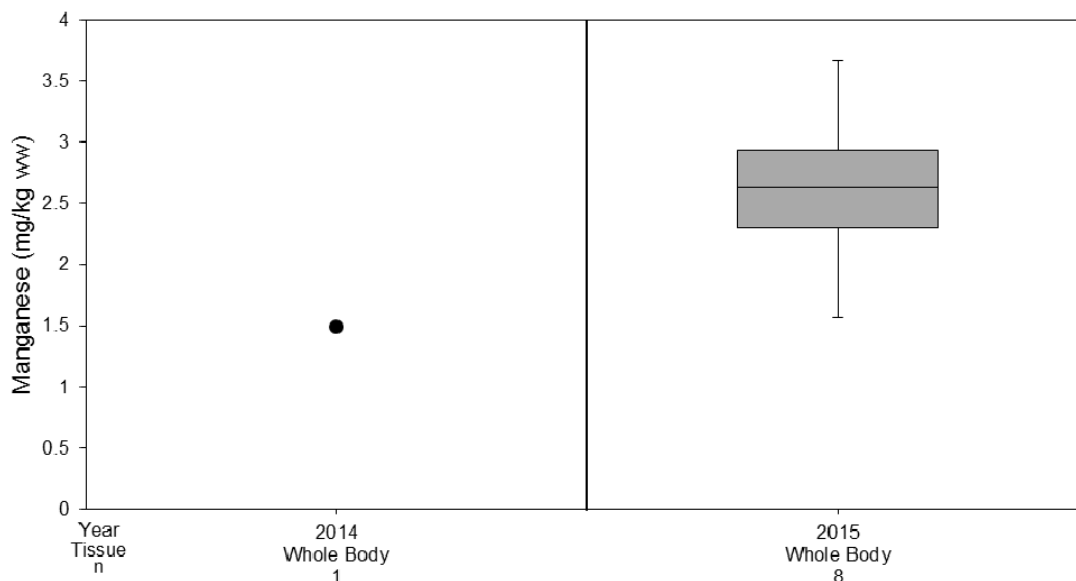
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Figure 225: Manganese Concentrations in Peamouth Chub Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 226: Manganese Concentrations in Peamouth Chub Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

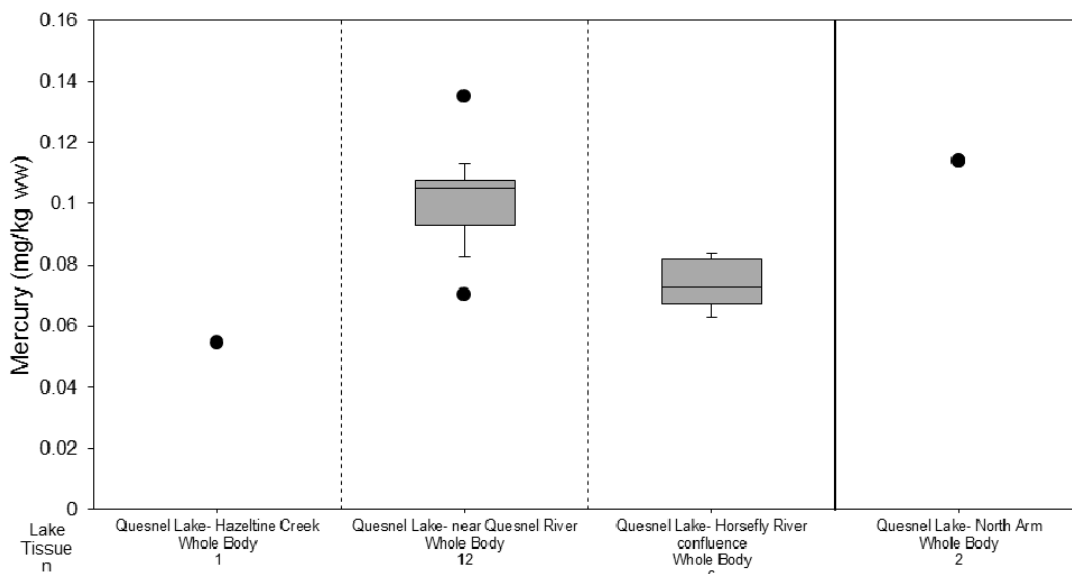


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



6.13 Mercury

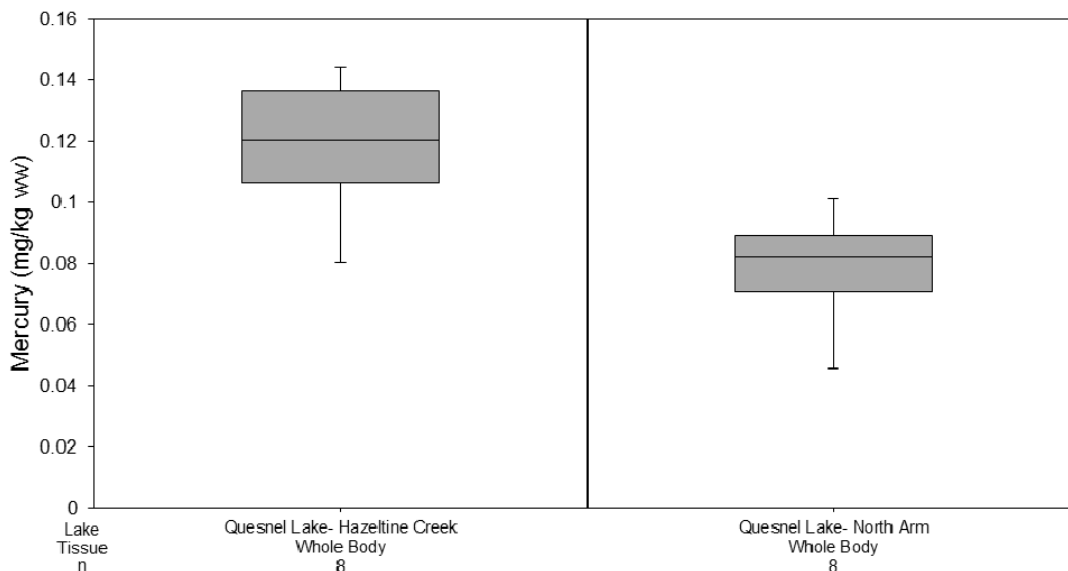
Figure 227: Mercury Concentrations in Peamouth Chub Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 228: Mercury Concentrations in Peamouth Chub Tissues Collected in 2015



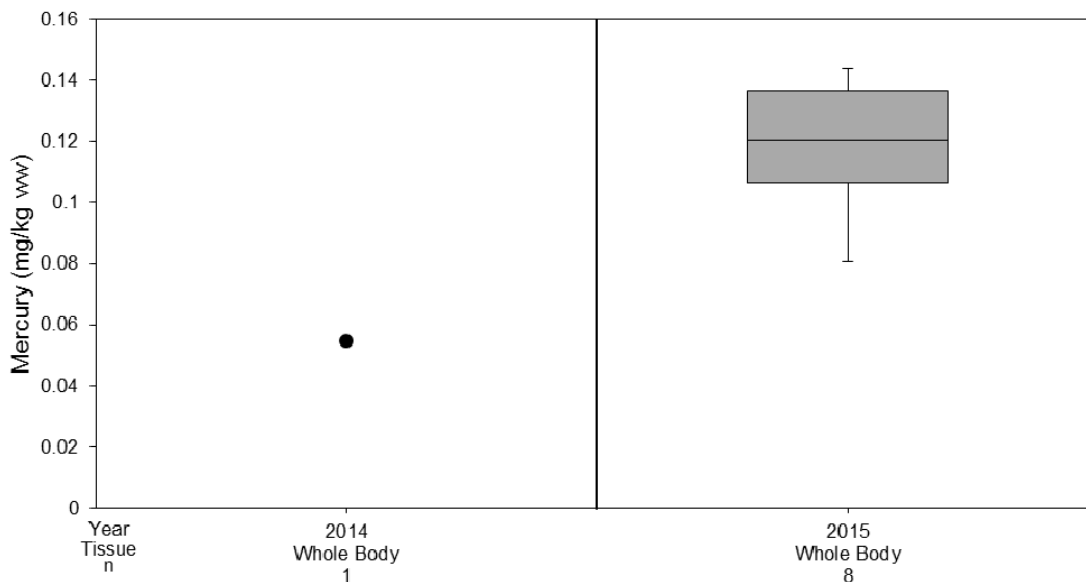
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



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Figure 229: Mercury Concentrations in Peamouth Chub Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

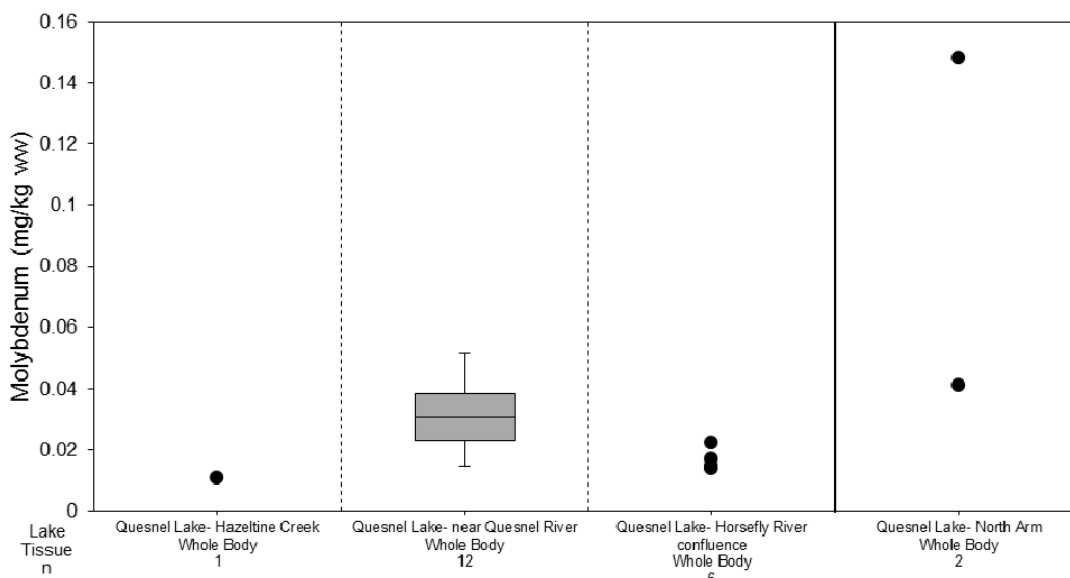


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

6.14 Molybdenum

Figure 230: Molybdenum Concentrations in Peamouth Chub Tissues Collected in 2014



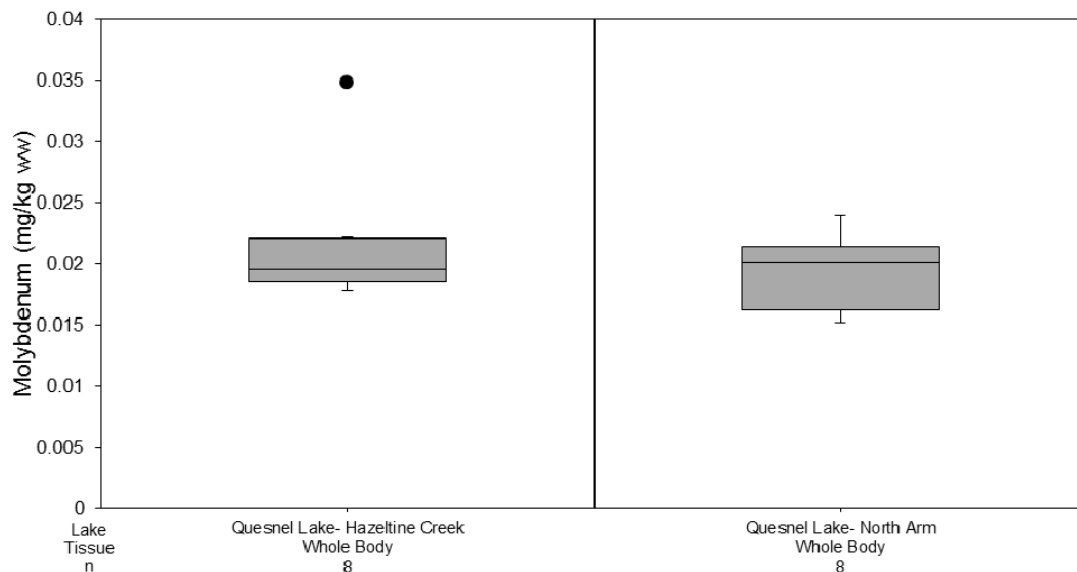
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



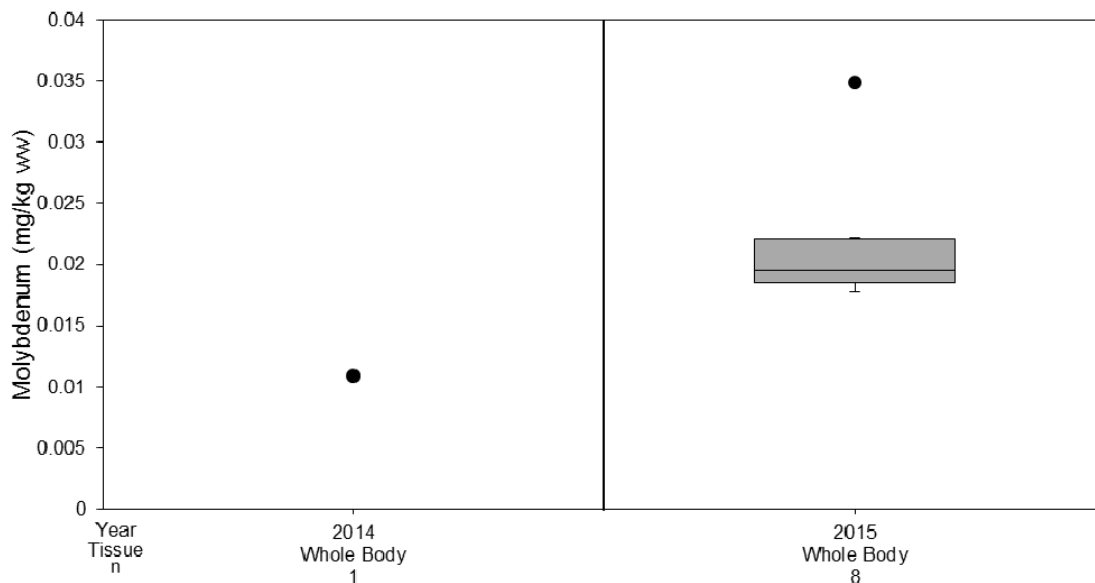
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Figure 231: Molybdenum Concentrations in Peamouth Chub Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 232: Molybdenum Concentrations in Peamouth Chub Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

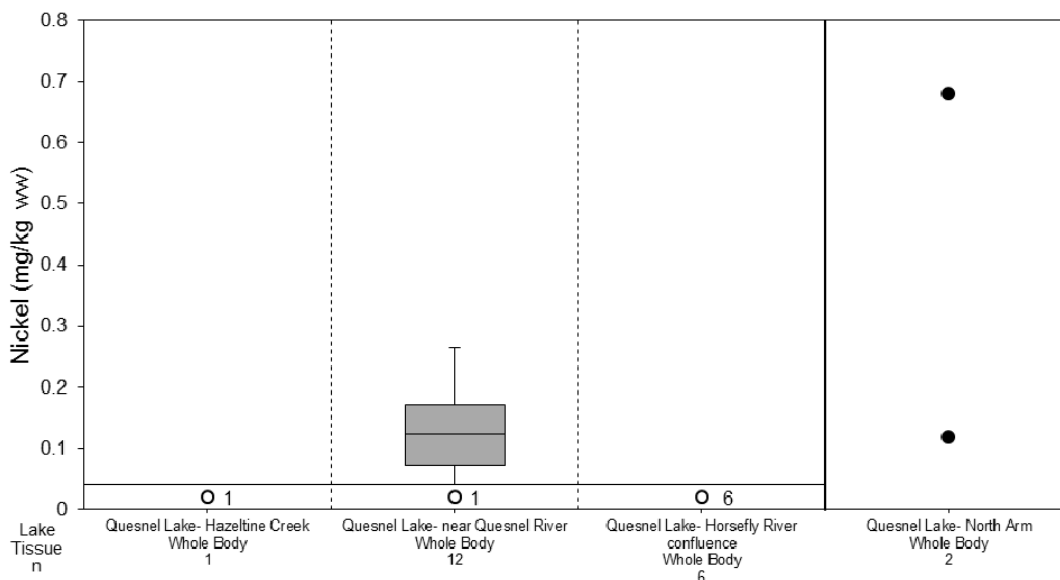


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



6.15 Nickel

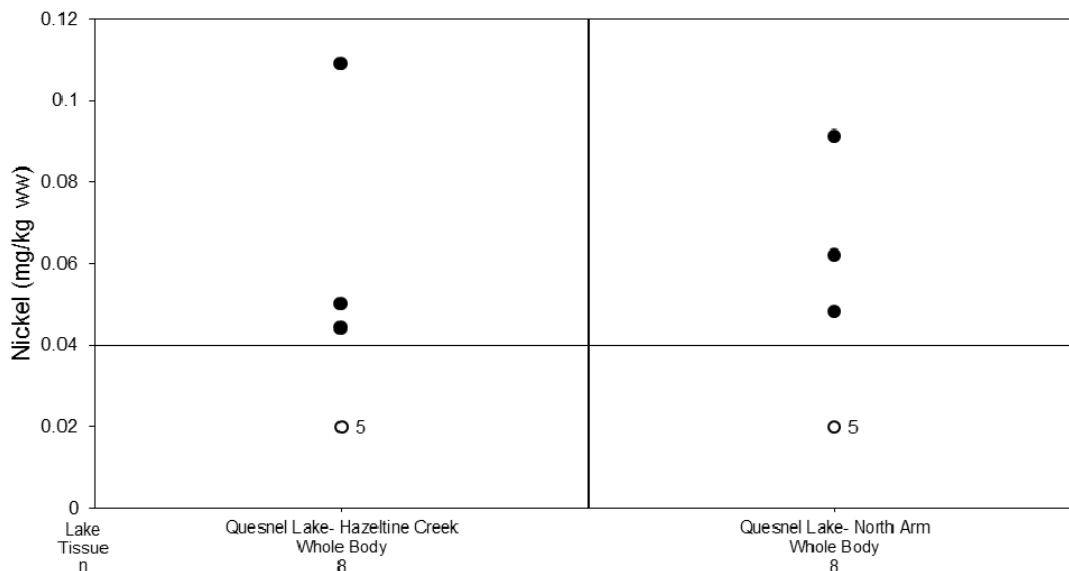
Figure 233: Nickel Concentrations in Peamouth Chub Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 234: Nickel Concentrations in Peamouth Chub Tissues Collected in 2015



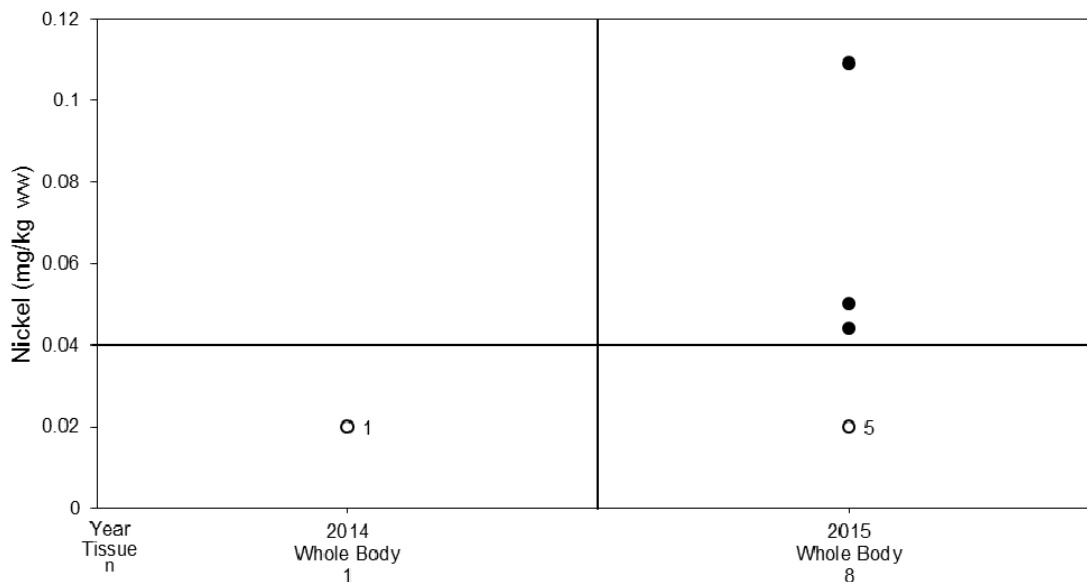
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



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Figure 235: Nickel Concentrations in Peamouth Chub Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

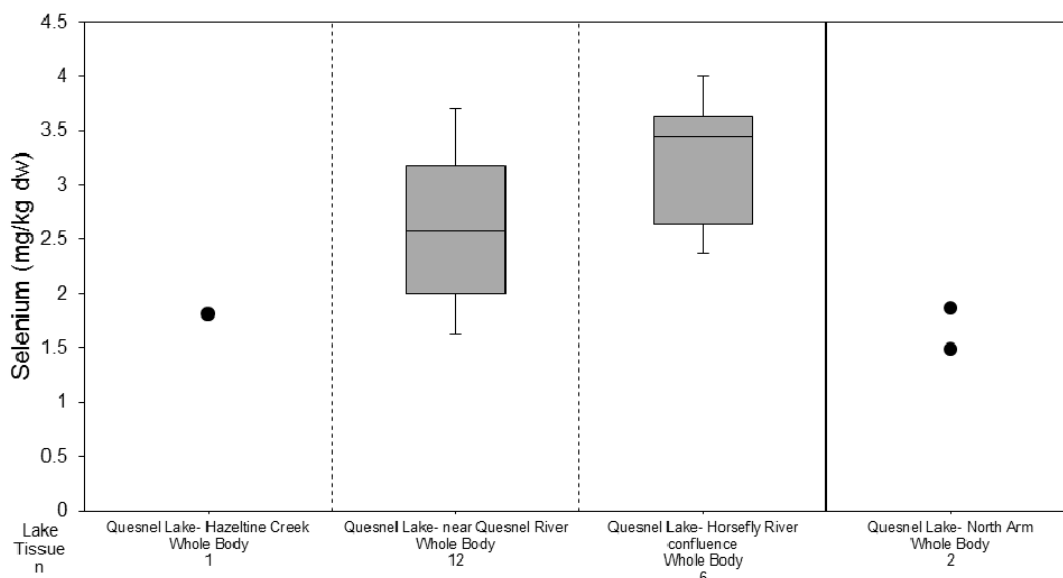


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

6.16 Selenium

Figure 236: Selenium Concentrations in Peamouth Chub Tissues Collected in 2014



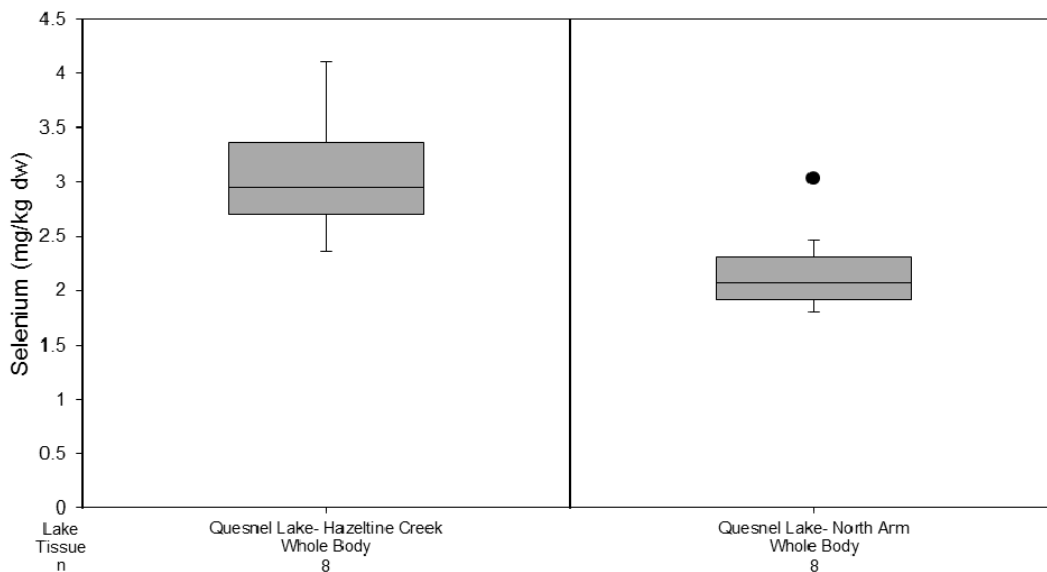
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



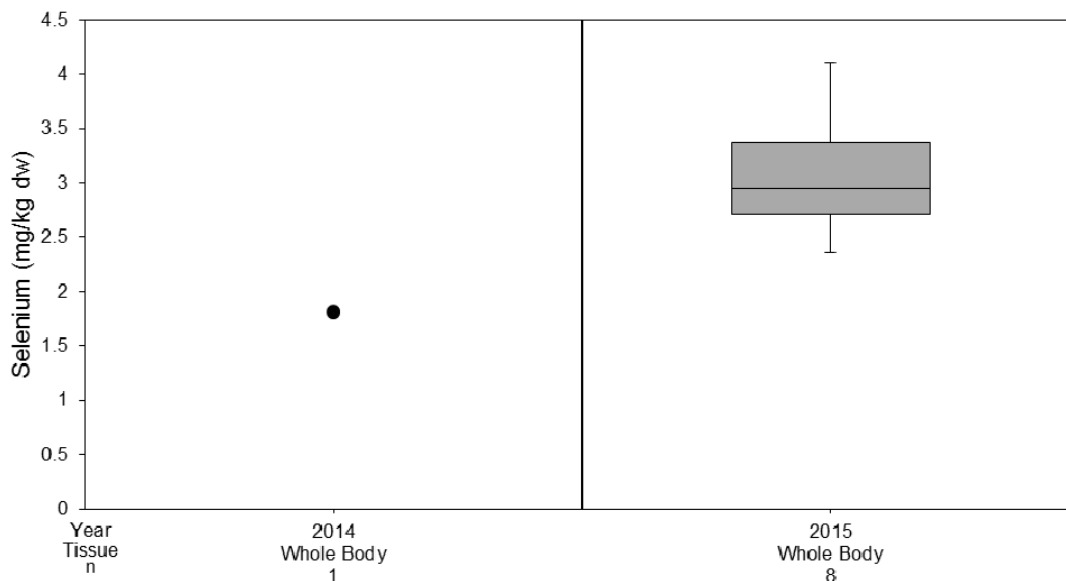
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Figure 237: Selenium Concentrations in Peamouth Chub Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 238: Selenium Concentrations in Peamouth Chub Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

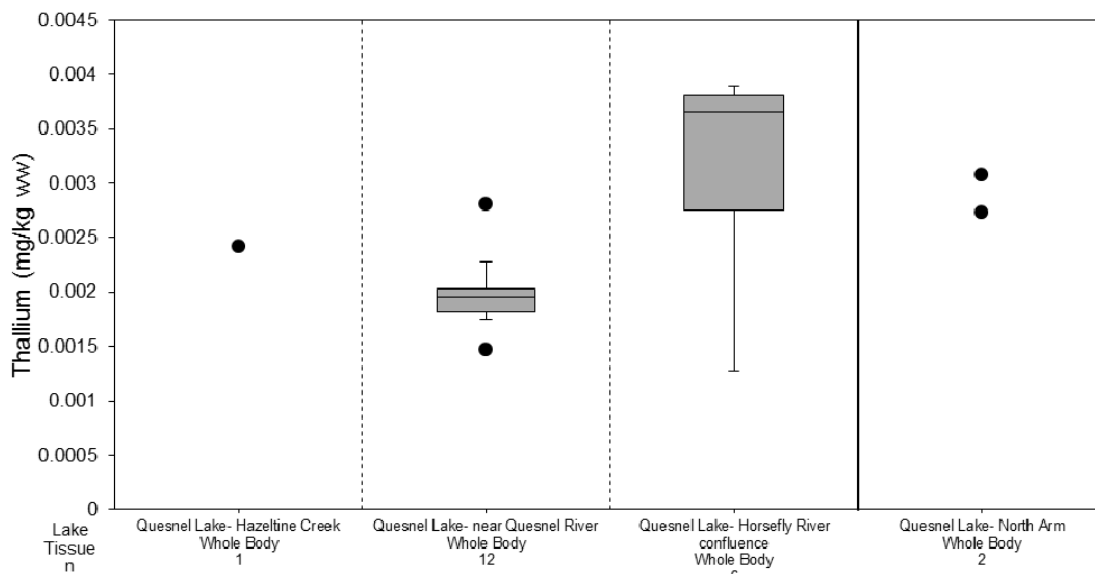


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



6.17 Thallium

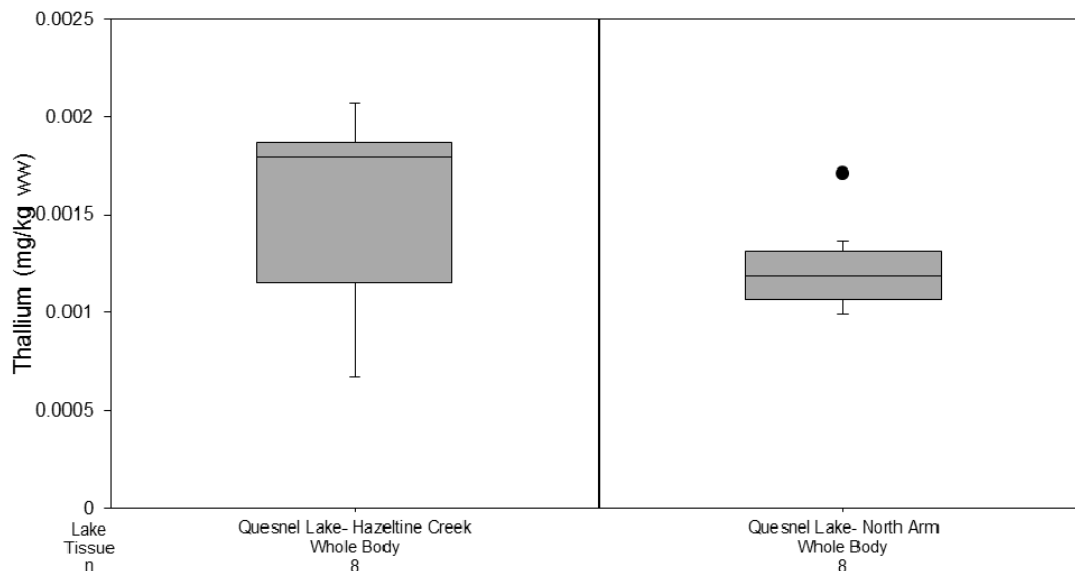
Figure 239: Thallium Concentrations in Peamouth Chub Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 240: Thallium Concentrations in Peamouth Chub Tissues Collected in 2015



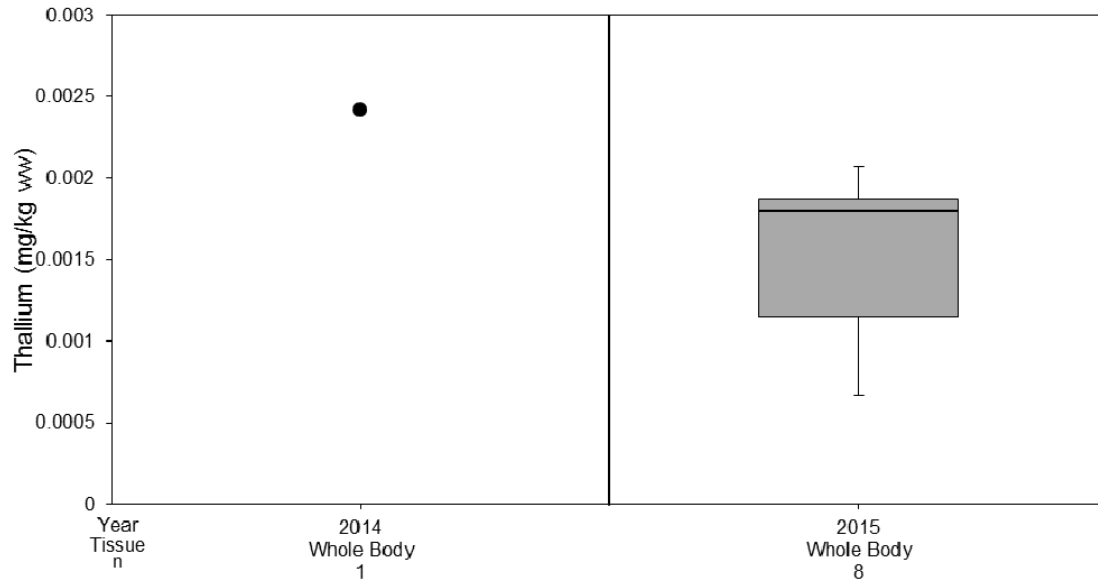
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



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Figure 241: Thallium Concentrations in Peamouth Chub Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

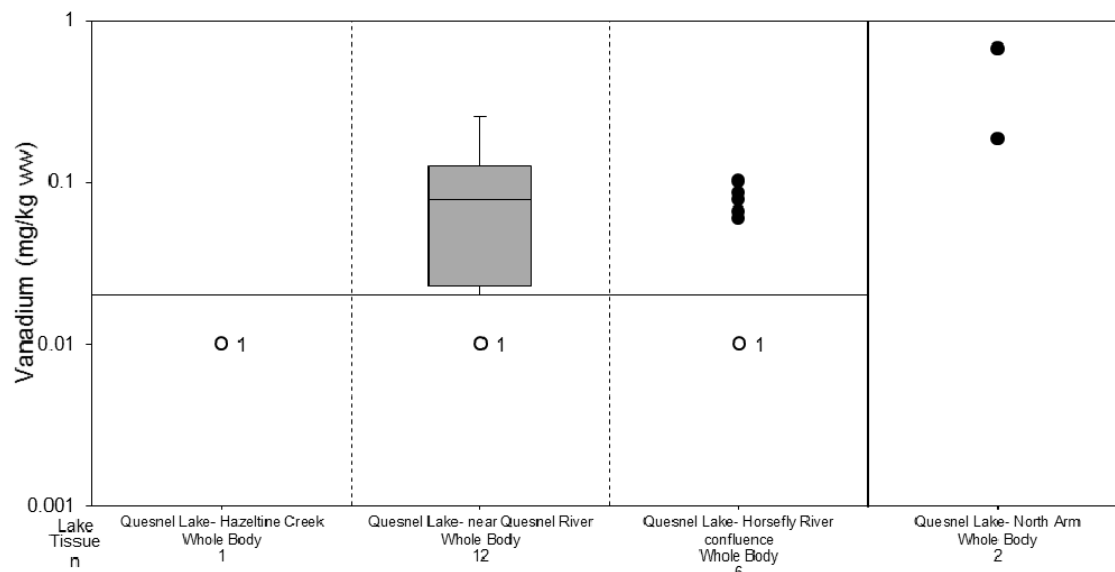


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

6.18 Vanadium

Figure 242: Vanadium Concentrations in Peamouth Chub Tissues Collected in 2014



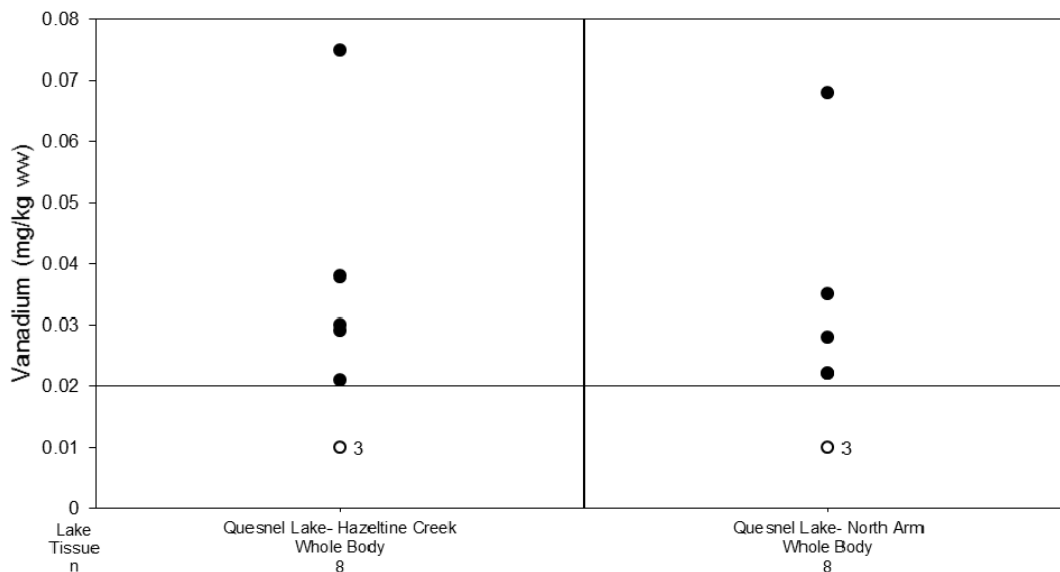
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



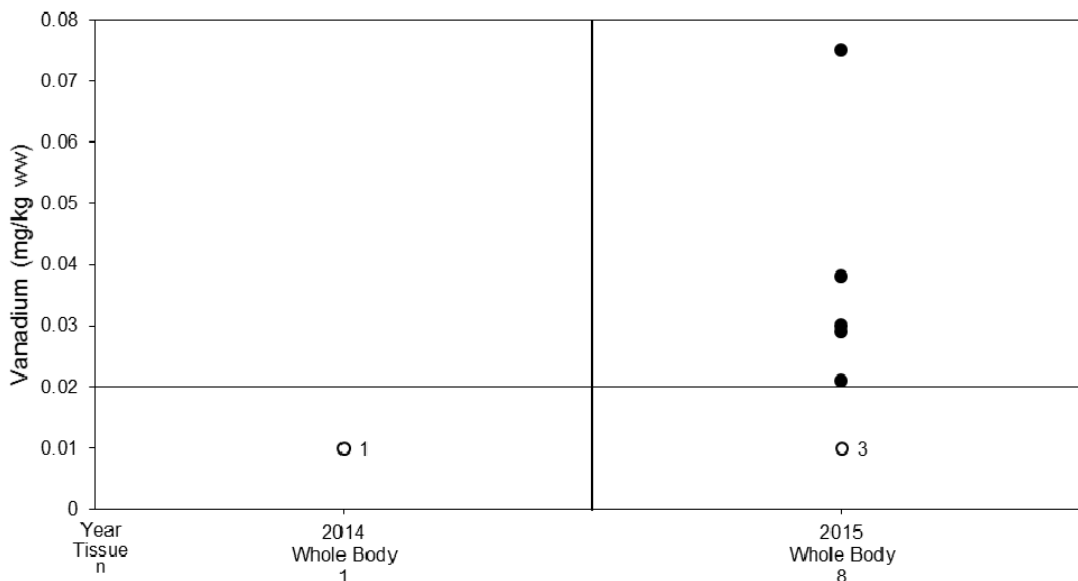
ATTACHMENT 3 Fish Tissue Chemistry Censored Boxplots

Figure 243: Vanadium Concentrations in Peamouth Chub Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 244: Vanadium Concentrations in Peamouth Chub Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015

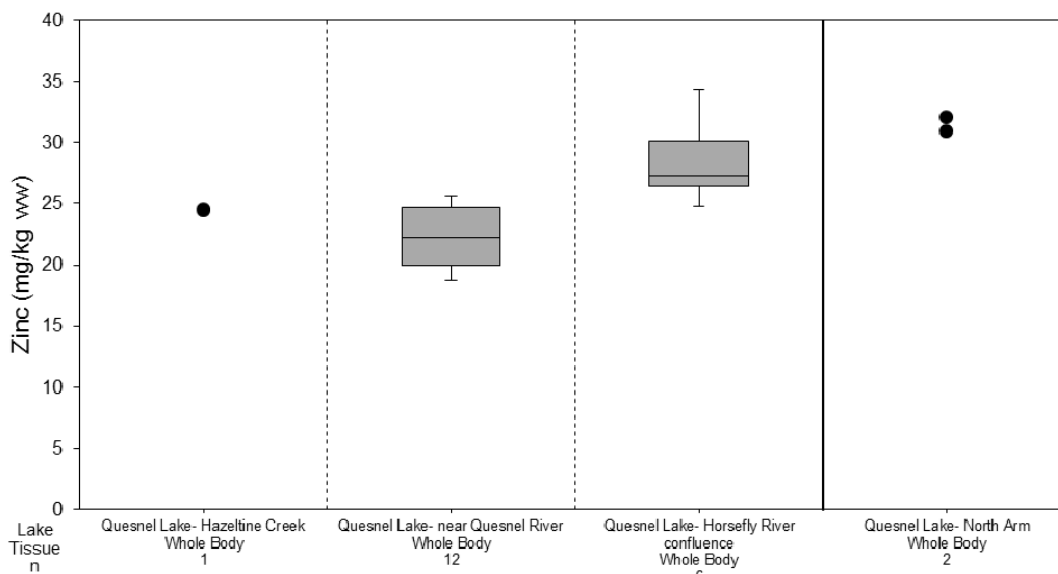


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



6.19 Zinc

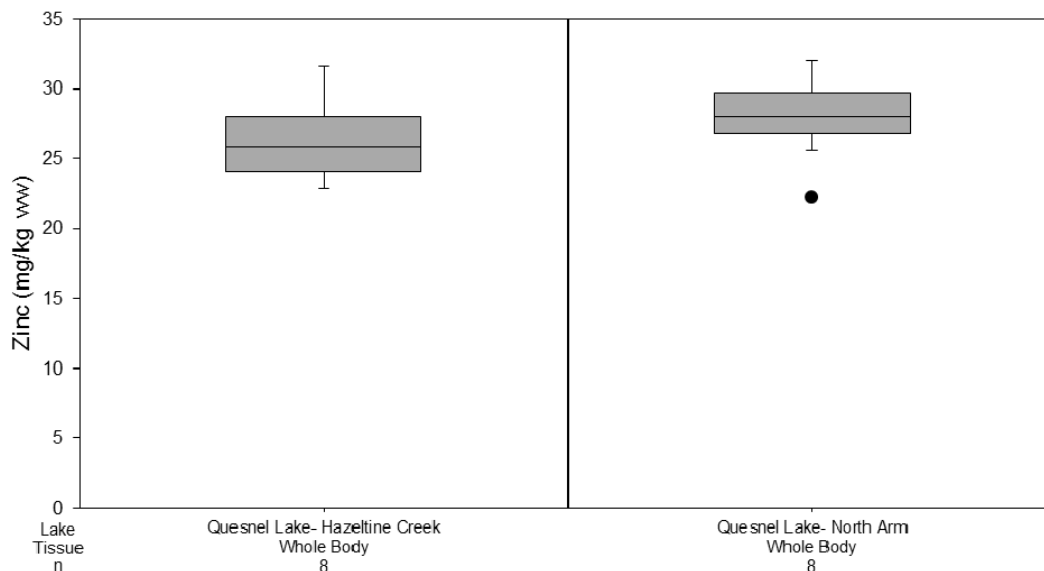
Figure 245: Zinc Concentrations in Peamouth Chub Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 246: Zinc Concentrations in Peamouth Chub Tissues Collected in 2015



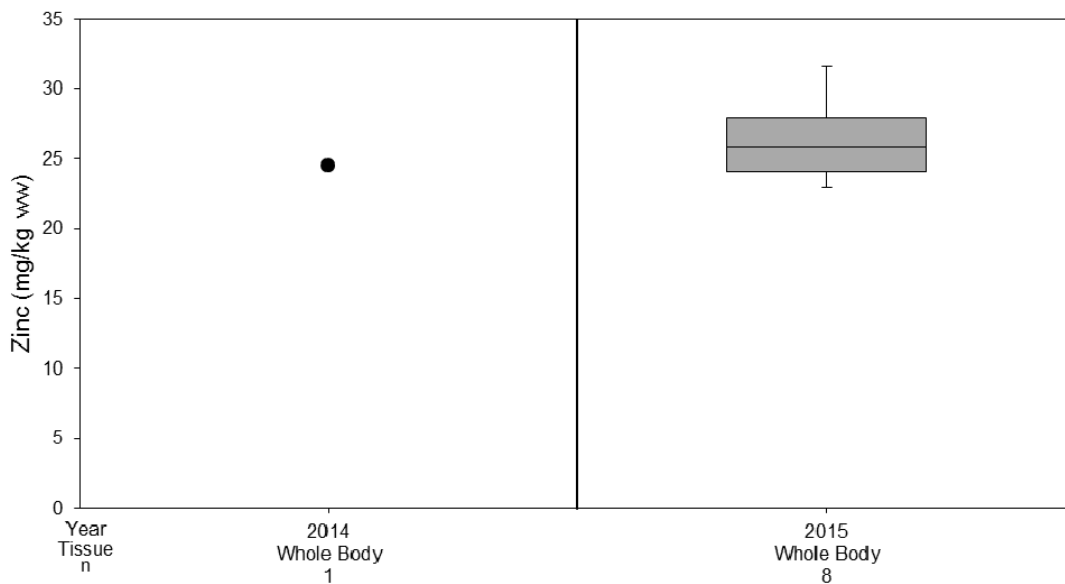
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



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Figure 247: Zinc Concentrations in Peamouth Chub Tissues Collected from the Quesnel Lake - Hazeltine Creek Confluence in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

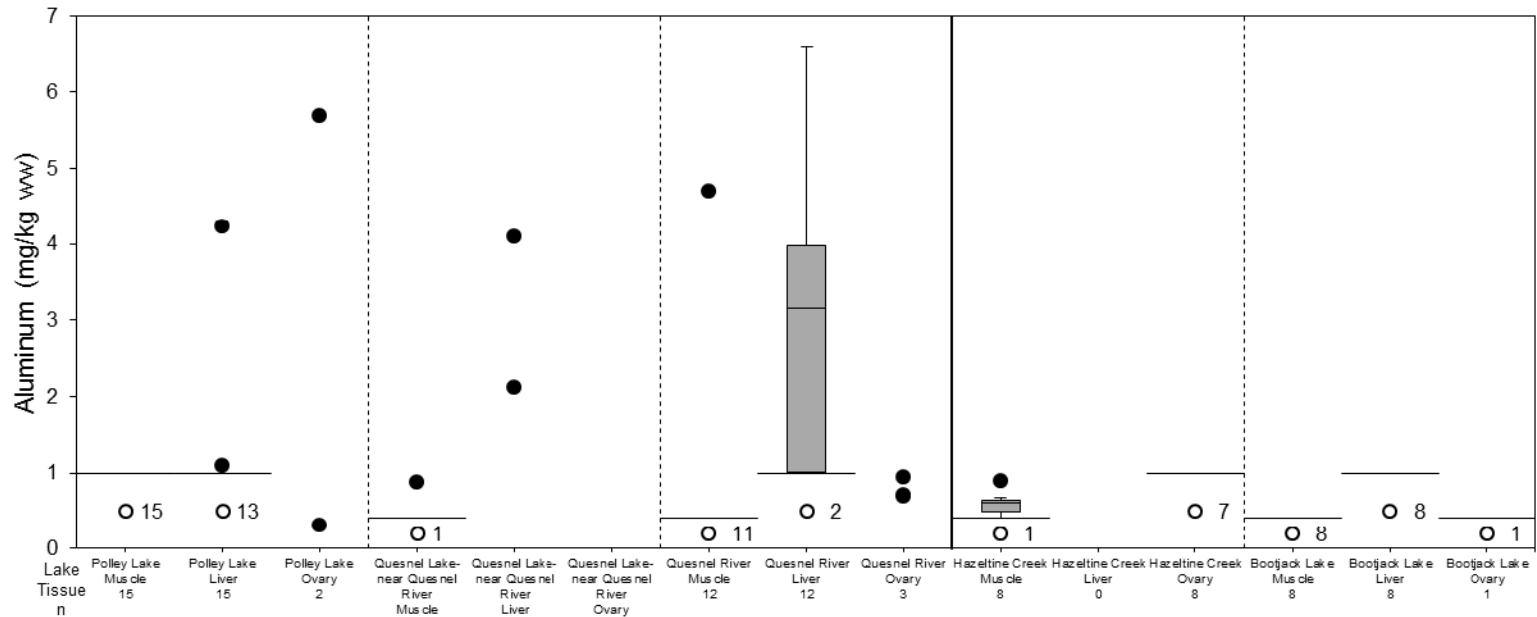
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



7.0 RAINBOW TROUT

7.1 Aluminum

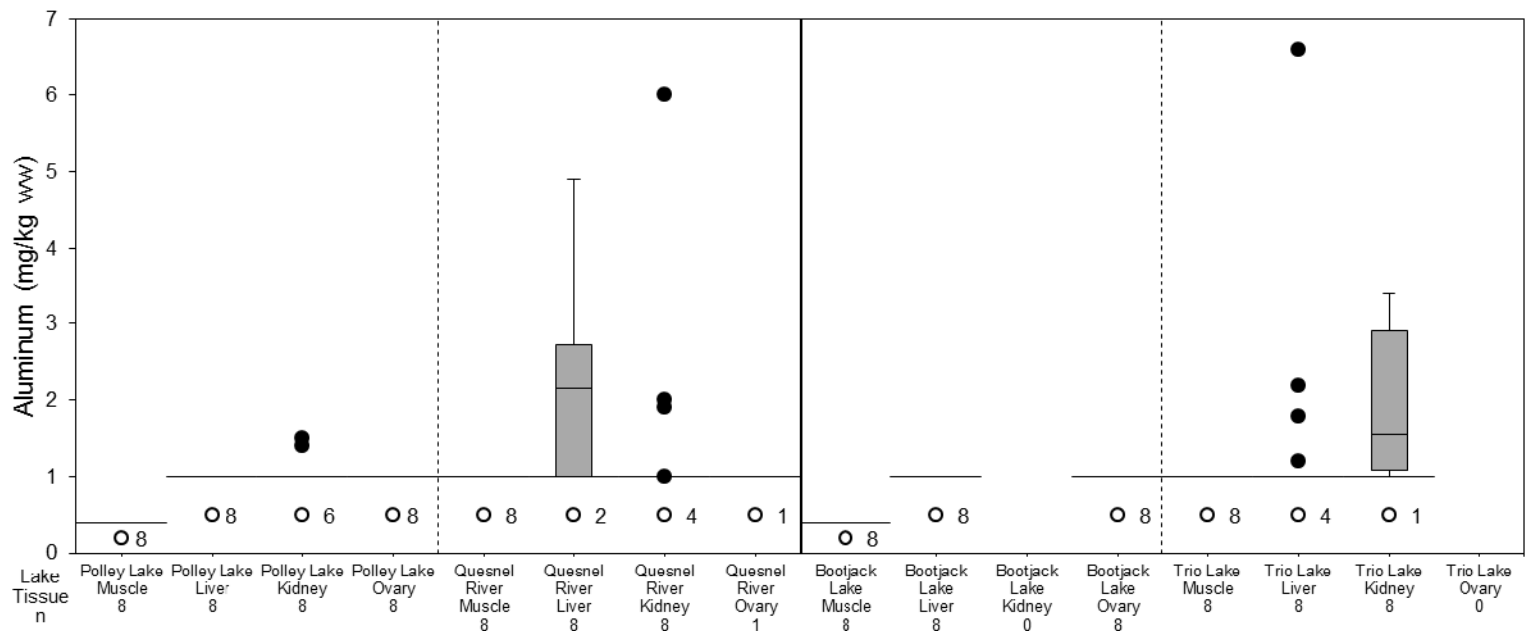
Figure 248: Aluminum Concentrations in Rainbow Trout Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

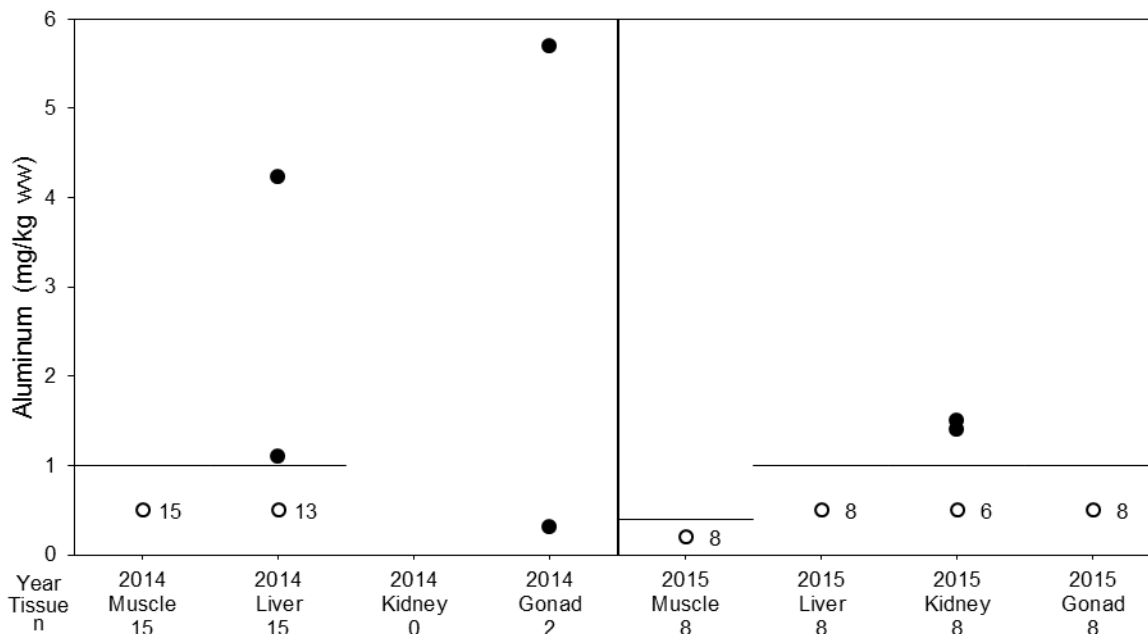
Figure 249: Aluminum Concentrations in Rainbow Trout Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 250: Aluminum Concentrations in Rainbow Trout Tissues Collected from Polley Lake in 2014 and 2015

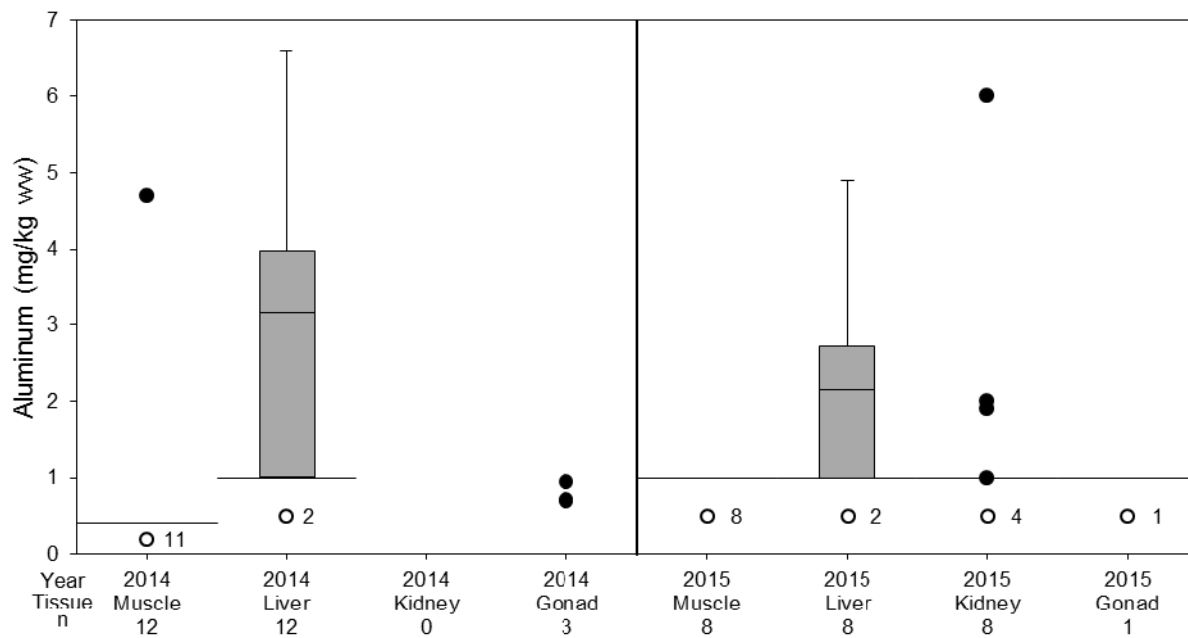


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



Figure 251: Aluminum Concentrations in Rainbow Trout Tissues Collected from Quesnel River in 2014 and 2015

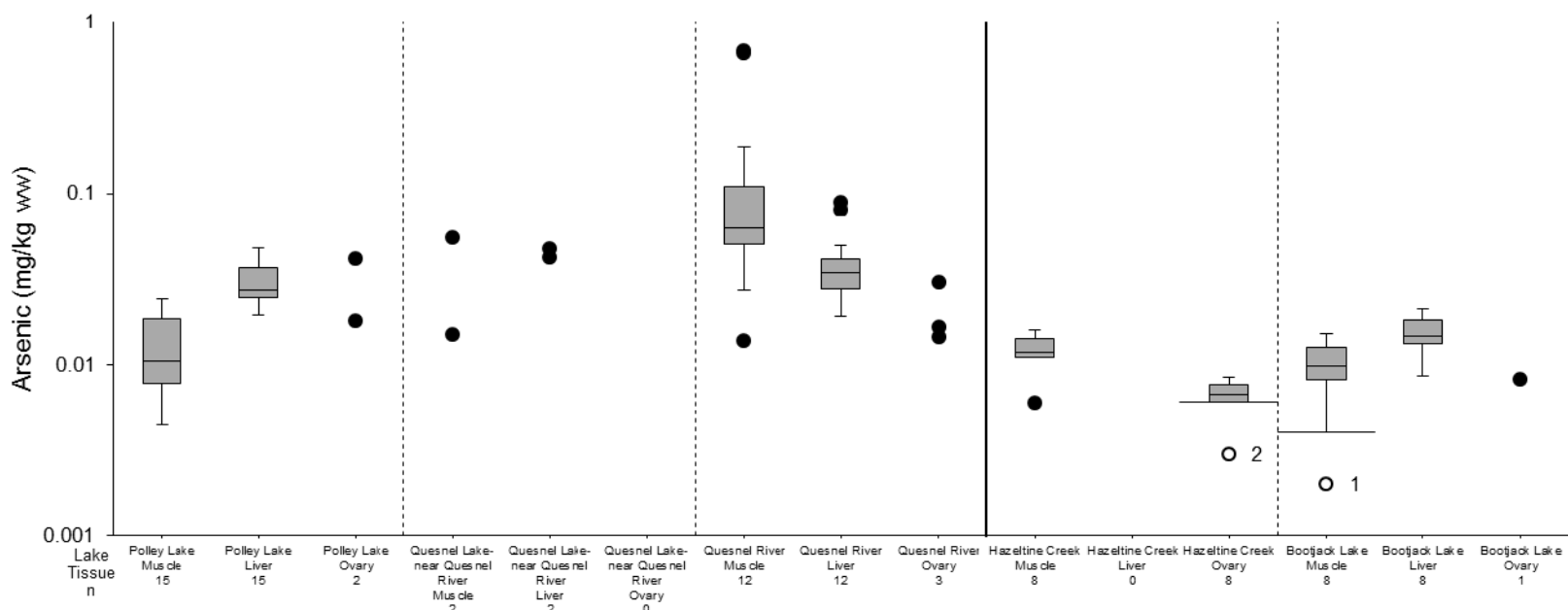


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

7.2 Arsenic

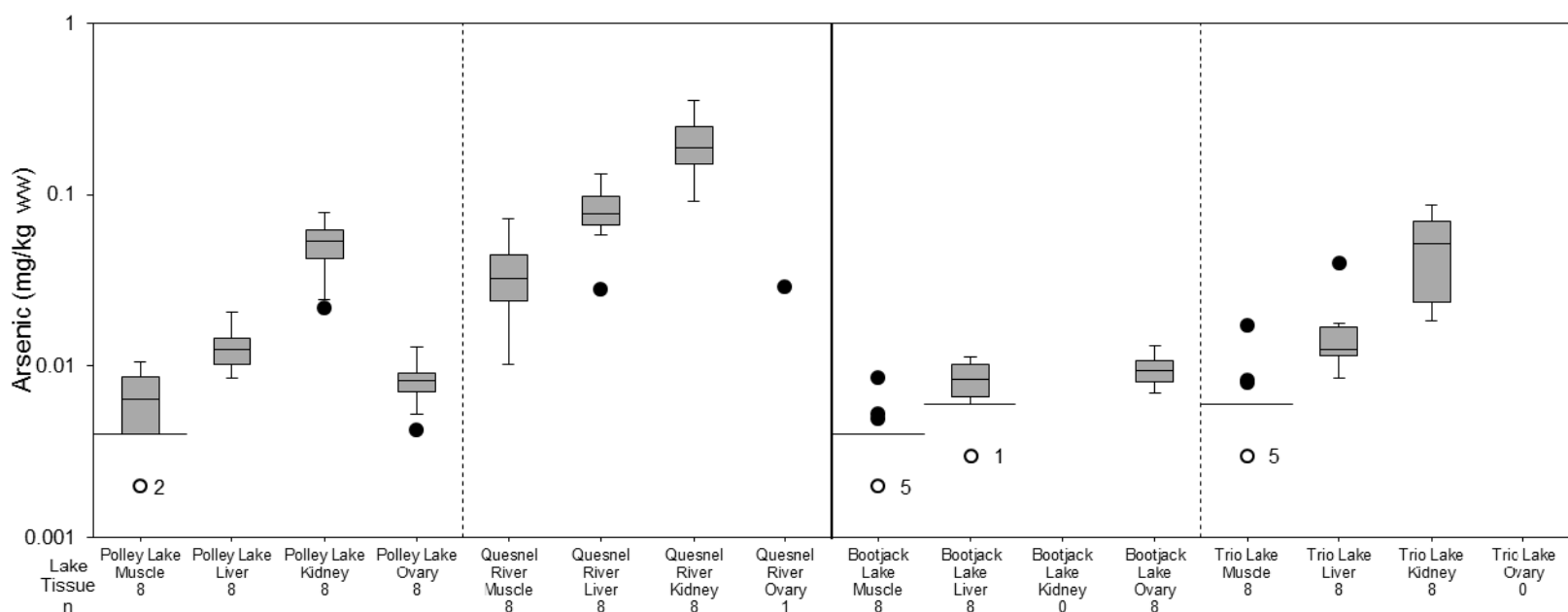
Figure 252: Arsenic Concentrations in Rainbow Trout Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 253: Arsenic Concentrations in Rainbow Trout Tissues Collected in 2015



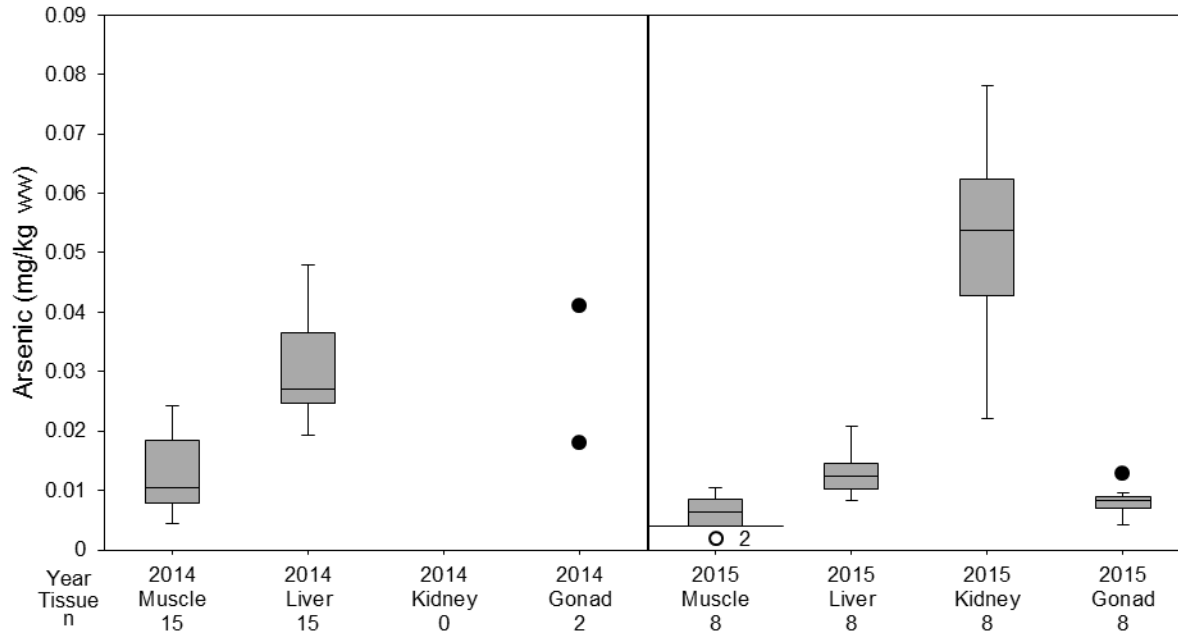
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



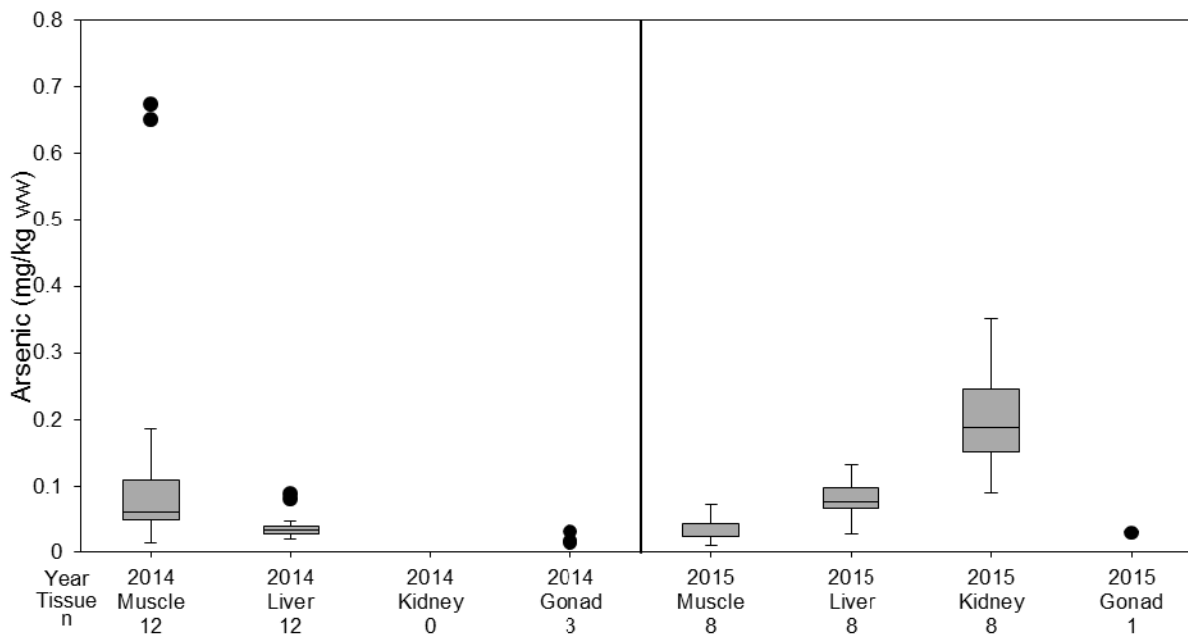
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Figure 254: Arsenic Concentrations in Rainbow Trout Tissues Collected from Polley Lake in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

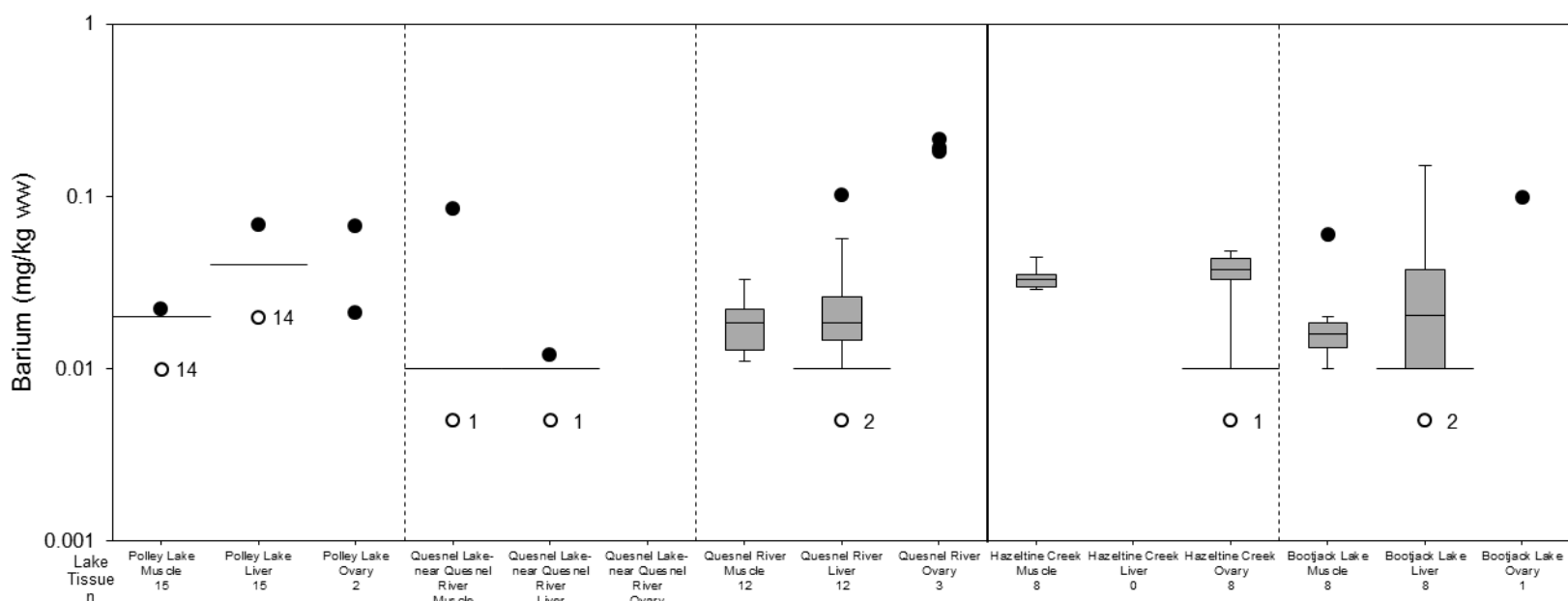
Figure 255: Arsenic Concentrations in Rainbow Trout Tissues Collected from Quesnel River in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

7.3 Barium

Figure 256: Barium Concentrations in Rainbow Trout Tissues Collected in 2014

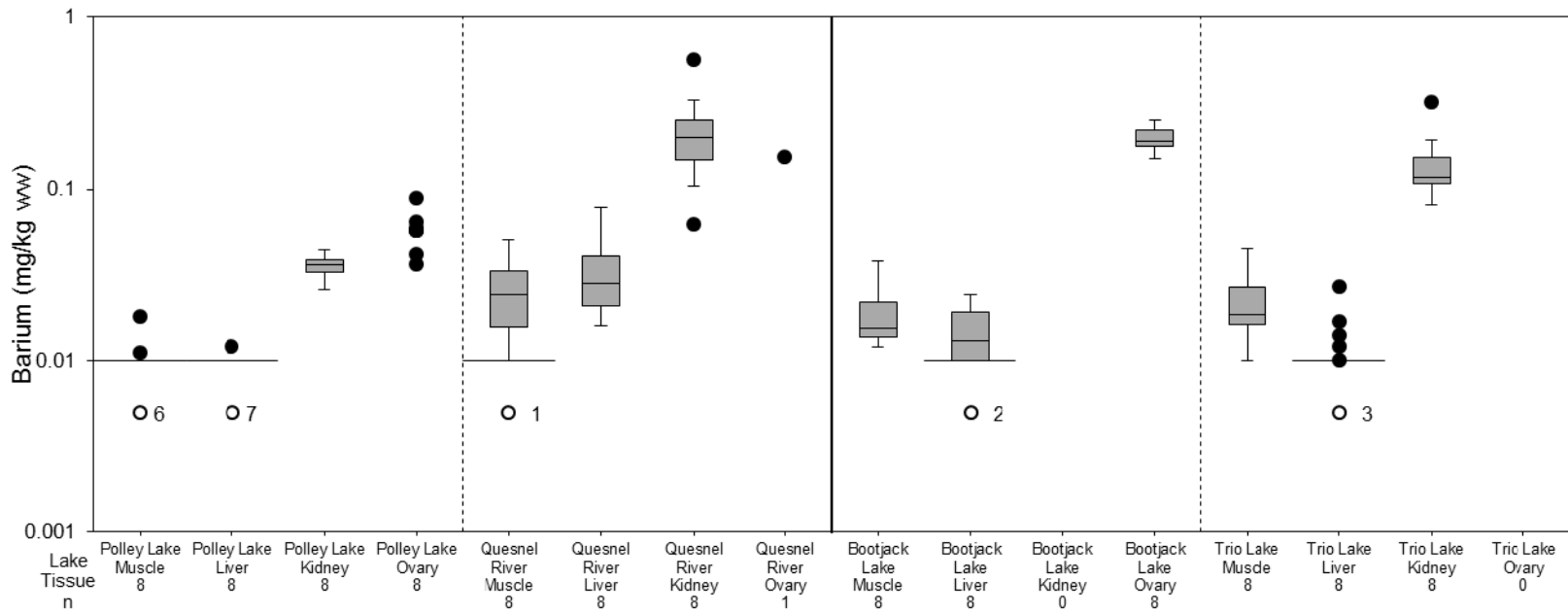


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



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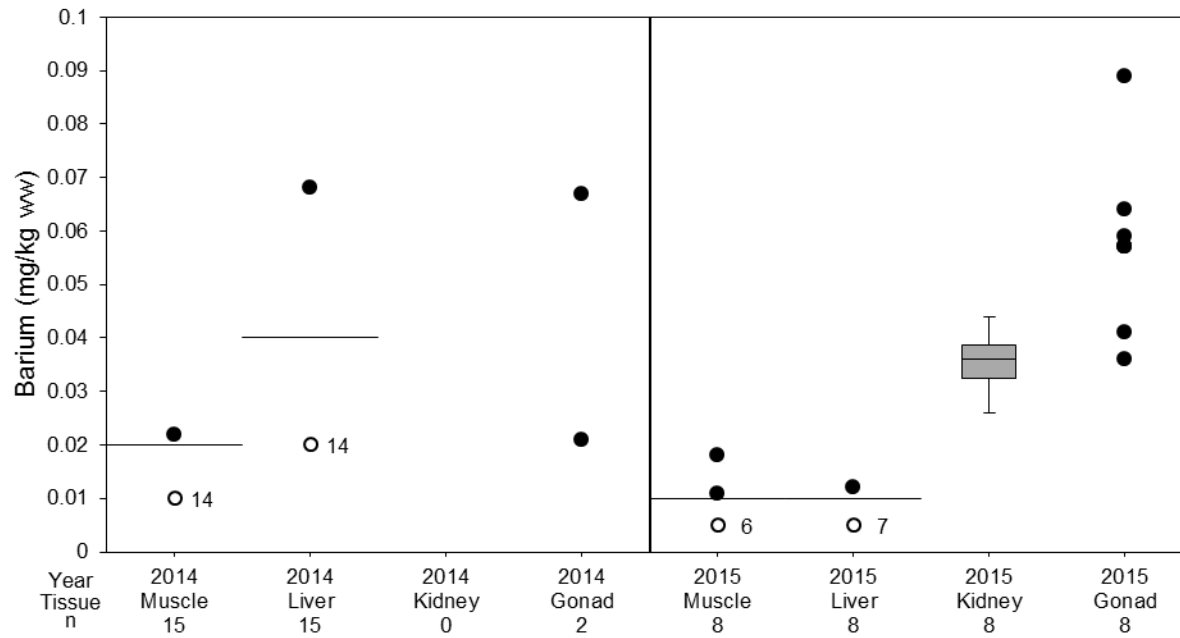
Figure 257: Barium Concentrations in Rainbow Trout Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

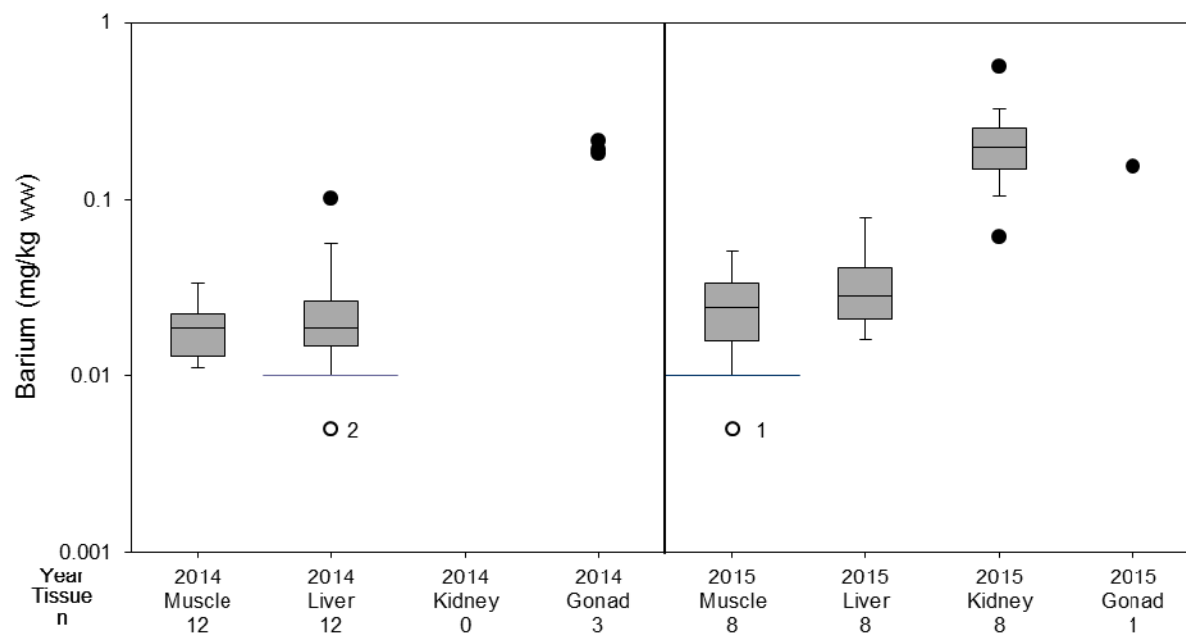
Figure 258: Barium Concentrations in Rainbow Trout Tissues Collected from Polley Lake in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 259: Barium Concentrations in Rainbow Trout Tissues Collected from Quesnel River in 2014 and 2015



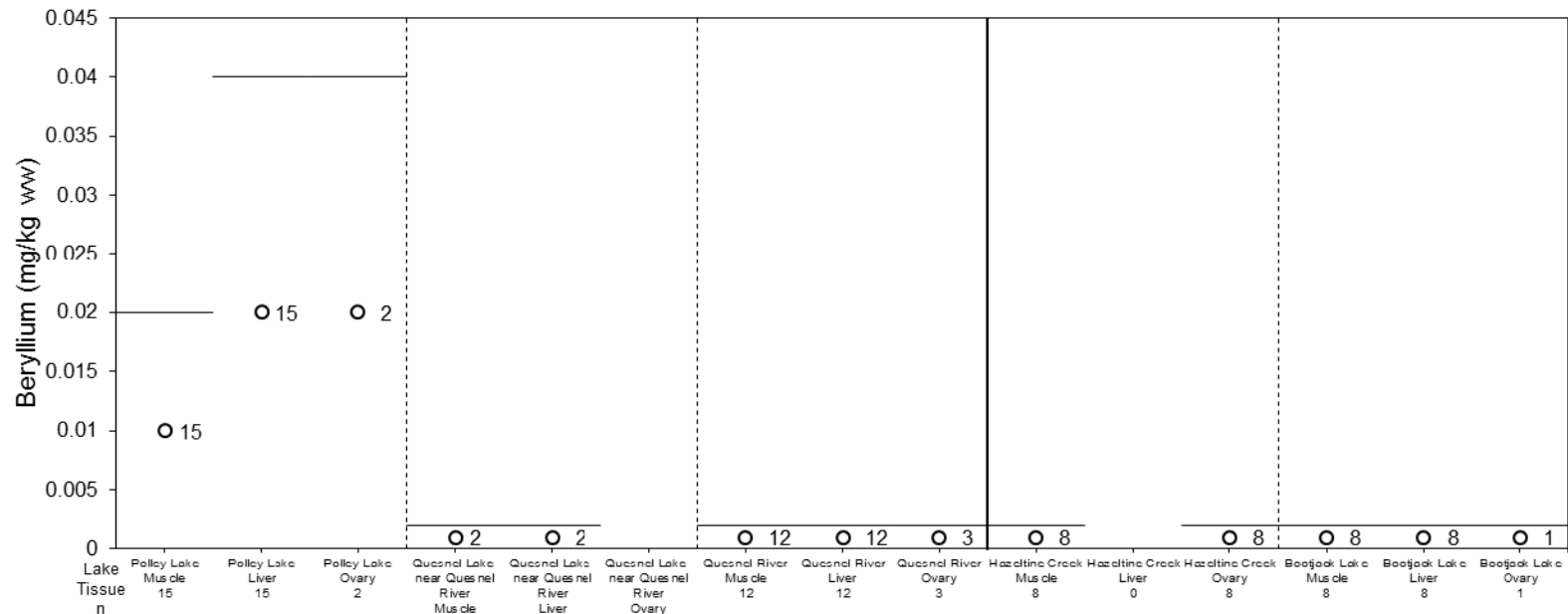
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



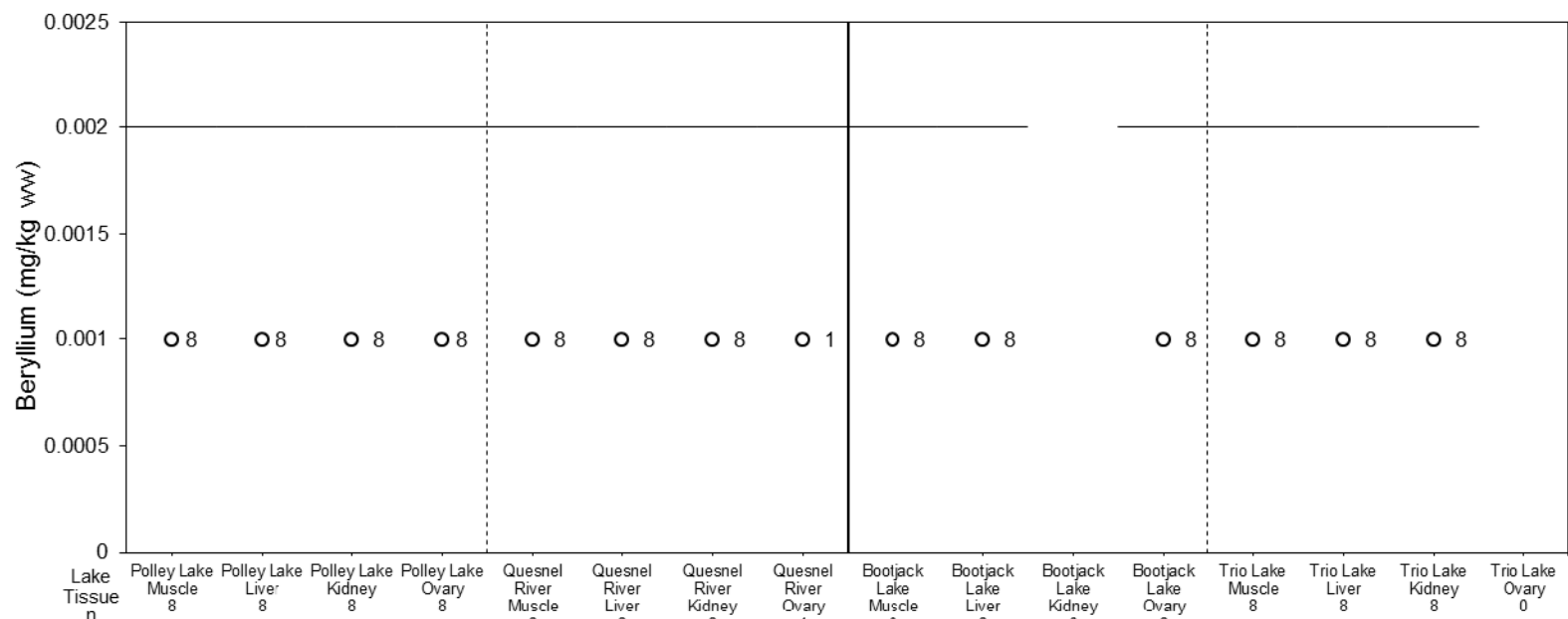
7.4 Beryllium

Figure 260: Beryllium Concentrations in Rainbow Trout Tissues Collected in 2014



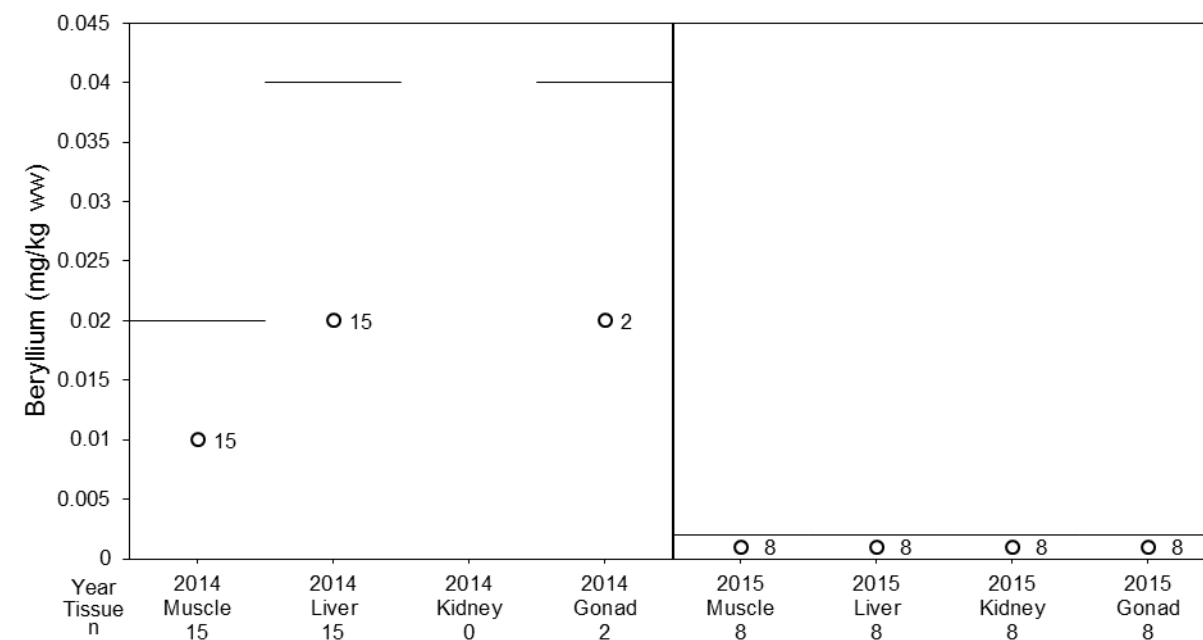
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 261: Beryllium Concentrations in Rainbow Trout Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

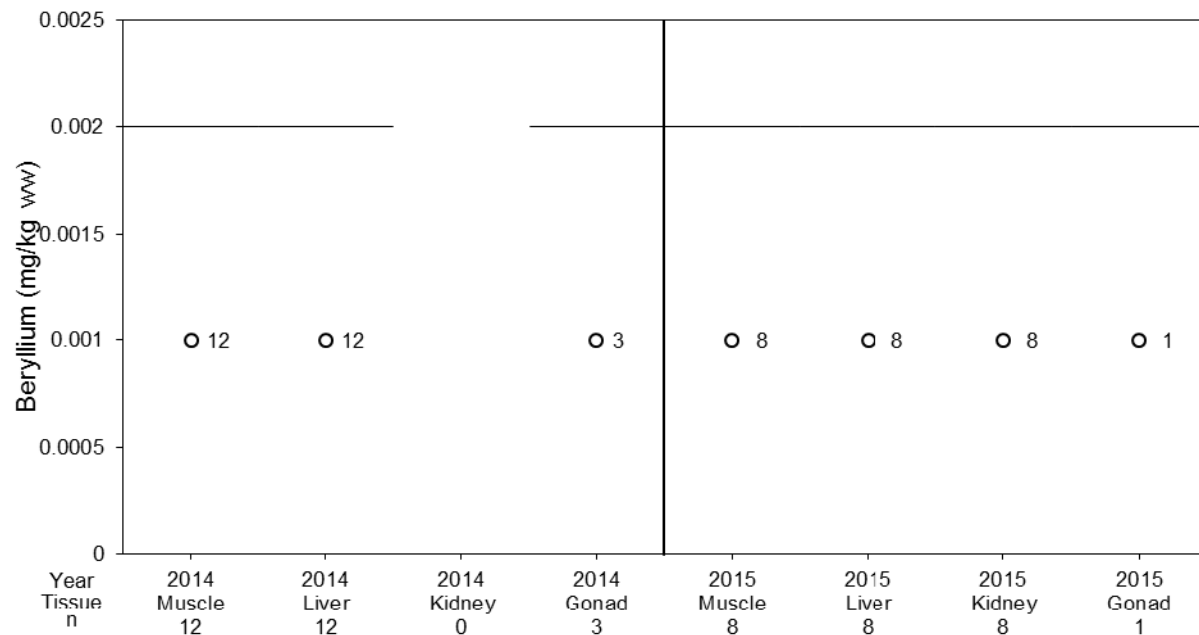
Figure 262: Beryllium Concentrations in Rainbow Trout Tissues Collected from Polley Lake in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



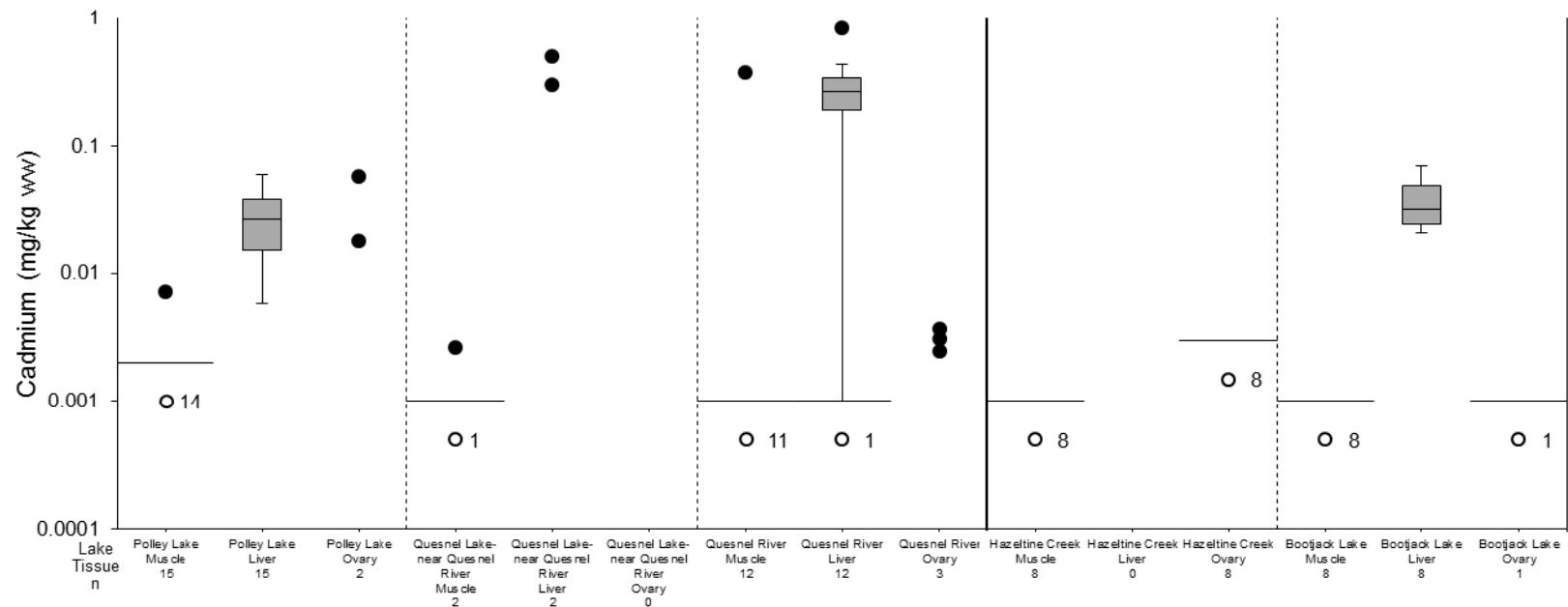
Figure 263: Beryllium Concentrations in Rainbow Trout Tissues Collected from Quesnel River in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

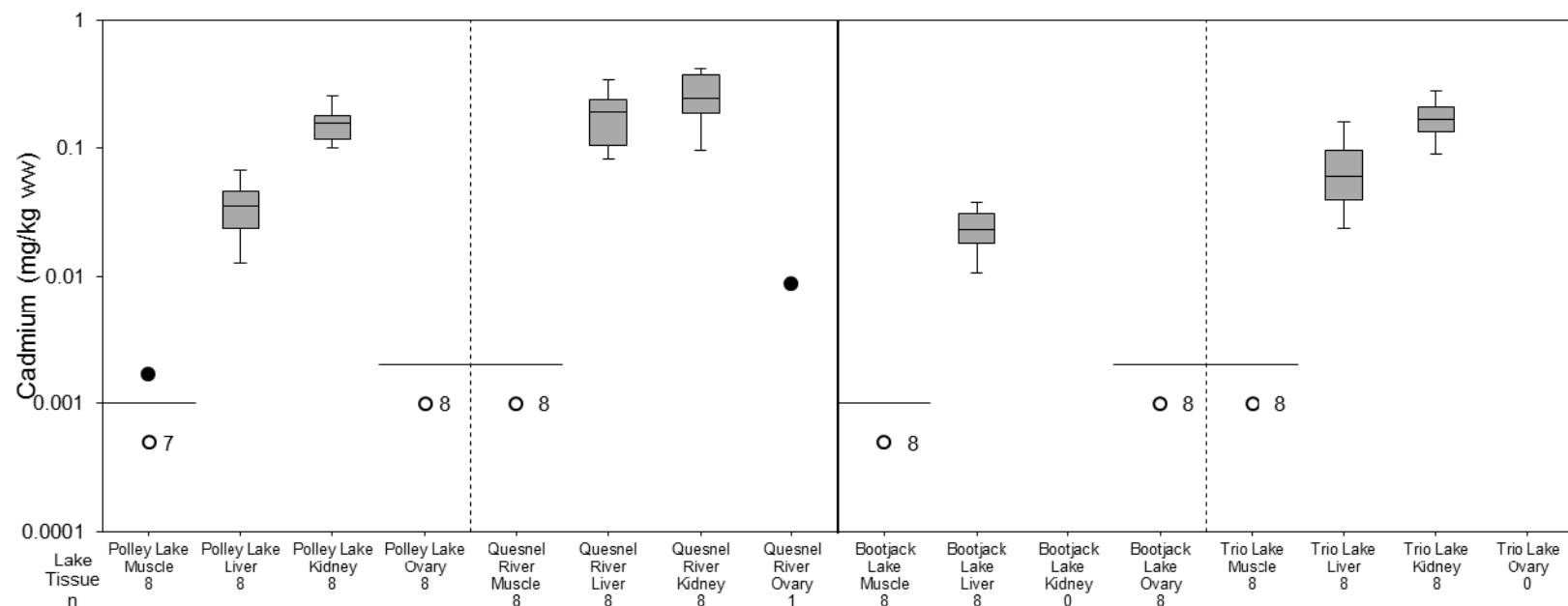
7.5 Cadmium

Figure 264: Cadmium Concentrations in Rainbow Trout Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

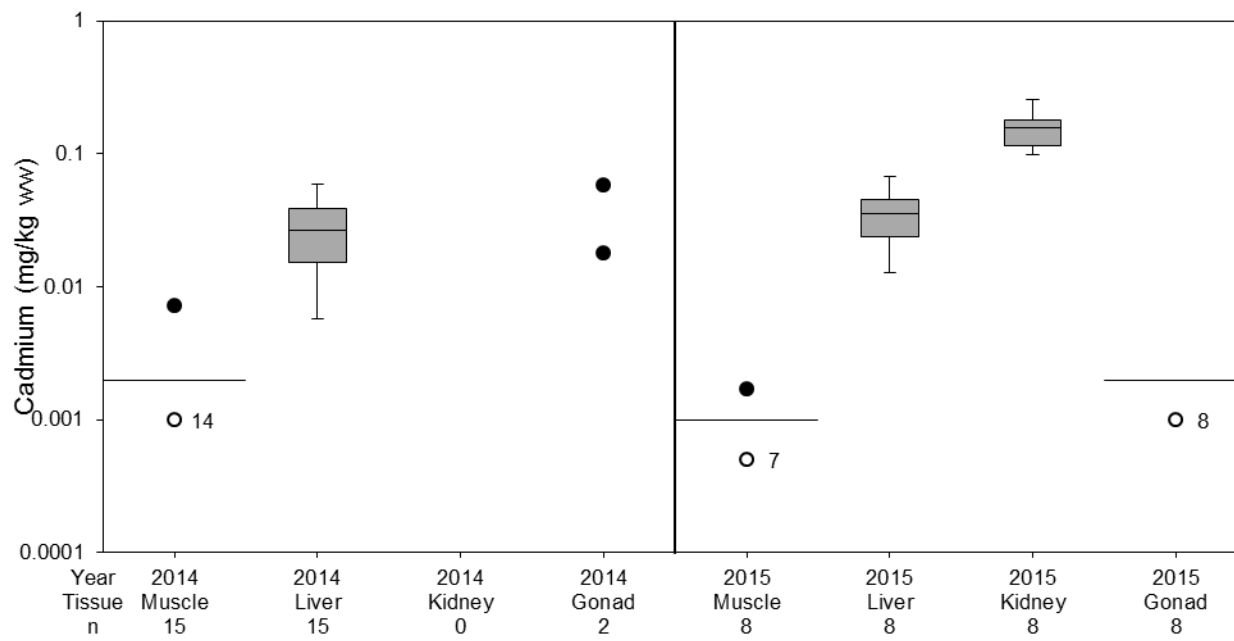
Figure 265: Cadmium Concentrations in Rainbow Trout Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

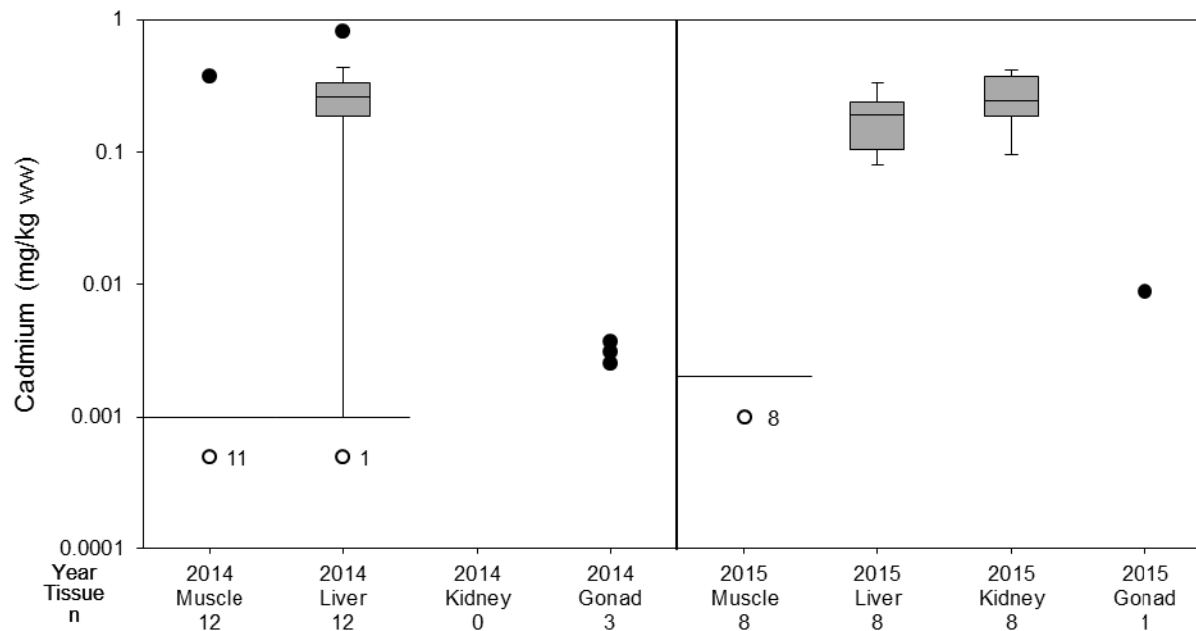


Figure 266: Cadmium Concentrations in Rainbow Trout Tissues Collected from Polley Lake in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

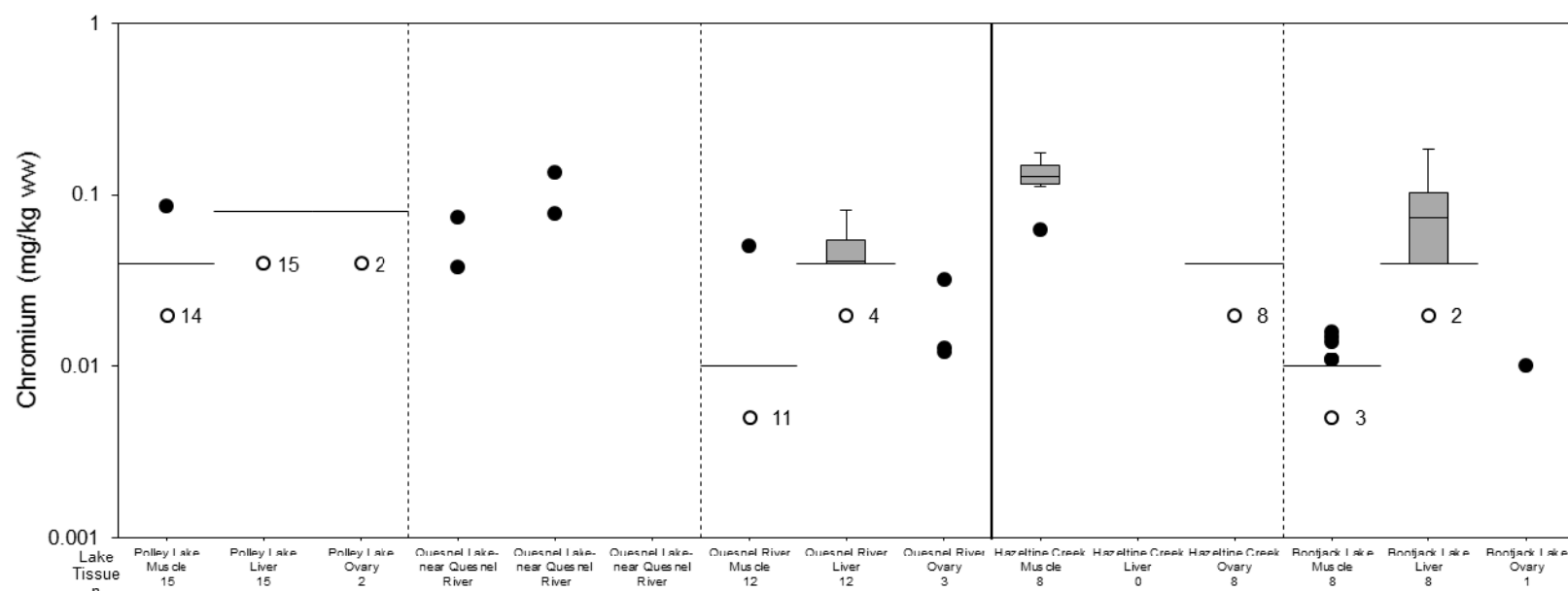
Figure 267: Cadmium Concentrations in Rainbow Trout Tissues Collected from Quesnel River in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

7.6 Chromium

Figure 268: Chromium Concentrations in Rainbow Trout Tissues Collected in 2014

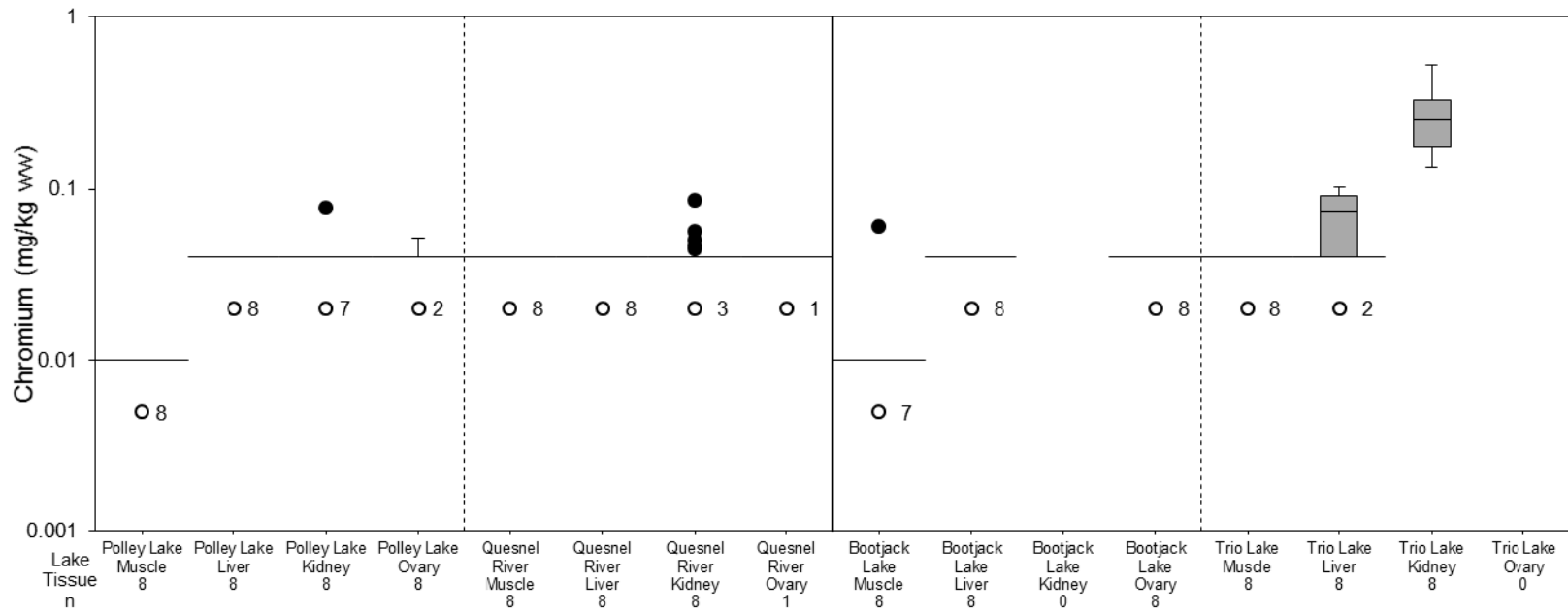


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



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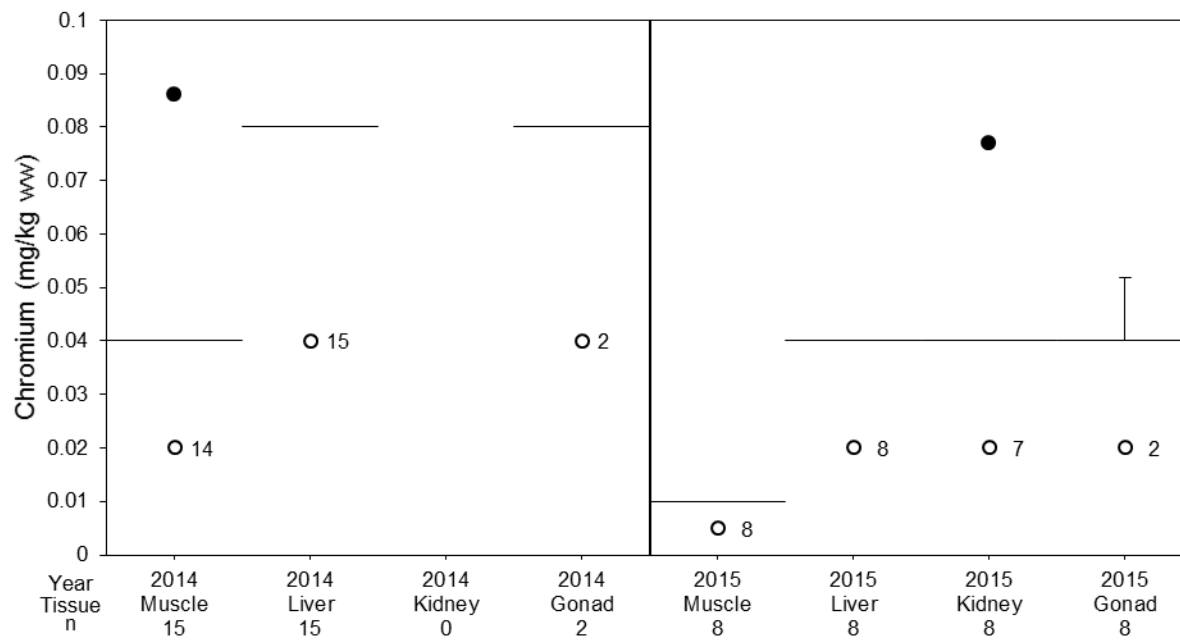
Figure 269: Chromium Concentrations in Rainbow Trout Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

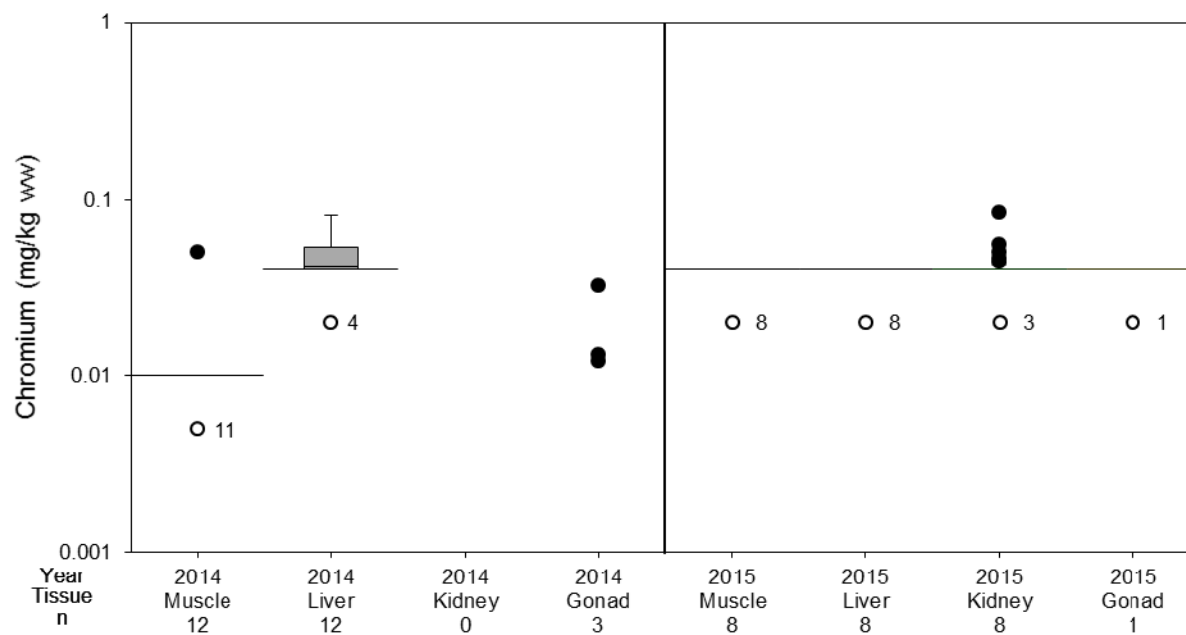
Figure 270: Chromium Concentrations in Rainbow Trout Tissues Collected from Polley Lake in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 271: Chromium Concentrations in Rainbow Trout Tissues Collected from Quesnel River in 2014 and 2015



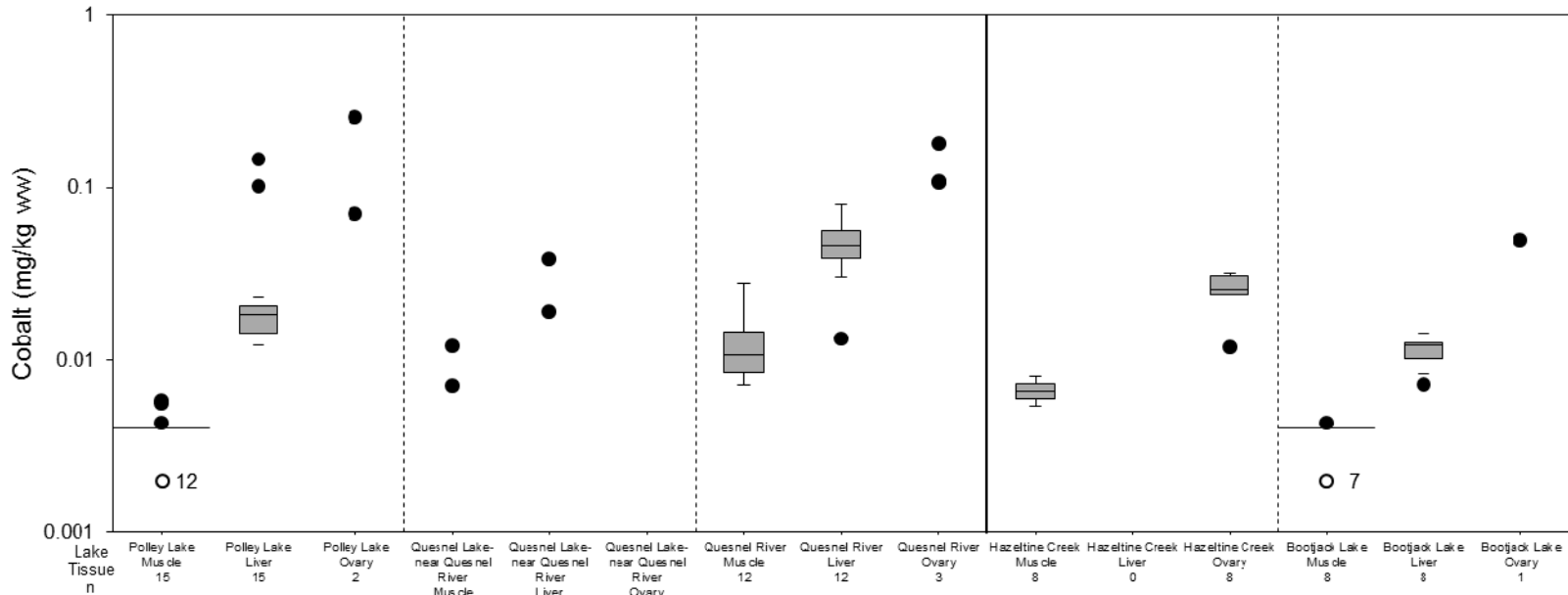
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale..



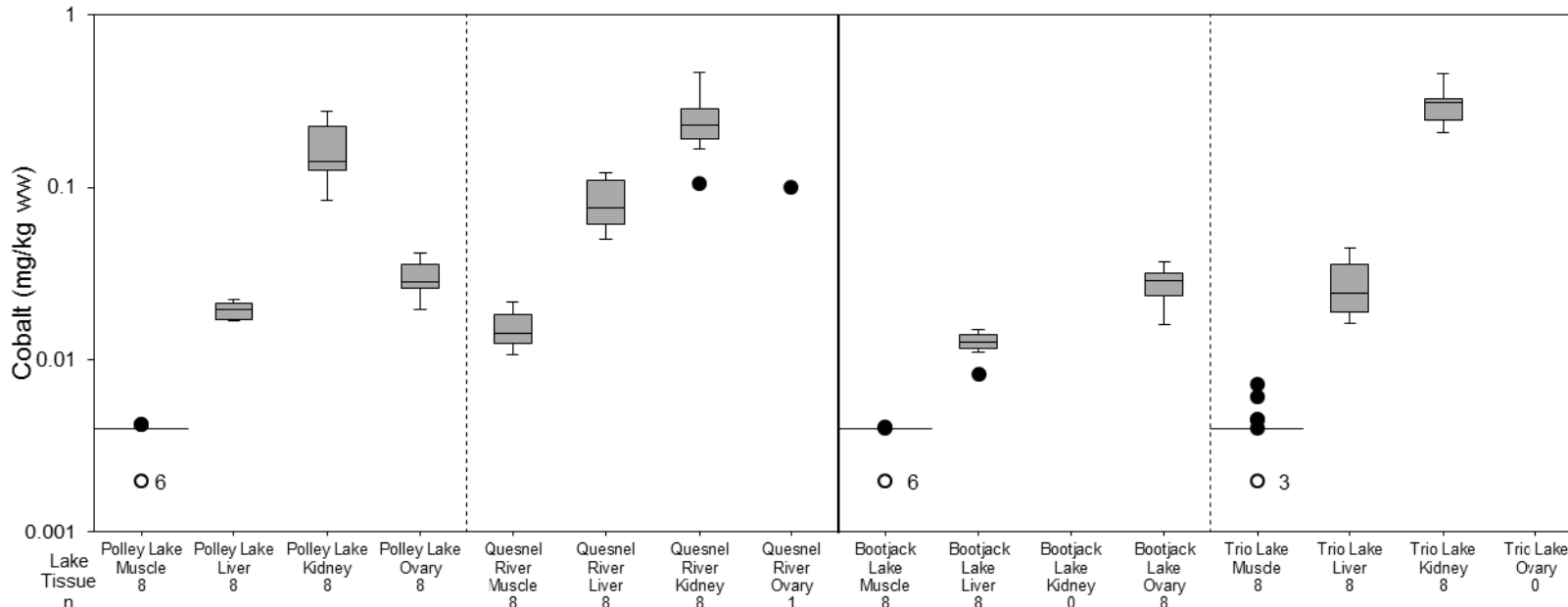
7.7 Cobalt

Figure 272: Cobalt Concentrations in Rainbow Trout Tissues Collected in 2014



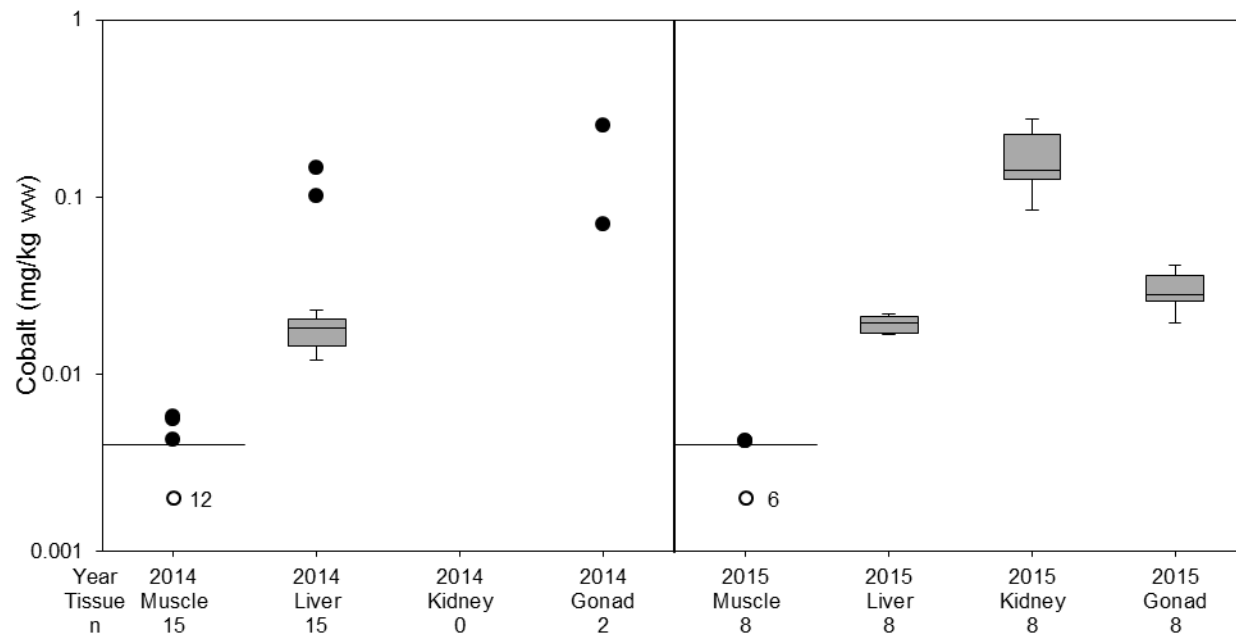
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 273: Cobalt Concentrations in Rainbow Trout Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

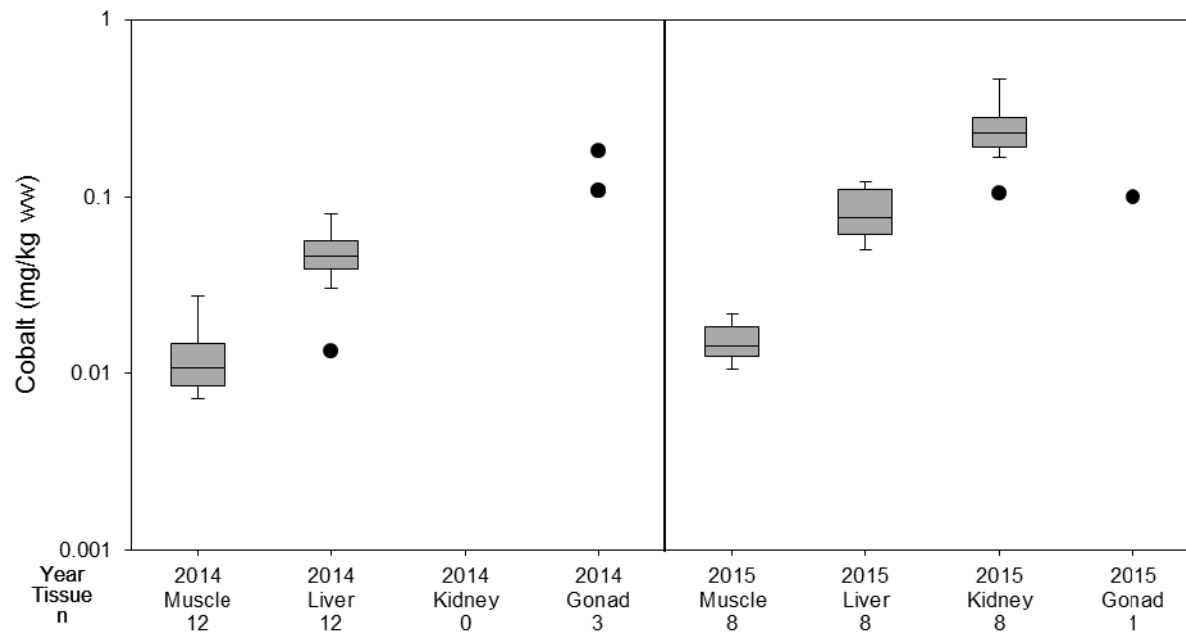
Figure 274: Cobalt Concentrations in Rainbow Trout Tissues Collected from Polley Lake in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



Figure 275: Cobalt Concentrations in Rainbow Trout Tissues Collected from Quesnel River in 2014 and 2015

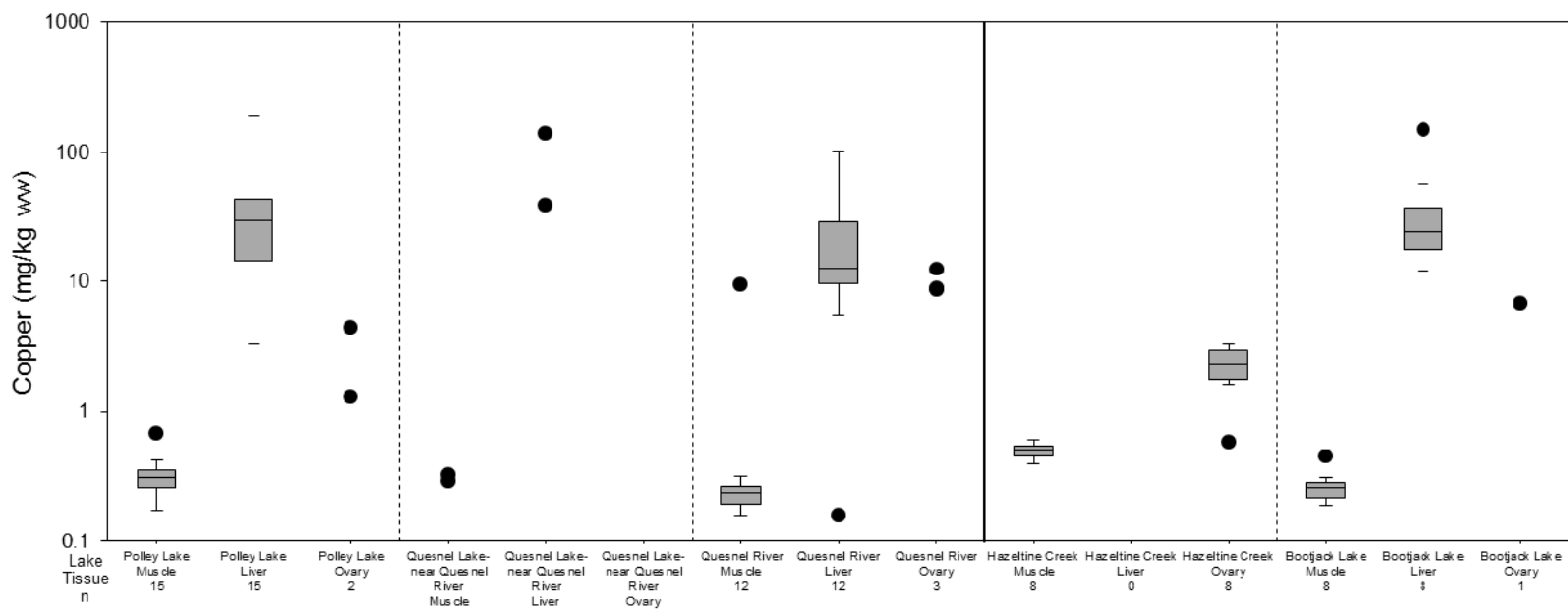


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

7.8 Copper

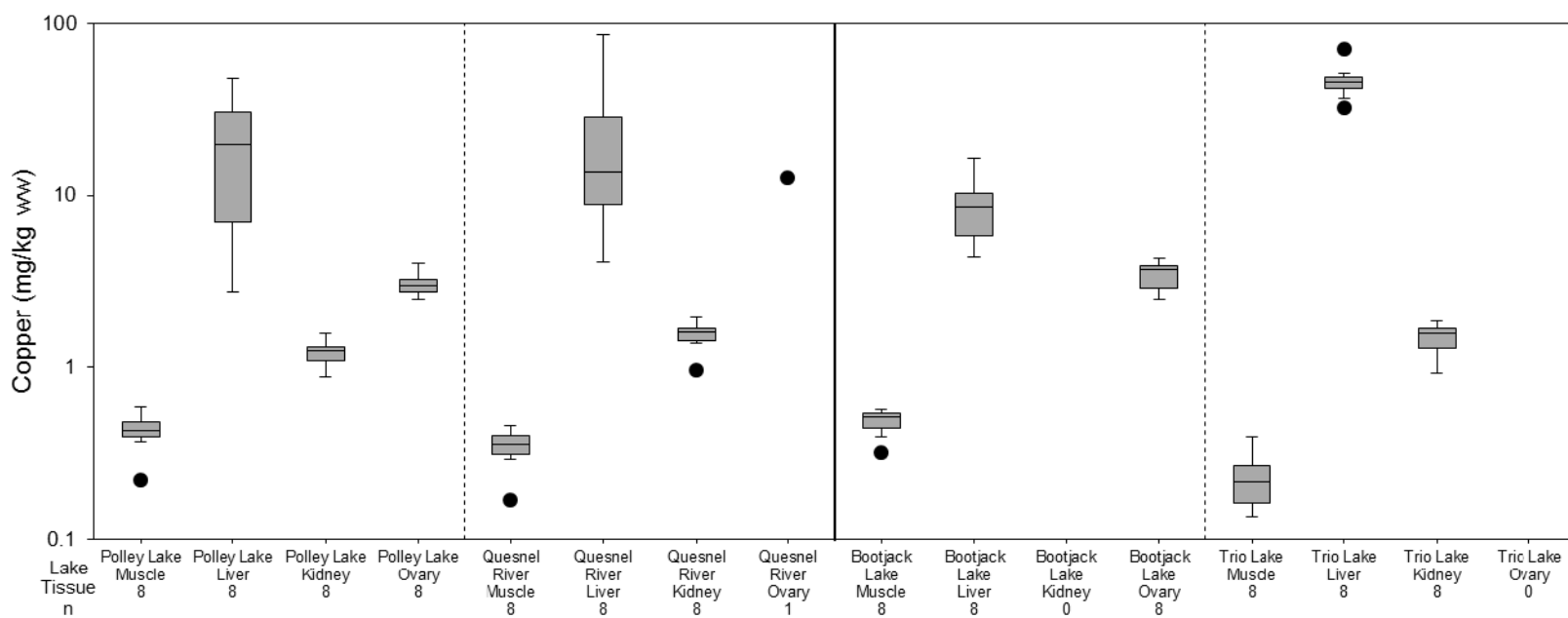
Figure 276: Copper Concentrations in Rainbow Trout Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 277: Copper Concentrations in Rainbow Trout Tissues Collected in 2015

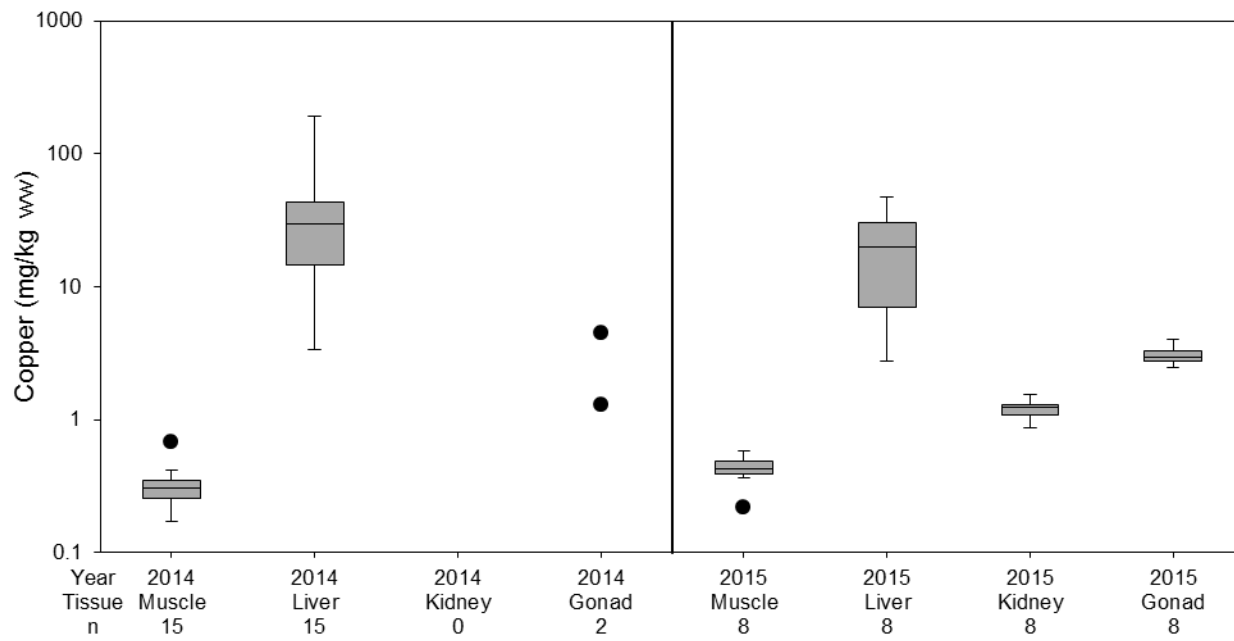


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

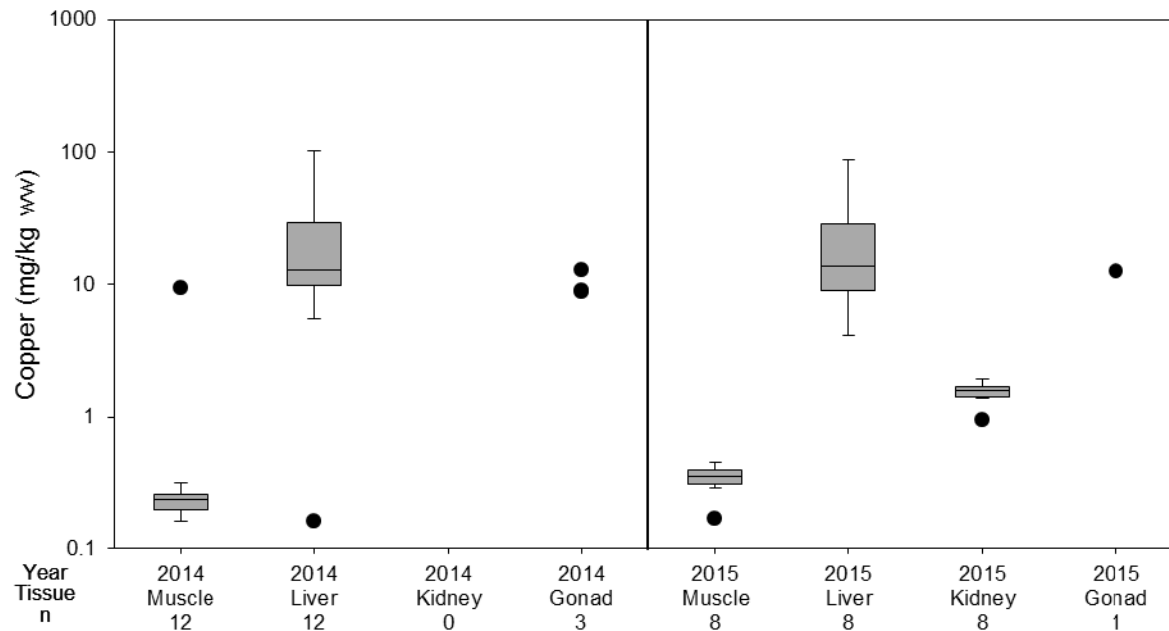


Figure 278: Copper Concentrations in Rainbow Trout Tissues Collected from Polley Lake in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

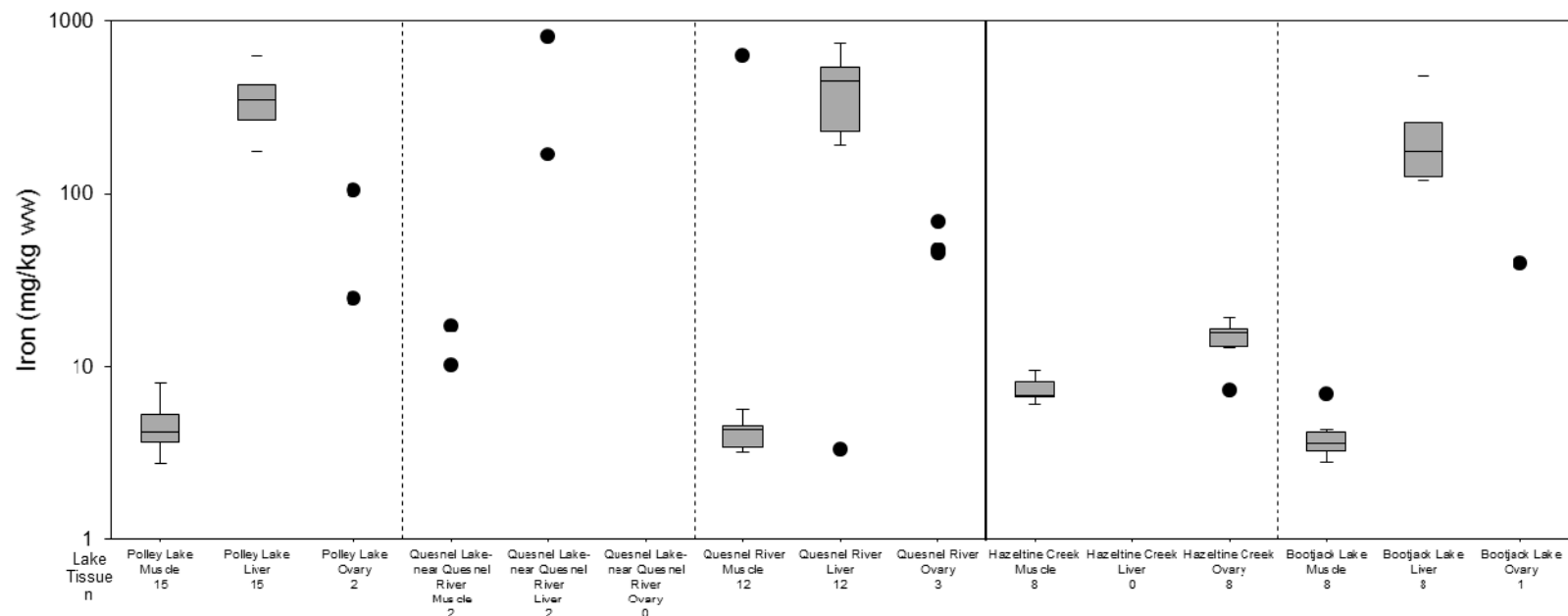
Figure 279: Copper Concentrations in Rainbow Trout Tissues Collected from Quesnel River in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

7.9 Iron

Figure 280: Iron Concentrations in Rainbow Trout Tissues Collected in 2014

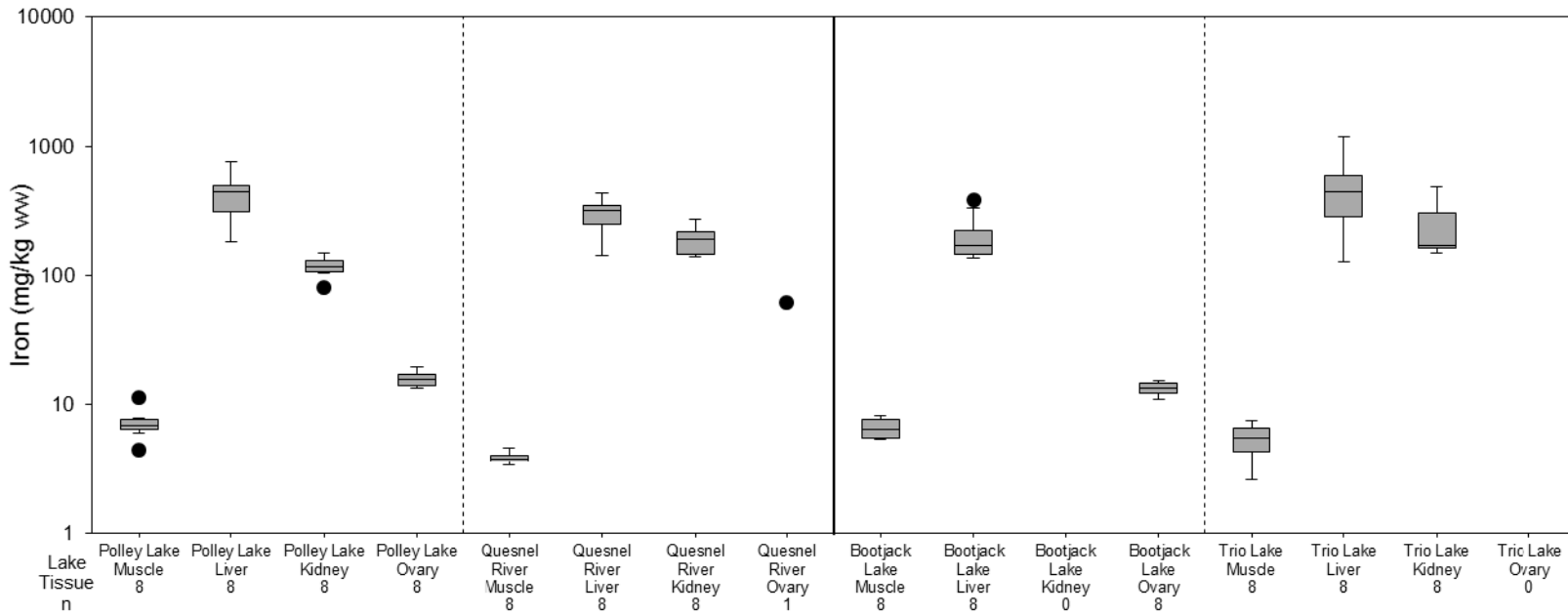


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 281: Iron Concentrations in Rainbow Trout Tissues Collected in 2015



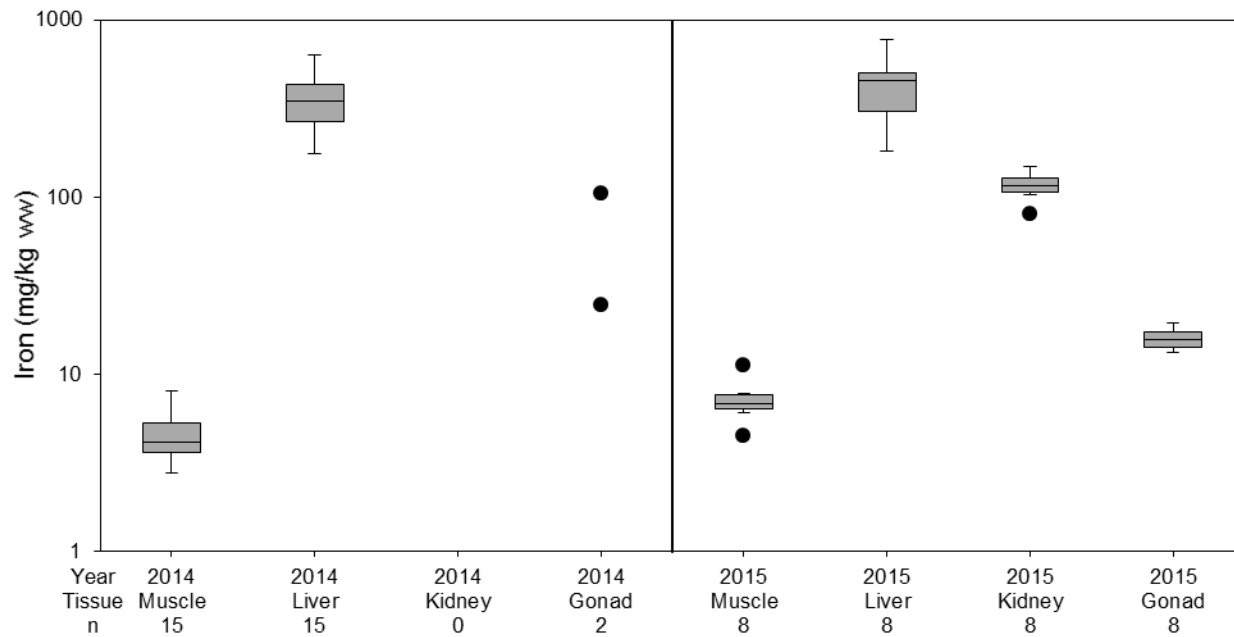
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Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

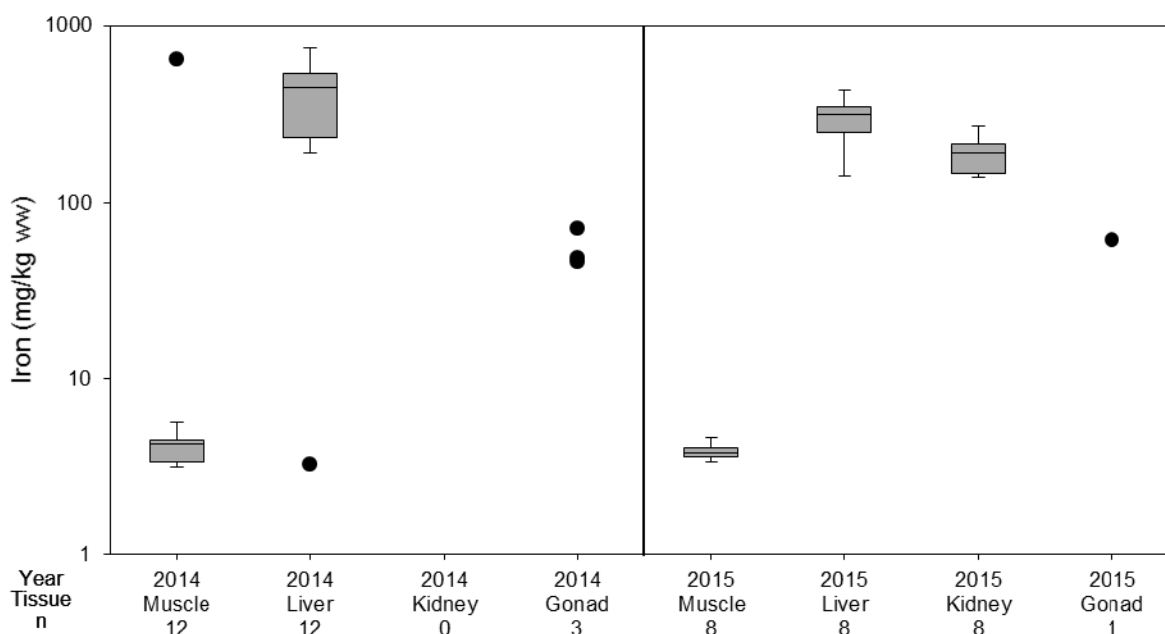
Figure 282: Iron Concentrations in Rainbow Trout Tissues Collected from Polley Lake in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 283: Iron Concentrations in Rainbow Trout Tissues Collected from Quesnel River in 2014 and 2015



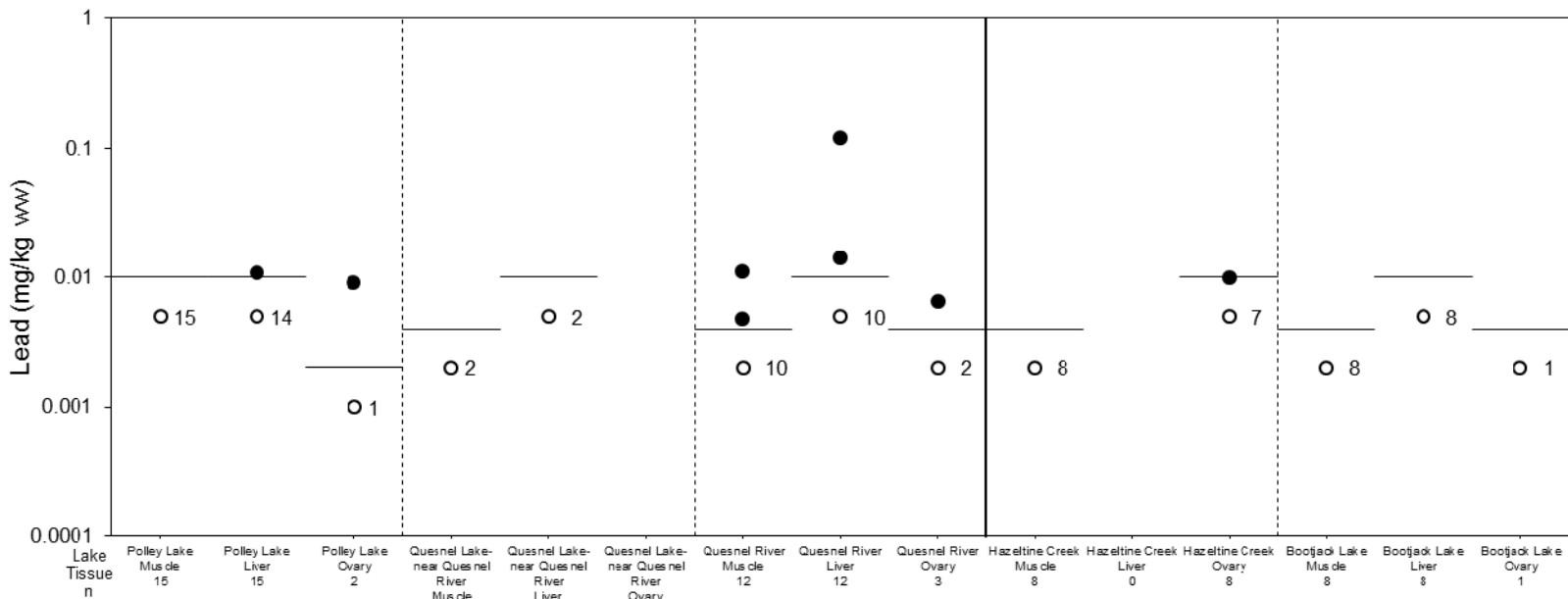
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



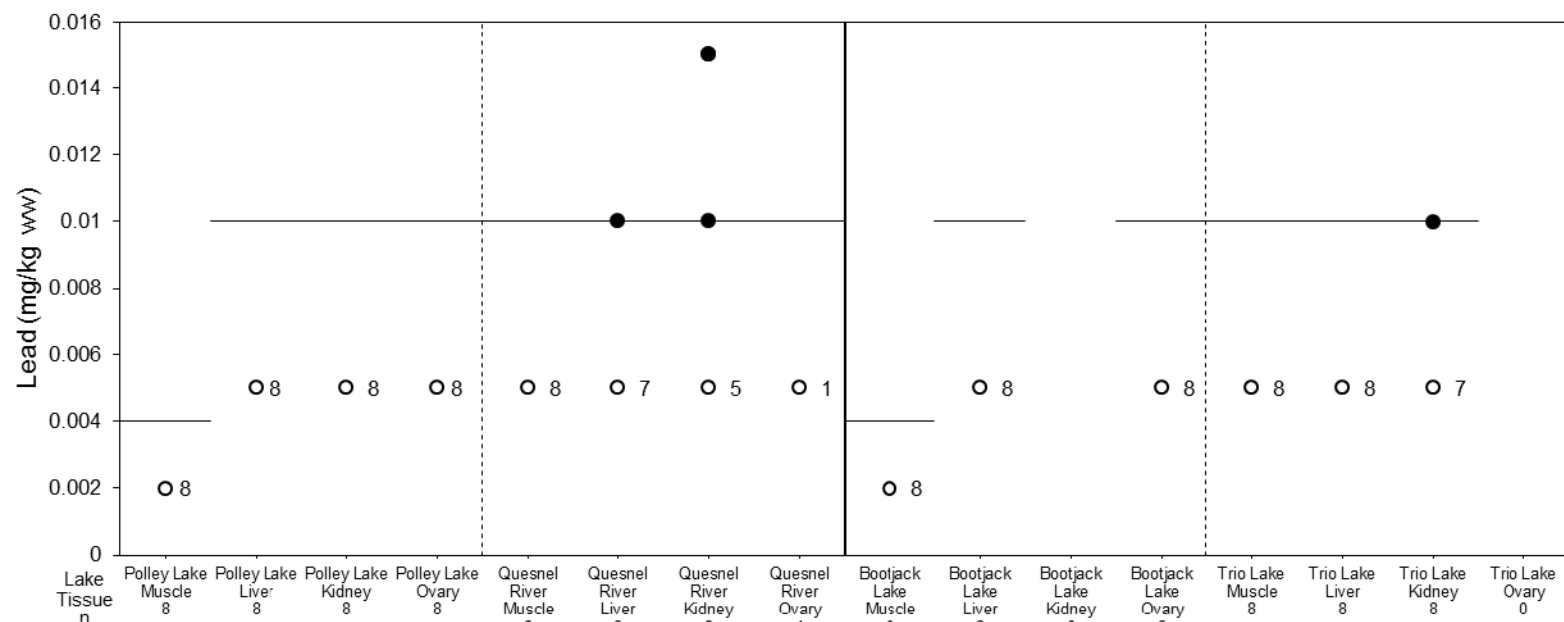
7.10 Lead

Figure 284: Lead Concentrations in Rainbow Trout Tissues Collected in 2014



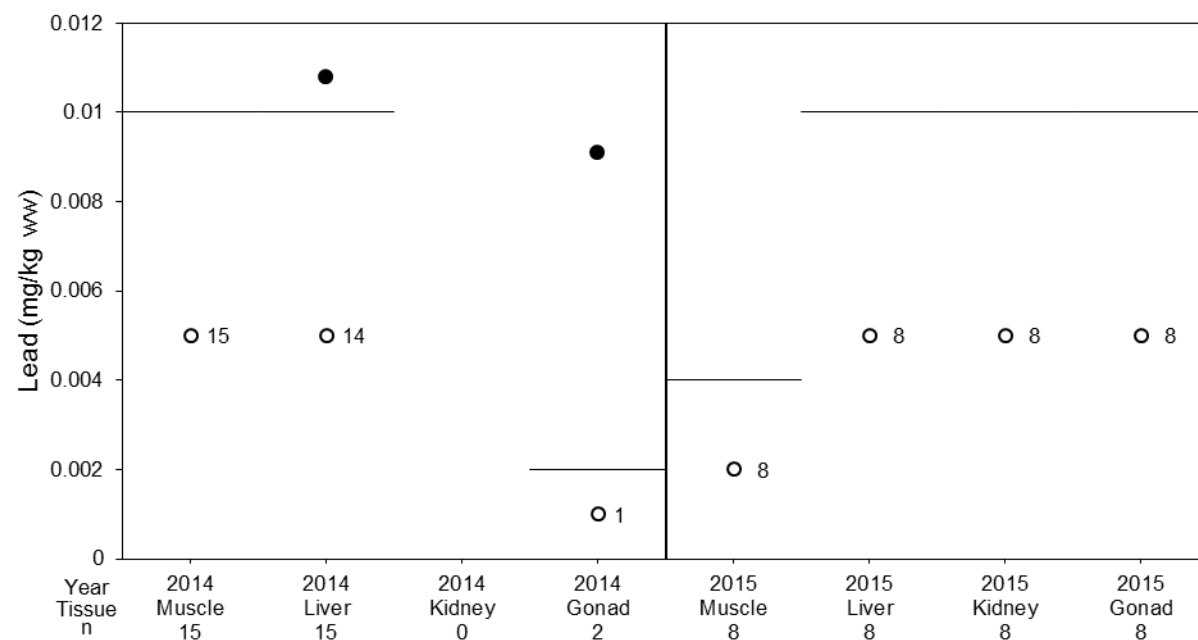
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 285: Lead Concentrations in Rainbow Trout Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

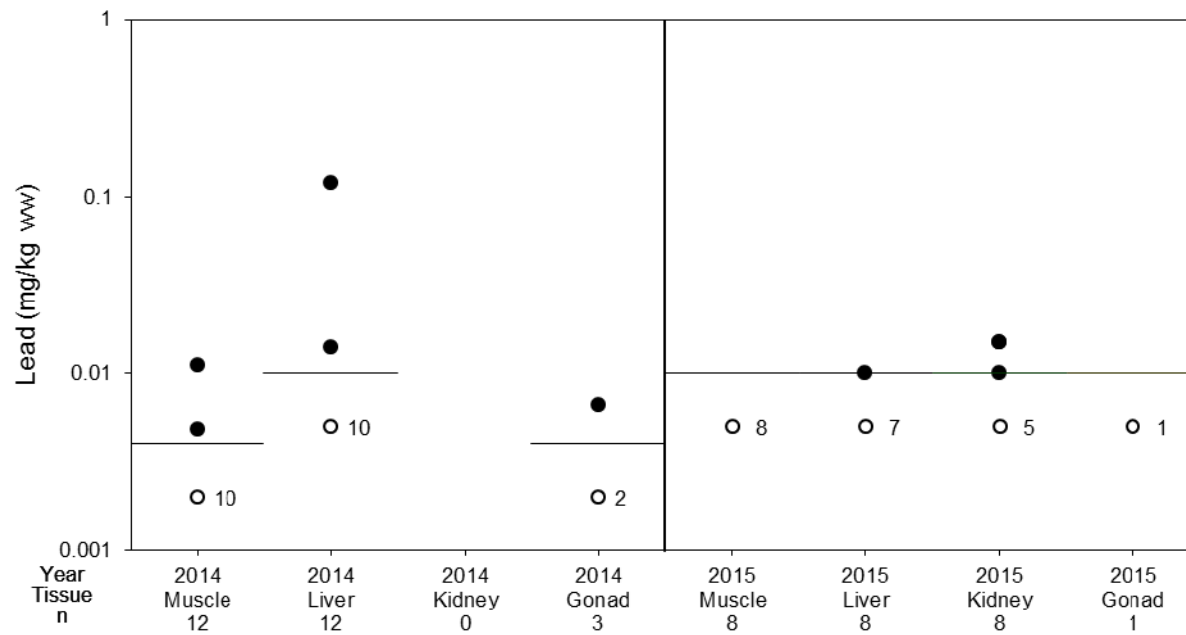
Figure 286: Lead Concentrations in Rainbow Trout Tissues Collected from Polley Lake in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



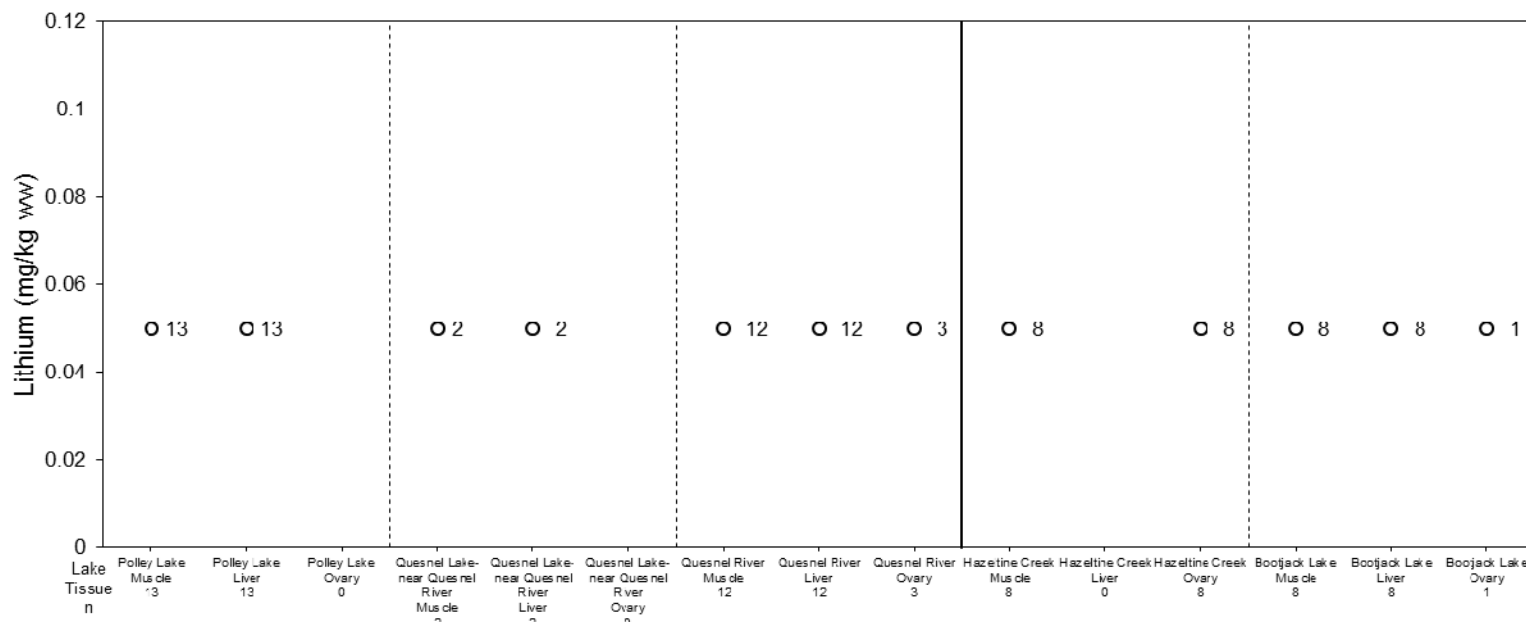
Figure 287: Lead Concentrations in Rainbow Trout Tissues Collected from Quesnel River in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

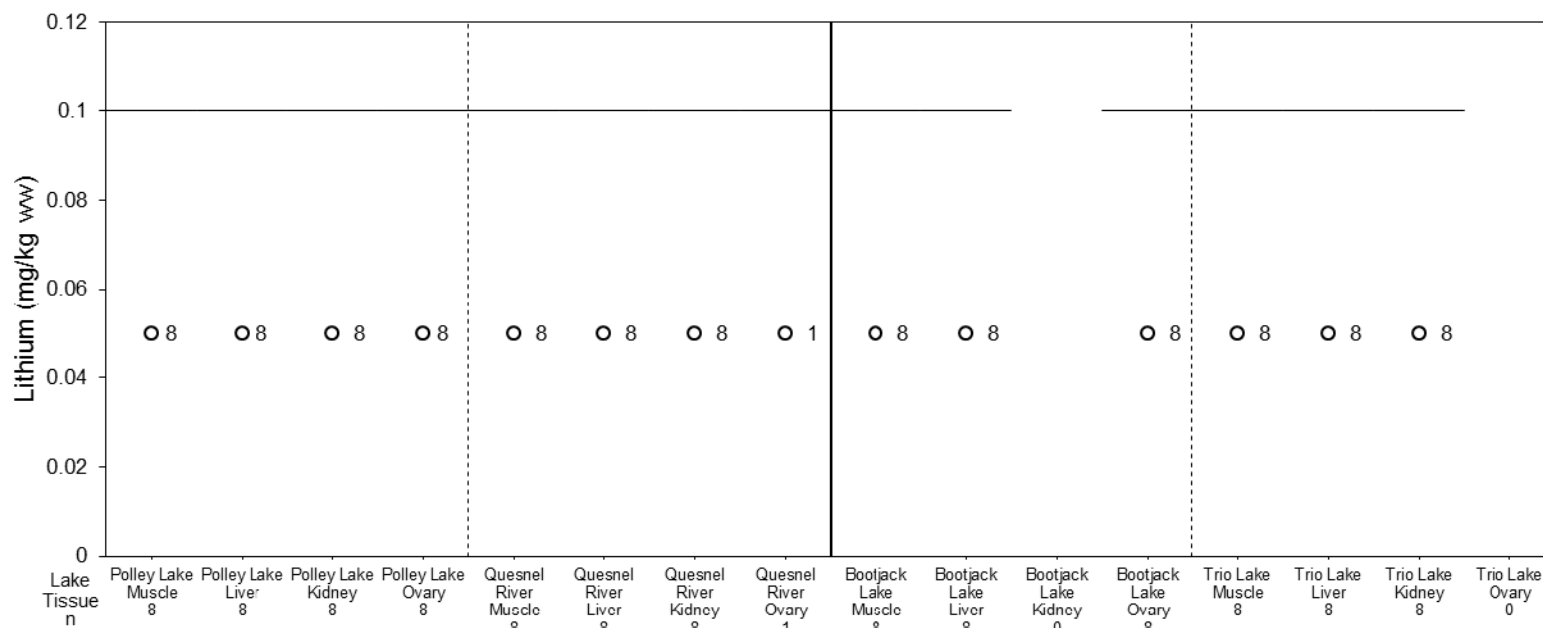
7.11 Lithium

Figure 288: Lithium Concentrations in Rainbow Trout Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

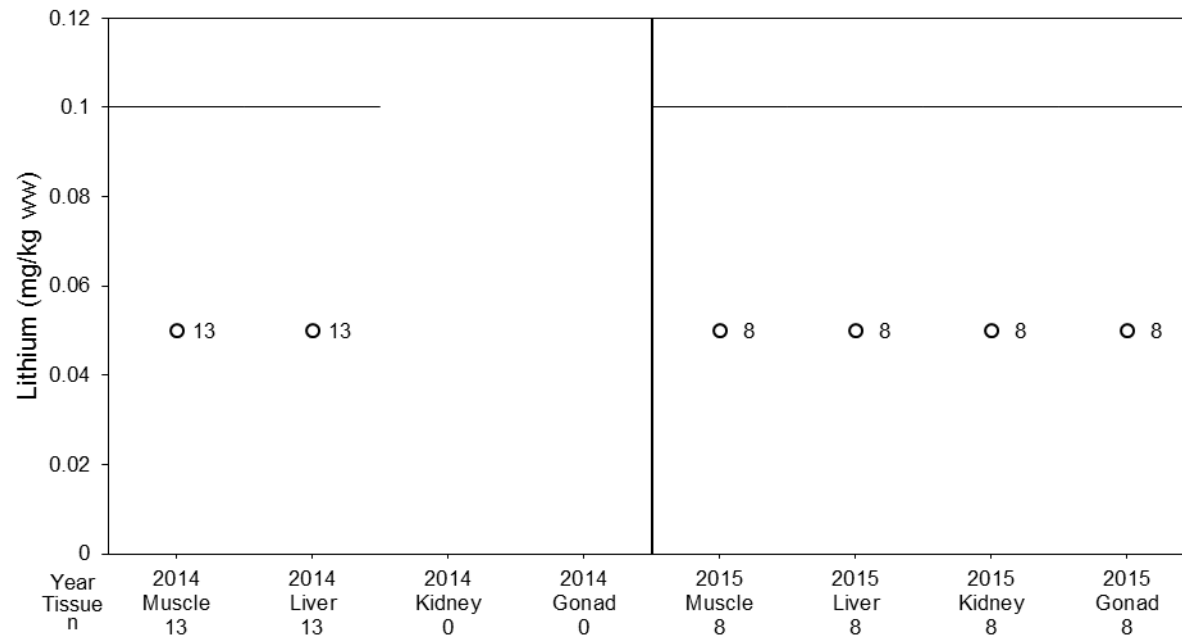
Figure 289: Lithium Concentrations in Rainbow Trout Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

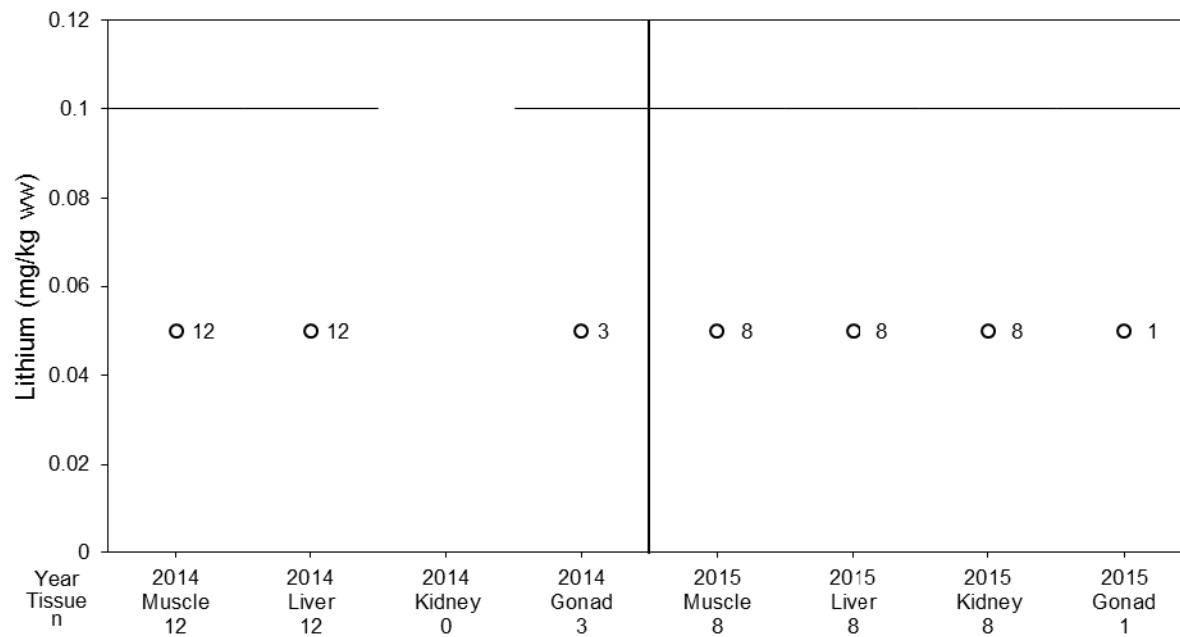


Figure 290: Lithium Concentrations in Rainbow Trout Tissues Collected from Polley Lake in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

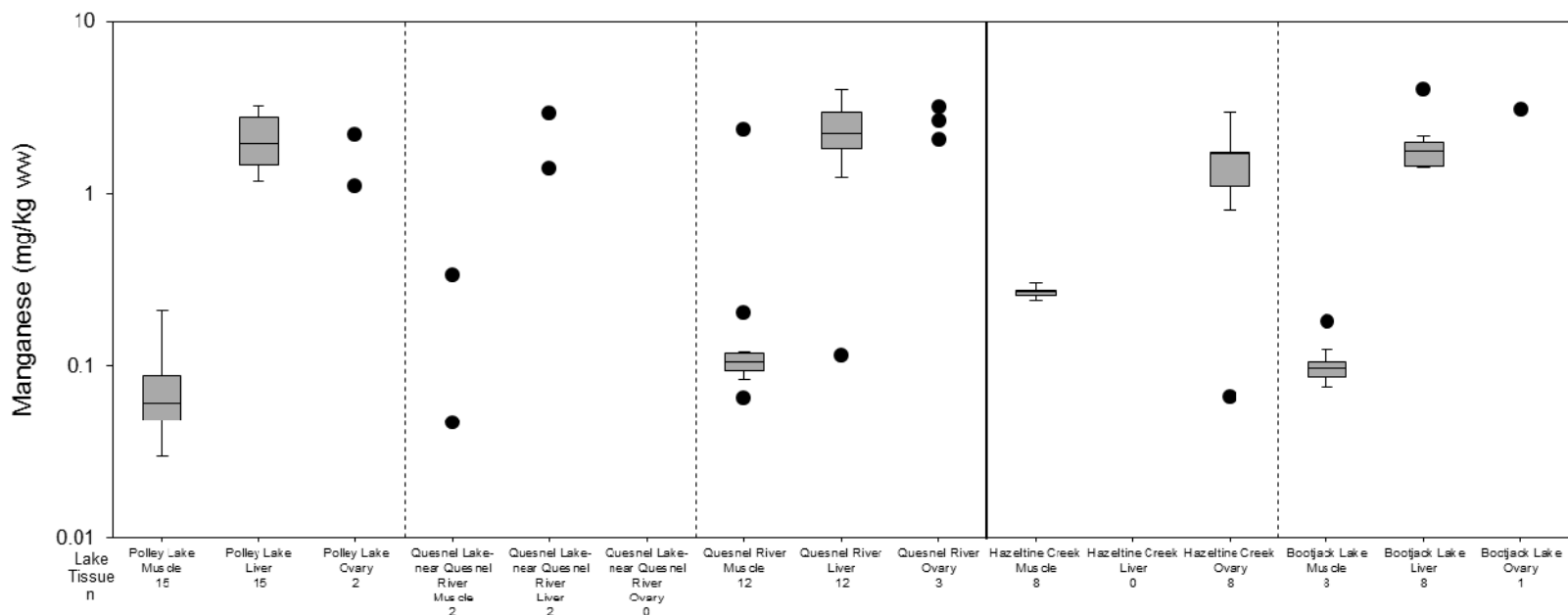
Figure 291: Lithium Concentrations in Rainbow Trout Tissues Collected from Quesnel River in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

7.12 Manganese

Figure 292: Manganese Concentrations in Rainbow Trout Tissues Collected in 2014

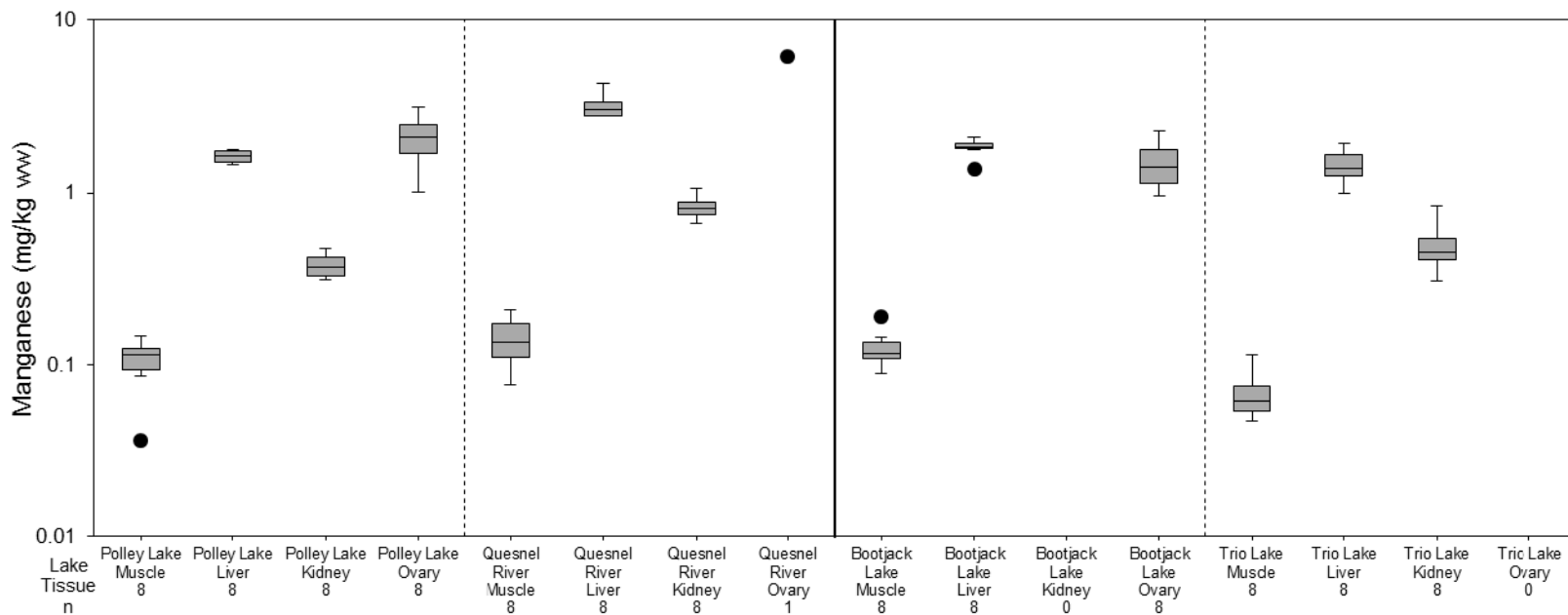


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



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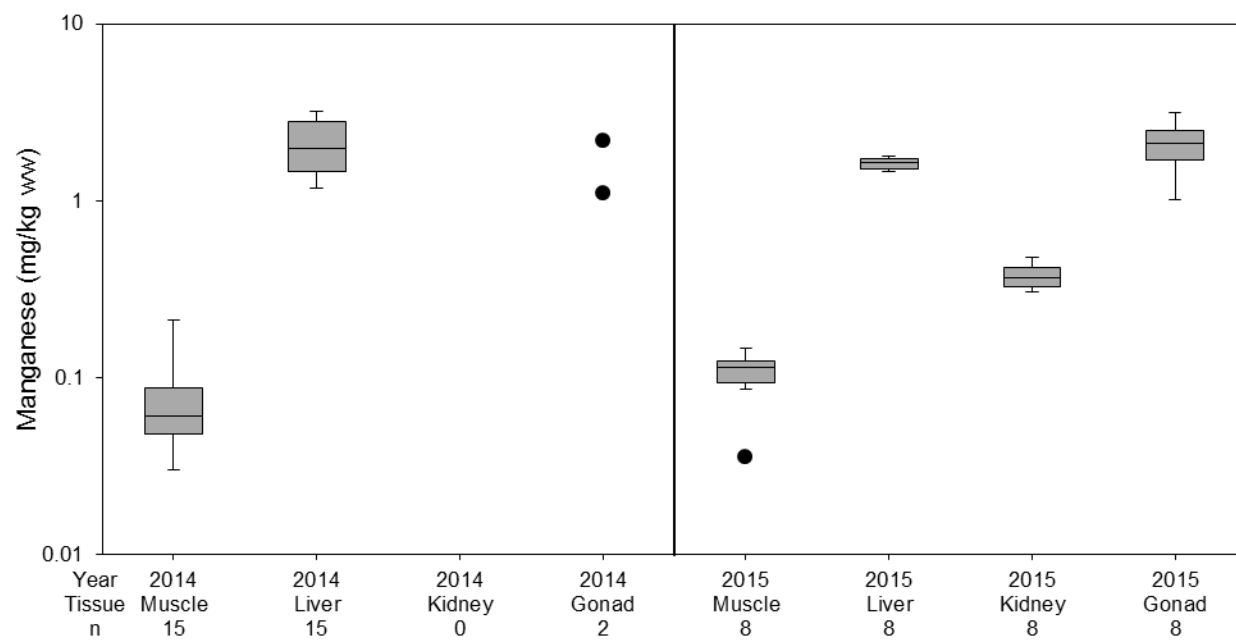
Figure 293: Manganese Concentrations in Rainbow Trout Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

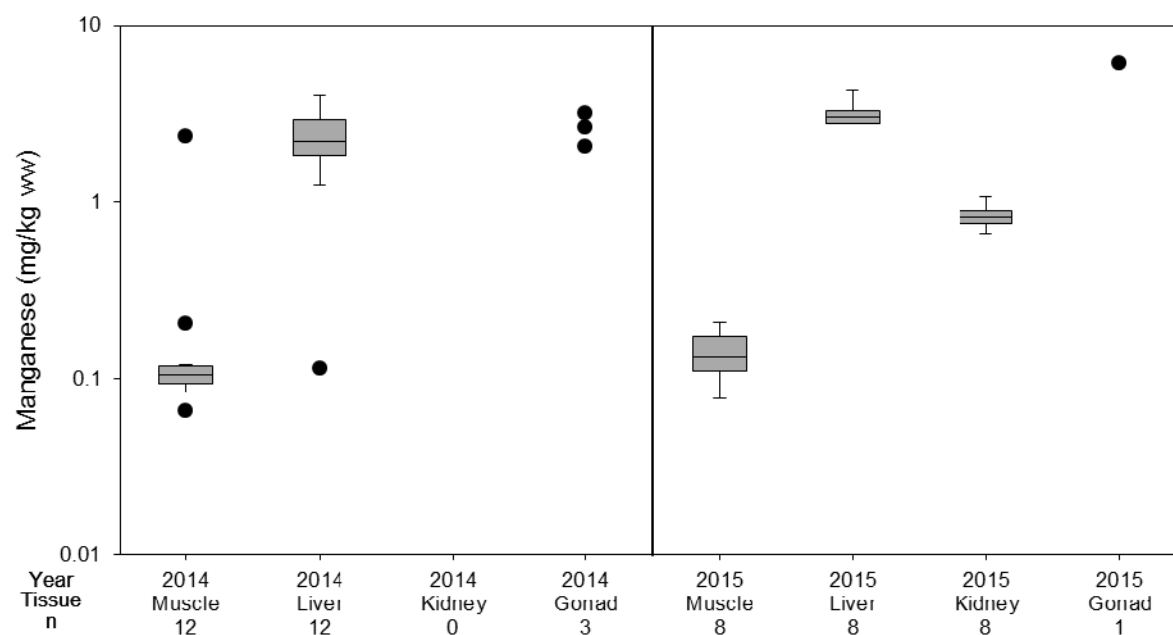
Figure 294: Manganese Concentrations in Rainbow Trout Tissues Collected from Polley Lake in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 295: Manganese Concentrations in Rainbow Trout Tissues Collected from Quesnel River in 2014 and 2015



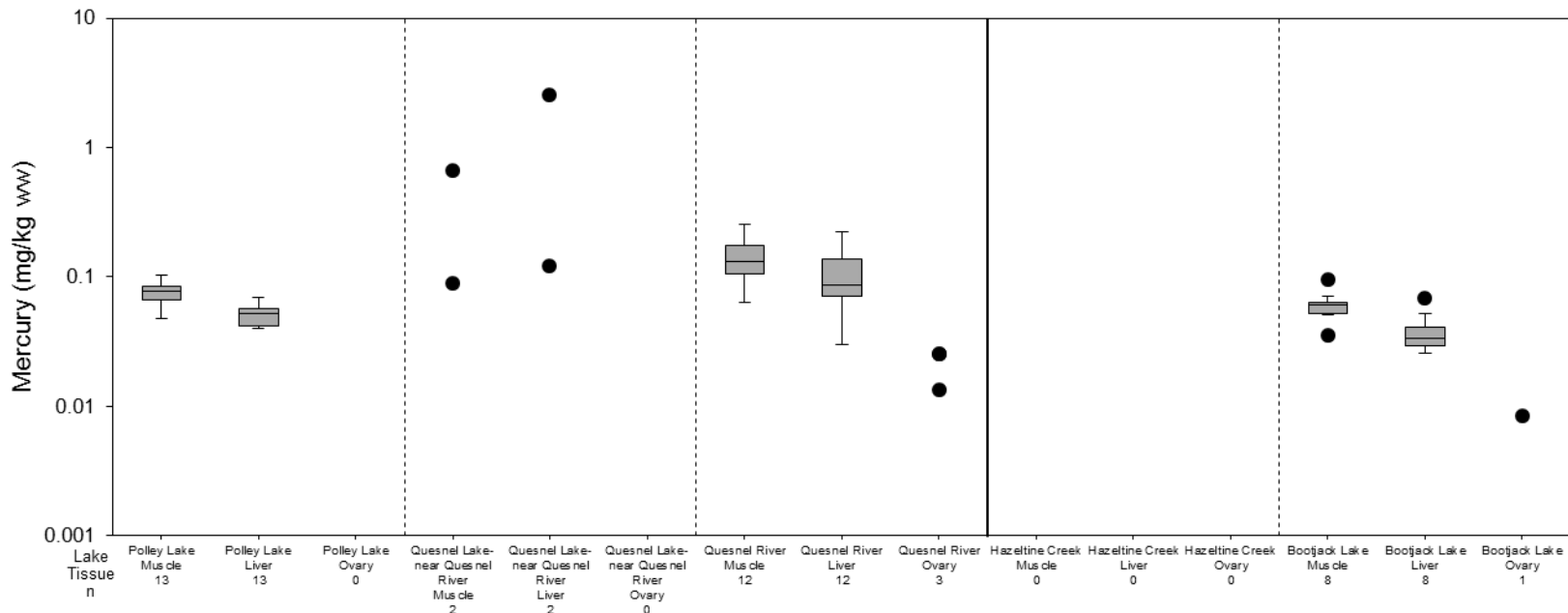
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



7.13 Mercury

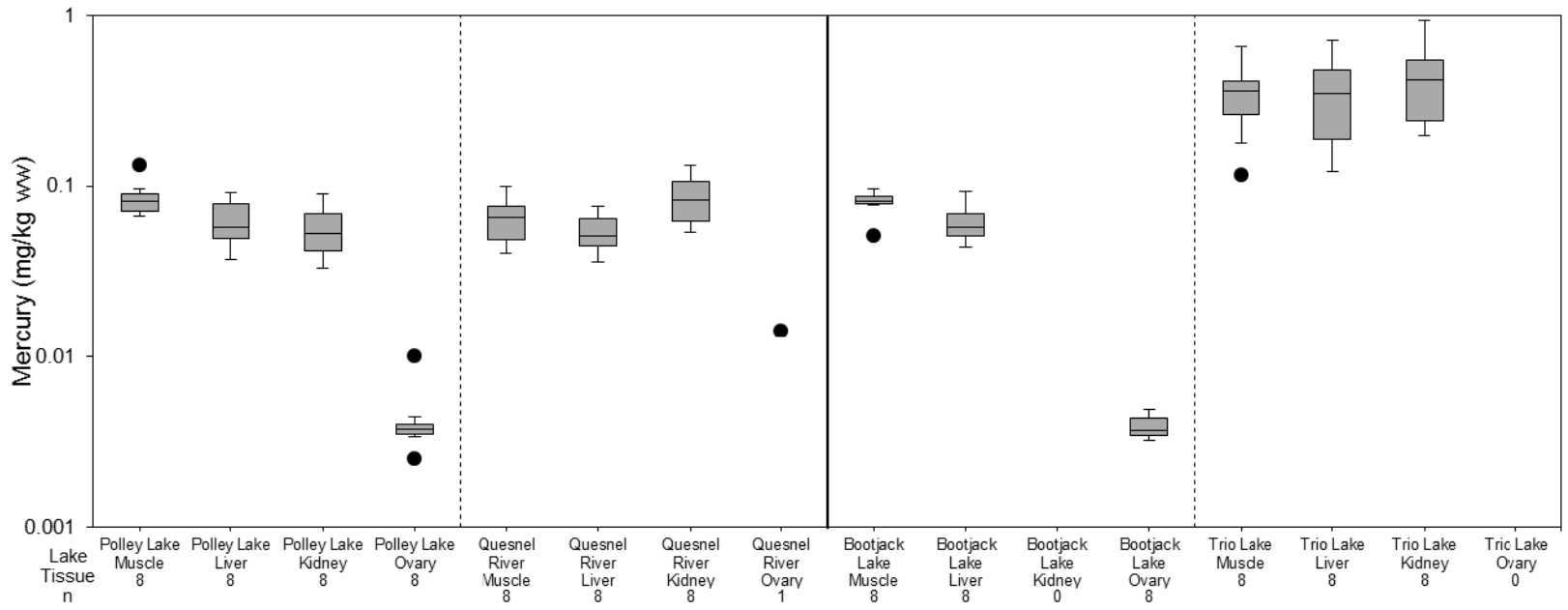
Figure 296: Mercury Concentrations in Rainbow Trout Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

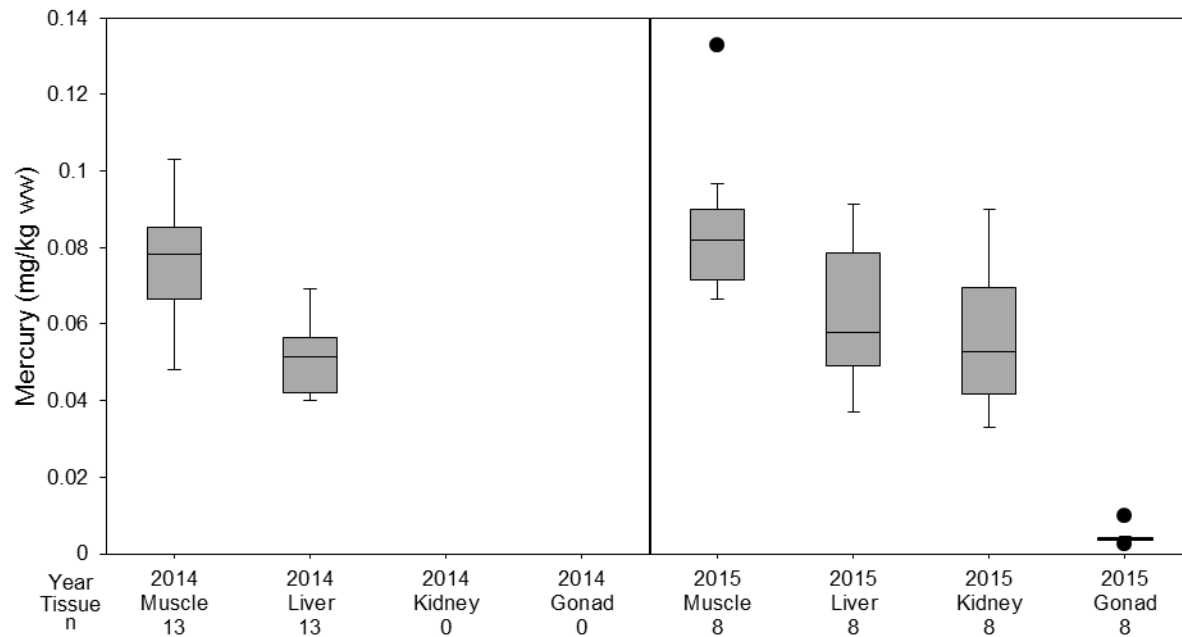
Figure 297: Mercury Concentrations in Rainbow Trout Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 298: Mercury Concentrations in Rainbow Trout Tissues Collected from Polley Lake in 2014 and 2015



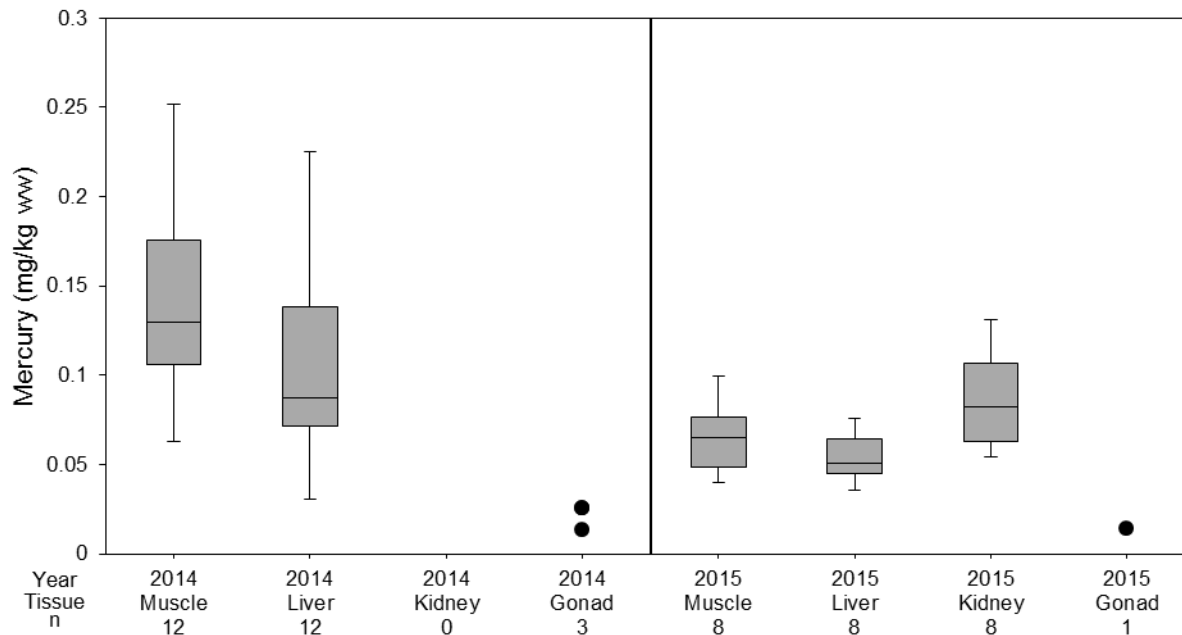
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



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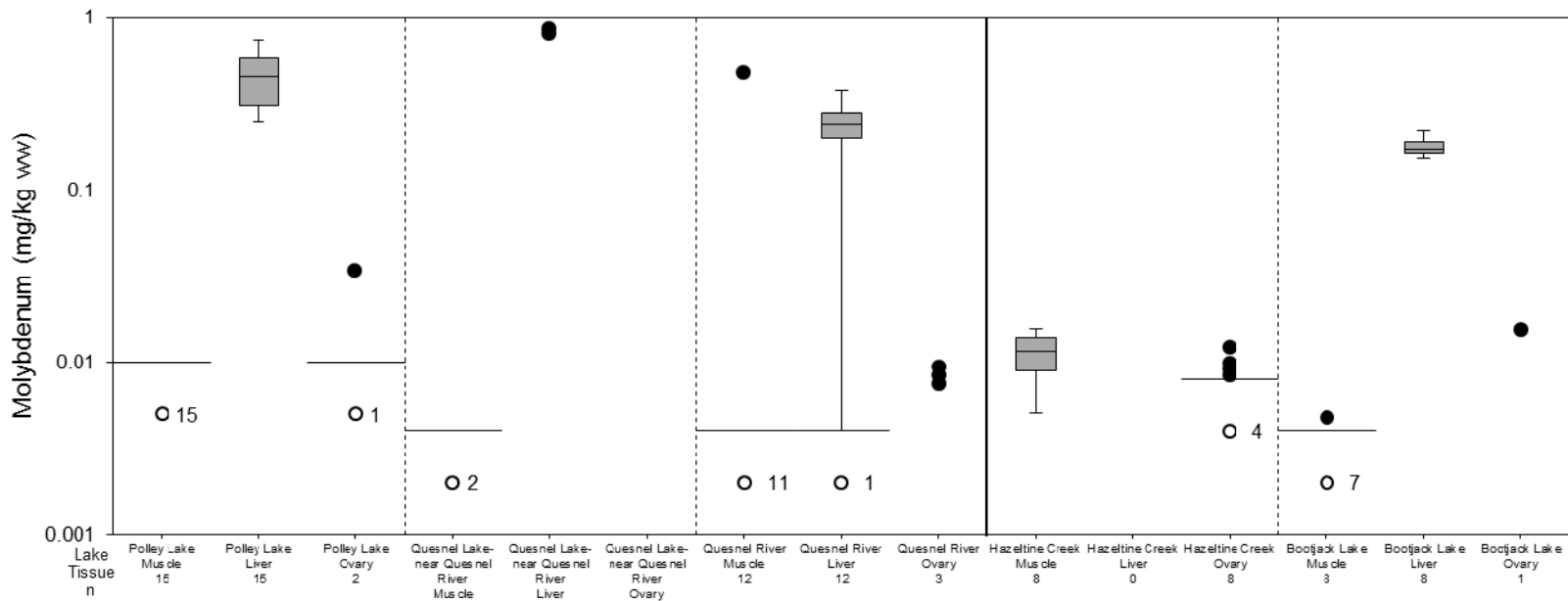
Figure 299: Mercury Concentrations in Rainbow Trout Tissues Collected from Quesnel River in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

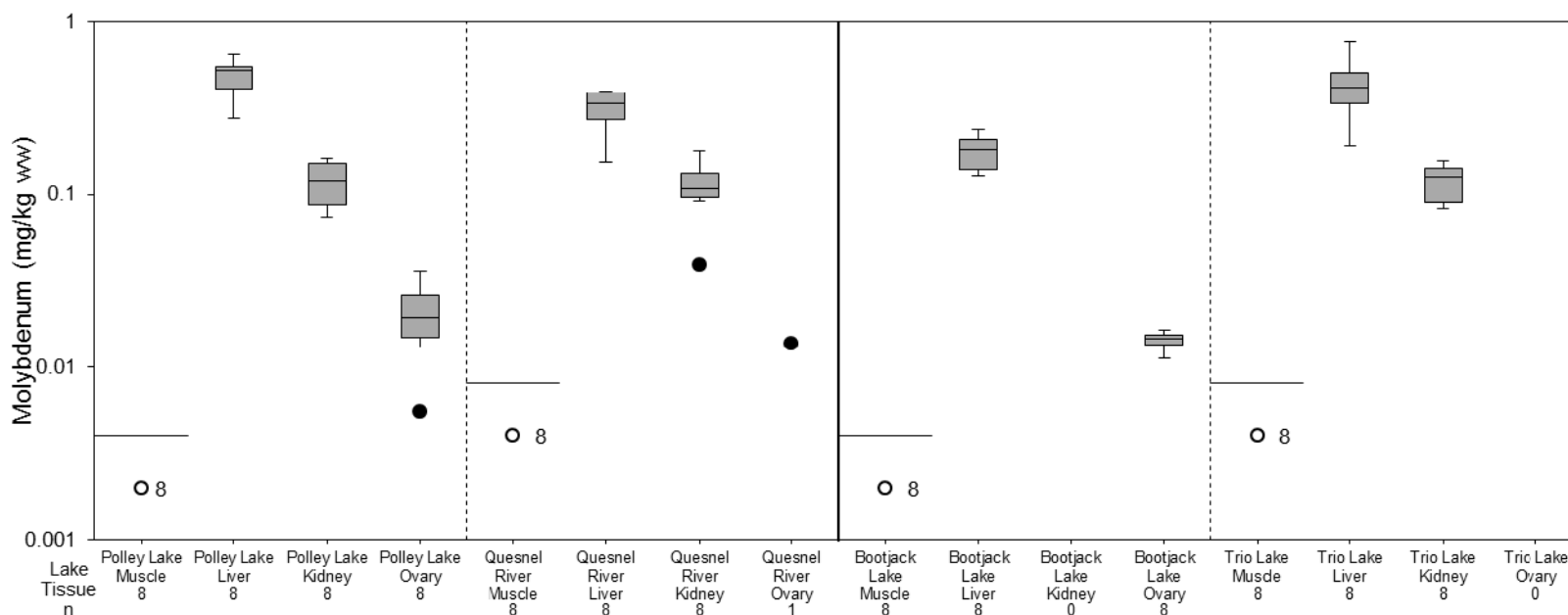
7.14 Molybdenum

Figure 300: Molybdenum Concentrations in Rainbow Trout Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 301: Molybdenum Concentrations in Rainbow Trout Tissues Collected in 2015

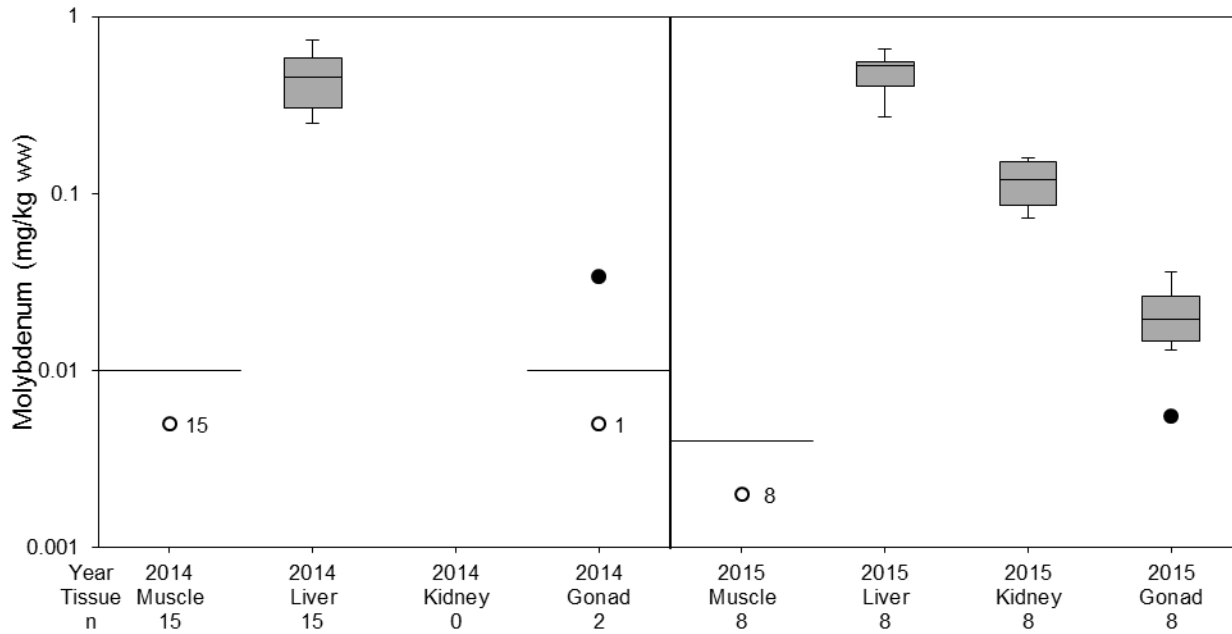


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 302: Molybdenum Concentrations in Rainbow Trout Tissues Collected from Polley Lake in 2014 and 2015



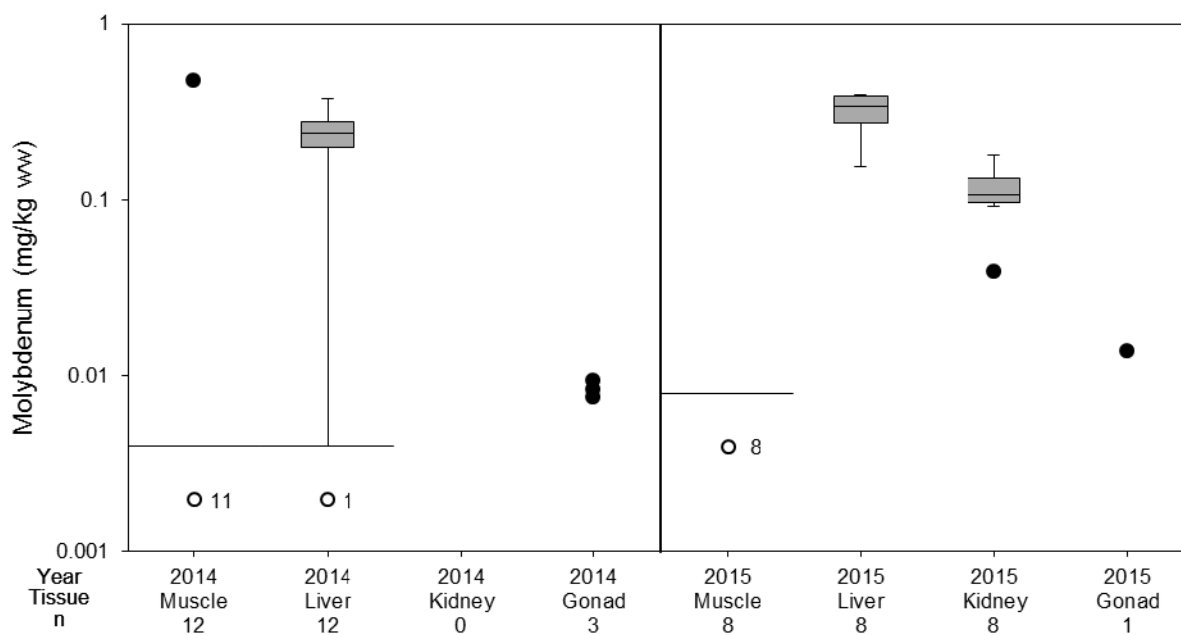
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Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 303: Molybdenum Concentrations in Rainbow Trout Tissues Collected from Quesnel River in 2014 and 2015

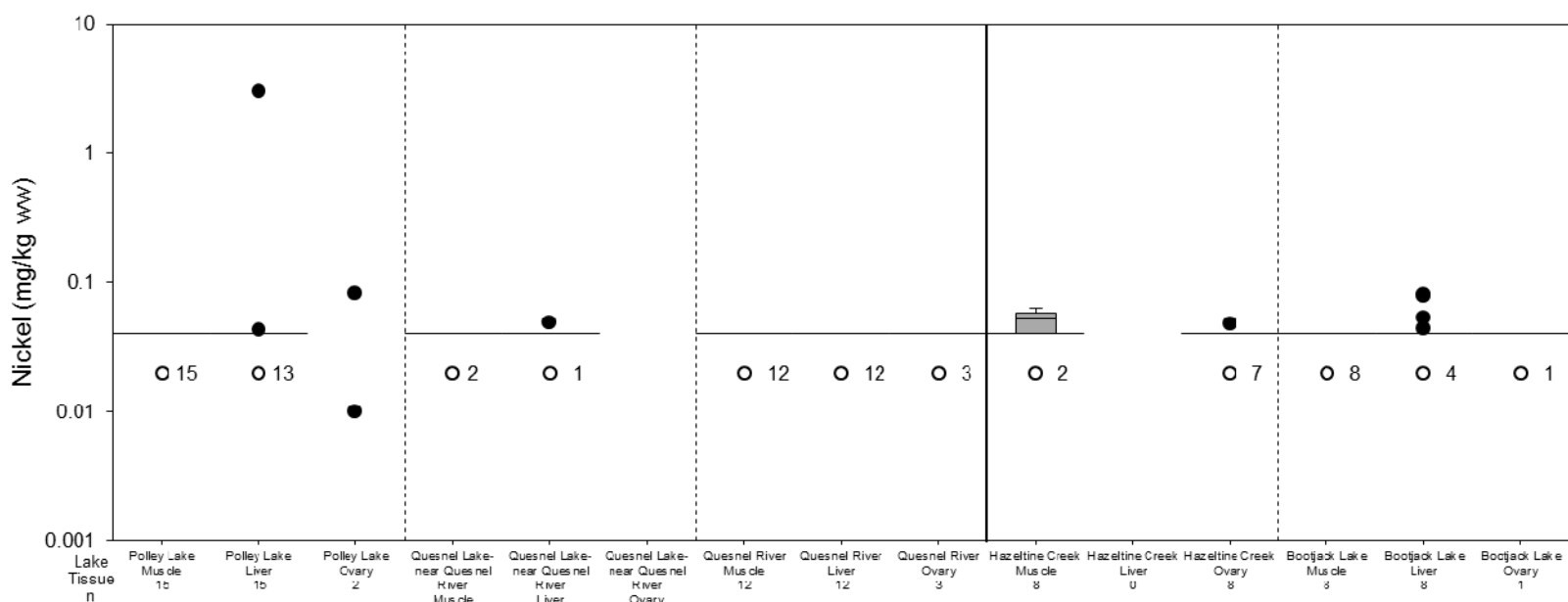


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

7.15 Nickel

Figure 304: Nickel Concentrations in Rainbow Trout Tissues Collected in 2014



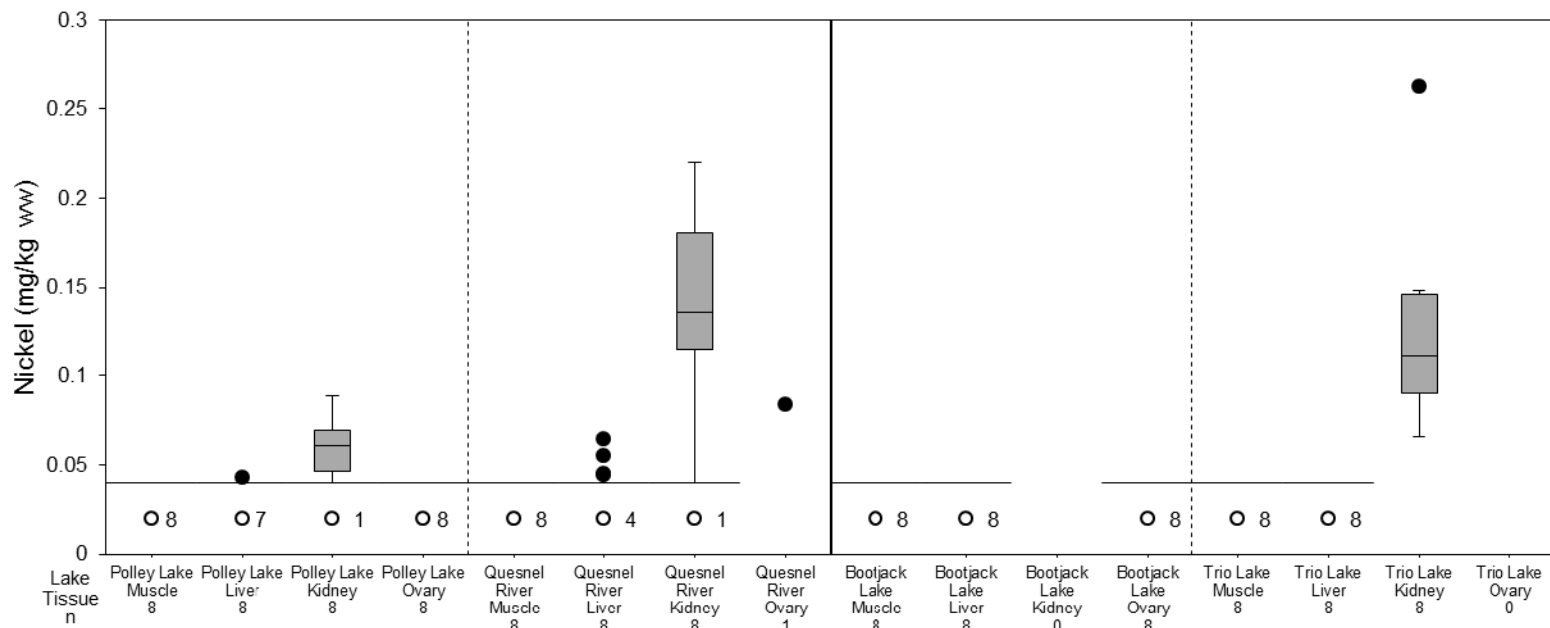
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



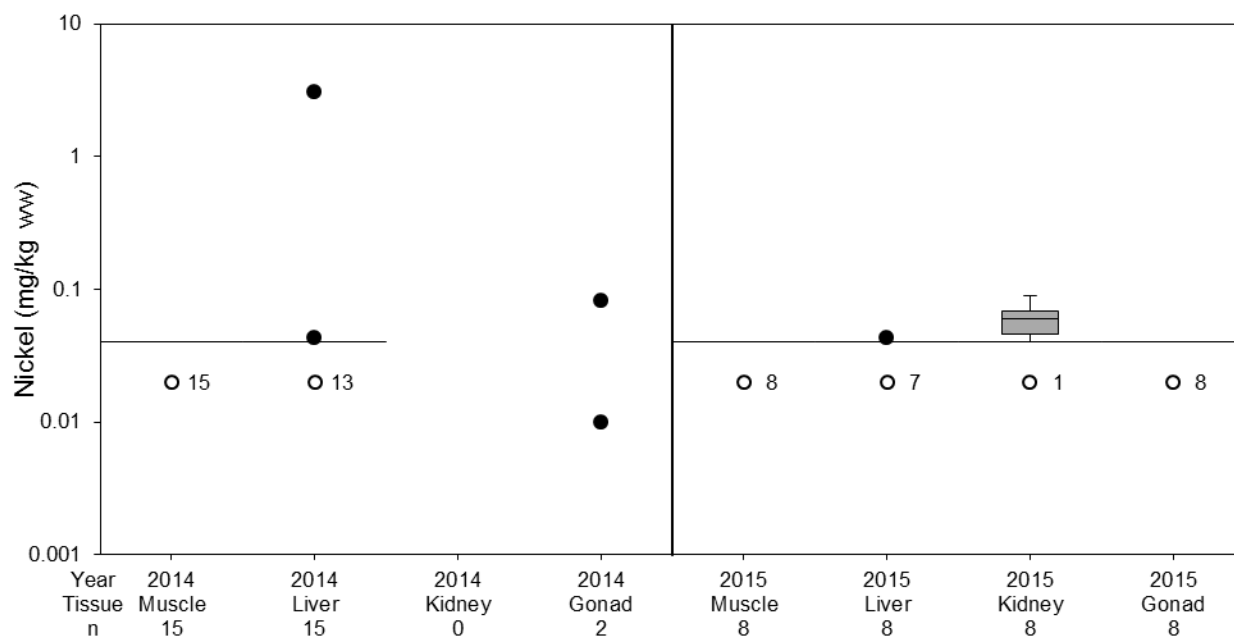
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Figure 305: Nickel Concentrations in Rainbow Trout Tissues Collected in 2015



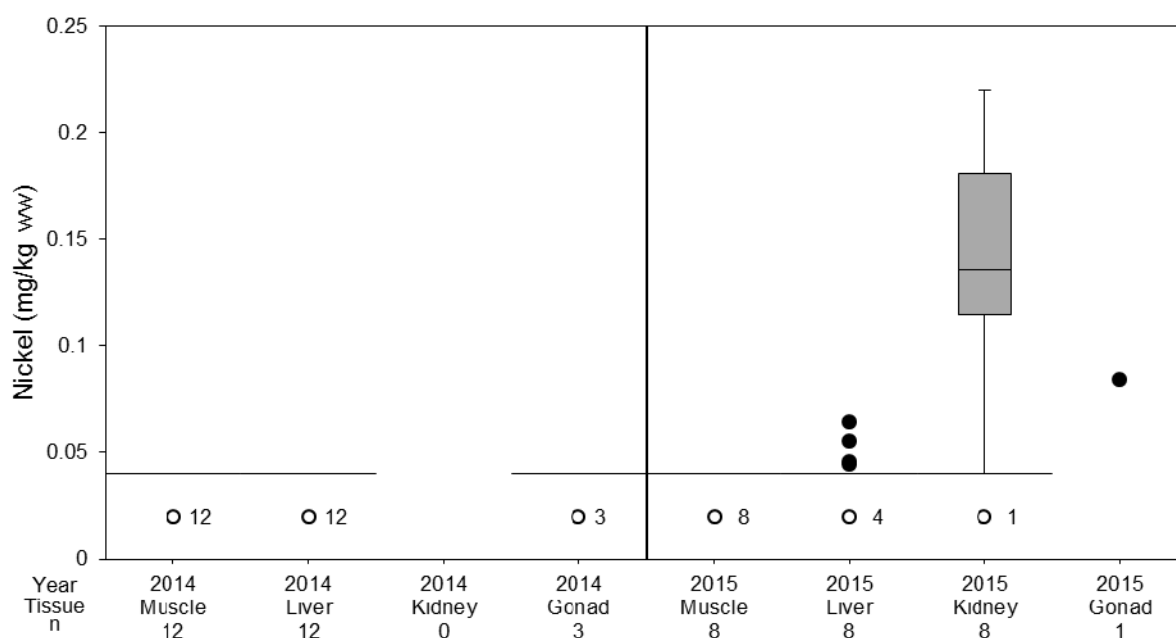
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 306: Nickel Concentrations in Rainbow Trout Tissues Collected from Polley Lake in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 307: Nickel Concentrations in Rainbow Trout Tissues Collected from Quesnel River in 2014 and 2015

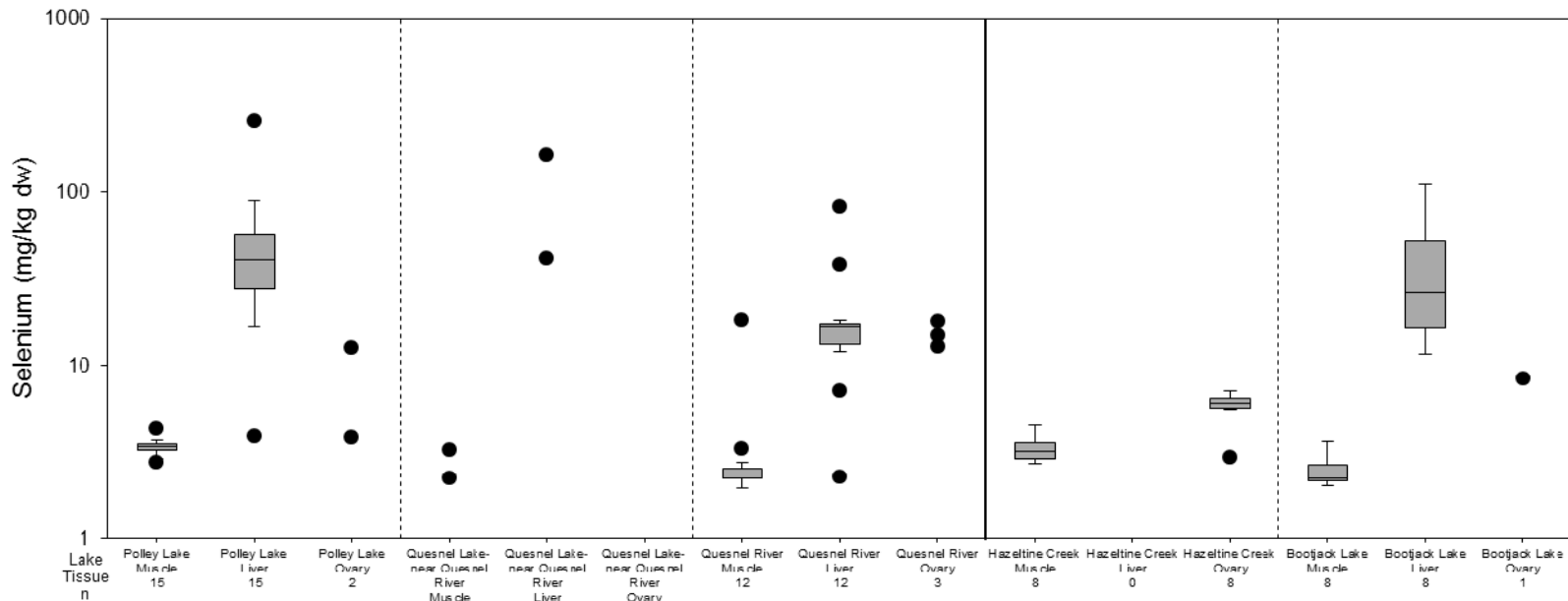


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



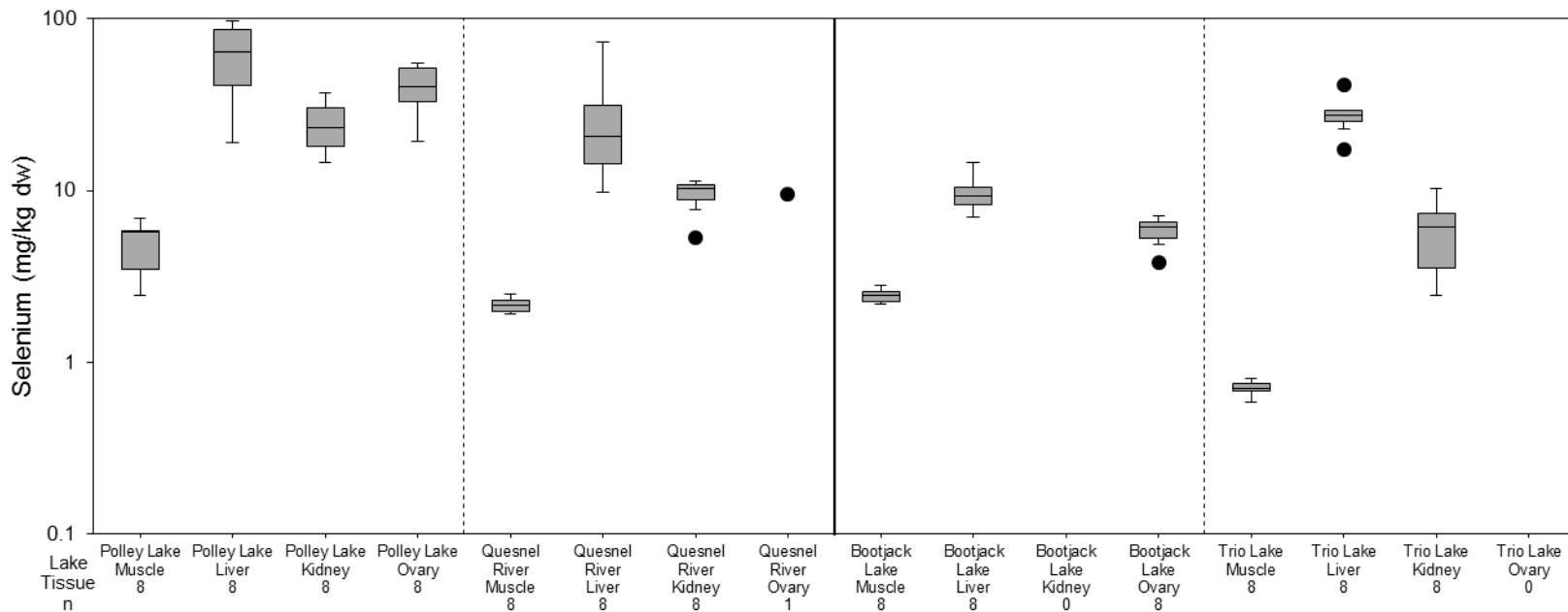
7.16 Selenium

Figure 308: Selenium Concentrations in Rainbow Trout Tissues Collected in 2014



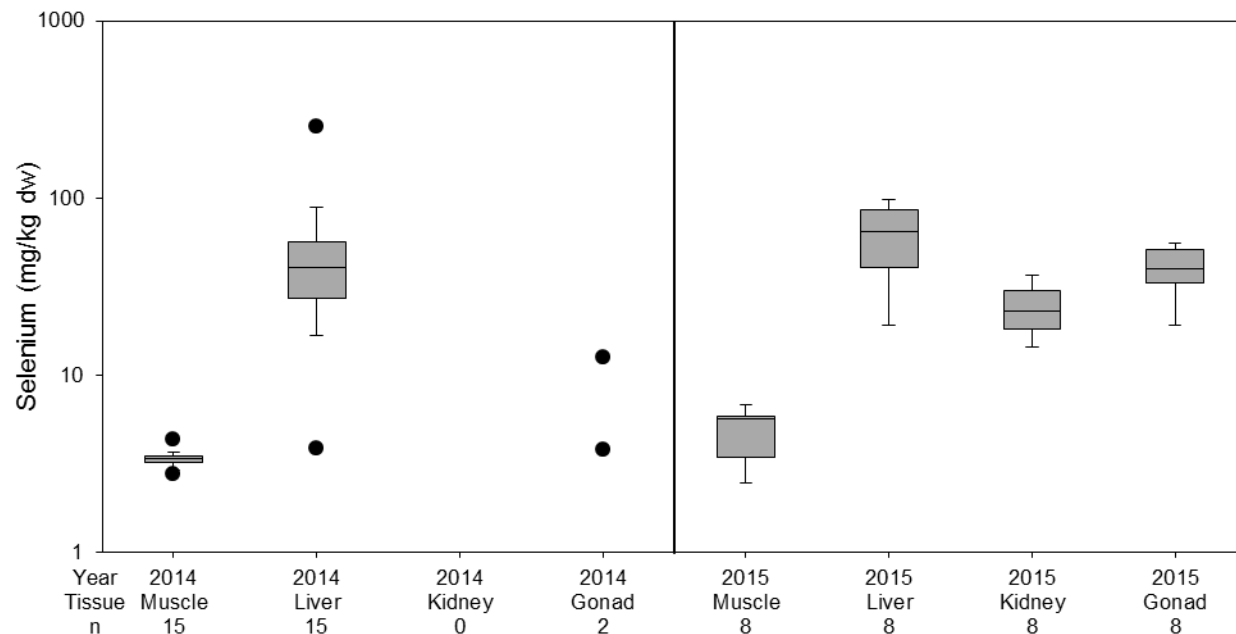
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 309: Selenium Concentrations in Rainbow Trout Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 310: Selenium Concentrations in Rainbow Trout Tissues Collected from Polley Lake in 2014 and 2015

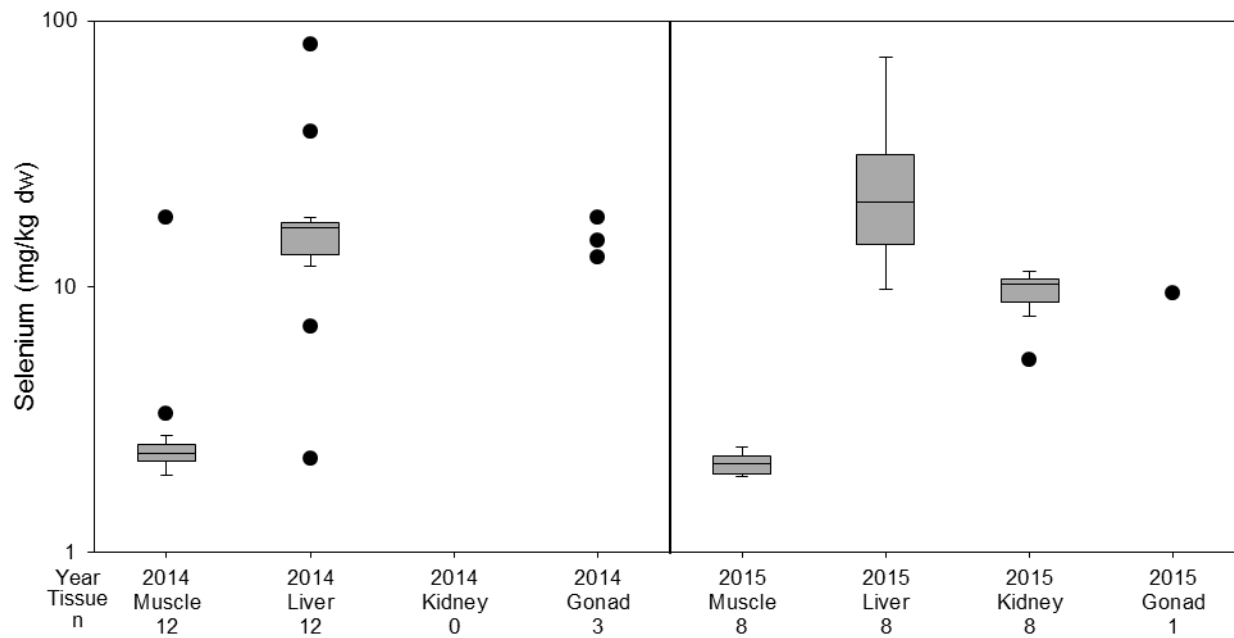


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



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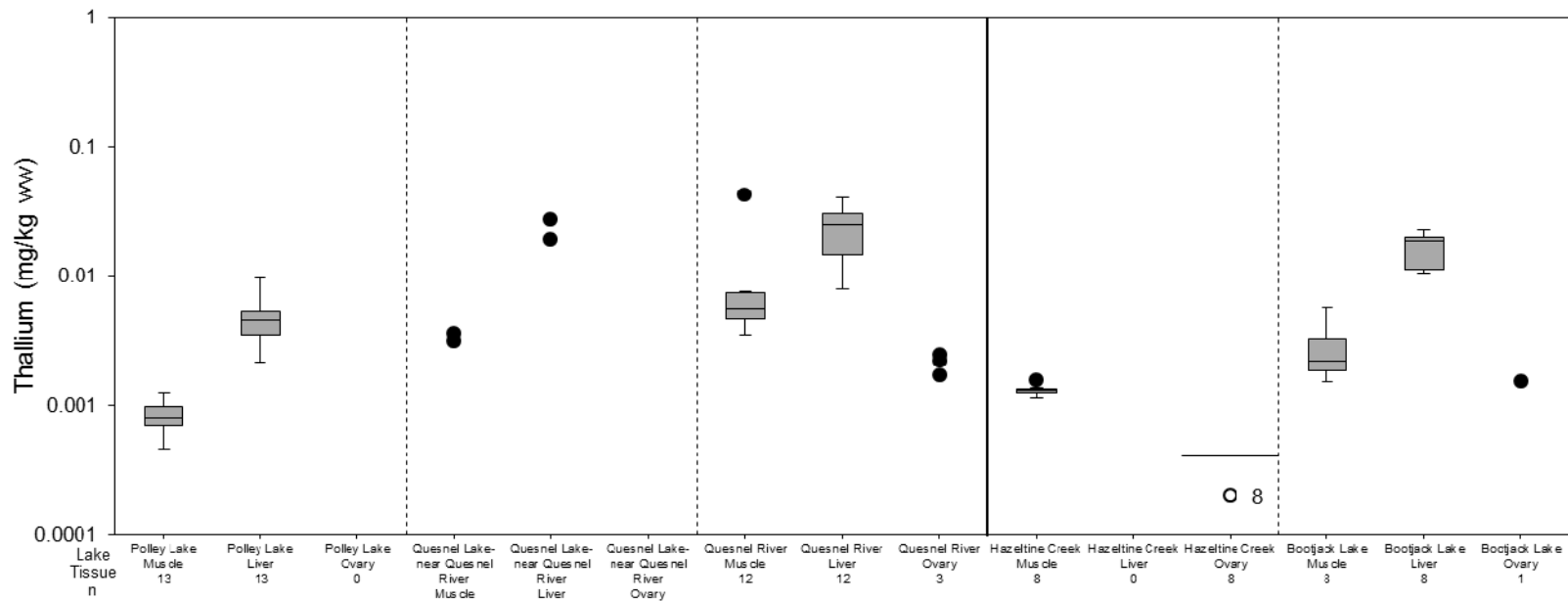
Figure 311: Selenium Concentrations in Rainbow Trout Tissues Collected from Quesnel River in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

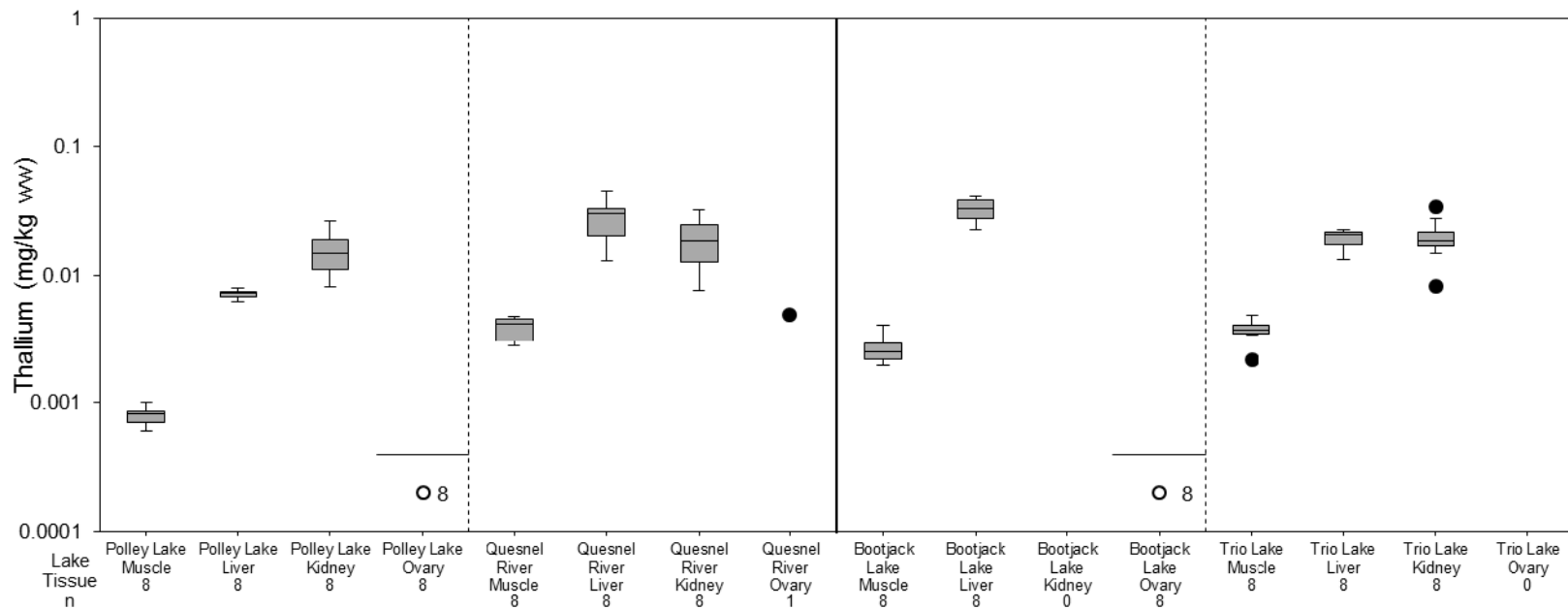
7.17 Thallium

Figure 312: Thallium Concentrations in Rainbow Trout Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 313: Thallium Concentrations in Rainbow Trout Tissues Collected in 2015

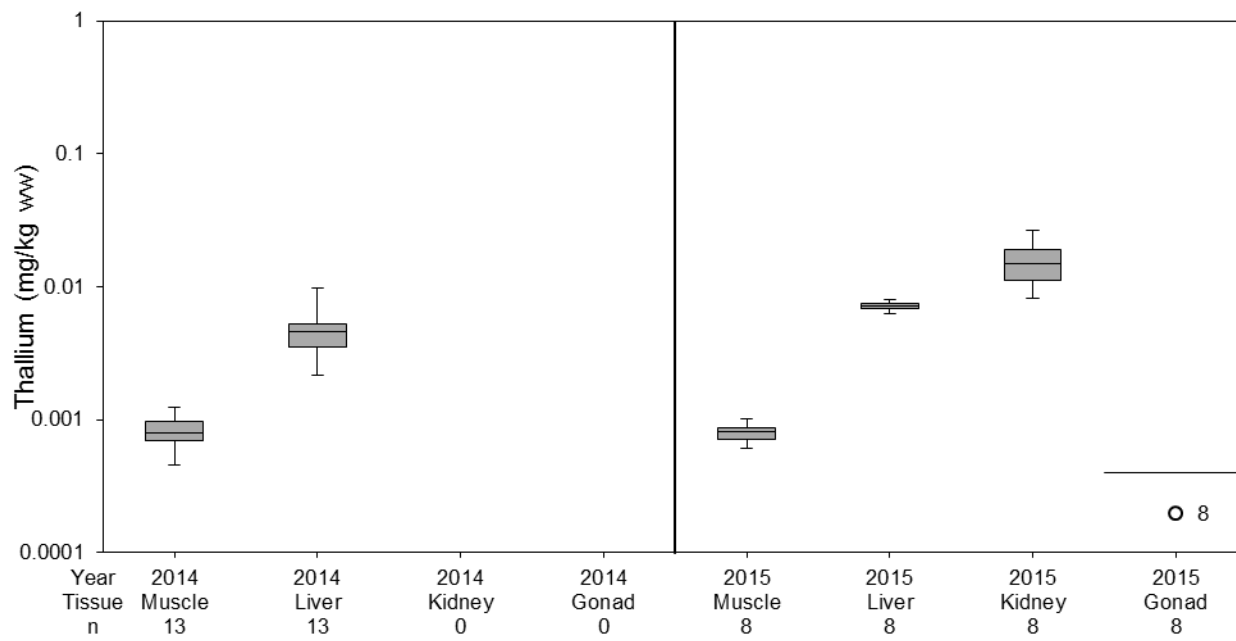


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



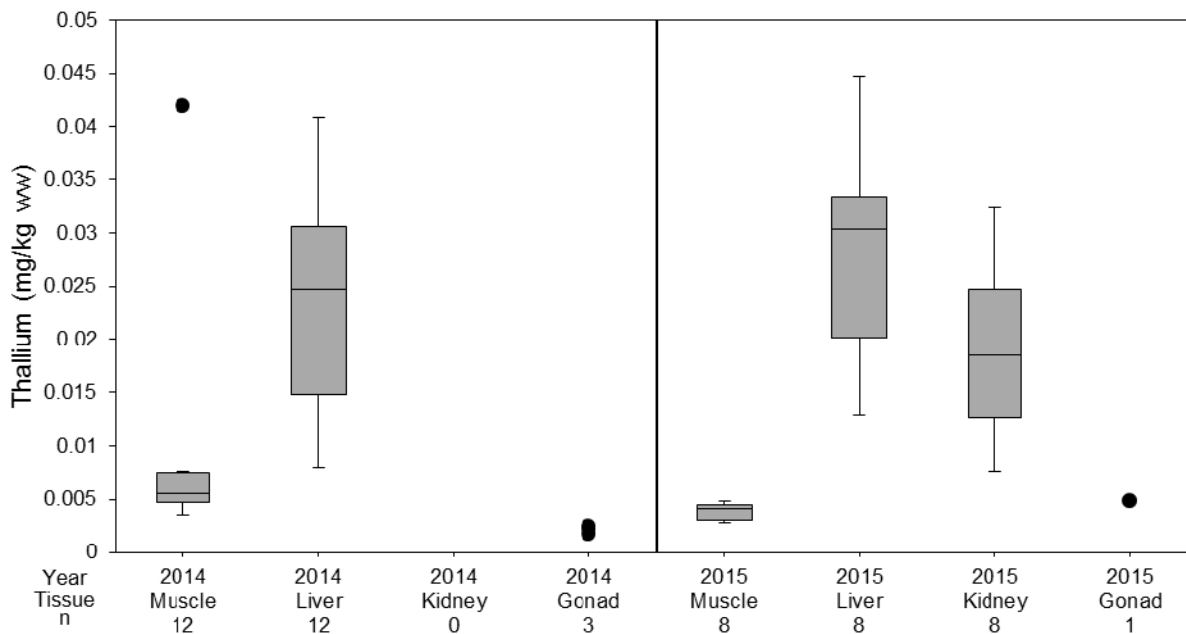
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Figure 314: Thallium Concentrations in Rainbow Trout Tissues Collected from Polley Lake in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

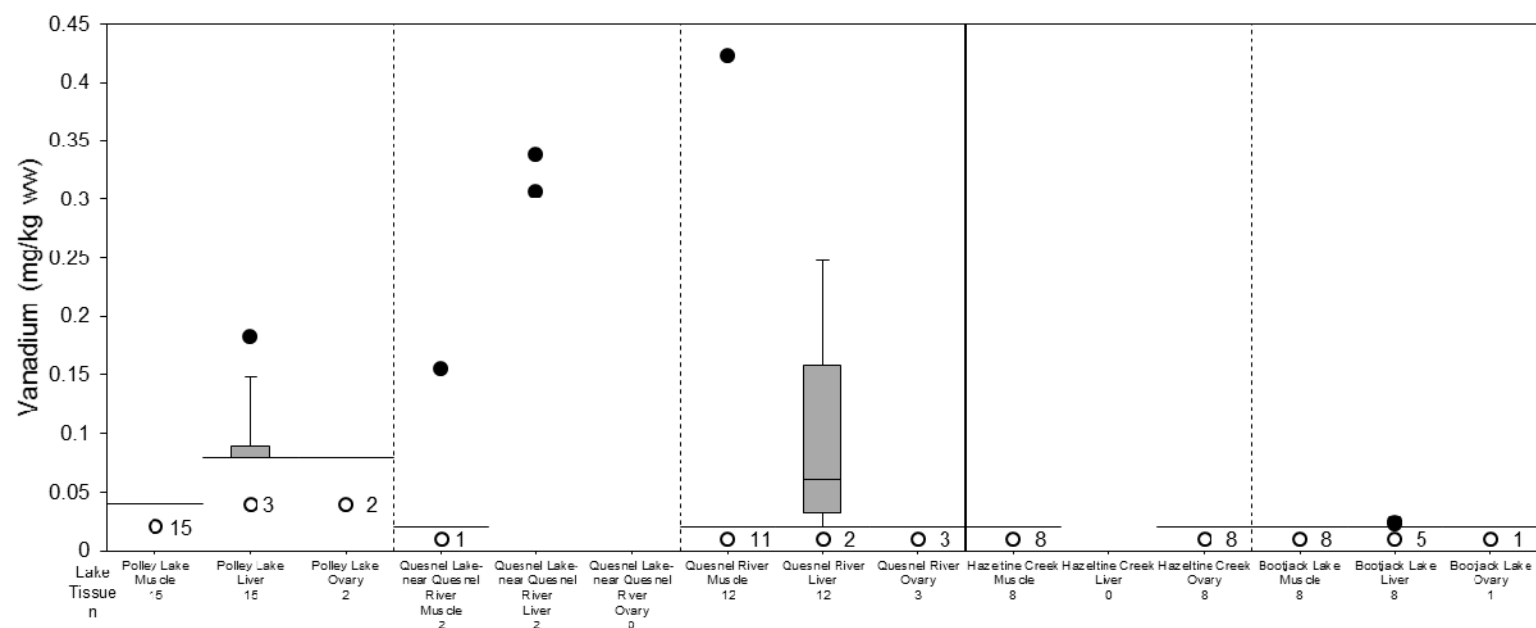
Figure 315: Thallium Concentrations in Rainbow Trout Tissues Collected from Quesnel River in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

7.18 Vanadium

Figure 316: Vanadium Concentrations in Rainbow Trout Tissues Collected in 2014

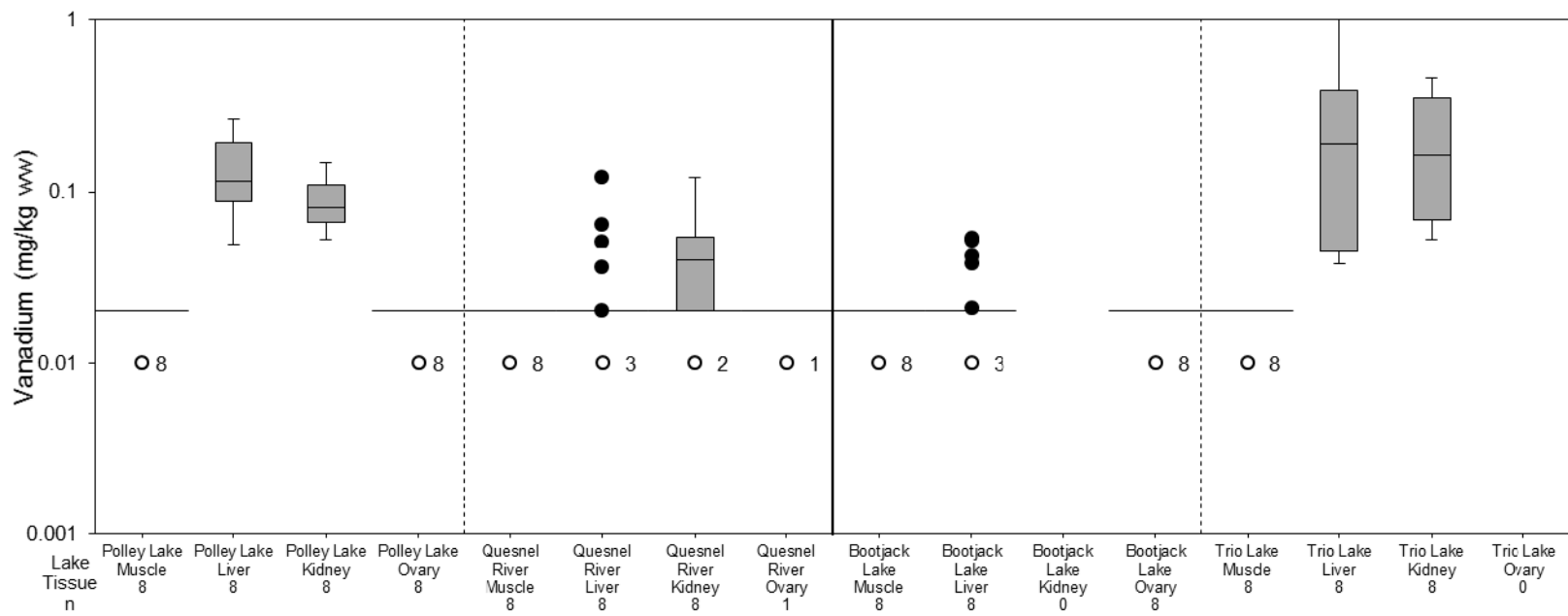


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



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Fish Tissue Chemistry Censored Boxplots

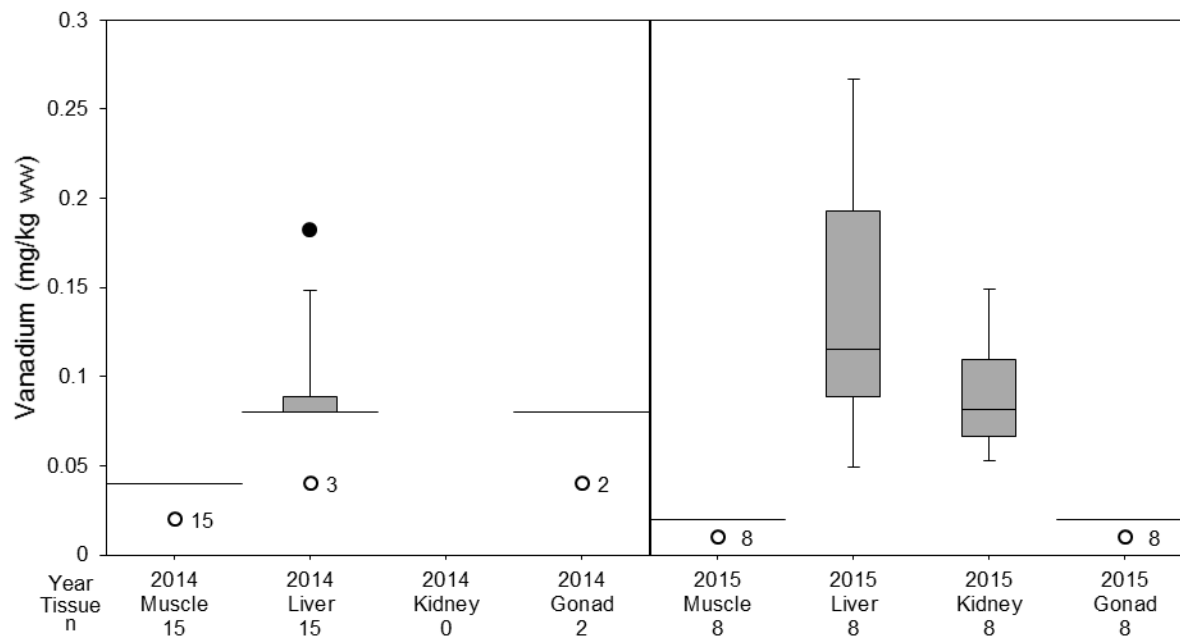
Figure 317: Vanadium Concentrations in Rainbow Trout Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

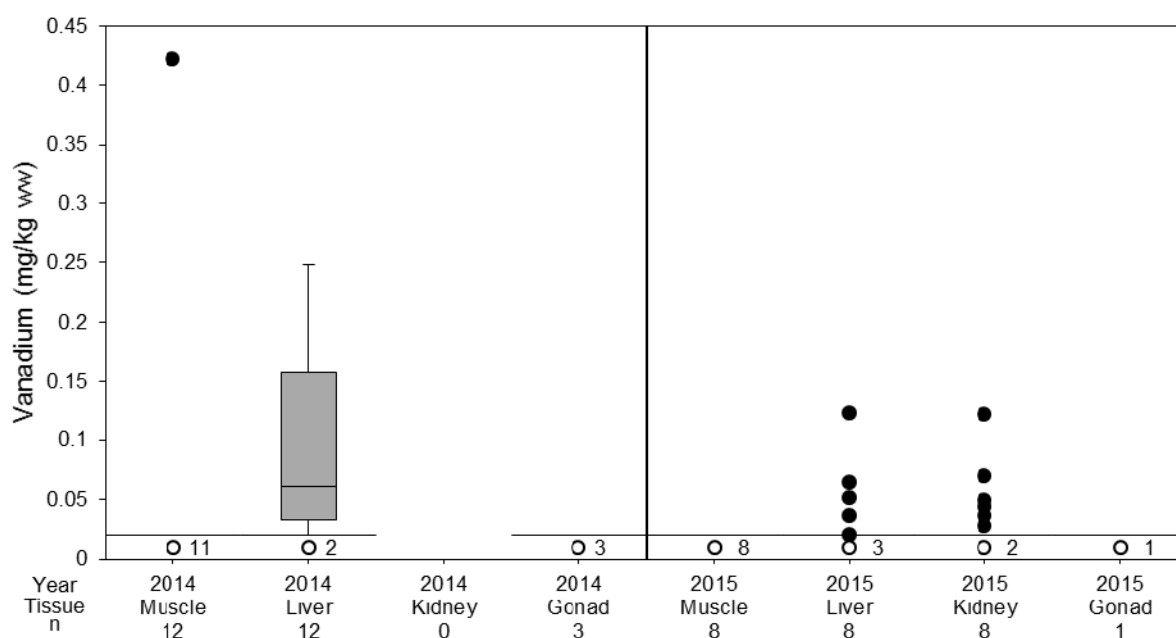
Figure 318: Vanadium Concentrations in Rainbow Trout Tissues Collected from Polley Lake in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 319: Vanadium Concentrations in Rainbow Trout Tissues Collected from Quesnel River in 2014 and 2015



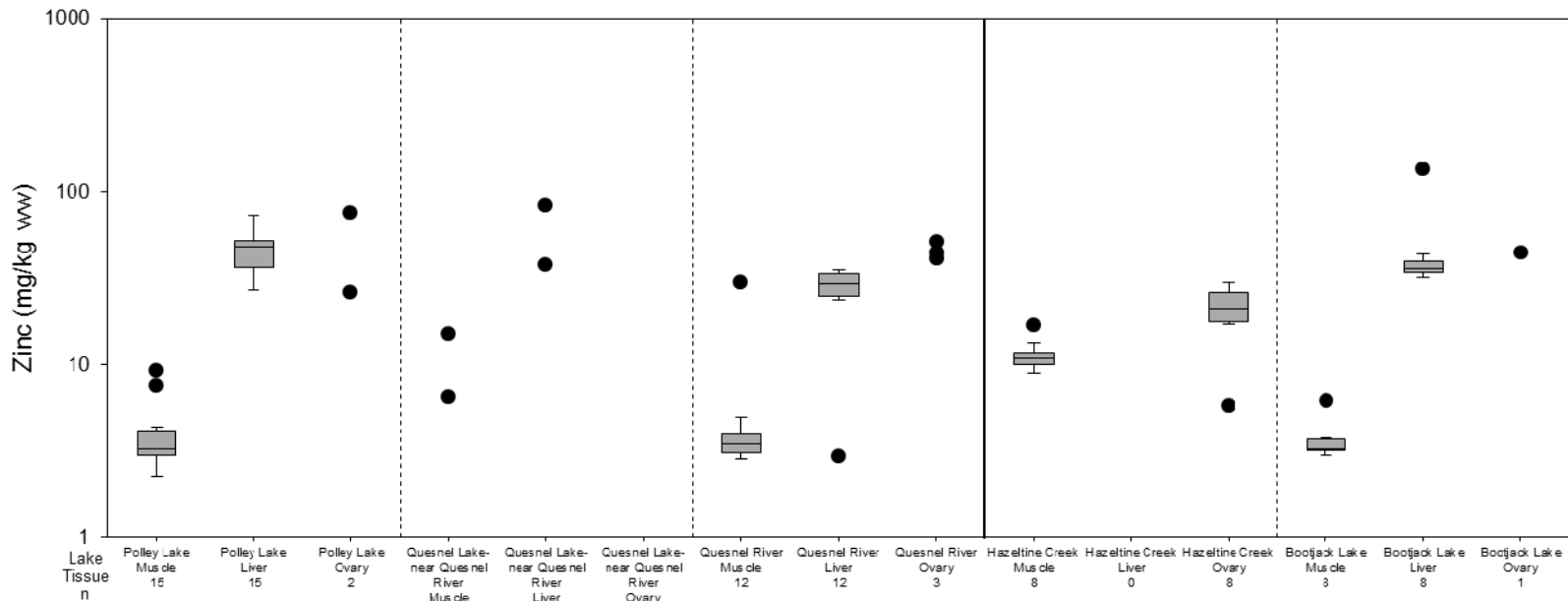
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



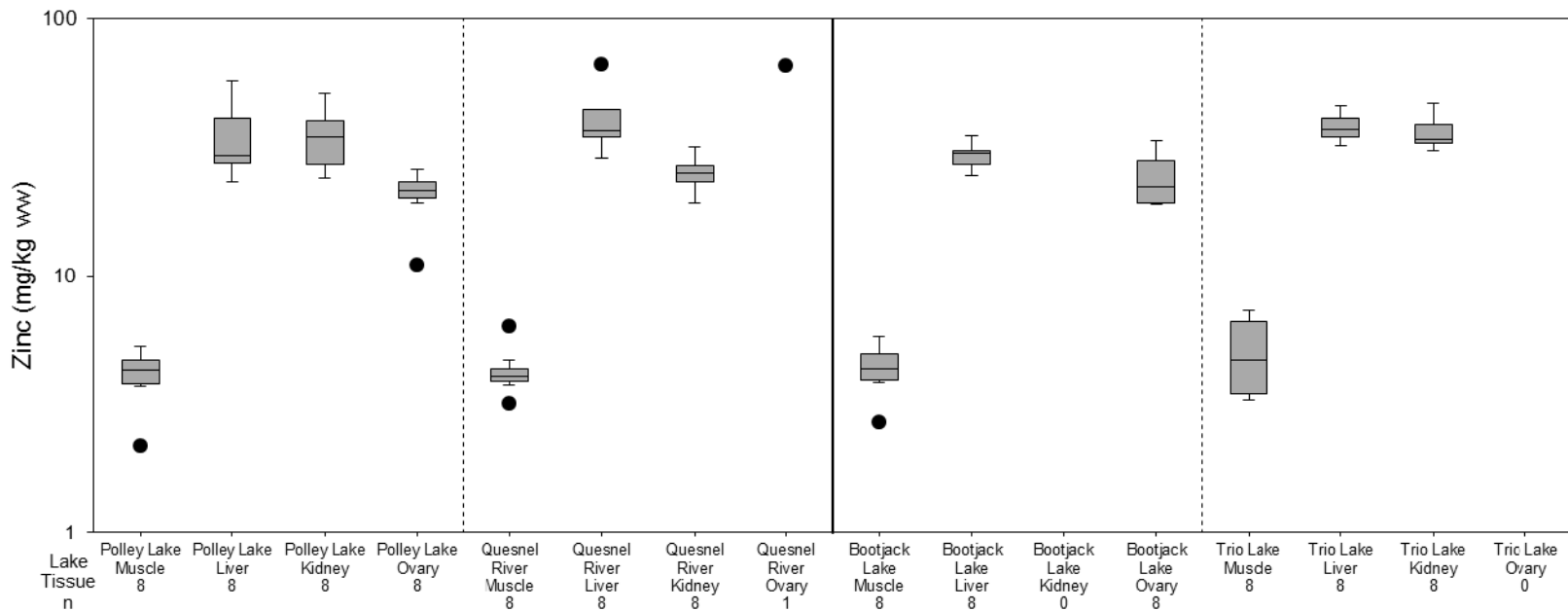
7.19 Zinc

Figure 320: Zinc Concentrations in Rainbow Trout Tissues Collected in 2014



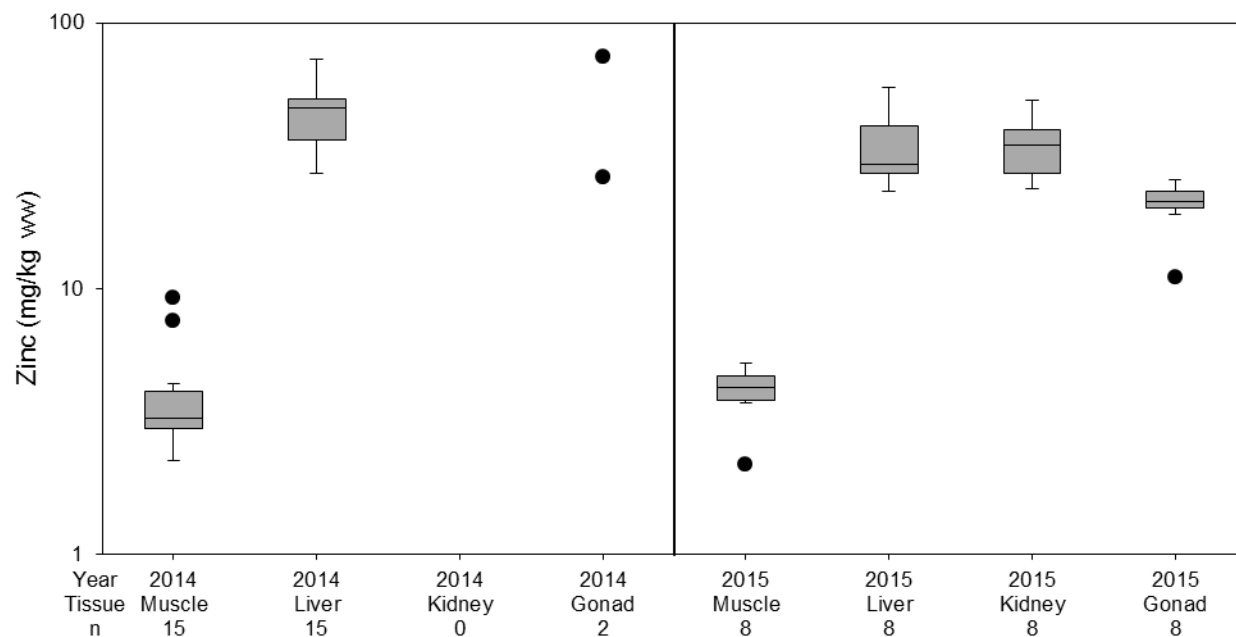
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 321: Zinc Concentrations in Rainbow Trout Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

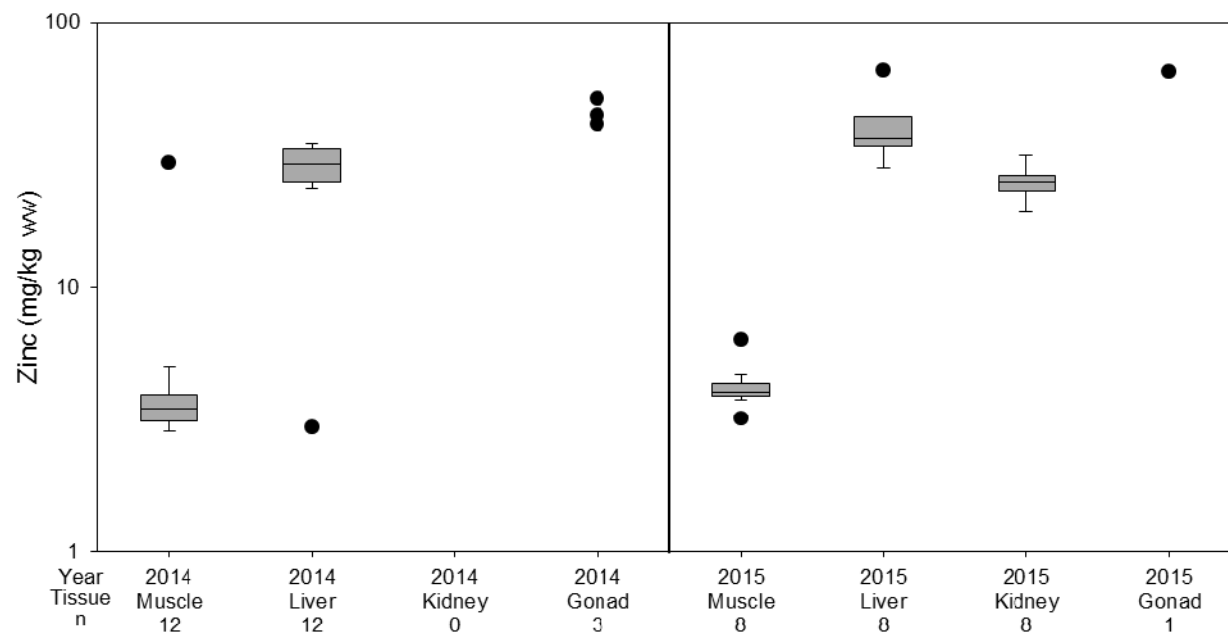
Figure 322: Zinc Concentrations in Rainbow Trout Tissues Collected from Polley Lake in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



Figure 323: Zinc Concentrations in Rainbow Trout Tissues Collected from Quesnel River in 2014 and 2015



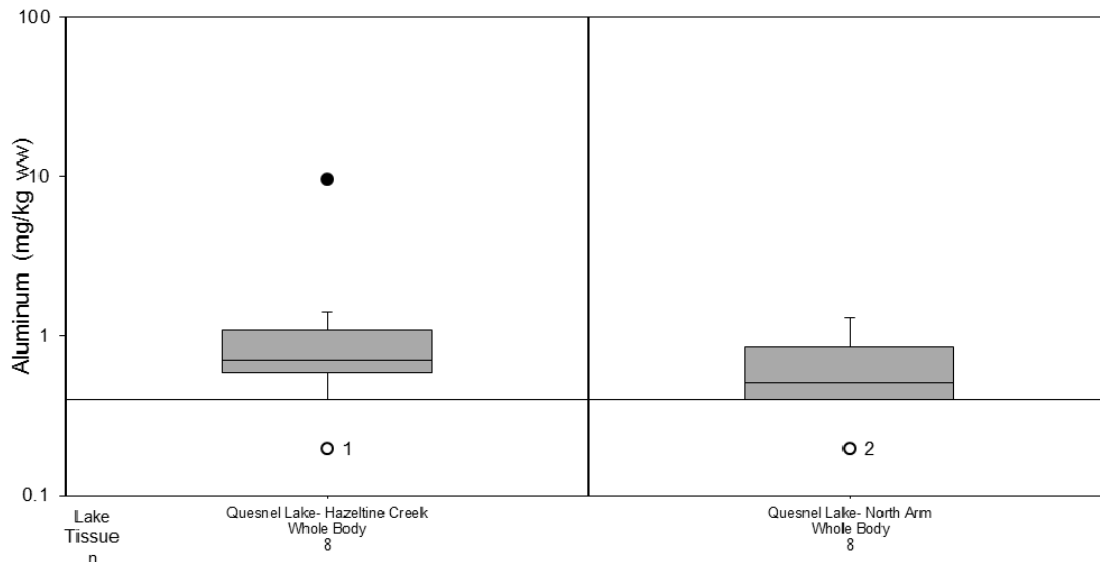
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



8.0 REDSIDE SHINER

8.1 Aluminum

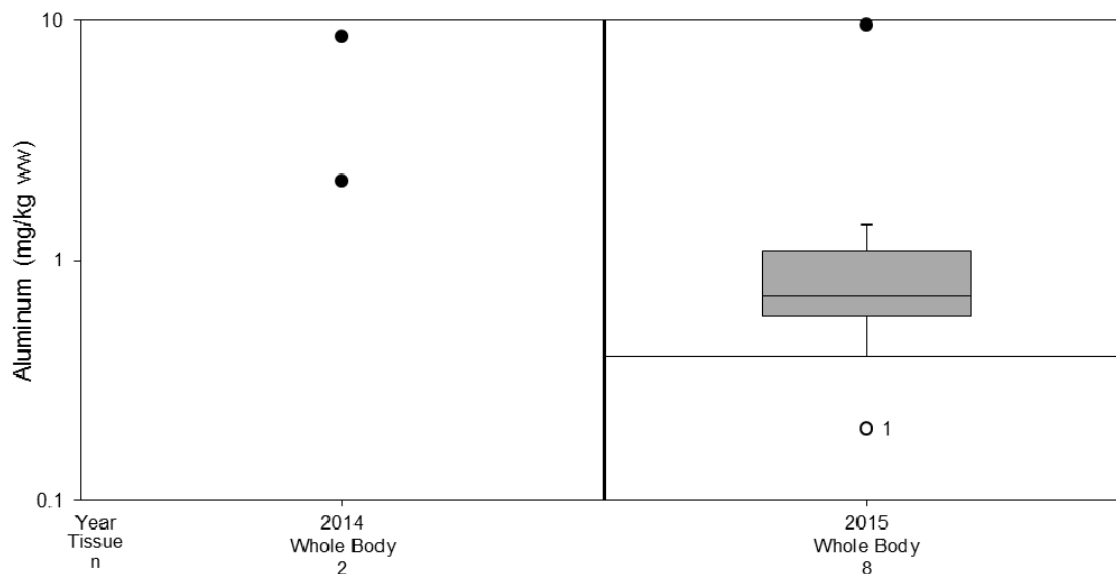
Figure 324: Aluminum Concentrations in Redside Shiner Tissue Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 325: Aluminum Concentrations in Redside Shiner Tissue Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015



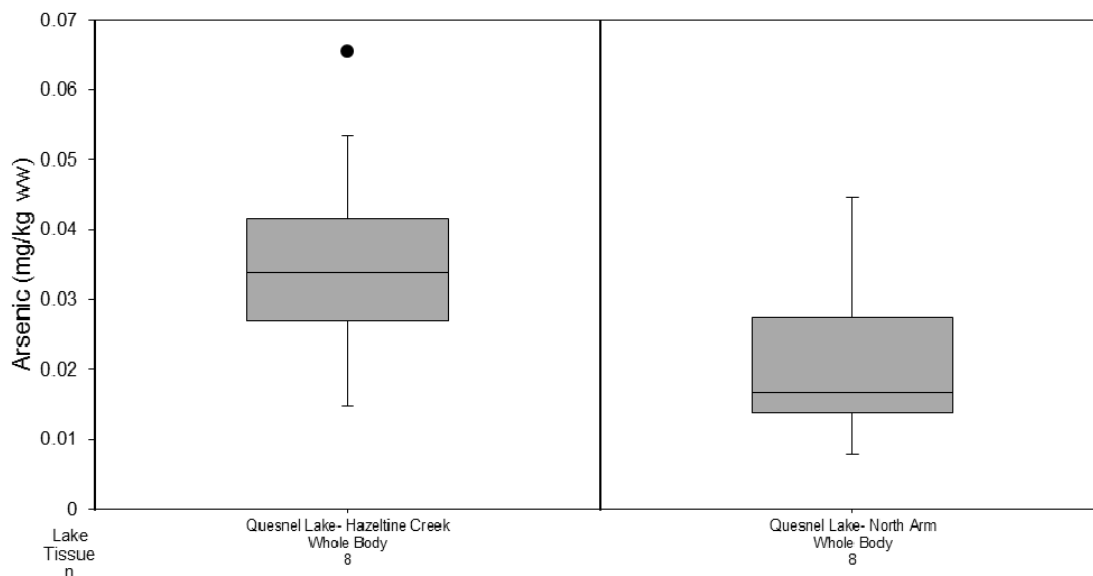
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



8.2 Arsenic

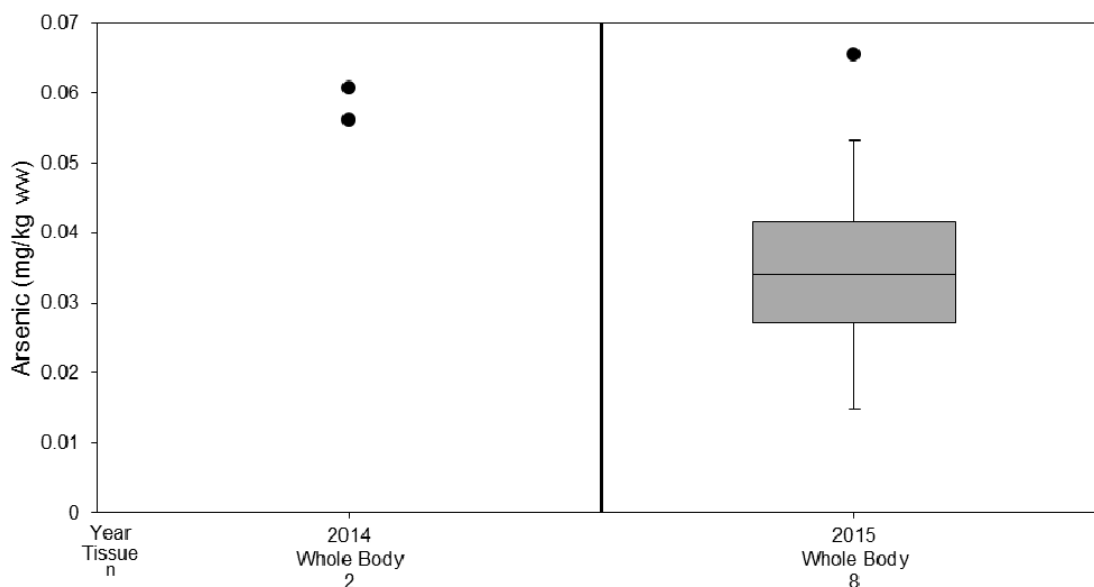
Figure 326: Arsenic Concentrations in Redside Shiner Tissue Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 327: Arsenic Concentrations in Redside Shiner Tissue Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015



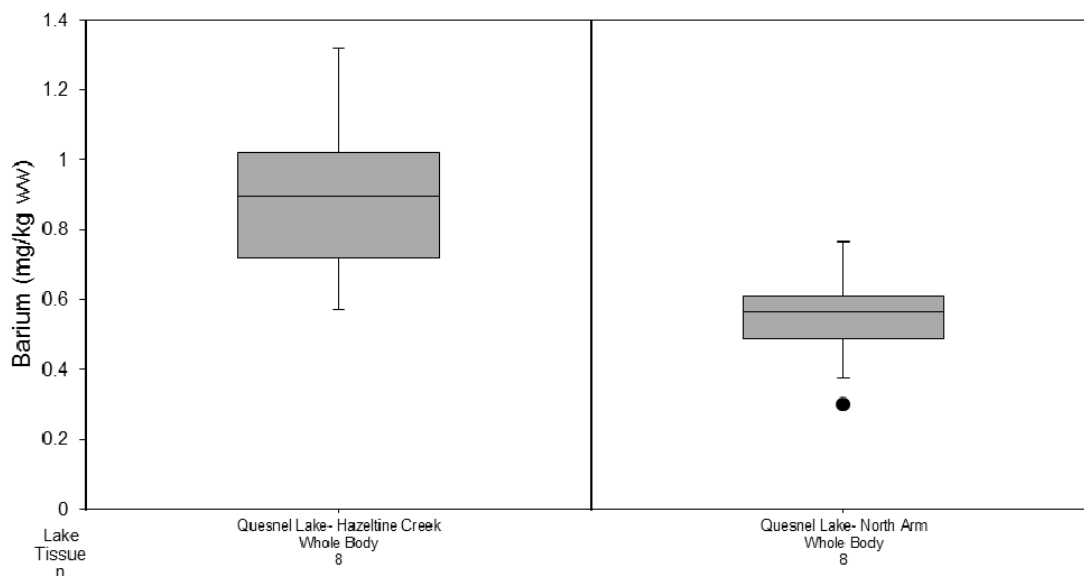
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



8.3 Barium

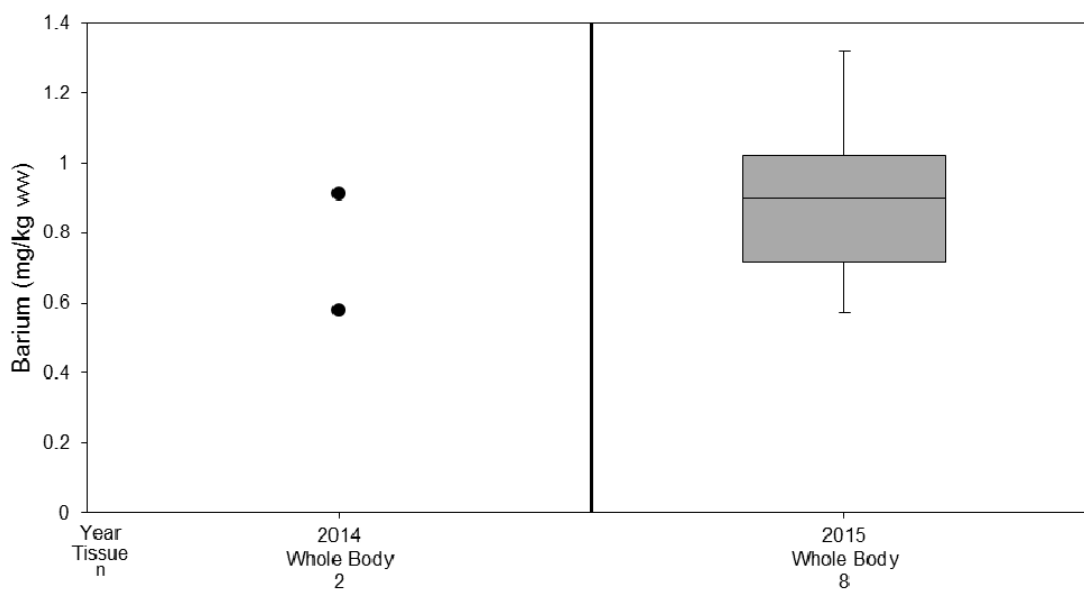
Figure 328: Barium Concentrations in Redside Shiner Tissue Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 329: Barium Concentrations in Redside Shiner Tissue Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015



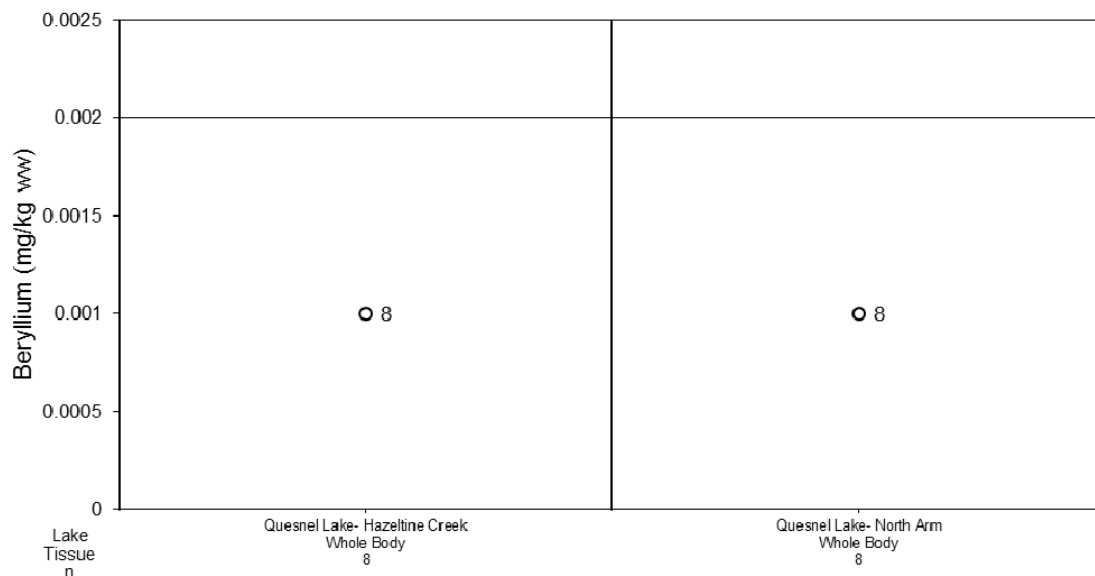
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



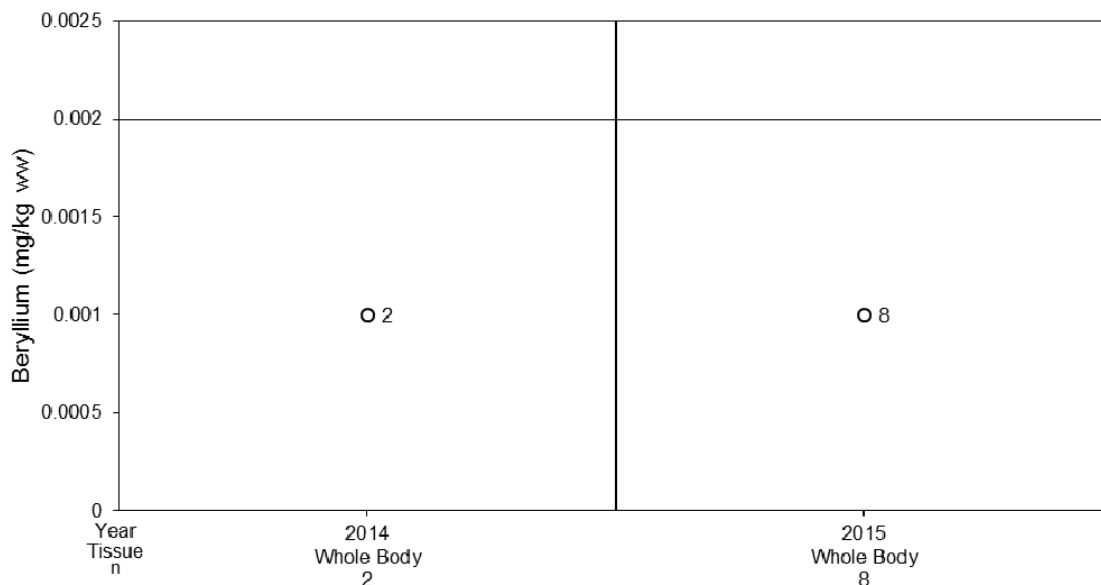
8.4 Beryllium

Figure 330: Beryllium Concentrations in Redside Shiner Tissue Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 331: Beryllium Concentrations in Redside Shiner Tissue Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015

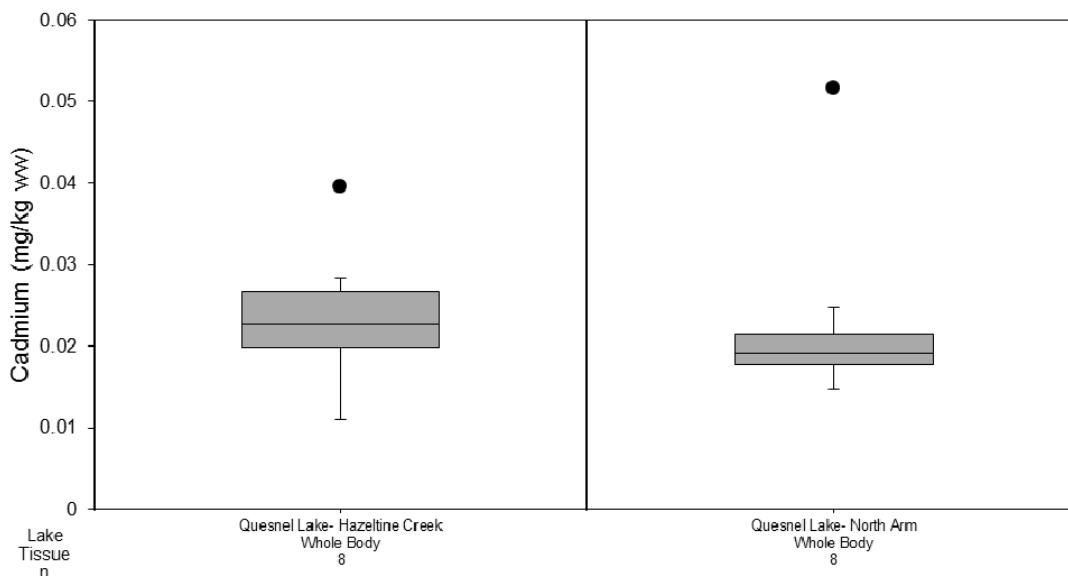


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



8.5 Cadmium

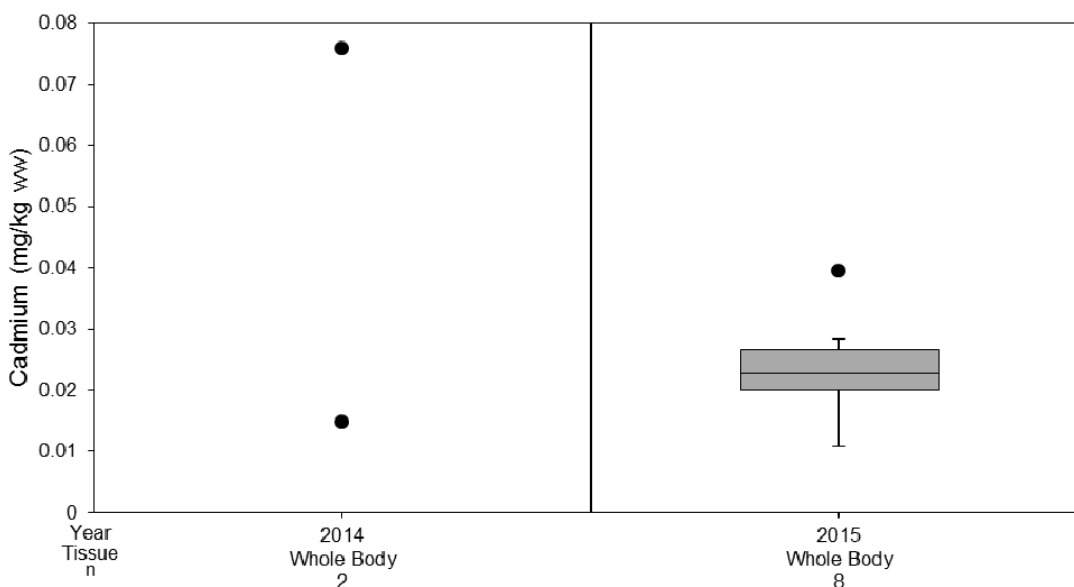
Figure 332: Cadmium Concentrations in Redside Shiner Tissue Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 333: Cadmium Concentrations in Redside Shiner Tissue Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015



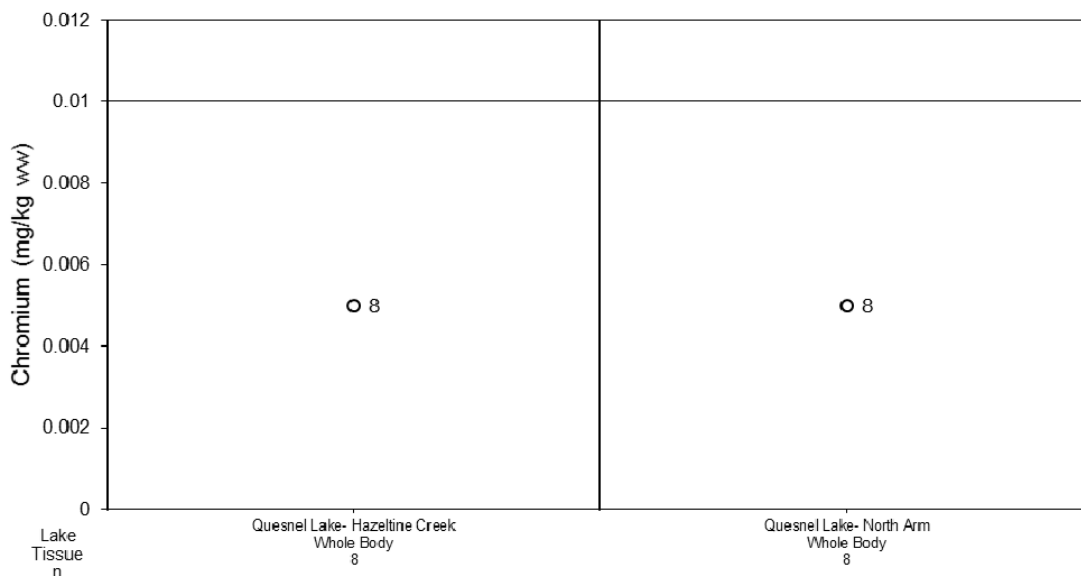
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



8.6 Chromium

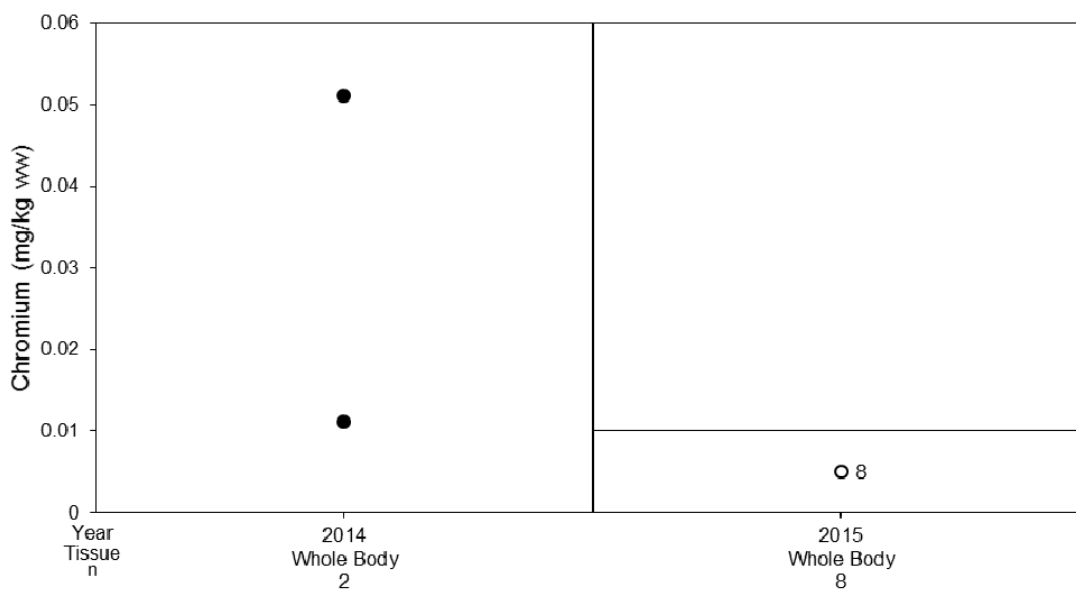
Figure 334: Chromium Concentrations in Redside Shiner Tissue Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 335: Chromium Concentrations in Redside Shiner Tissue Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015



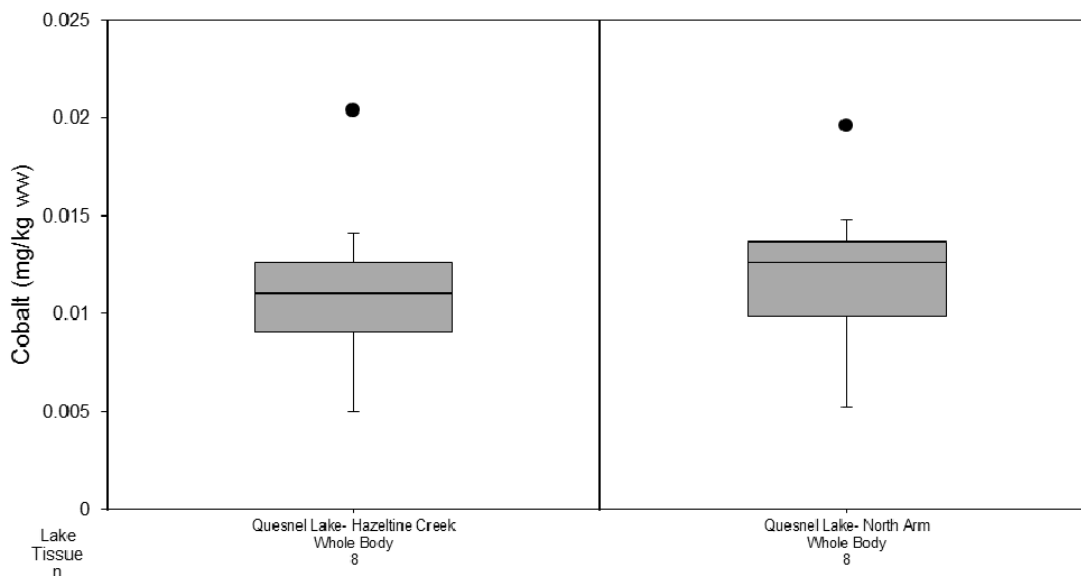
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



8.7 Cobalt

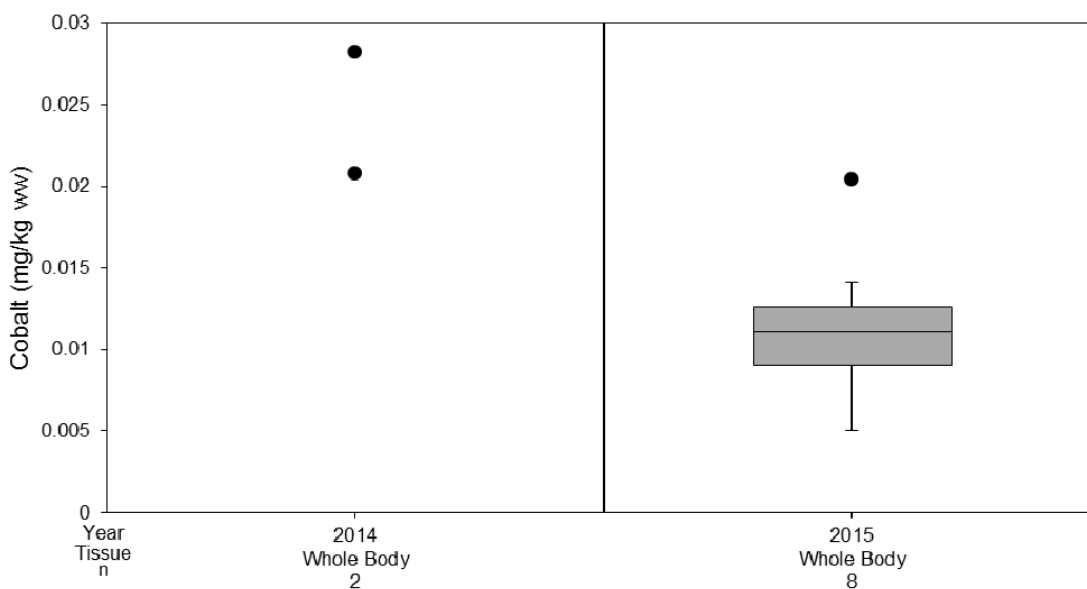
Figure 336: Cobalt Concentrations in Redside Shiner Tissue Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 337: Cobalt Concentrations in Redside Shiner Tissue Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015



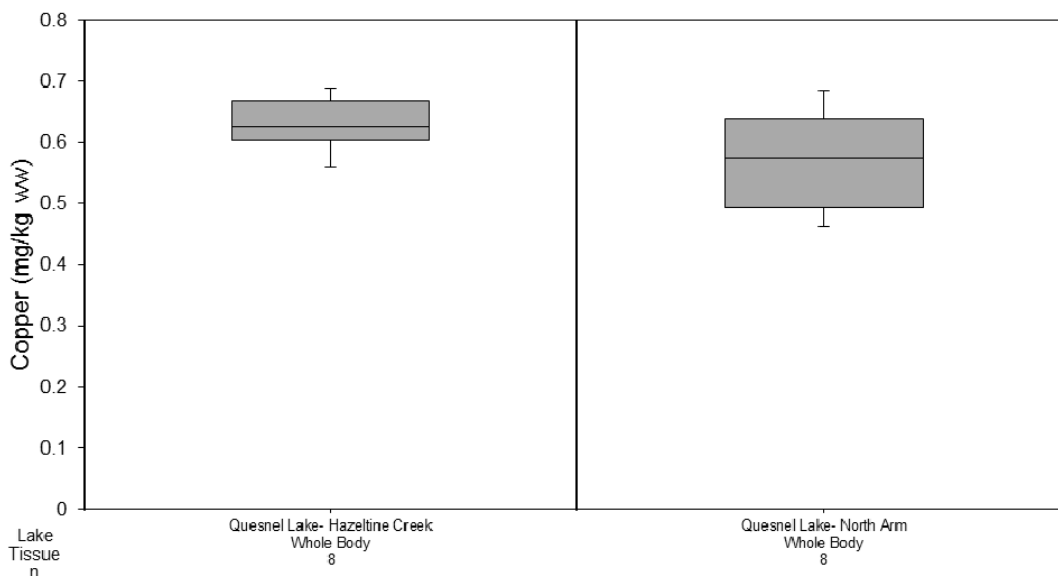
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



8.8 Copper

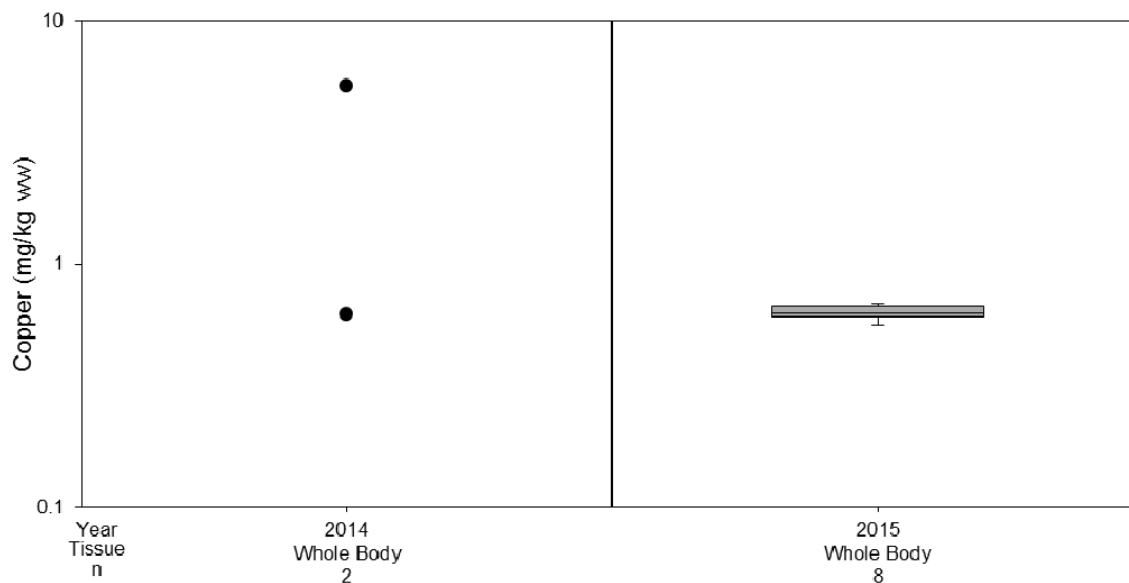
Figure 338: Copper Concentrations in Redside Shiner Tissue Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 339: Copper Concentrations in Redside Shiner Tissue Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015



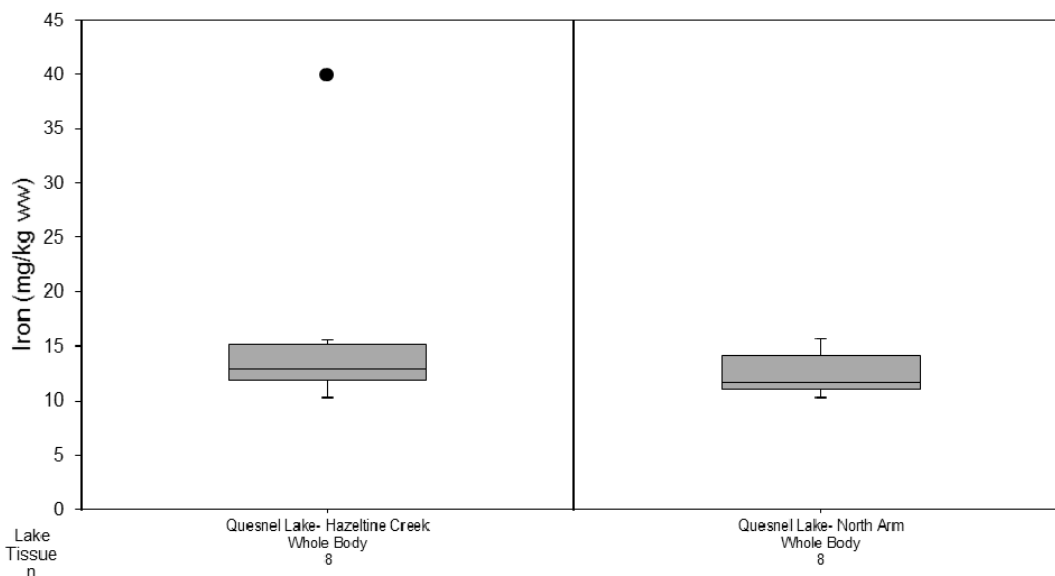
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



8.9 Iron

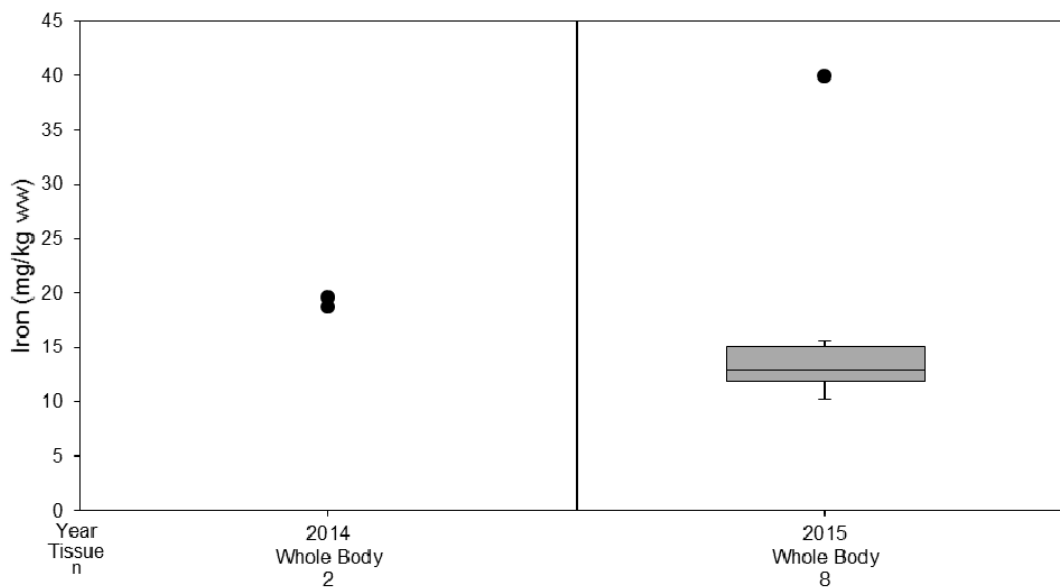
Figure 340: Iron Concentrations in Lake Redside Shiner Tissue Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 341: Iron Concentrations in Lake Redside Shiner Tissue Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015



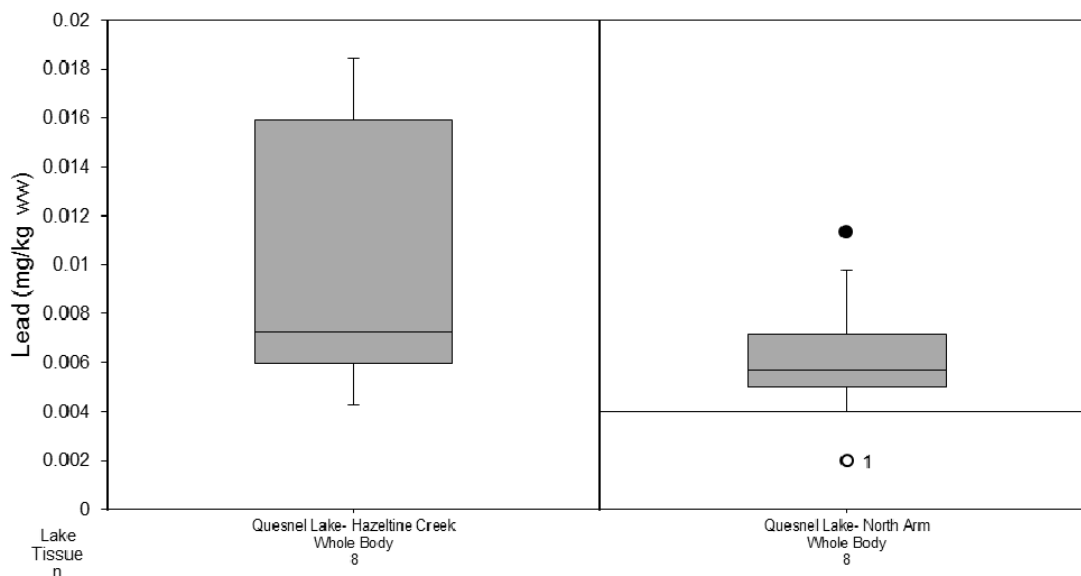
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



8.10 Lead

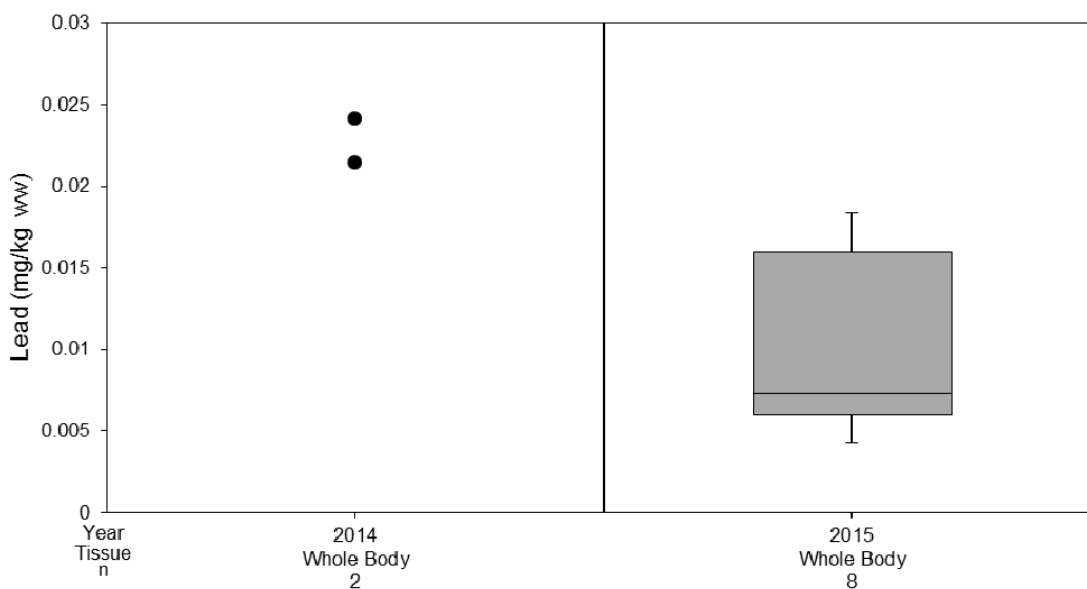
Figure 342: Lead Concentrations in Redside Shiner Tissue Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 343: Lead Concentrations in Redside Shiner Tissue Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015



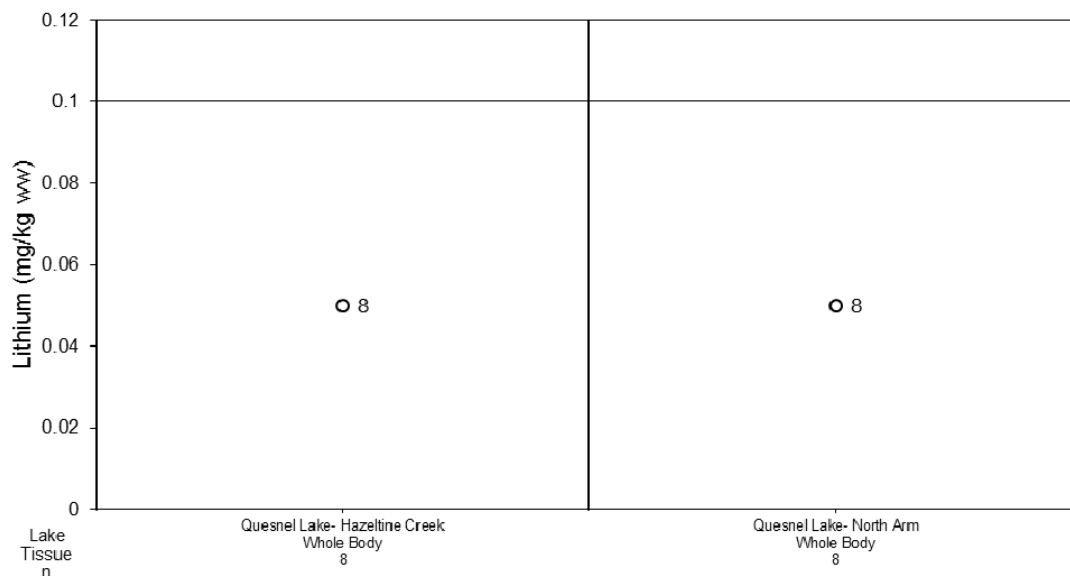
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



8.11 Lithium

Figure 344: Lithium Concentrations in Redside Shiner Tissue Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 345: Lithium Concentrations in Redside Shiner Tissue Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015



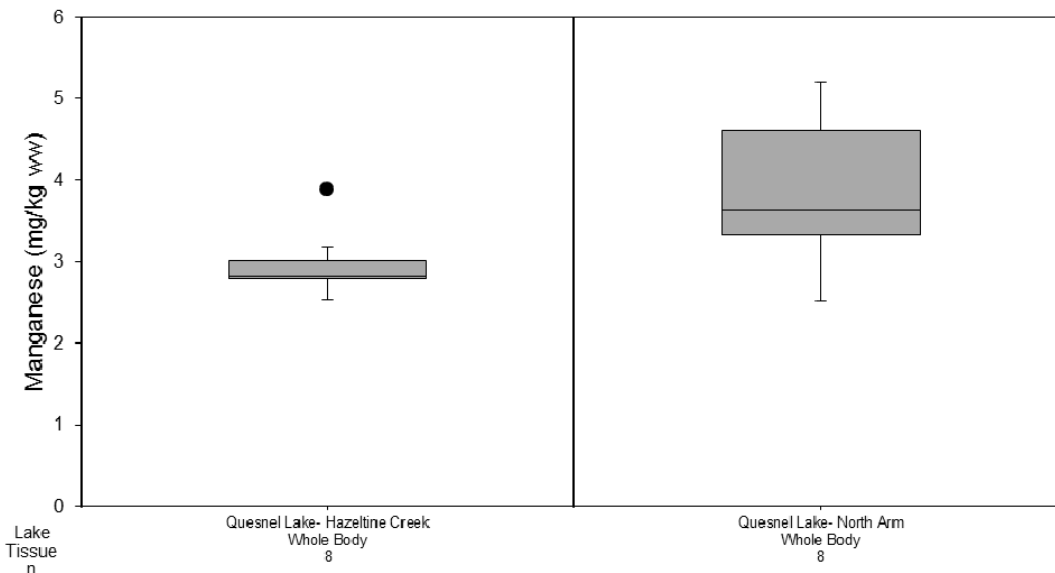
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



8.12 Manganese

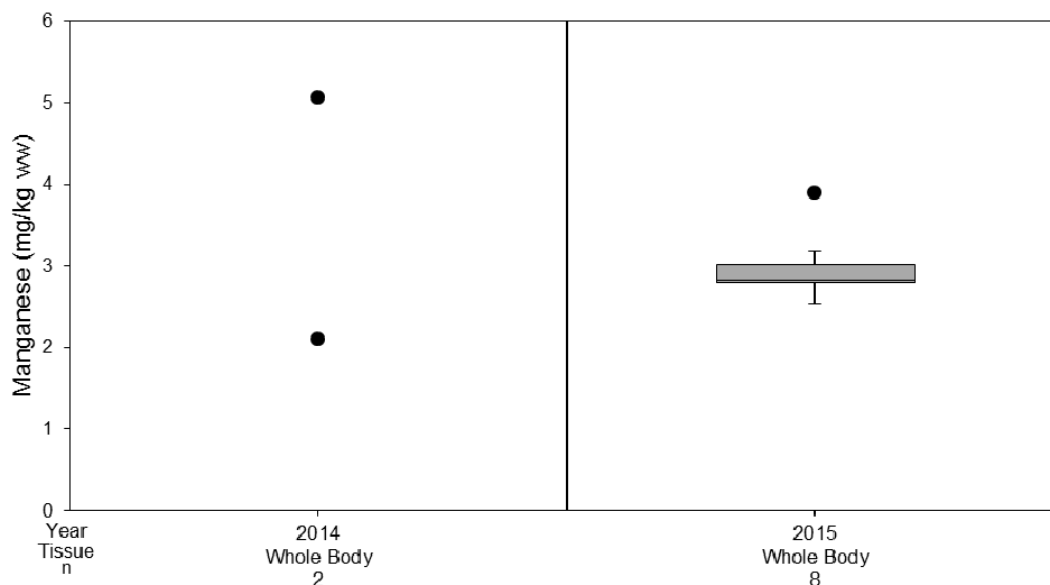
Figure 346: Manganese Concentrations in Redside Shiner Tissue Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 347: Manganese Concentrations in Redside Shiner Tissue Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015



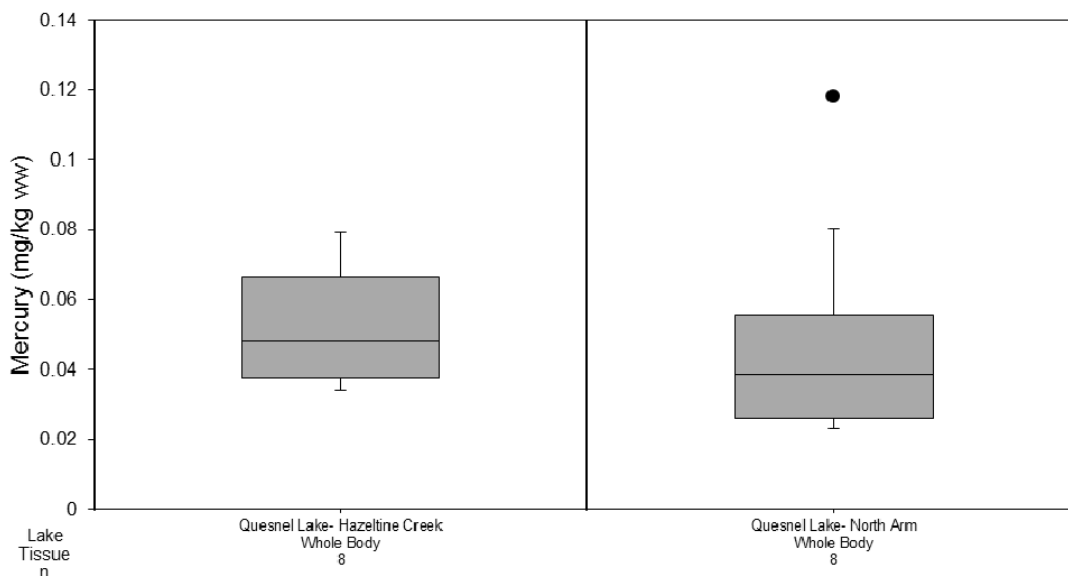
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



8.13 Mercury

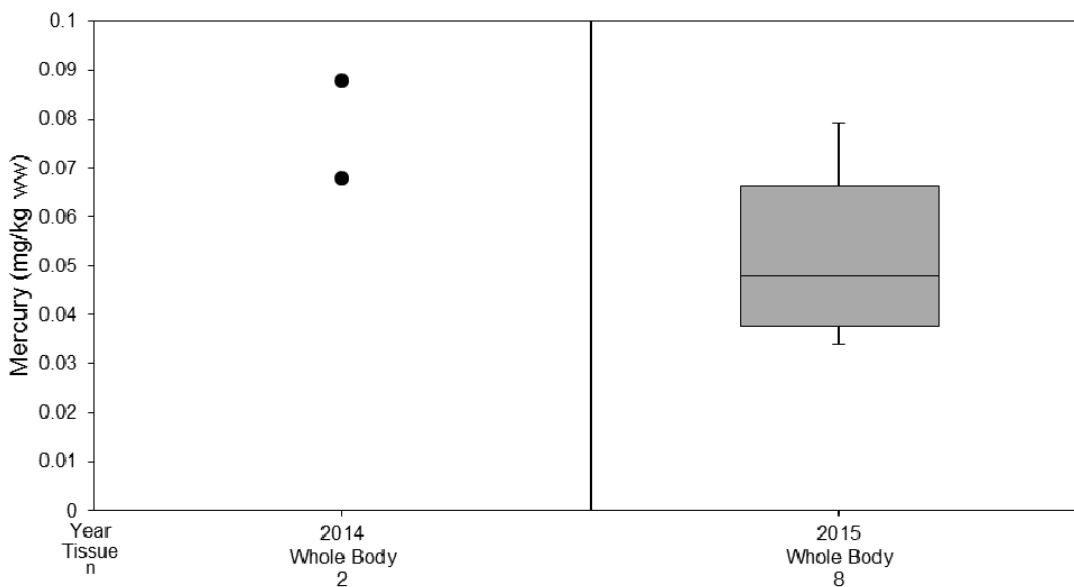
Figure 348: Mercury Concentrations in Redside Shiner Tissue Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 349: Mercury Concentrations in Redside Shiner Tissue Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015



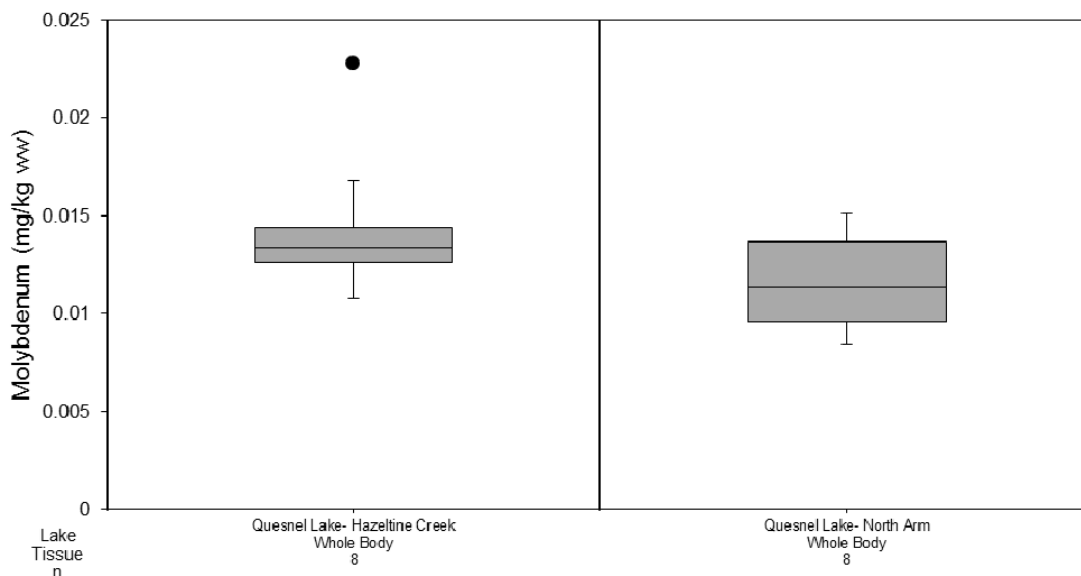
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



8.14 Molybdenum

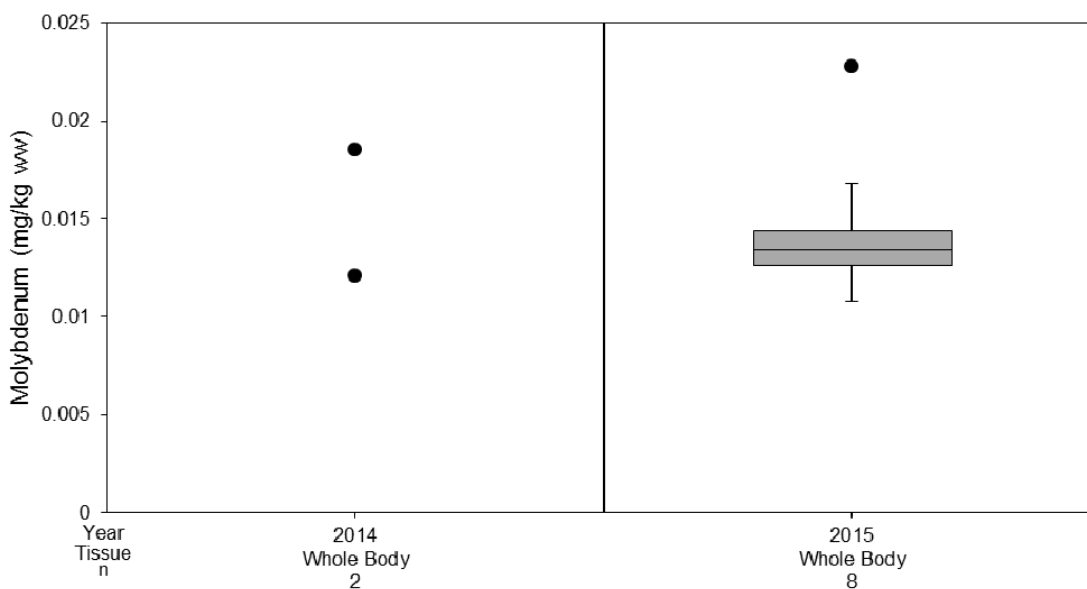
Figure 350: Molybdenum Concentrations in Redside Shiner Tissue Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 351: Molybdenum Concentrations in Redside Shiner Tissue Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015



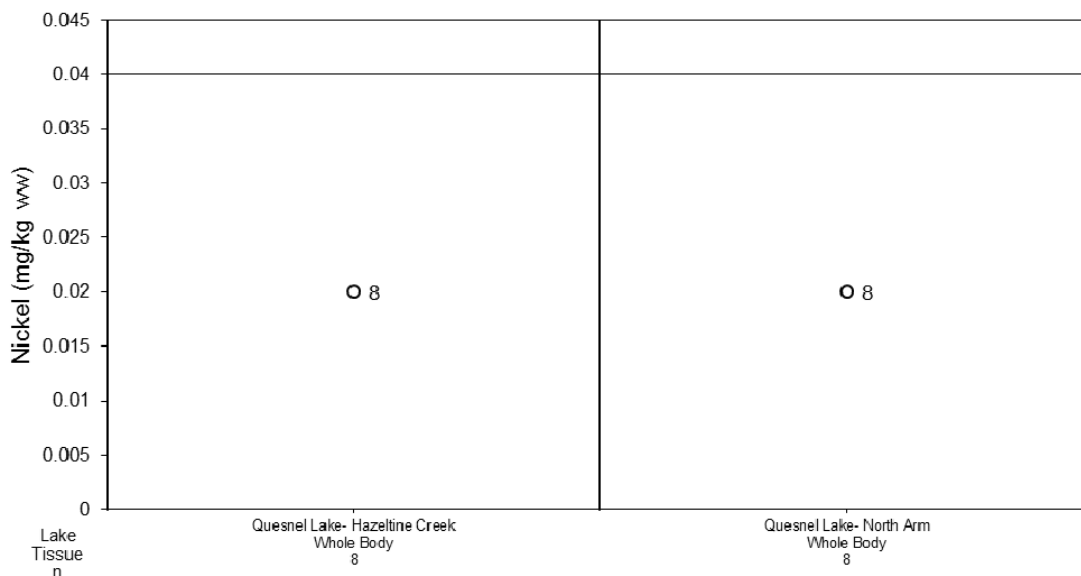
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



8.15 Nickel

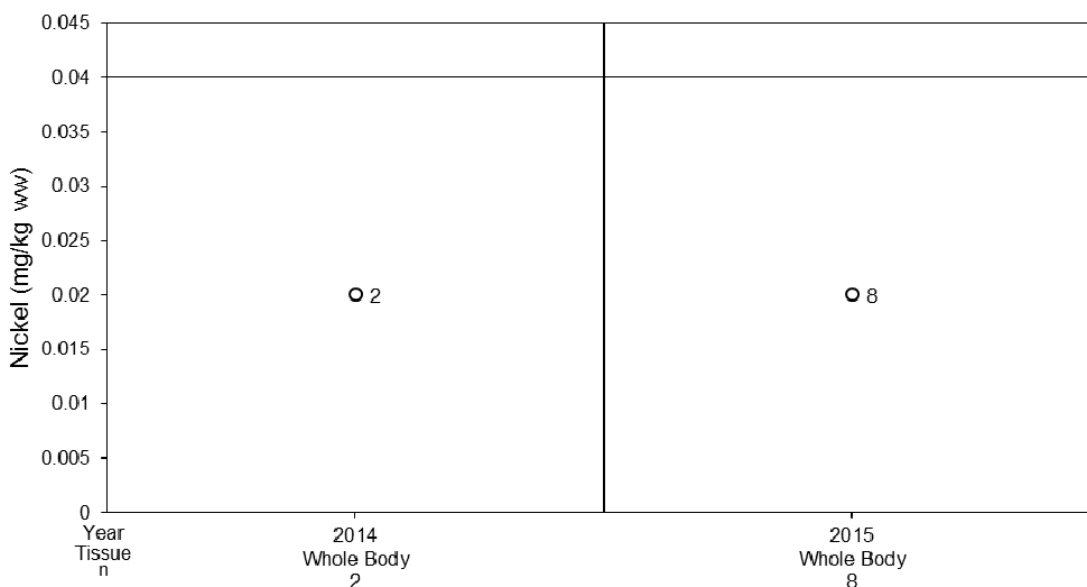
Figure 352: Nickel Concentrations in Lake Redside Shiner Tissue Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 353: Nickel Concentrations in Lake Redside Shiner Tissue Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015



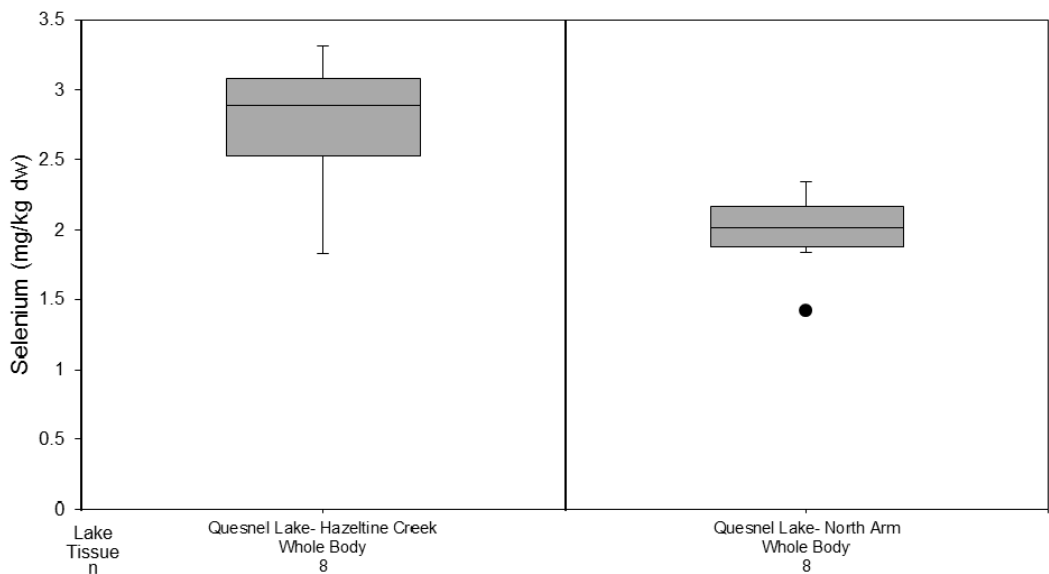
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



8.16 Selenium

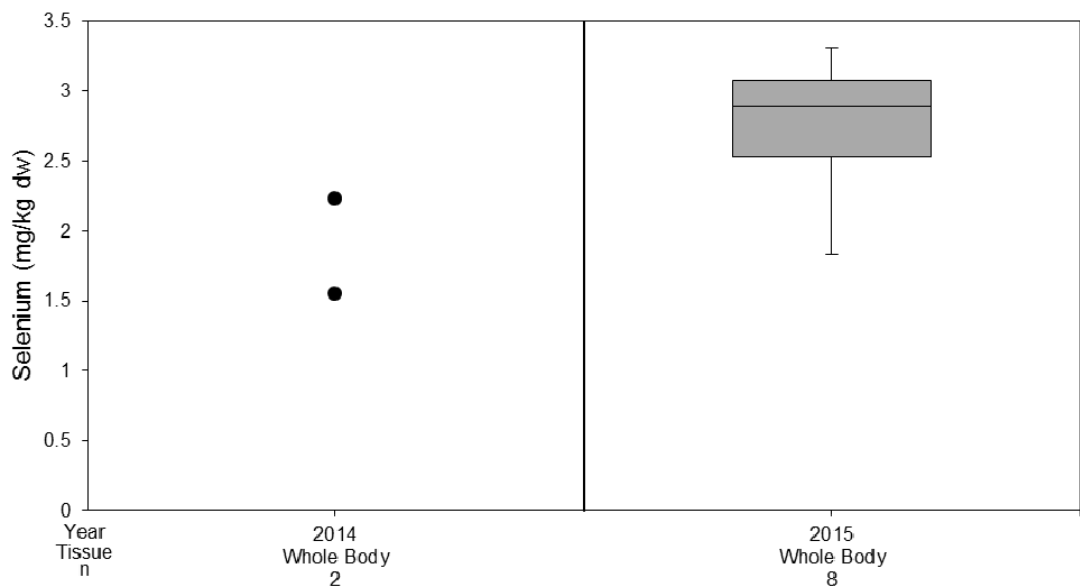
Figure 354: Selenium Concentrations in Redside Shiner Tissue Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 355: Selenium Concentrations in Redside Shiner Tissue Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015



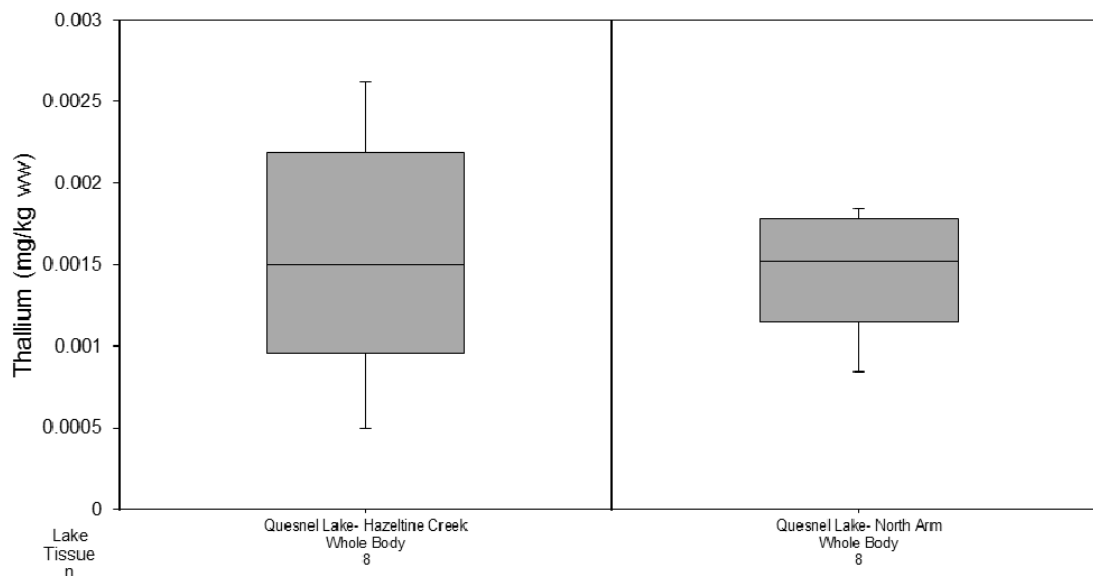
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



8.17 Thallium

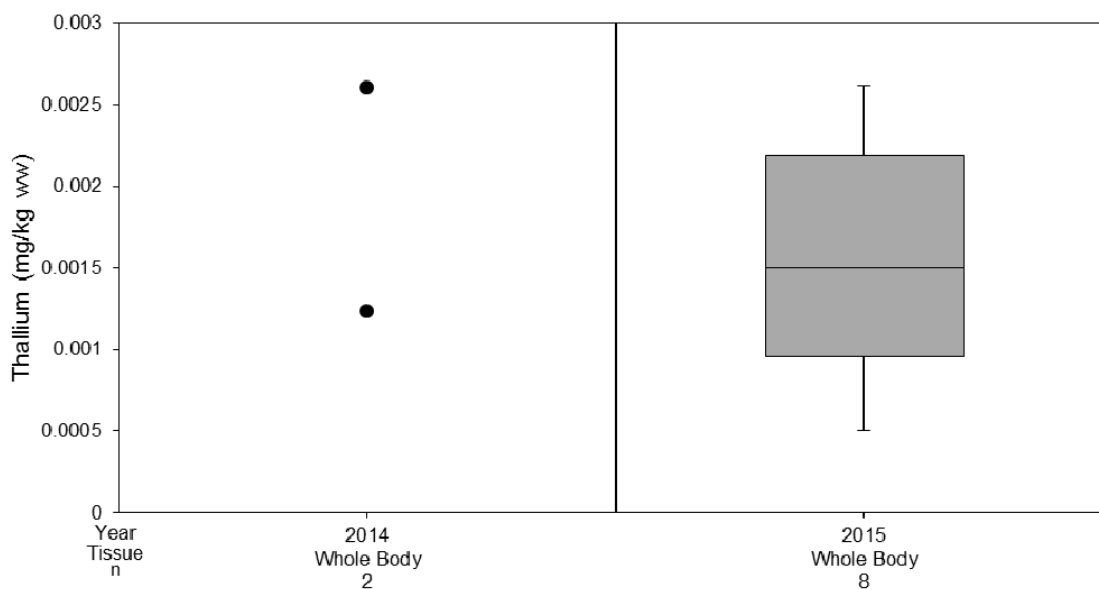
Figure 356: Thallium Concentrations in Redside Shiner Tissue Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 357: Thallium Concentrations in Redside Shiner Tissue Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015



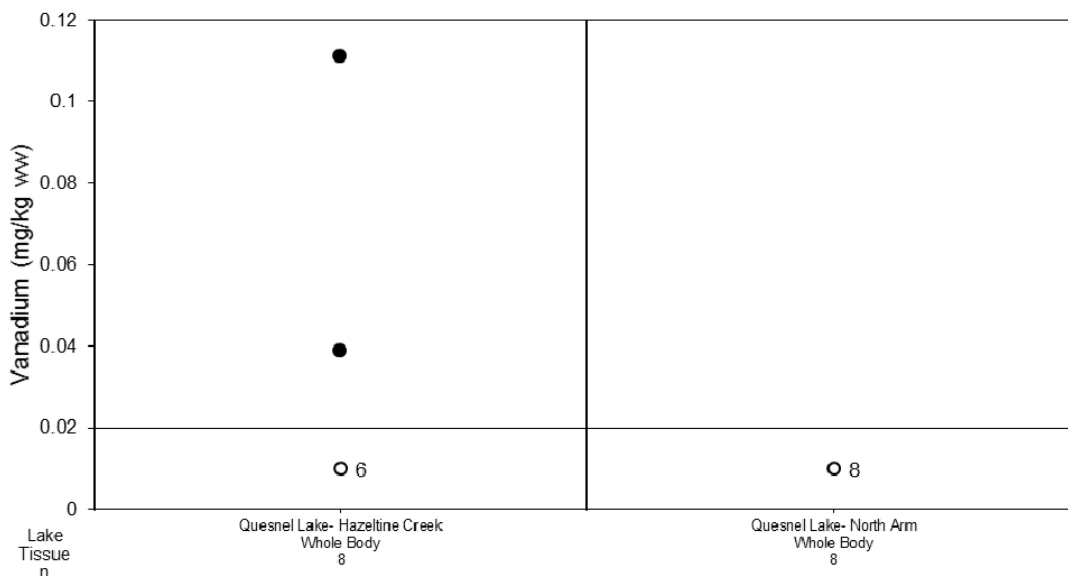
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



8.18 Vanadium

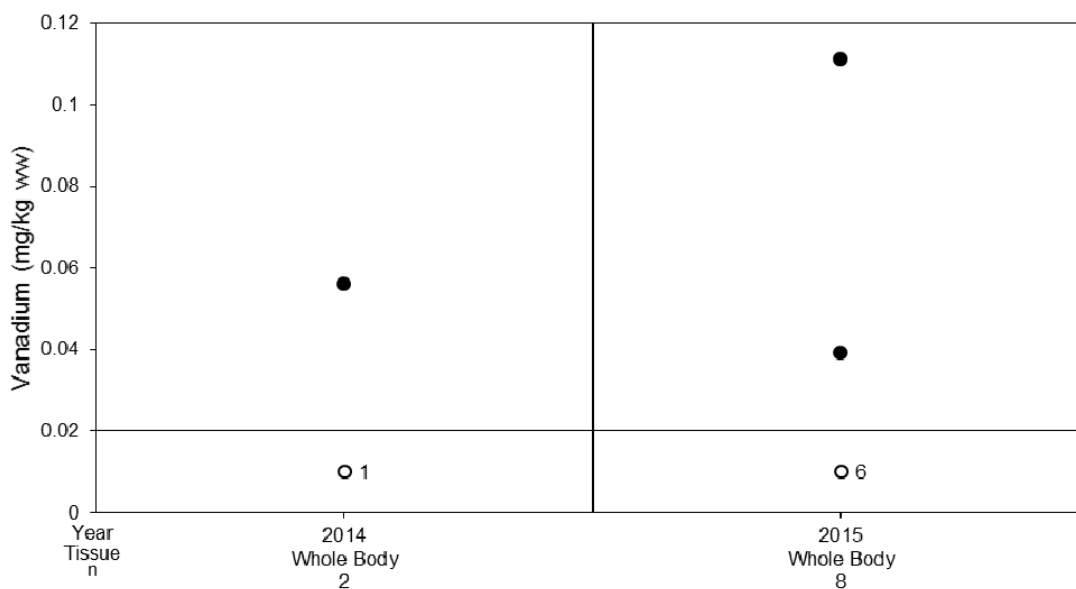
Figure 358: Vanadium Concentrations in Redside Shiner Tissue Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 359: Vanadium Concentrations in Redside Shiner Tissue Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015



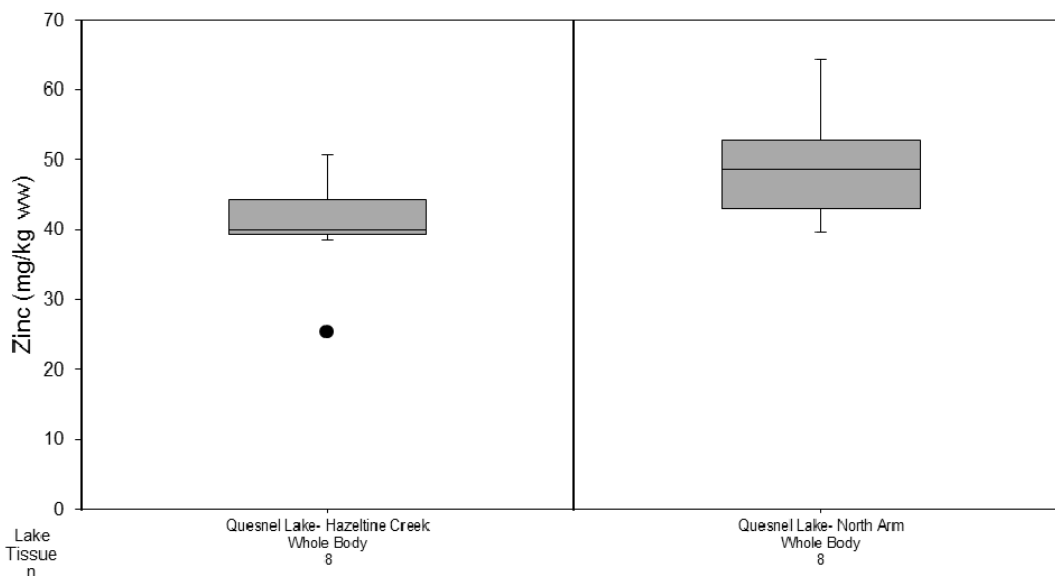
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



8.19 Zinc

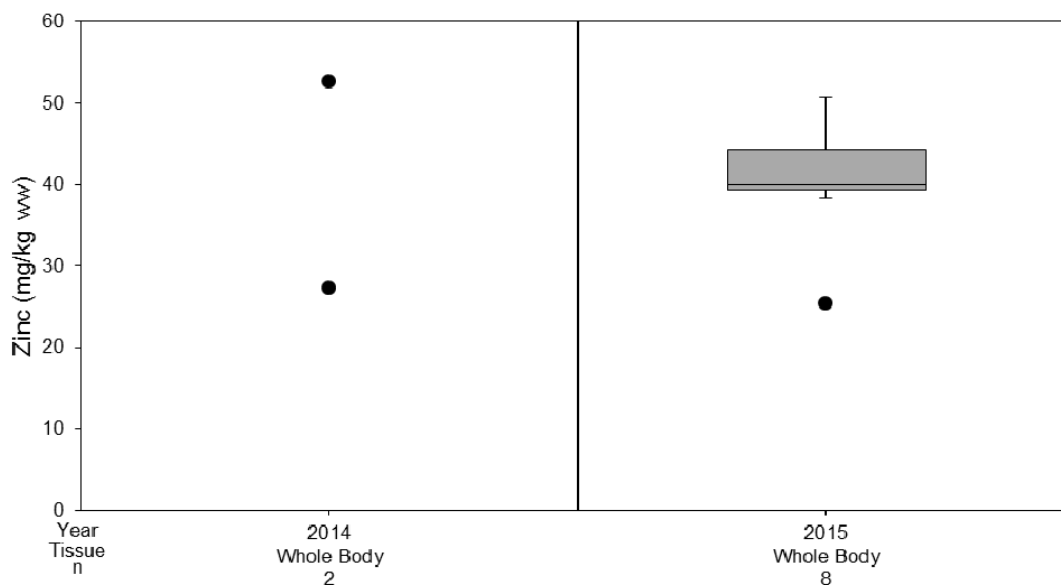
Figure 360: Zinc Concentrations in Redside Shiner Tissue Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 361: Zinc Concentrations in Redside Shiner Tissue Collected from the Quesnel Lake – Hazeltine Creek Confluence in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

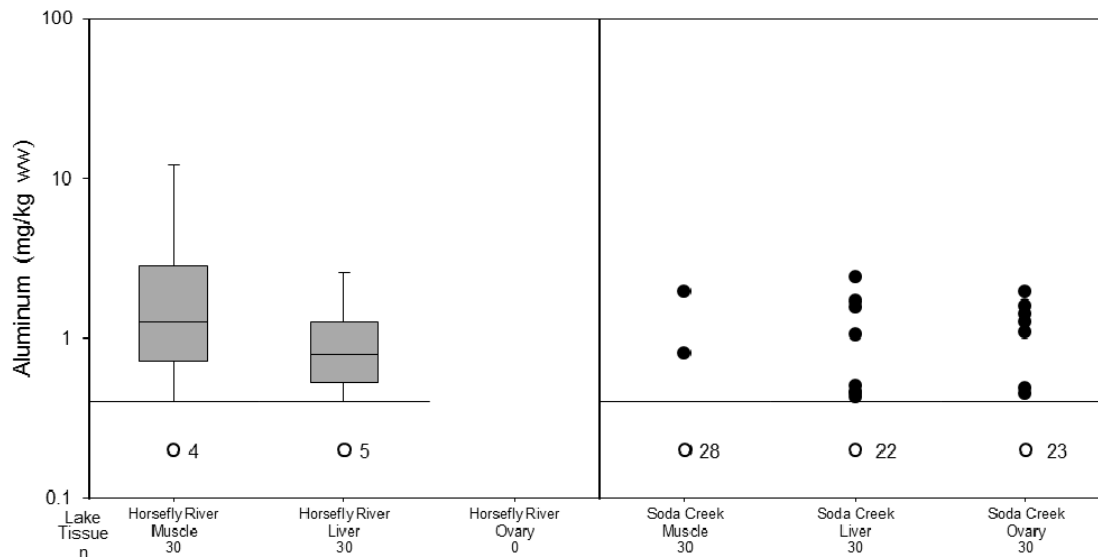
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



9.0 SOCKEYE SALMON ADULTS

9.1 Aluminum

Figure 362: Aluminum Concentrations in Sockeye Salmon Adult Tissues Collected in 2014

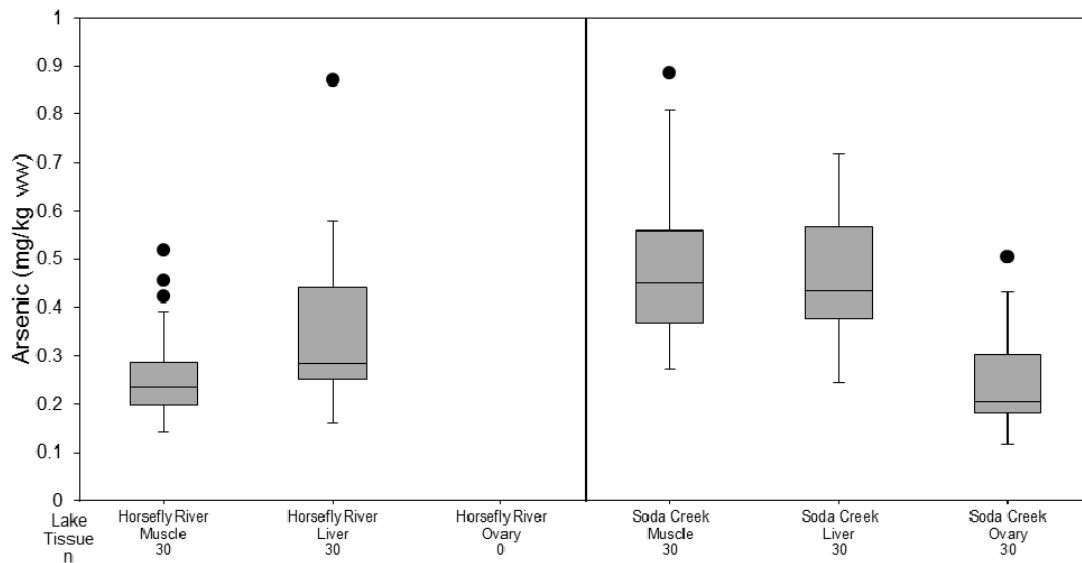


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

9.2 Arsenic

Figure 363: Arsenic Concentrations in Sockeye Salmon Adult Tissues Collected in 2014



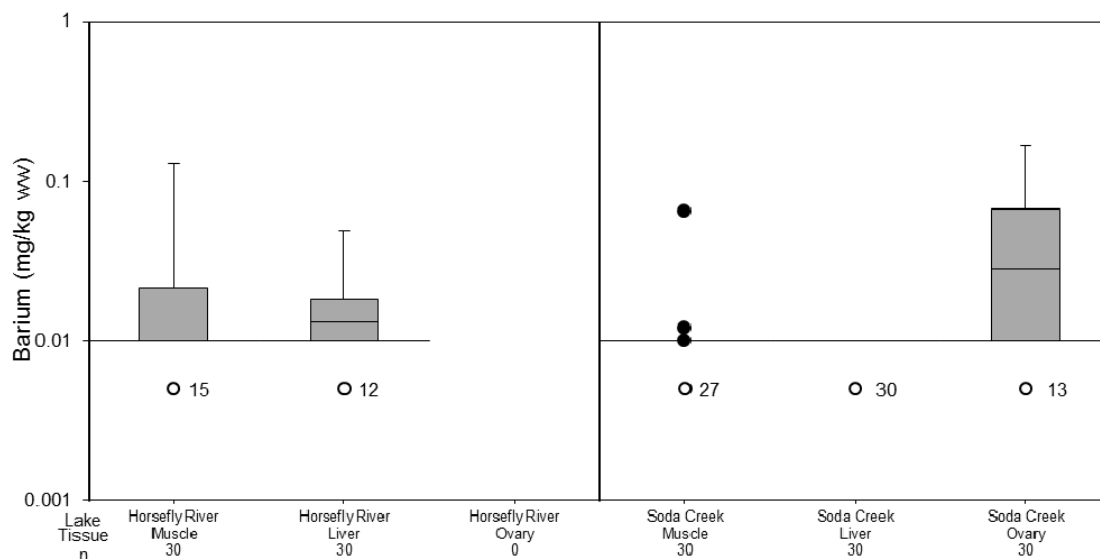
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



9.3 Barium

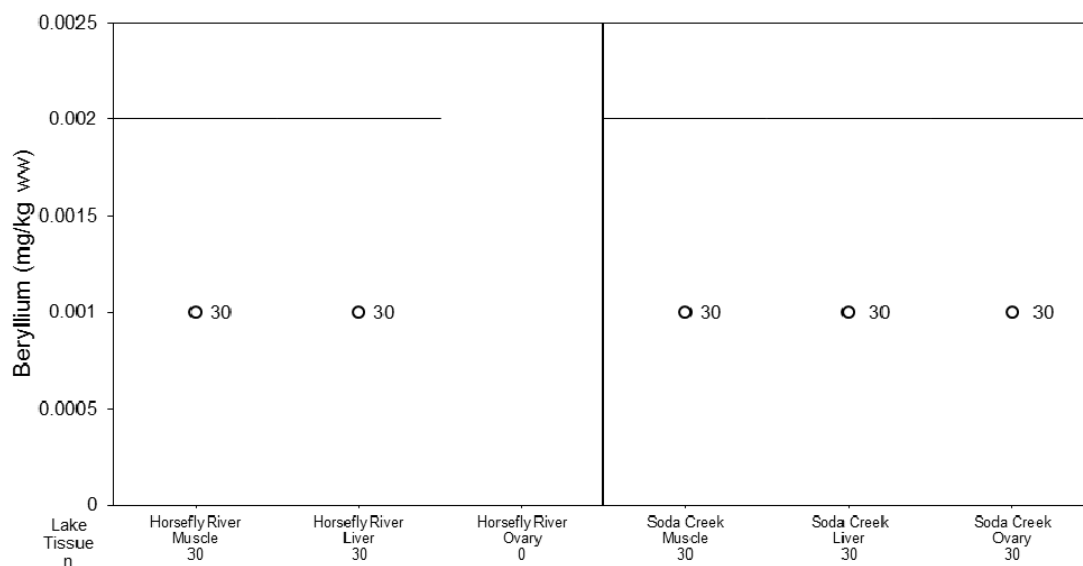
Figure 364: Barium Concentrations in Sockeye Salmon Adult Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

9.4 Beryllium

Figure 365: Beryllium Concentrations in Sockeye Salmon Adult Tissues Collected in 2014

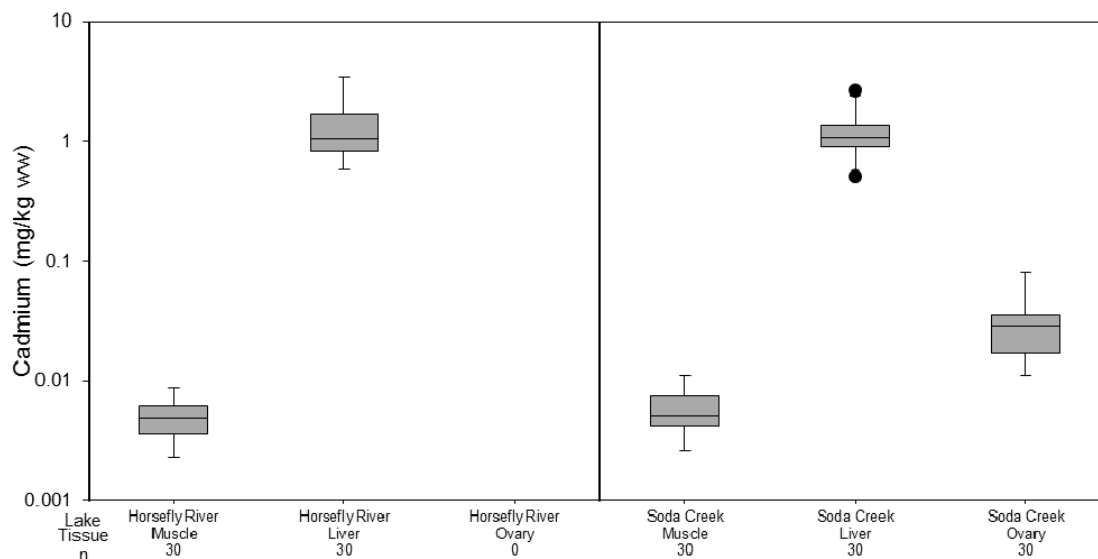


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



9.5 Cadmium

Figure 366: Cadmium Concentrations in Sockeye Salmon Adult Tissues Collected in 2014

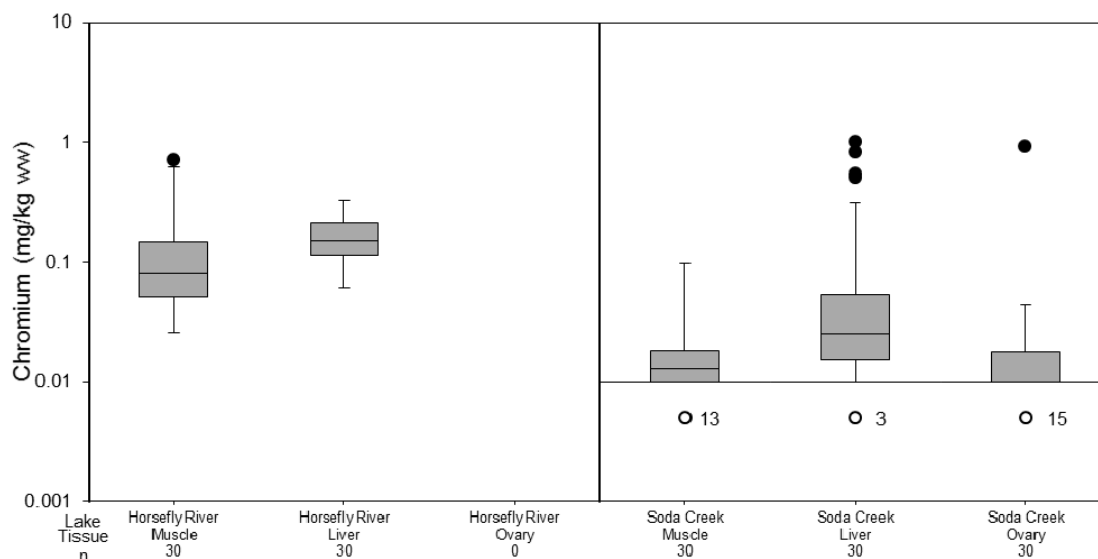


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

9.6 Chromium

Figure 367: Chromium Concentrations in Sockeye Salmon Adult Tissues Collected in 2014



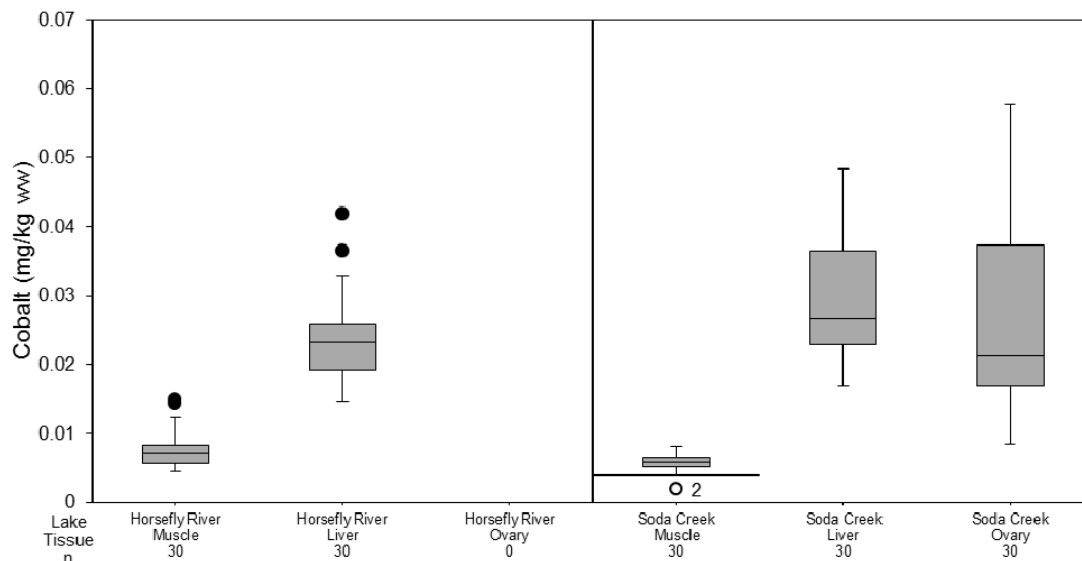
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



9.7 Cobalt

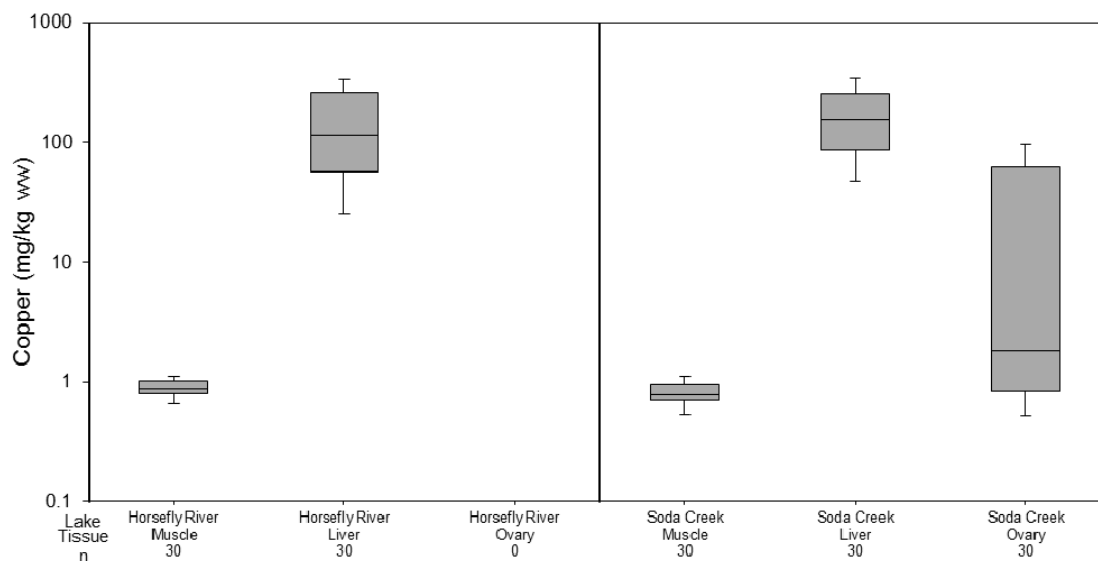
Figure 368: Cobalt Concentrations in Sockeye Salmon Adult Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

9.8 Copper

Figure 369: Copper Concentrations in Sockeye Salmon Adult Tissues Collected in 2014

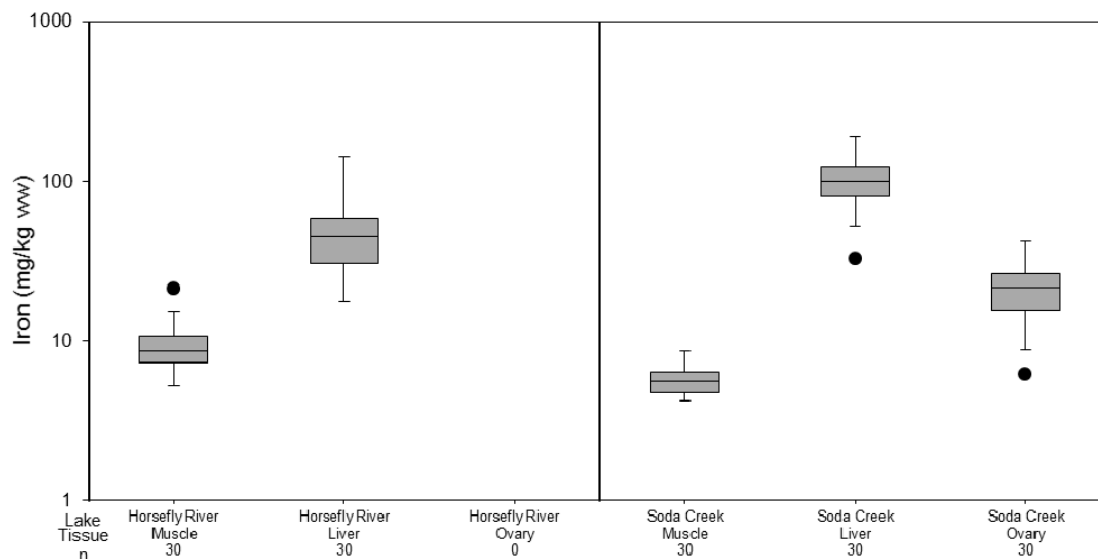


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



9.9 Iron

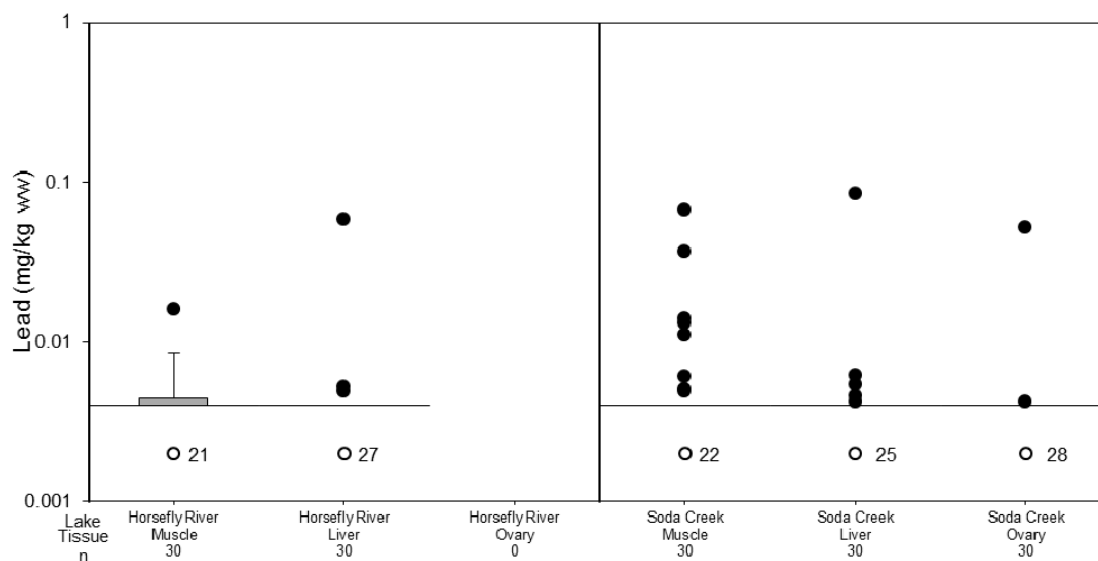
Figure 370: Iron Concentrations in Sockeye Salmon Adult Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

9.10 Lead

Figure 371: Lead Concentrations in Sockeye Salmon Adult Tissues Collected in 2014

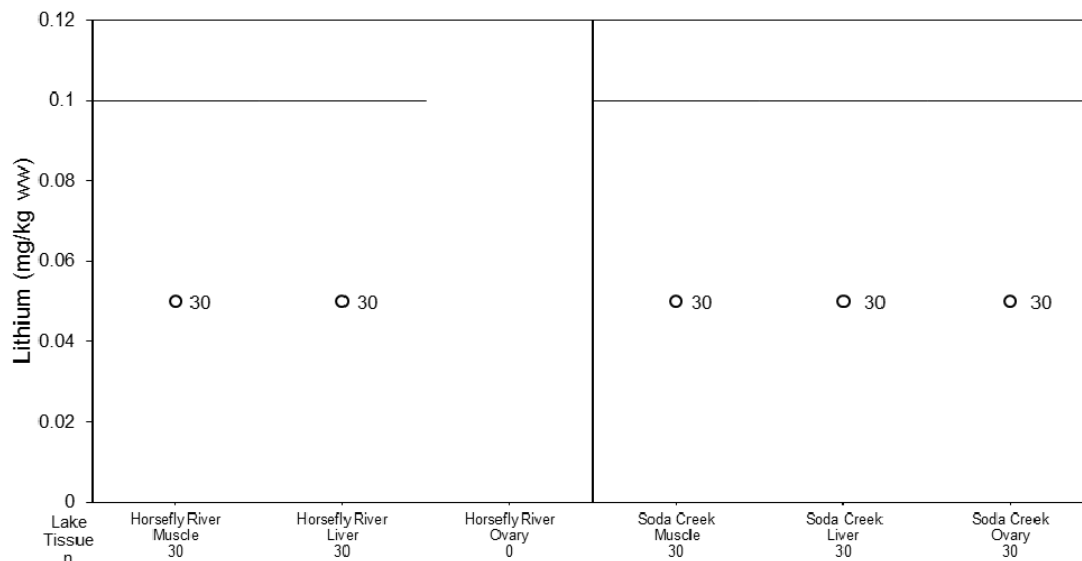


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



9.11 Lithium

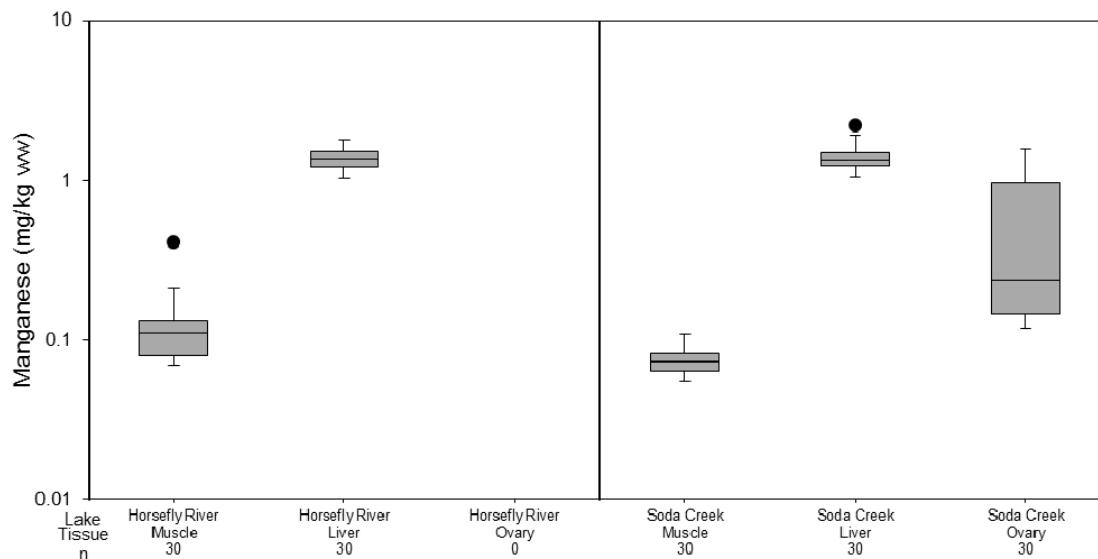
Figure 372: Lithium Concentrations in Sockeye Salmon Adult Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

9.12 Manganese

Figure 373: Manganese Concentrations in Sockeye Salmon Adult Tissues Collected in 2014

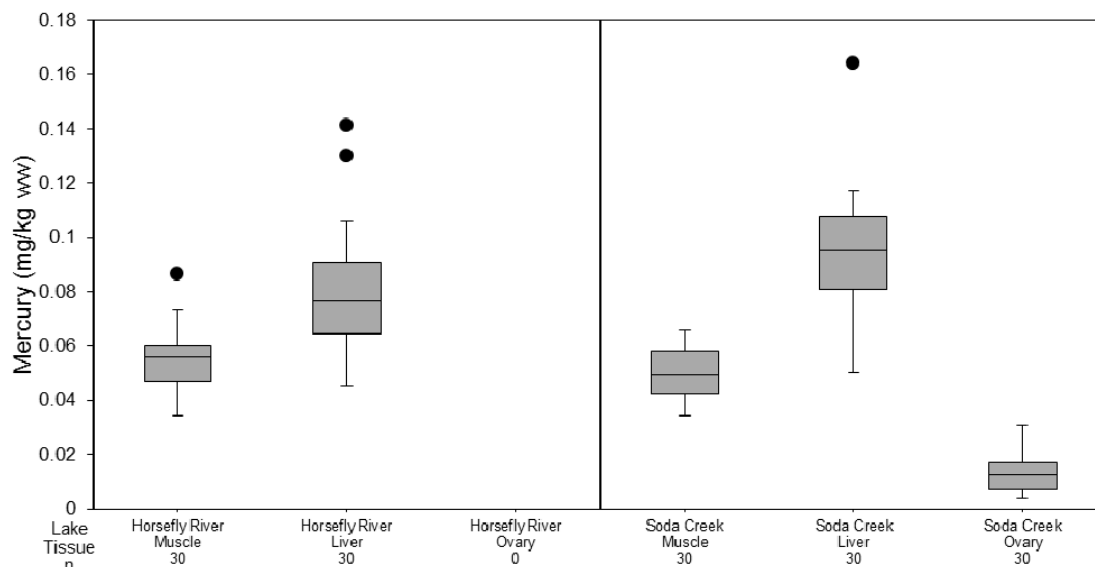


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



9.13 Mercury

Figure 374: Mercury Concentrations in Sockeye Salmon Adult Tissues Collected in 2014

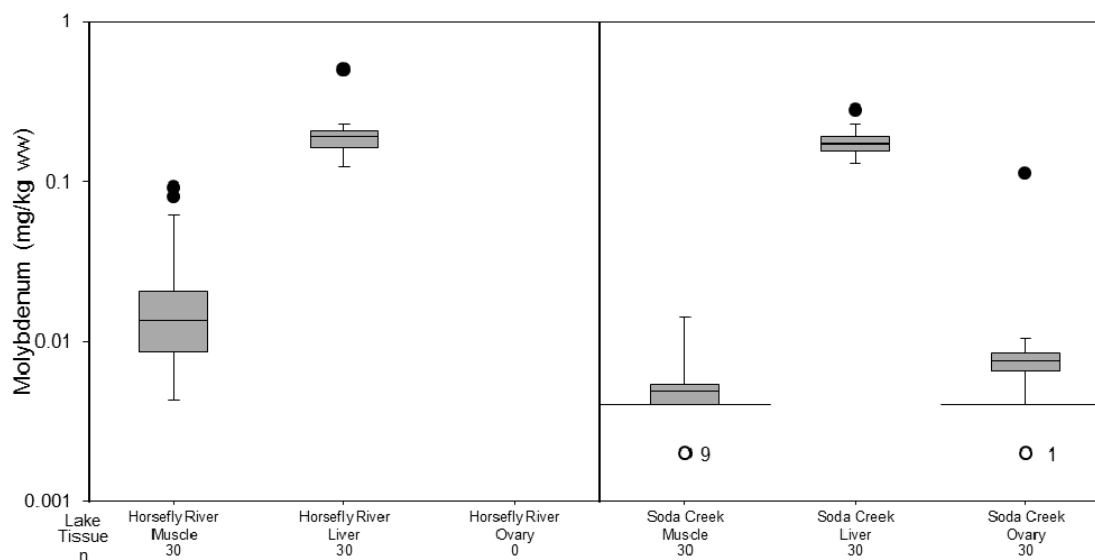


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

9.14 Molybdenum

Figure 375: Molybdenum Concentrations in Sockeye Salmon Adult Tissues Collected in 2014



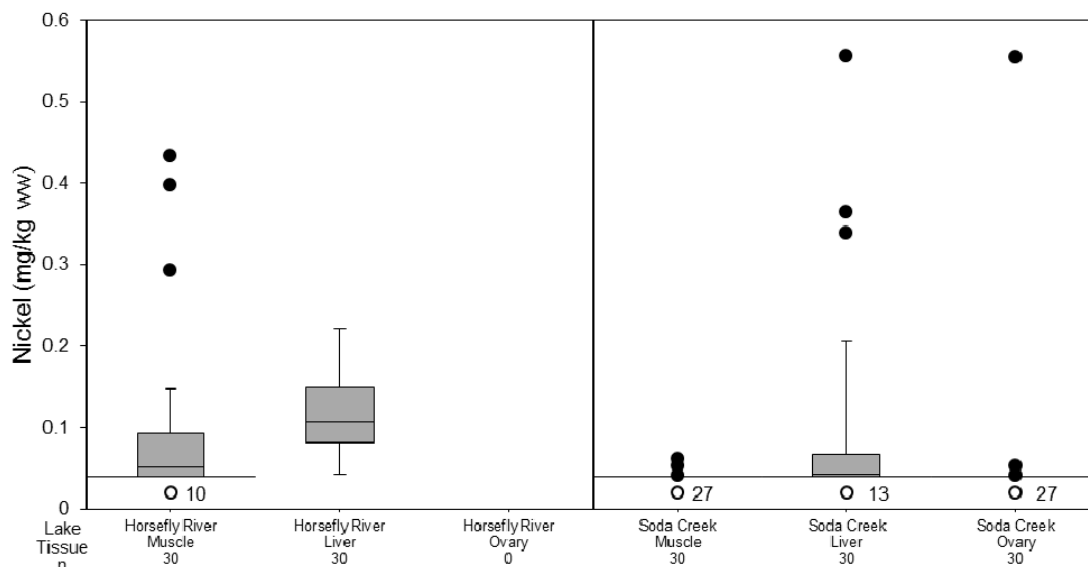
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



9.15 Nickel

Figure 376: Nickel Concentrations in Sockeye Salmon Adult Tissues Collected in 2014

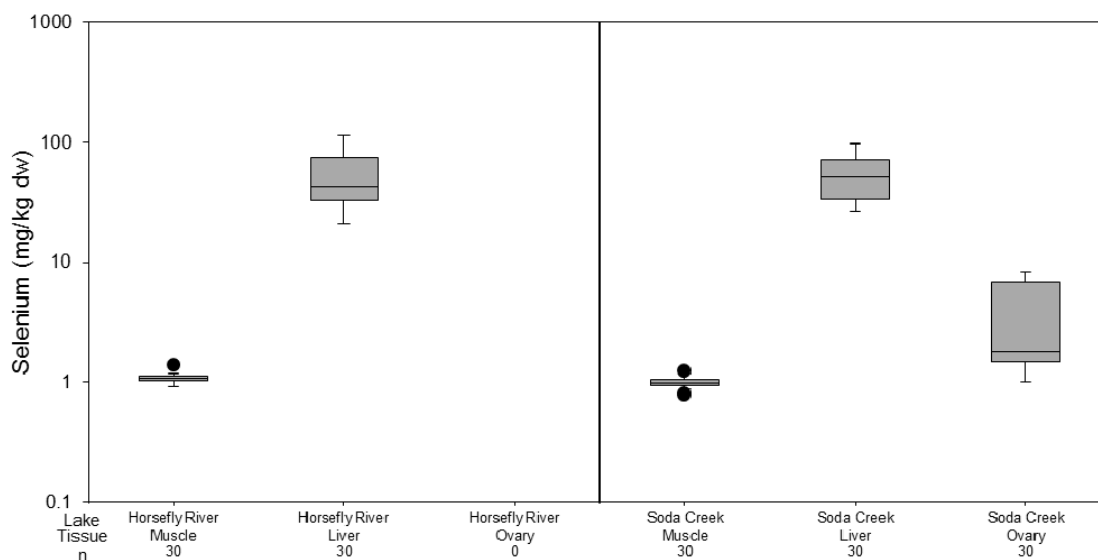


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

9.16 Selenium

Figure 377: Selenium Concentrations in Sockeye Salmon Adult Tissues Collected in 2014



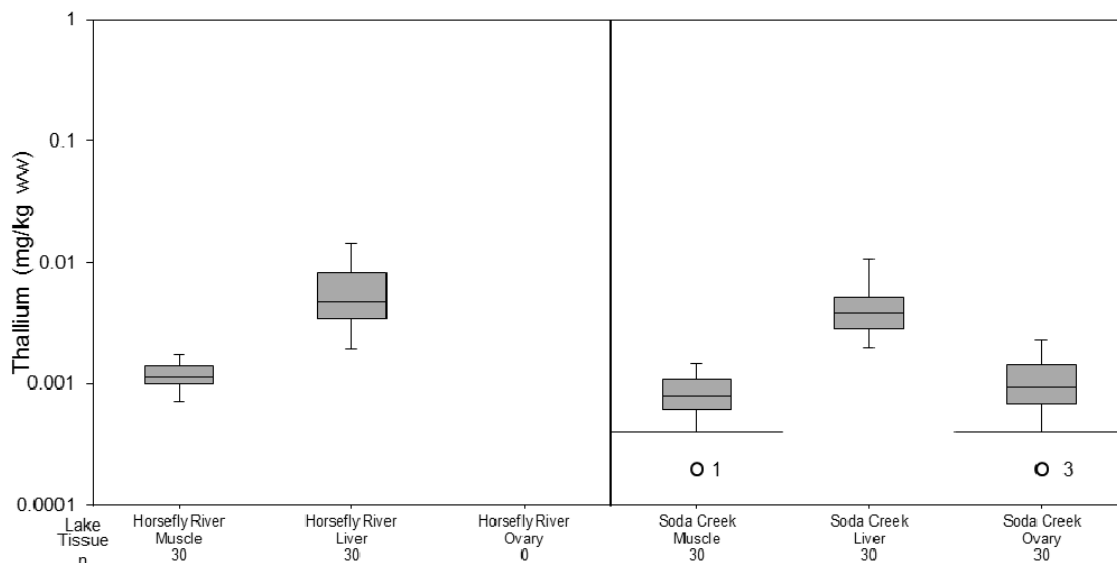
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



9.17 Thallium

Figure 378: Thallium Concentrations in Sockeye Salmon Adult Tissues Collected in 2014

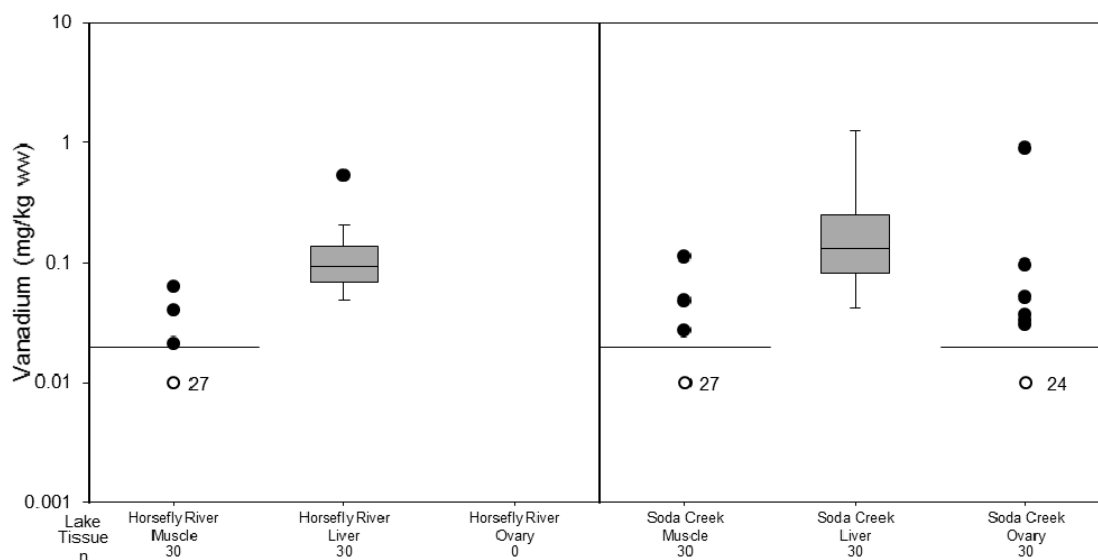


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

9.18 Vanadium

Figure 379: Vanadium Concentrations in Sockeye Salmon Adult Tissues Collected in 2014



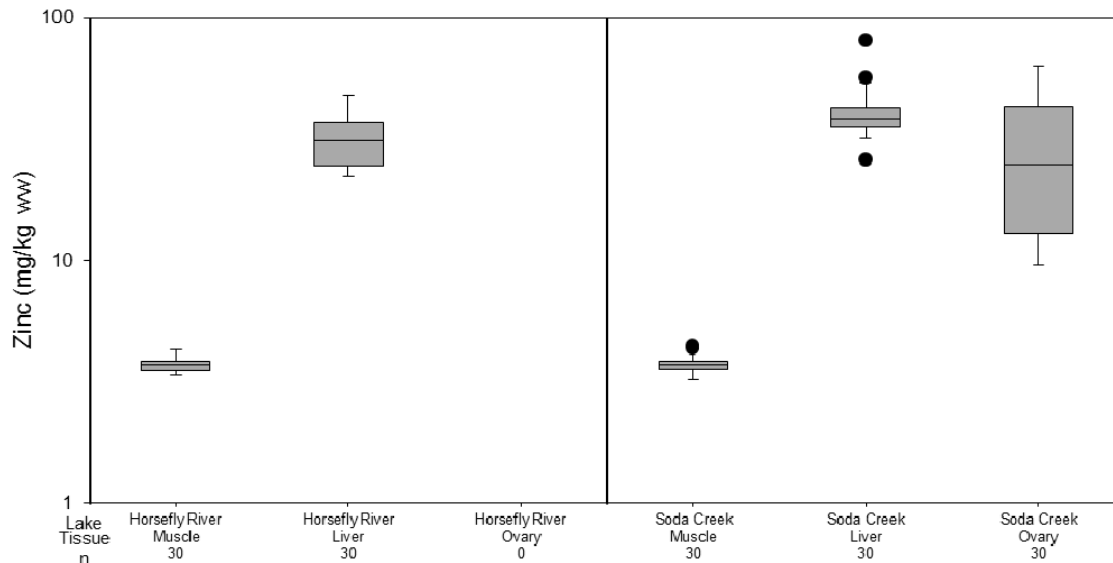
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



9.19 Zinc

Figure 380: Zinc Concentrations in Sockeye Salmon Adult Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values.

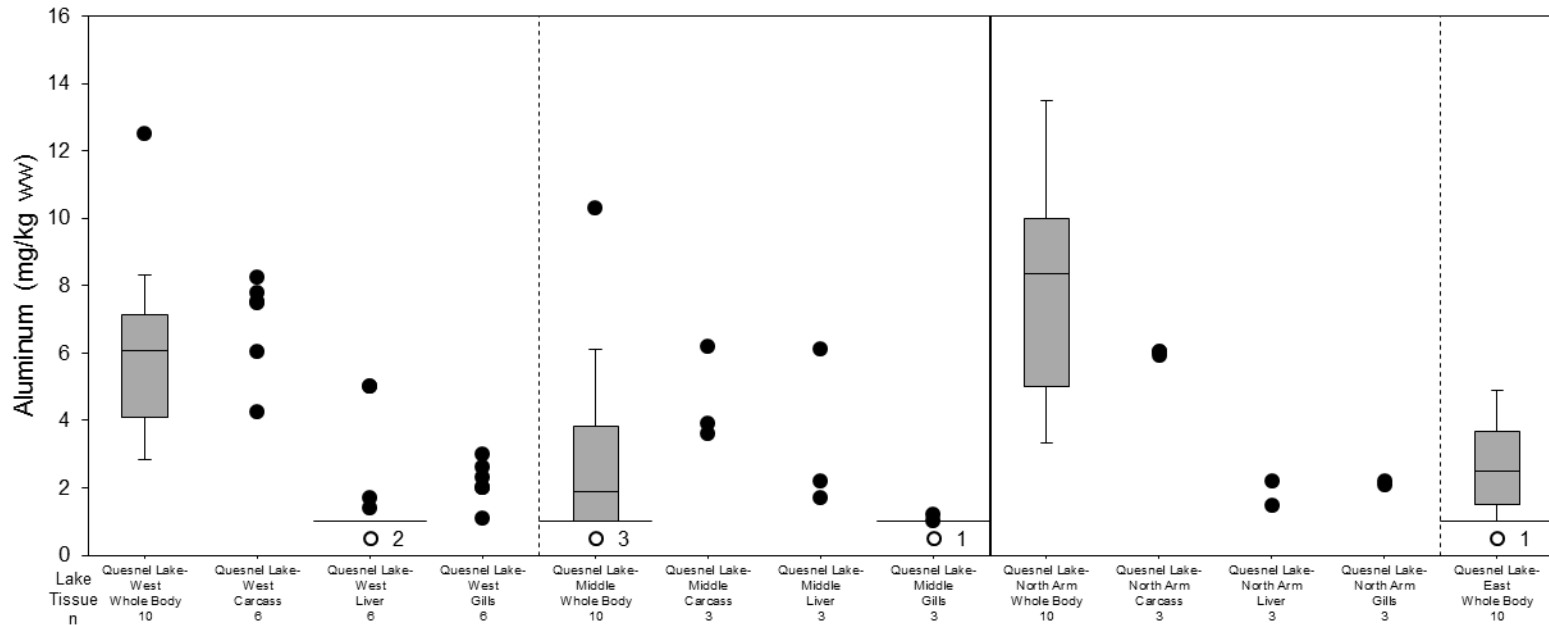
mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



10.0 SOCKEYE SALMON JUVENILES

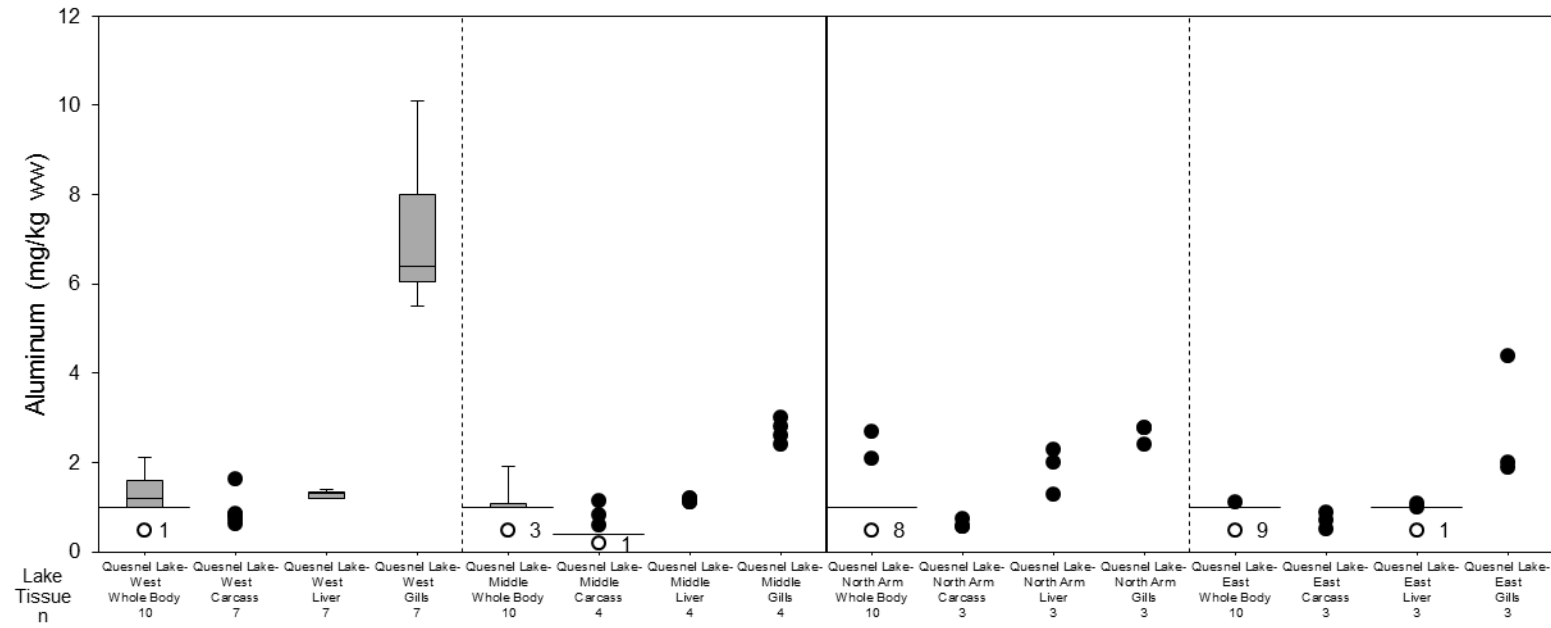
10.1 Aluminum

Figure 381: Aluminum Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2014



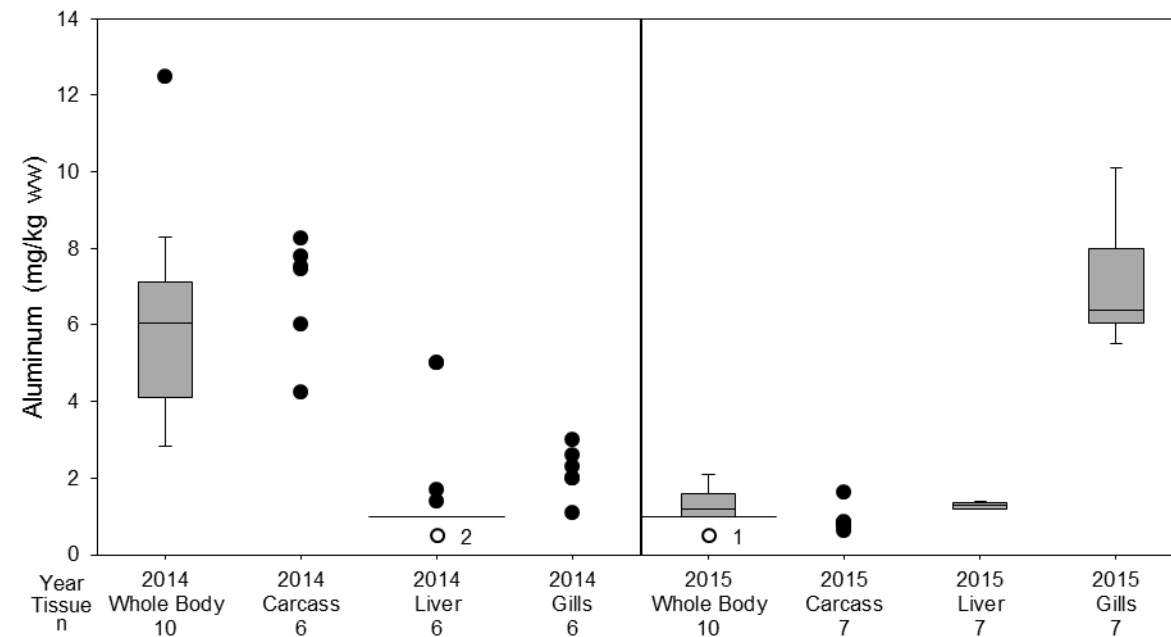
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 382: Aluminum Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 383: Aluminum Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – West in 2014 and 2015

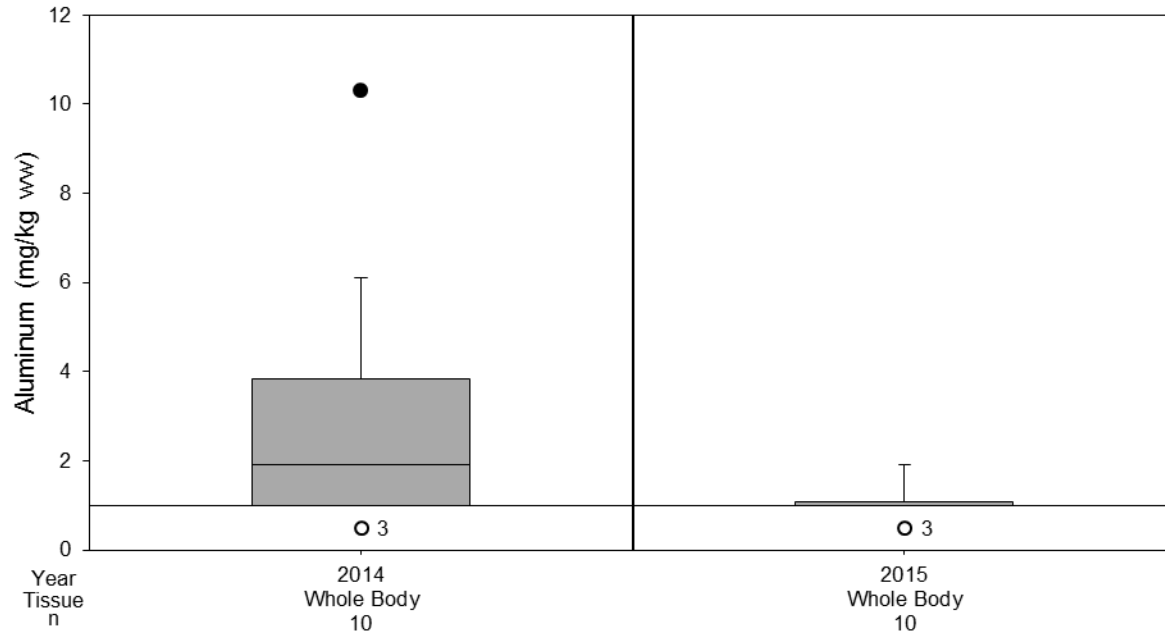


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3
Fish Tissue Chemistry Censored Boxplots

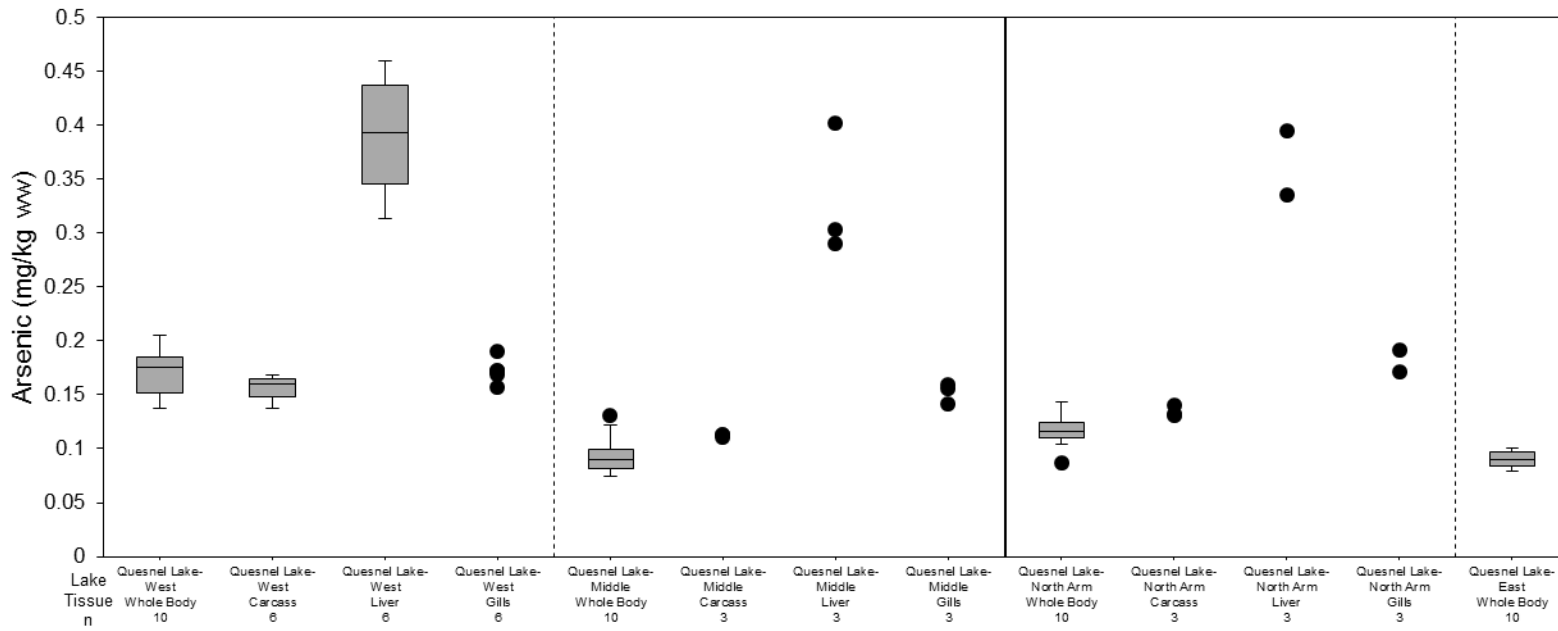
Figure 384: Aluminum Concentrations in Sockeye Salmon Juvenile Tissue Collected from the Quesnel Lake – Middle in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

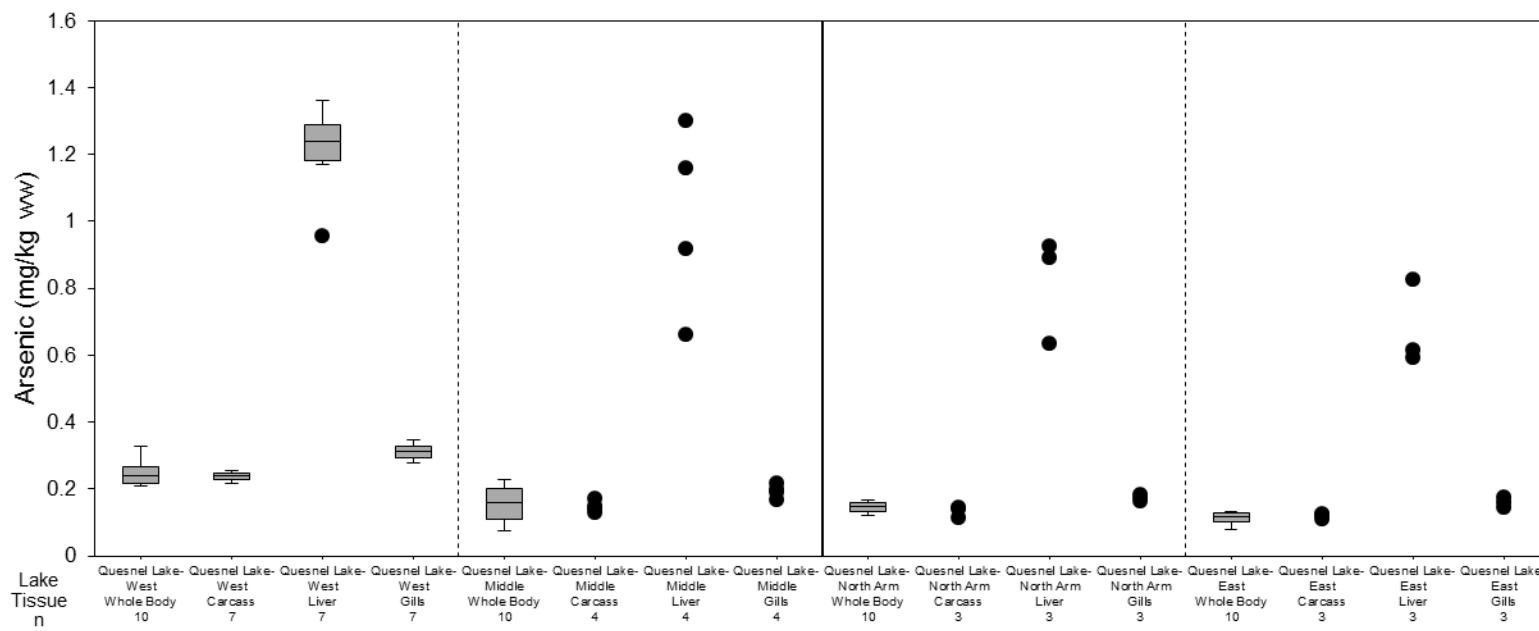
10.2 Arsenic

Figure 385: Arsenic Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 386: Arsenic Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2015

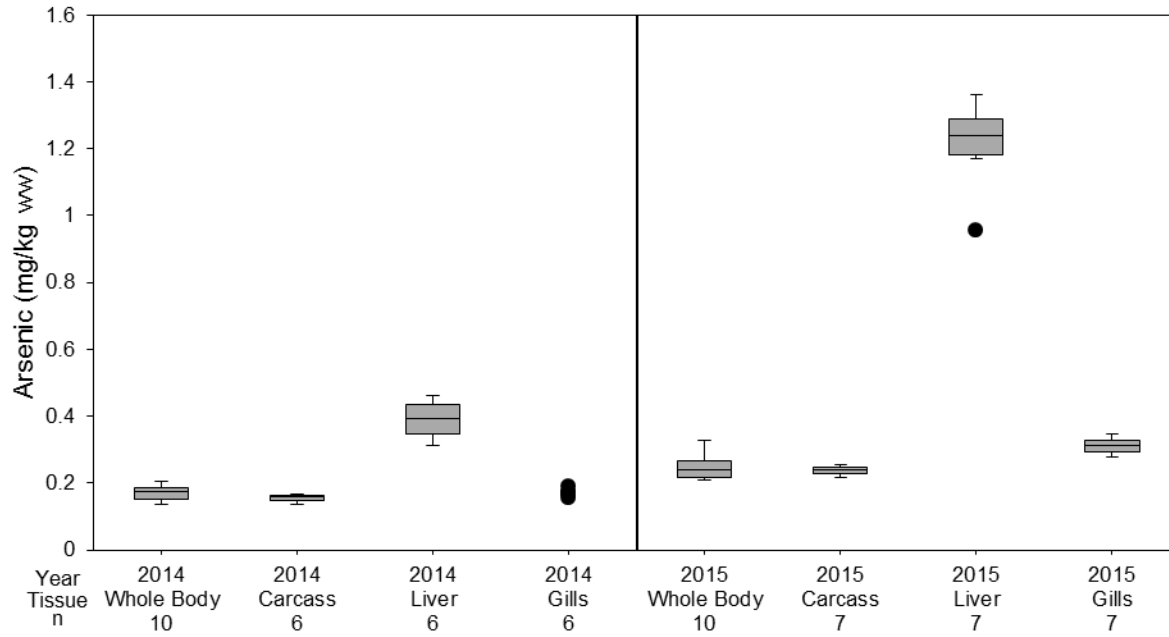


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



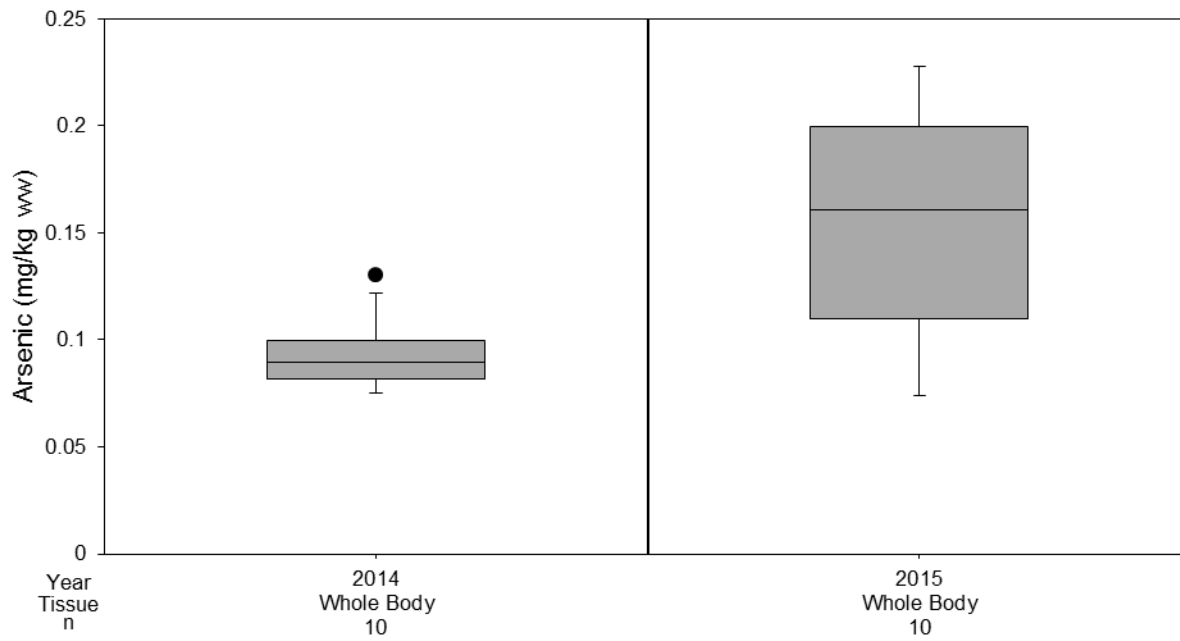
ATTACHMENT 3
Fish Tissue Chemistry Censored Boxplots

Figure 387: Arsenic Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – West in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

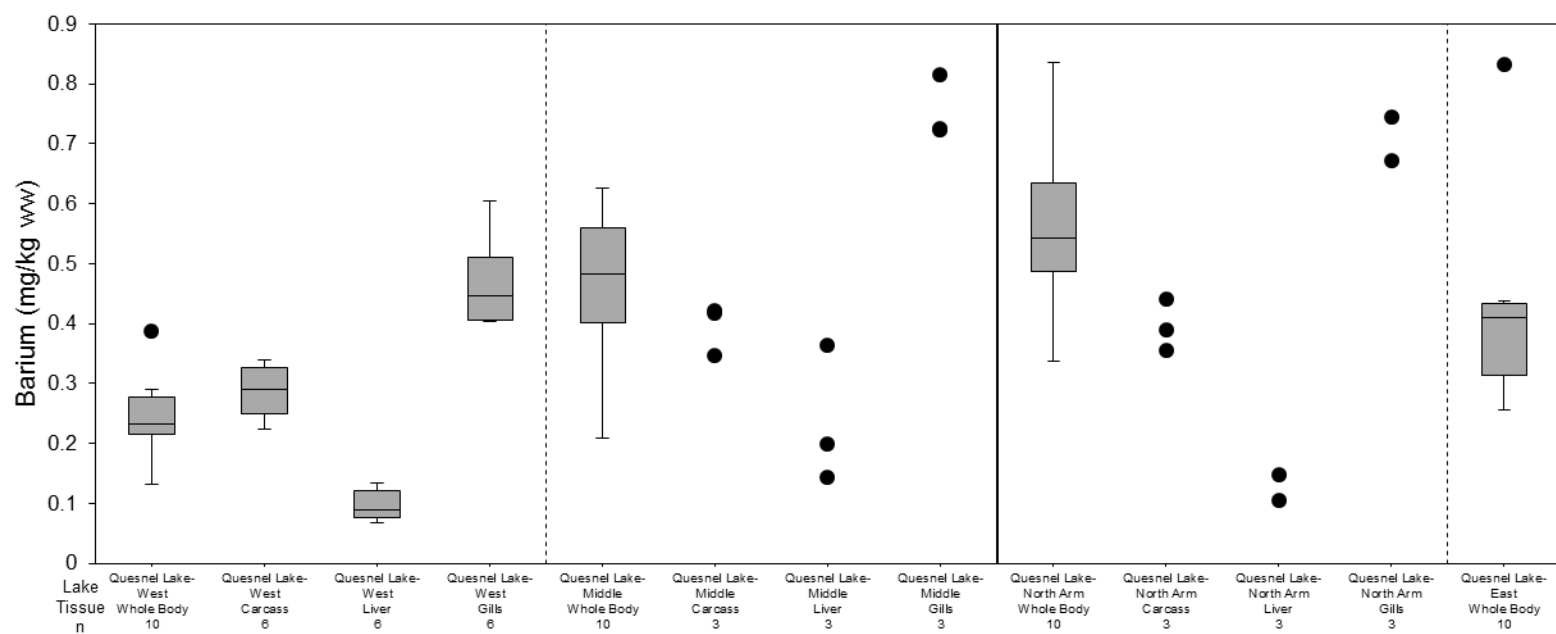
Figure 388: Arsenic Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – Middle in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

10.3 Barium

Figure 389: Barium Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2014

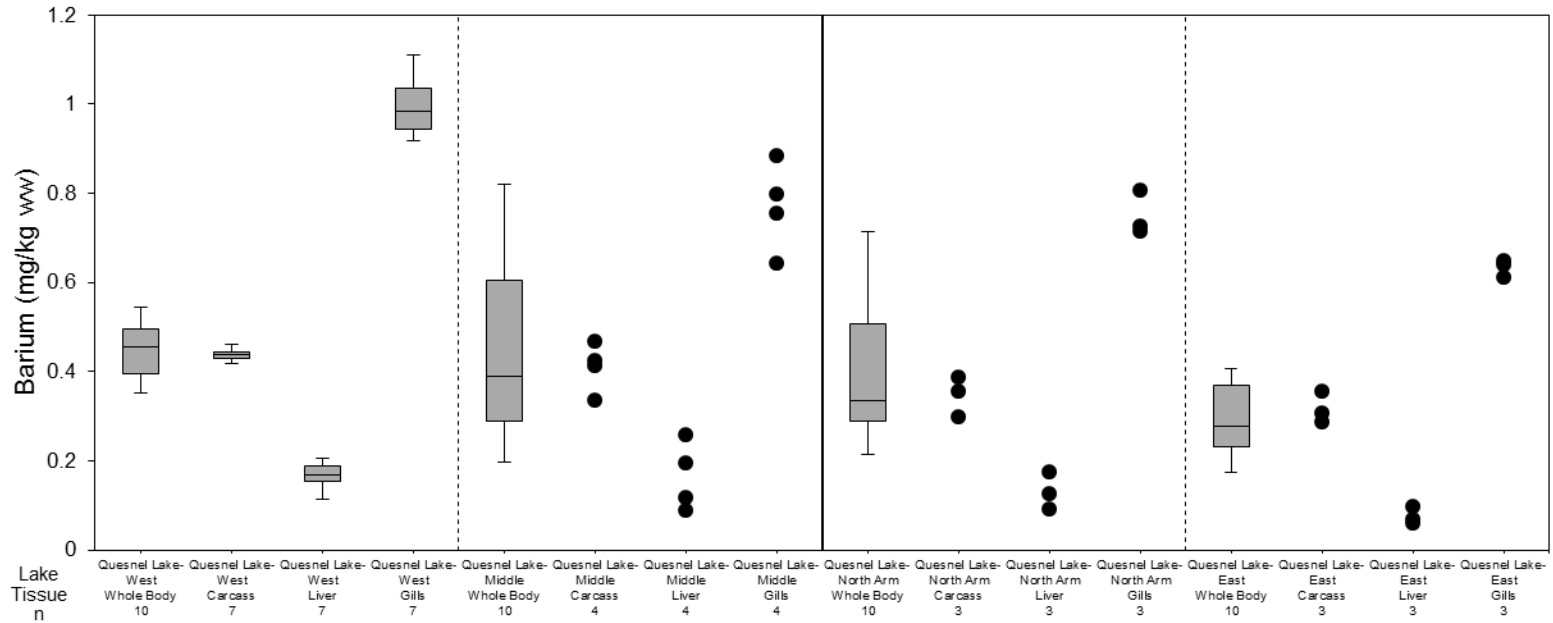


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



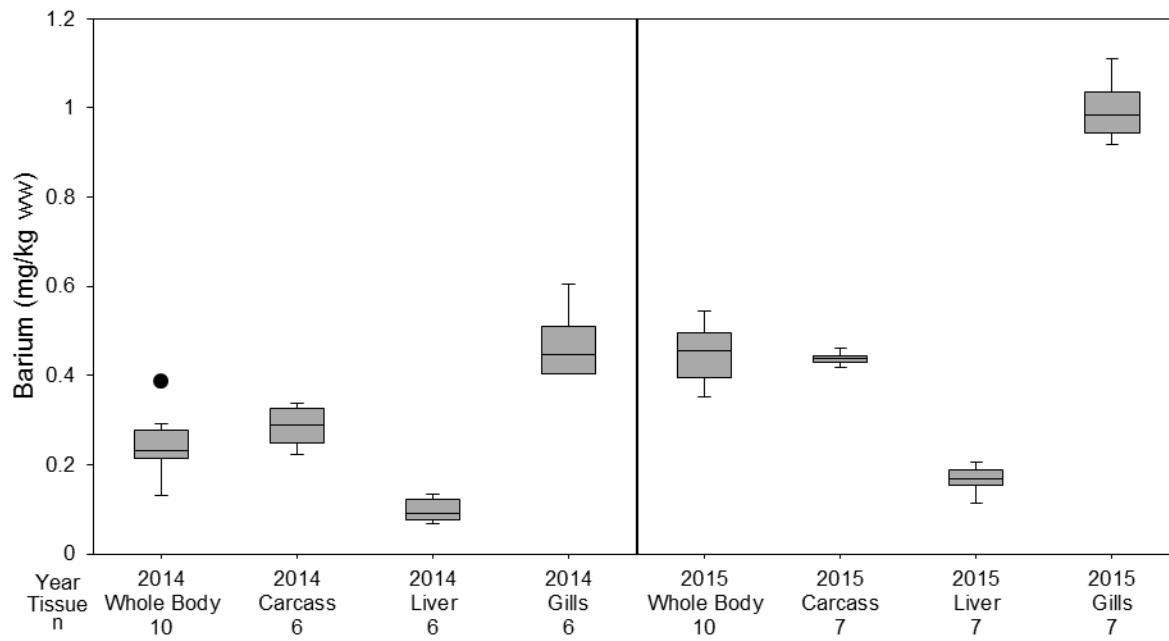
ATTACHMENT 3
Fish Tissue Chemistry Censored Boxplots

Figure 390: Barium Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2015



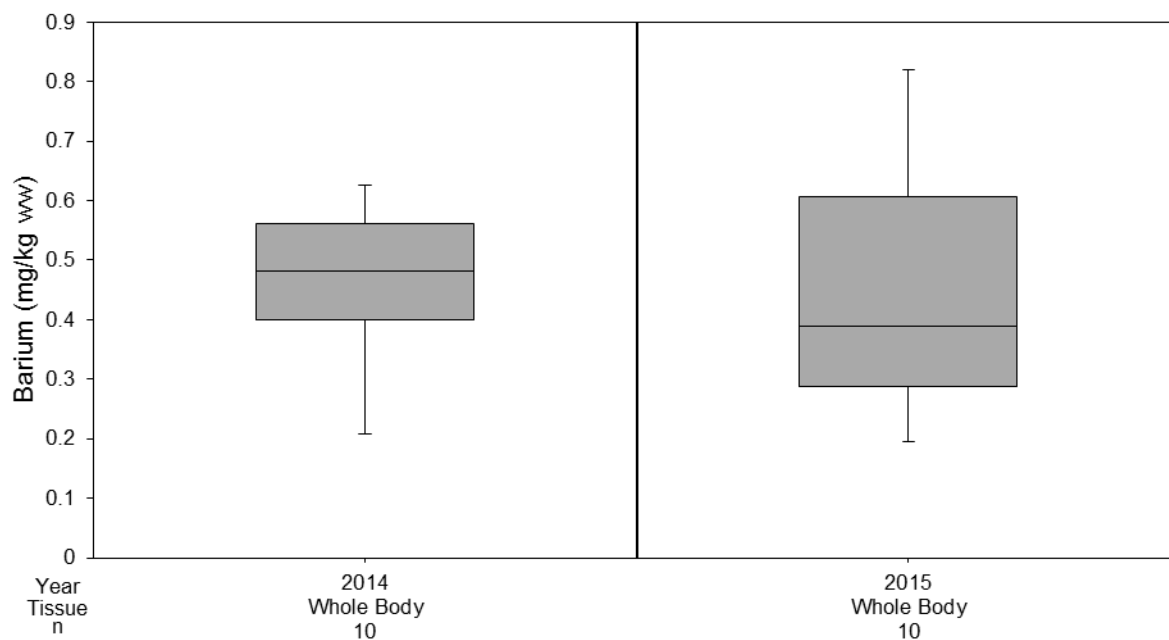
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years

Figure 391: Barium Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – West in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years

Figure 392: Barium Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – Middle in 2014 and 2015

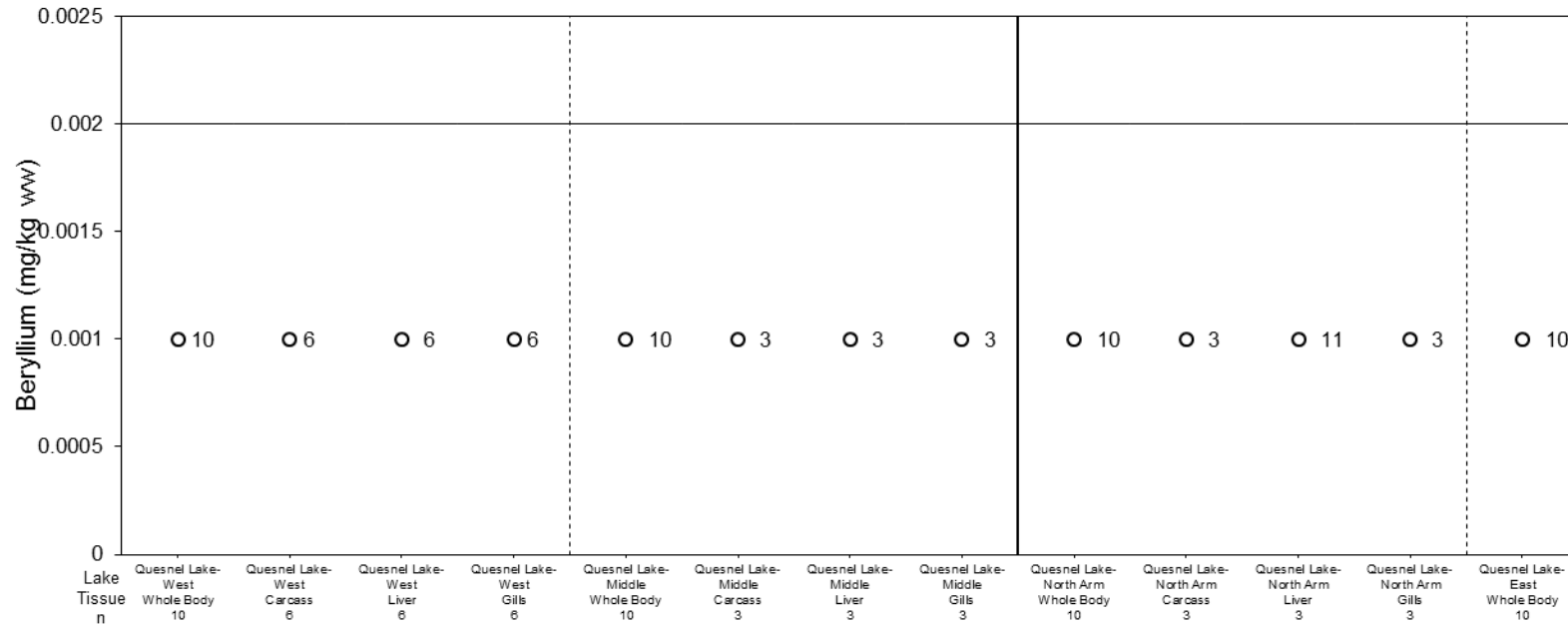


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years



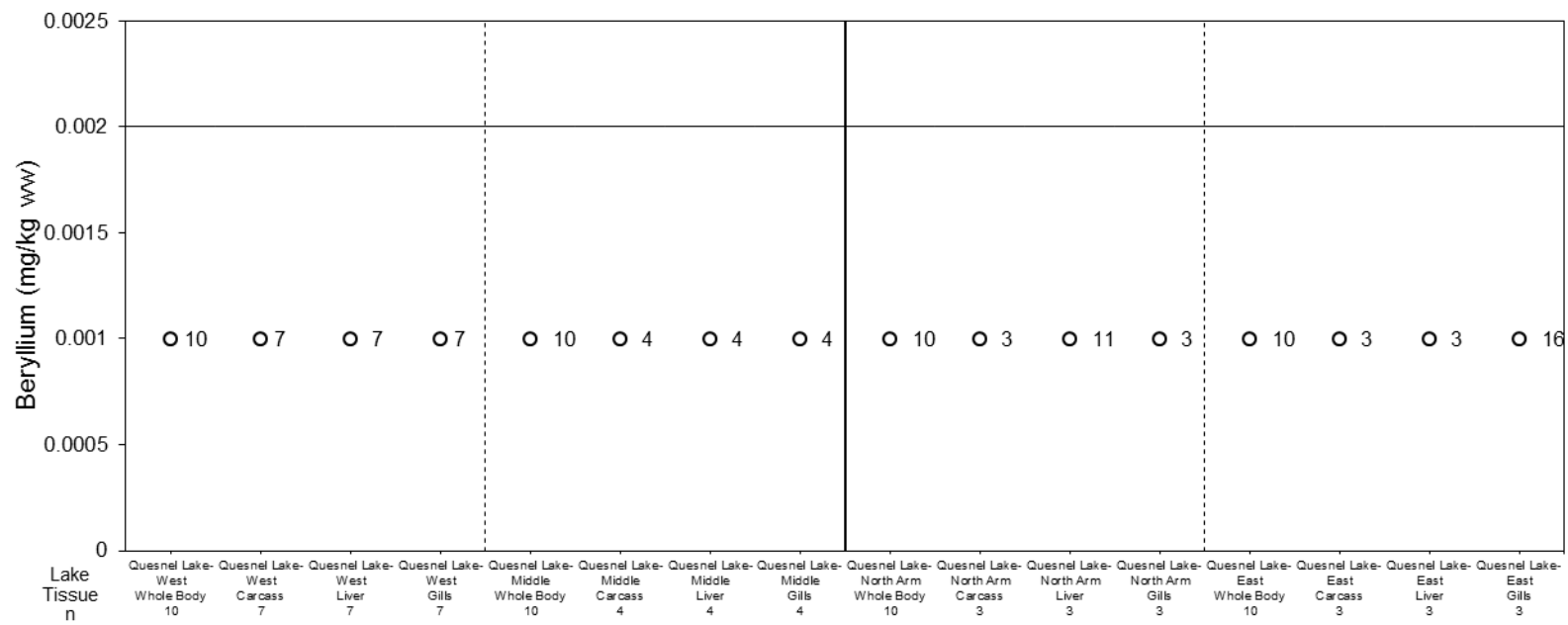
10.4 Beryllium

Figure 393: Beryllium Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2014



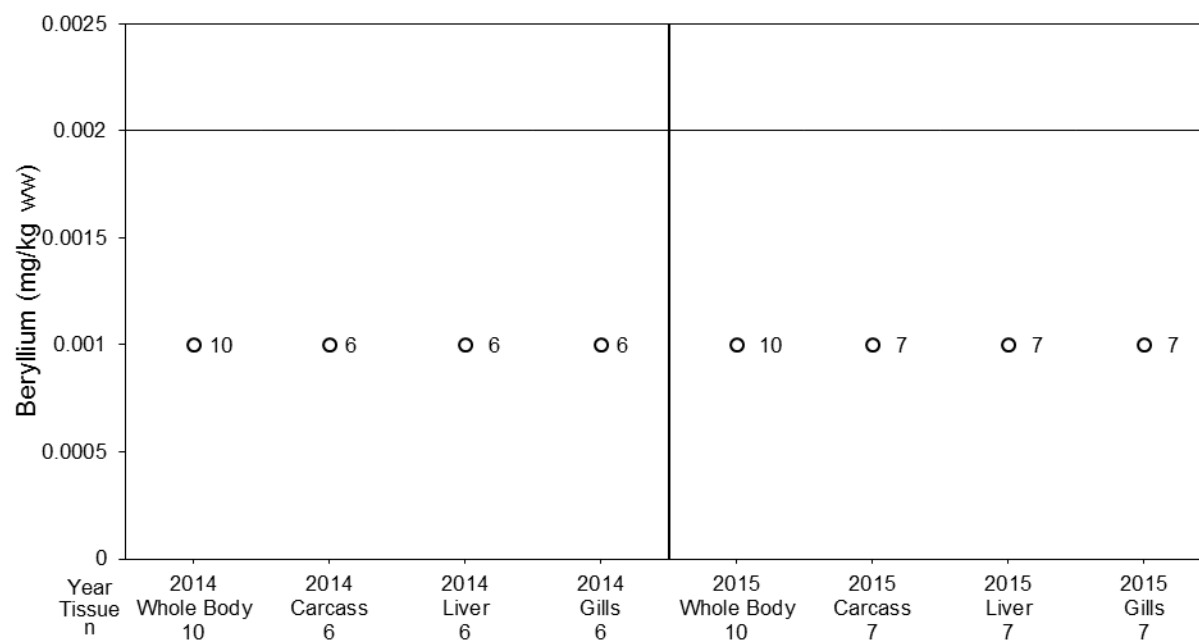
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 394: Beryllium Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 395: Beryllium Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – West in 2014 and 2015

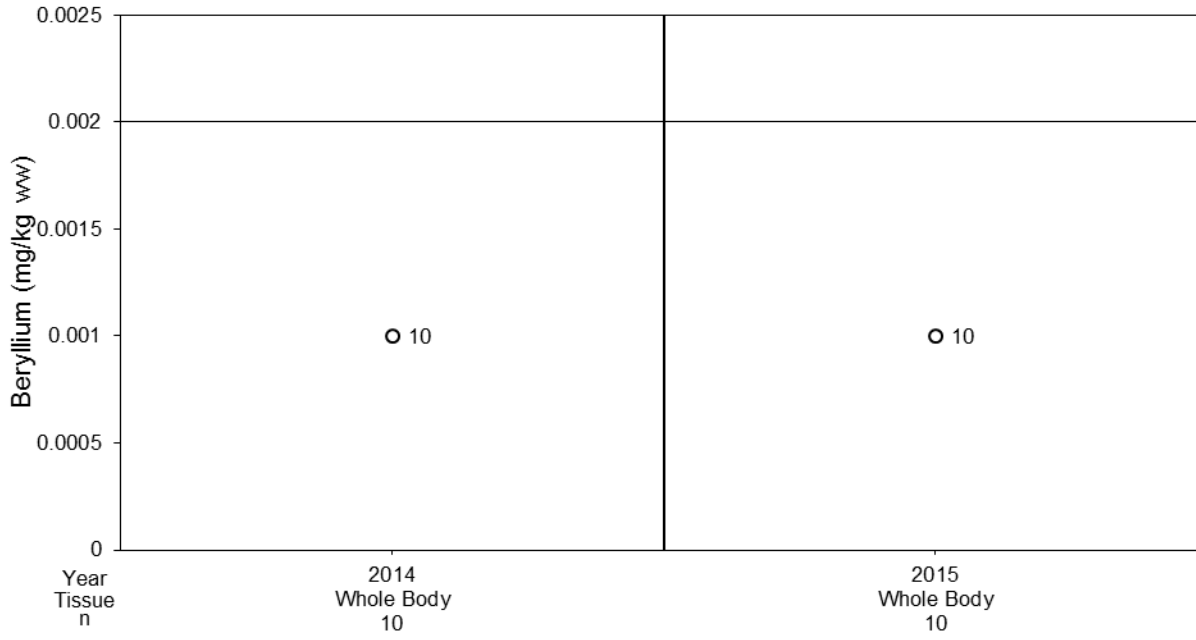


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3
Fish Tissue Chemistry Censored Boxplots

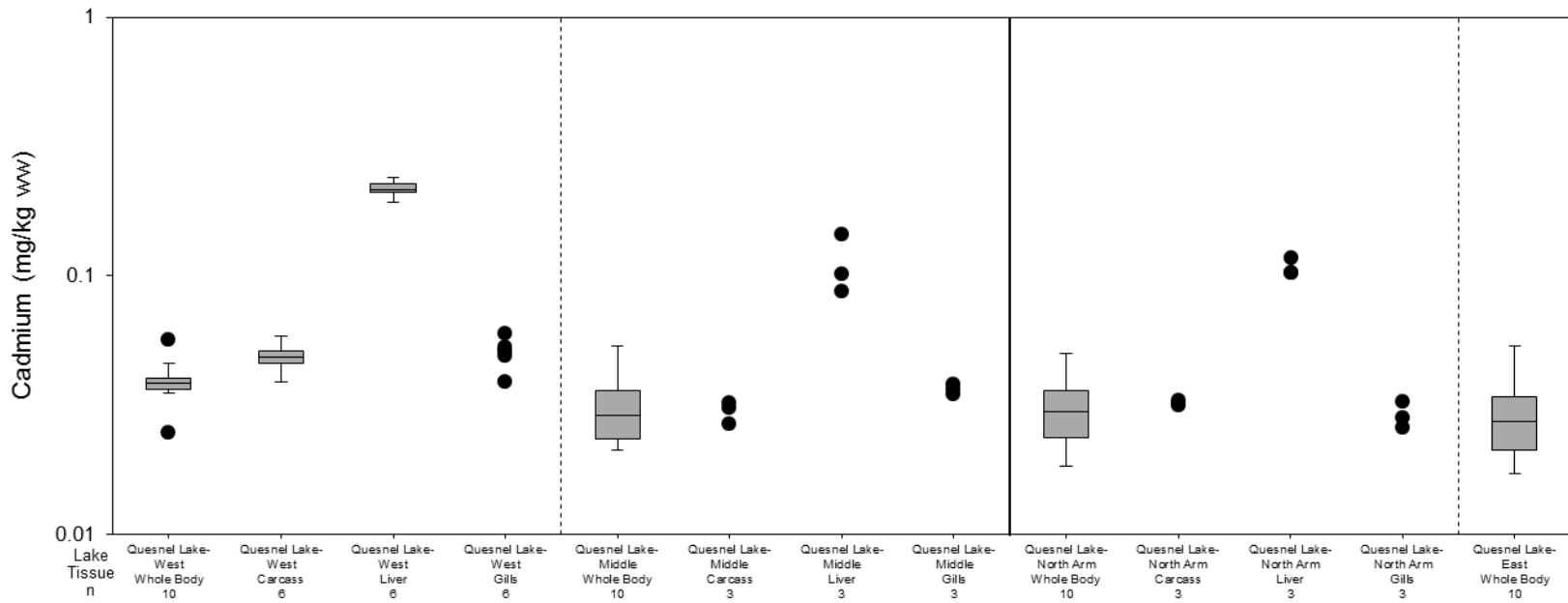
Figure 396: Beryllium Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – Middle in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

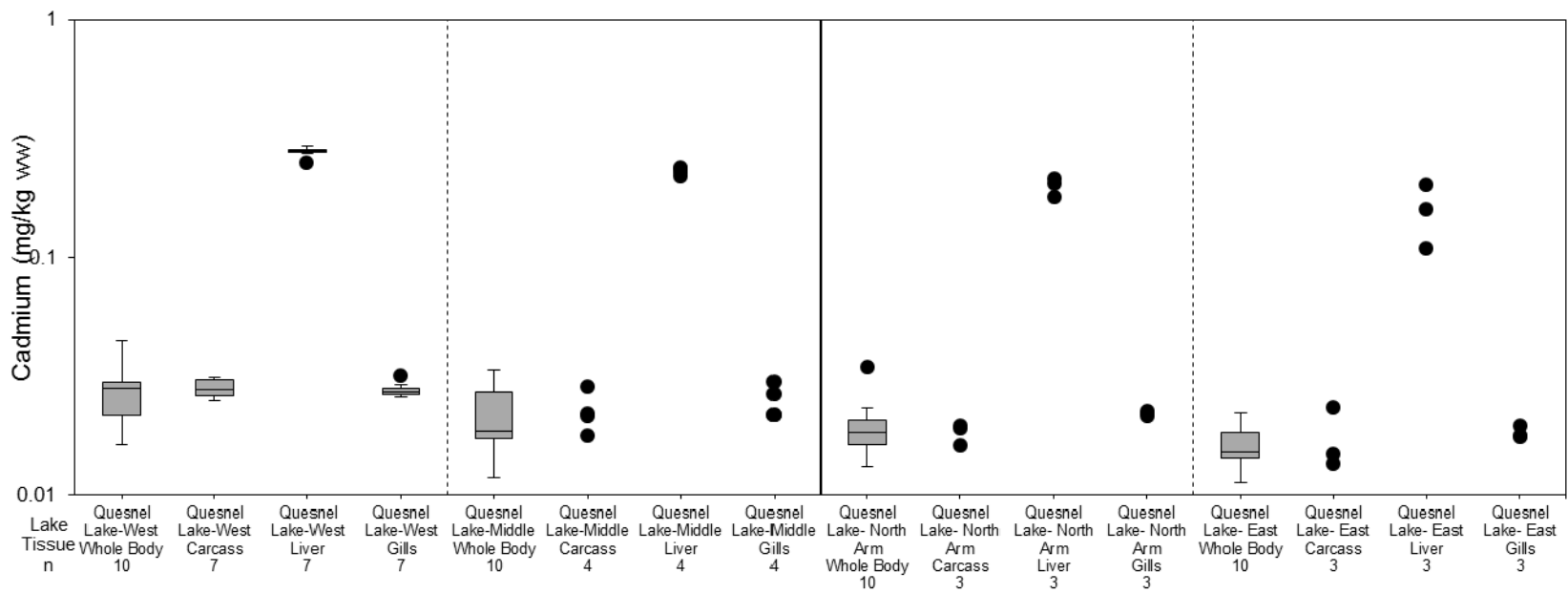
10.5 Cadmium

Figure 397: Cadmium Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 398: Cadmium Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2015

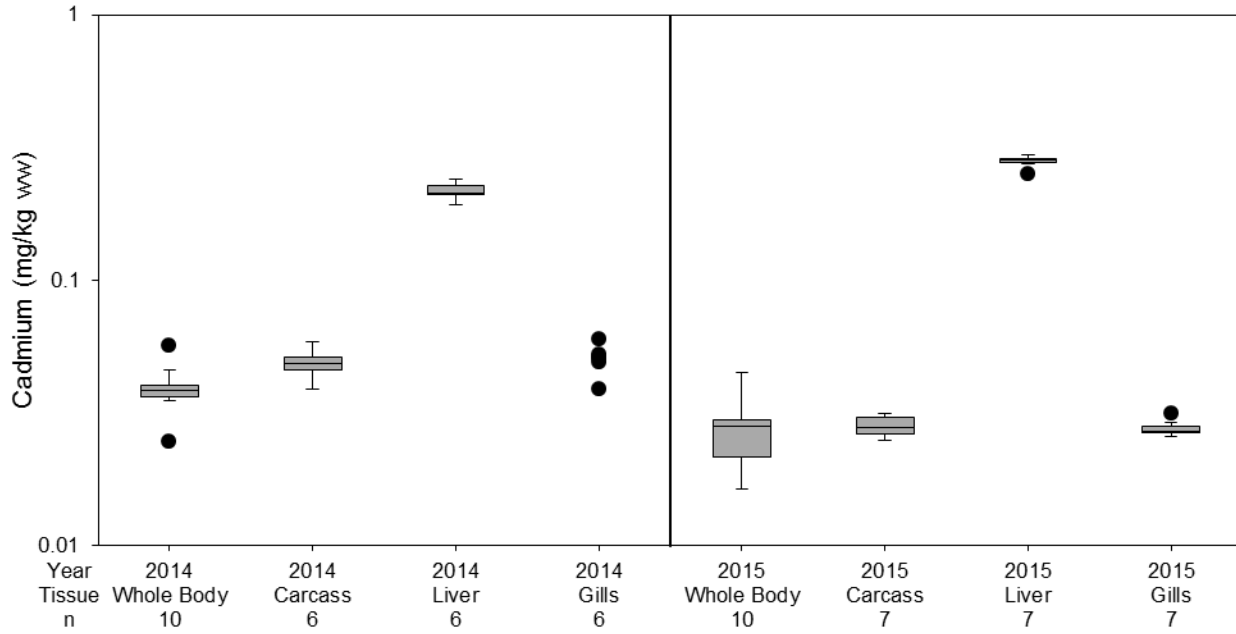


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



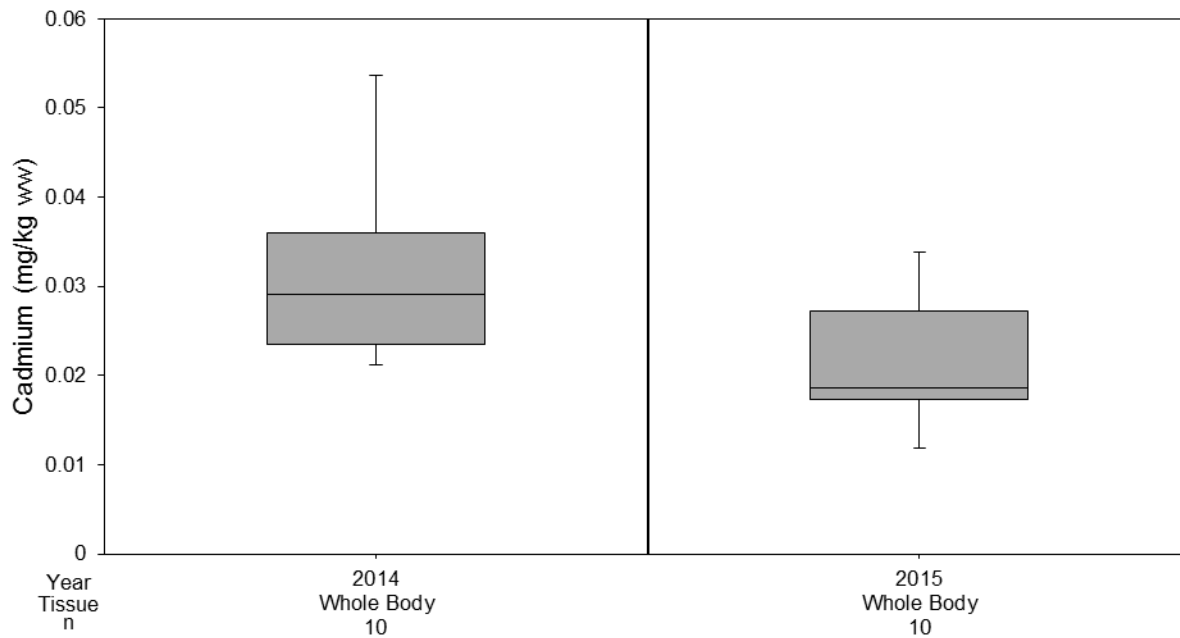
ATTACHMENT 3
Fish Tissue Chemistry Censored Boxplots

Figure 399: Cadmium Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – West in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

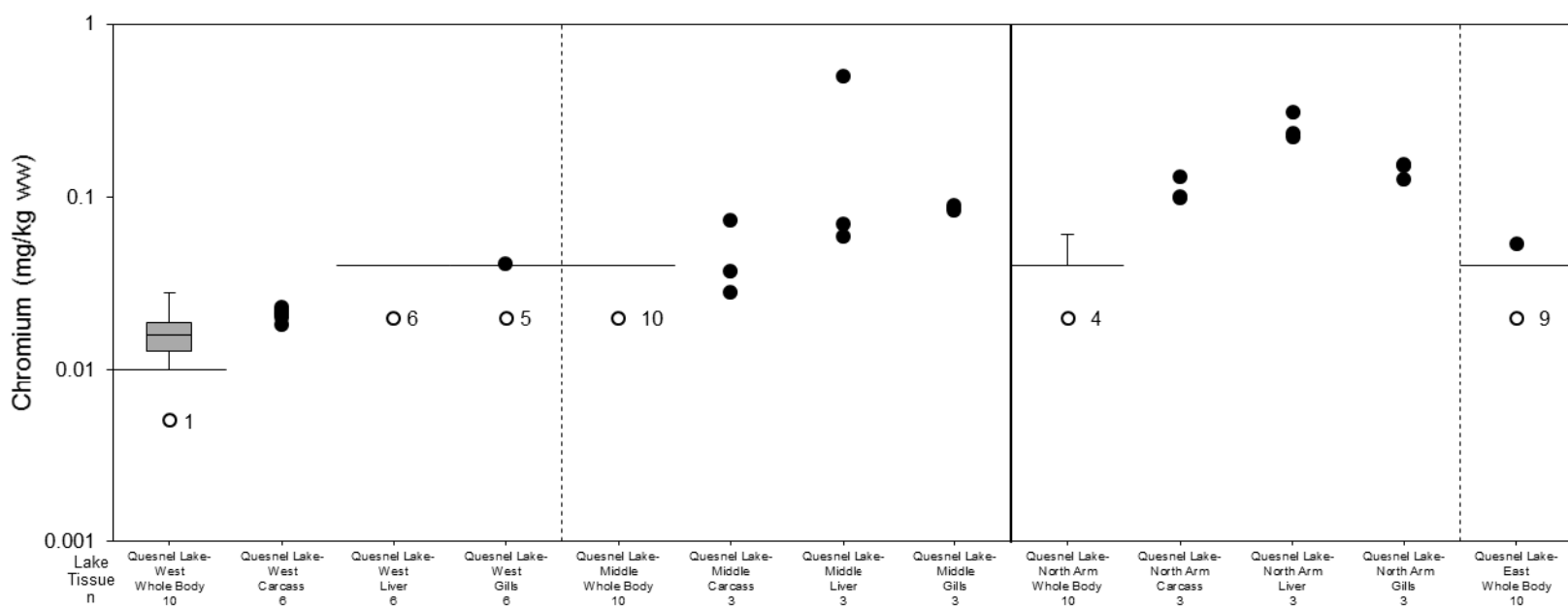
Figure 400: Cadmium Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – Middle in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

10.6 Chromium

Figure 401: Chromium Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2014

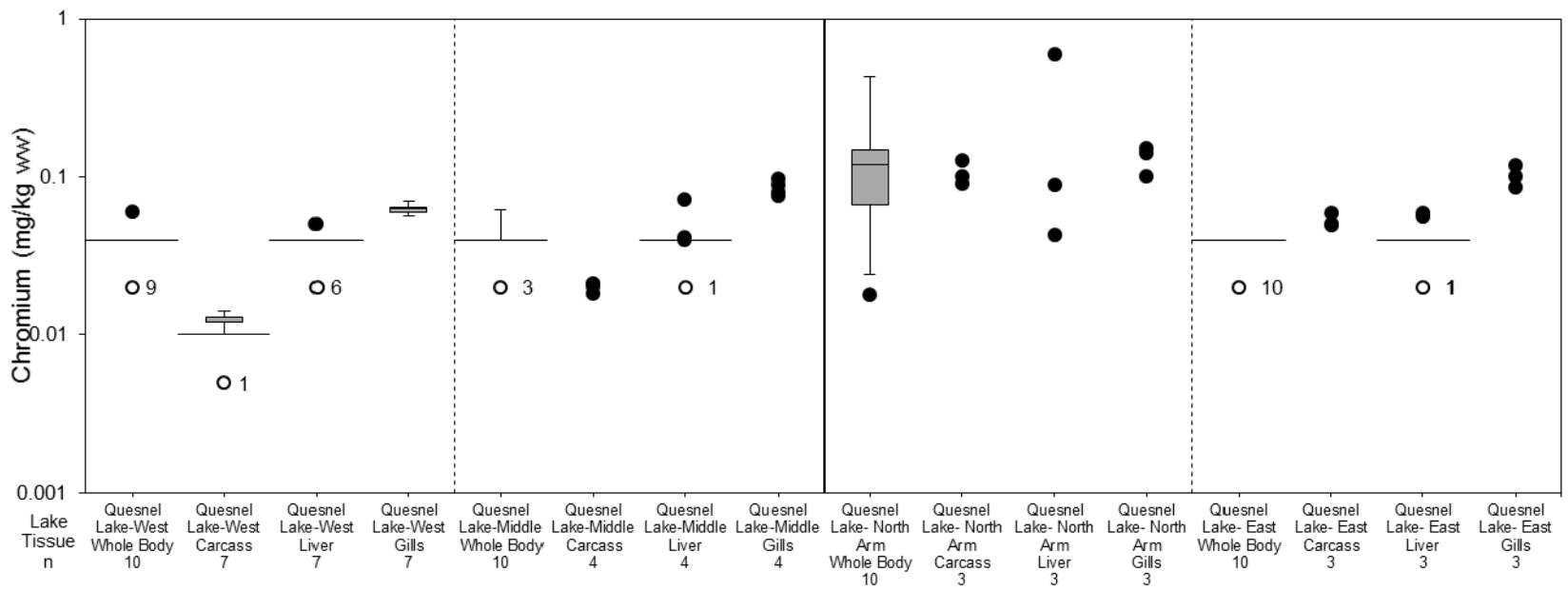


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



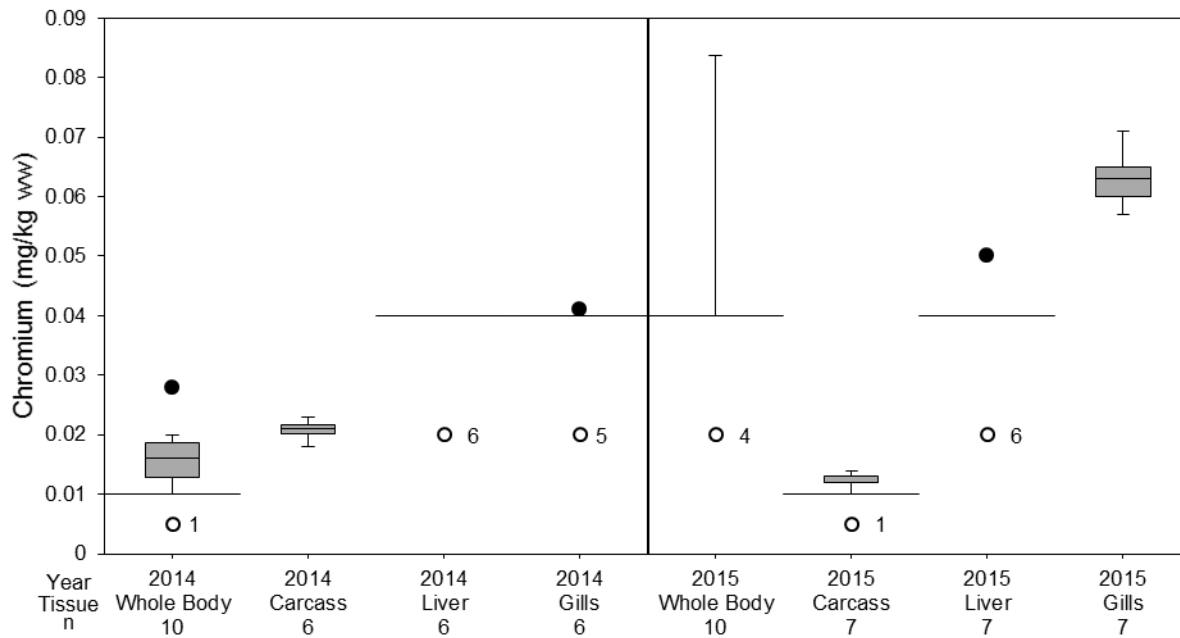
ATTACHMENT 3
Fish Tissue Chemistry Censored Boxplots

Figure 402: Chromium Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2014



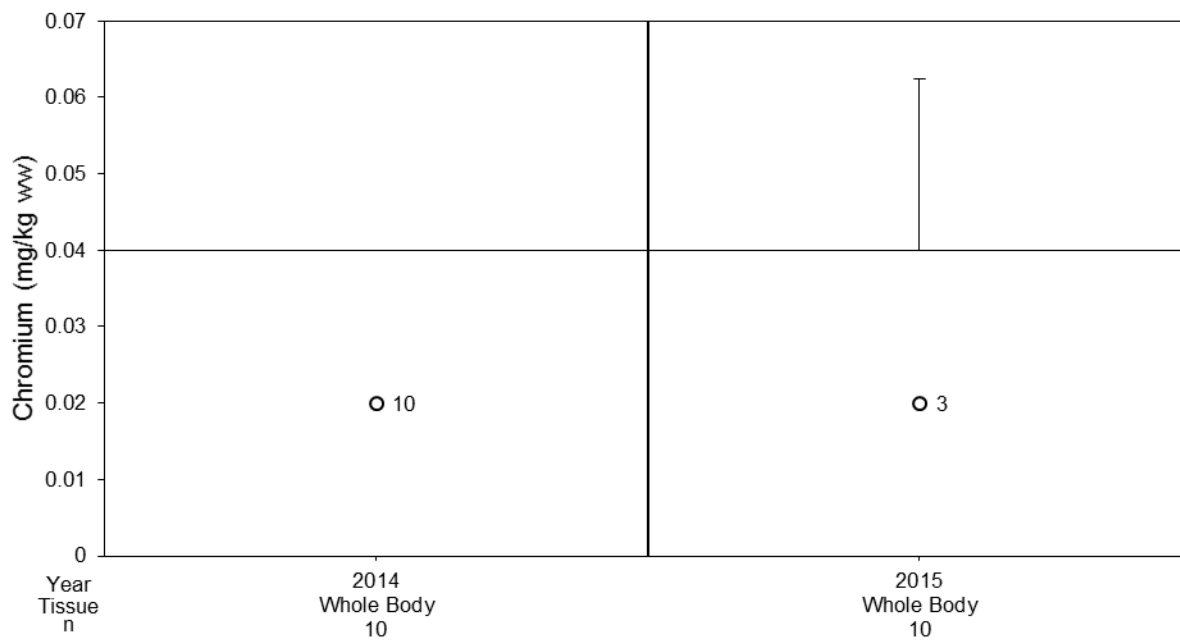
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 403: Chromium Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – West in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 404: Chromium Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – Middle in 2014 and 2015

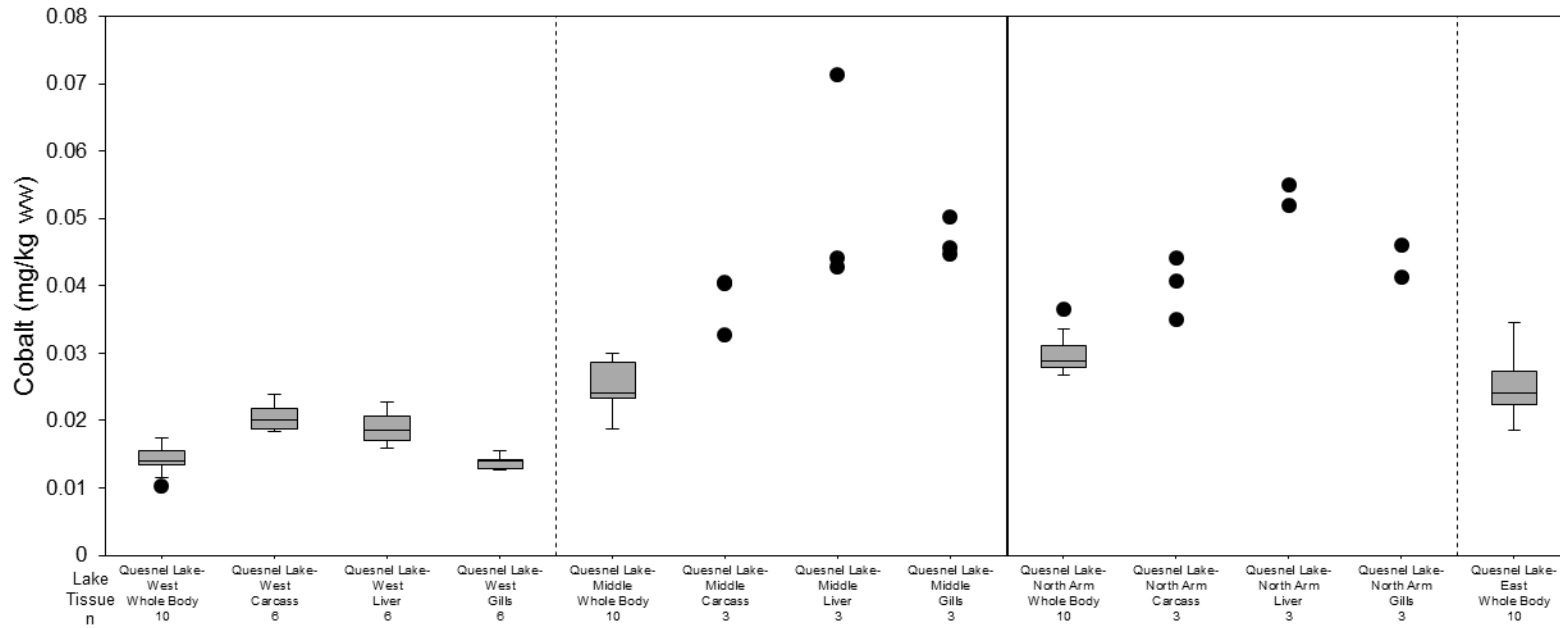


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



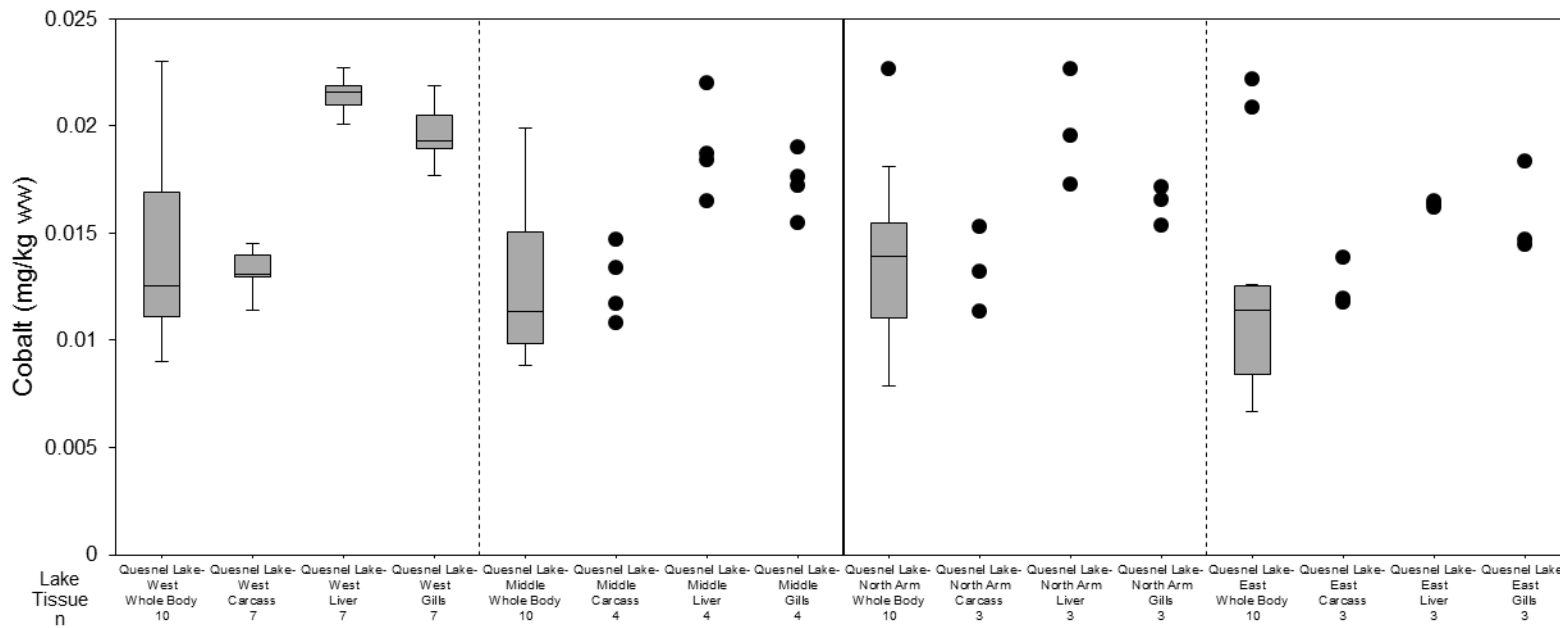
10.7 Cobalt

Figure 405: Cobalt Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2014



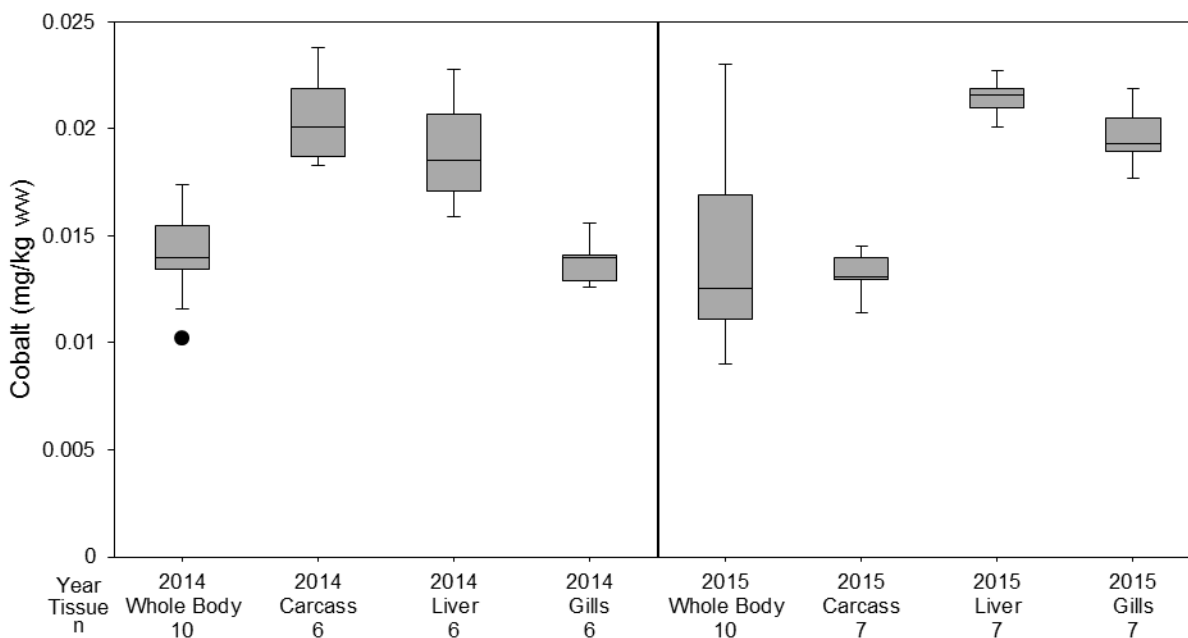
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 406: Cobalt Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 407: Cobalt Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – West in 2014 and 2015

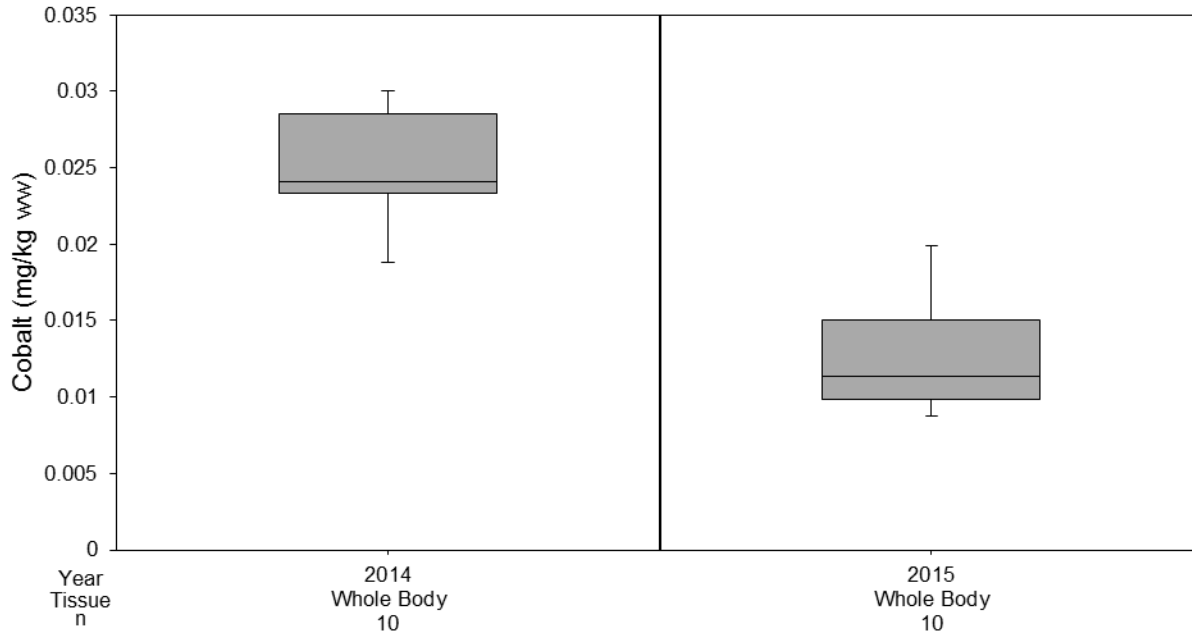


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



ATTACHMENT 3
Fish Tissue Chemistry Censored Boxplots

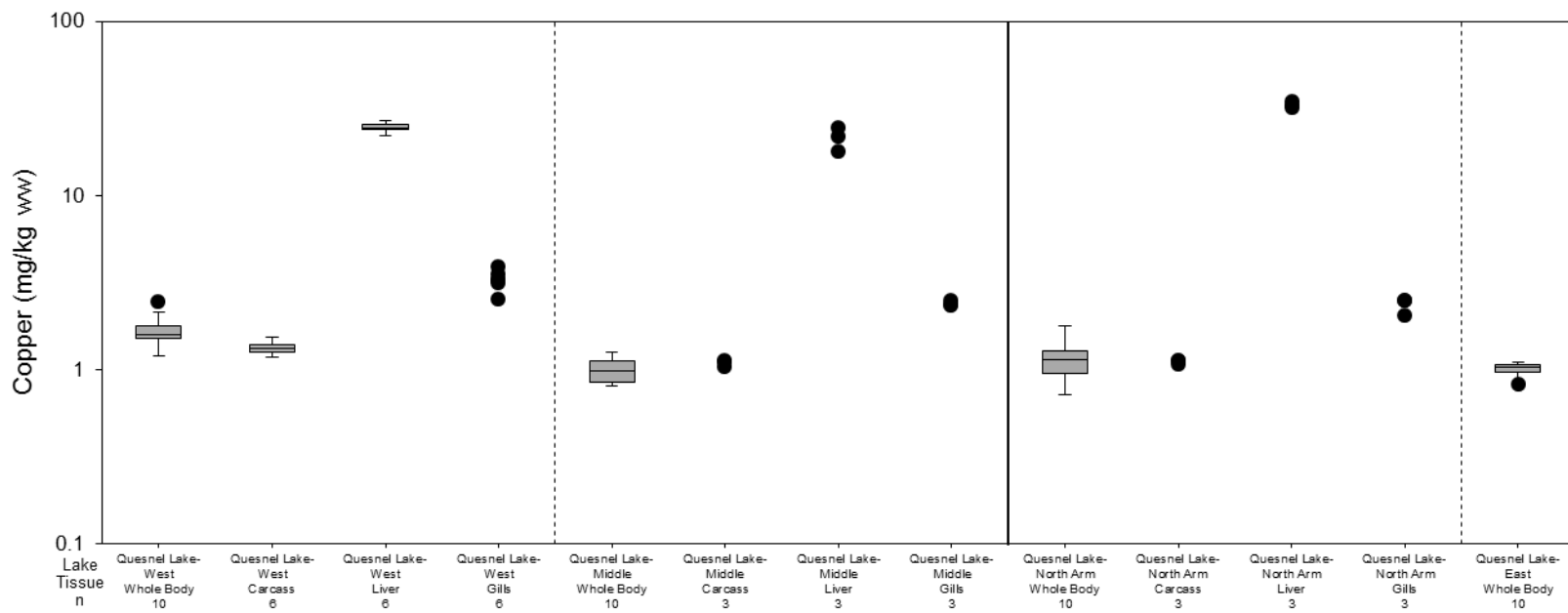
Figure 408: Cobalt Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – Middle in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

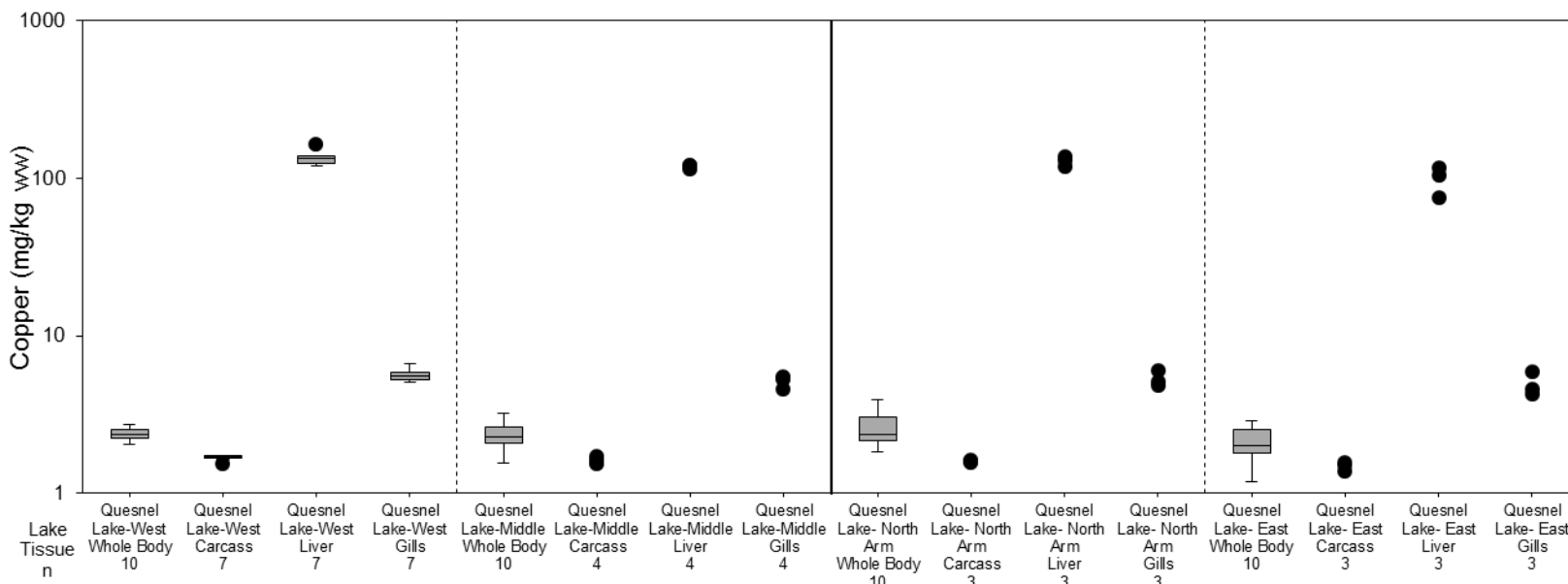
10.8 Copper

Figure 409: Copper Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 410: Copper Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2015

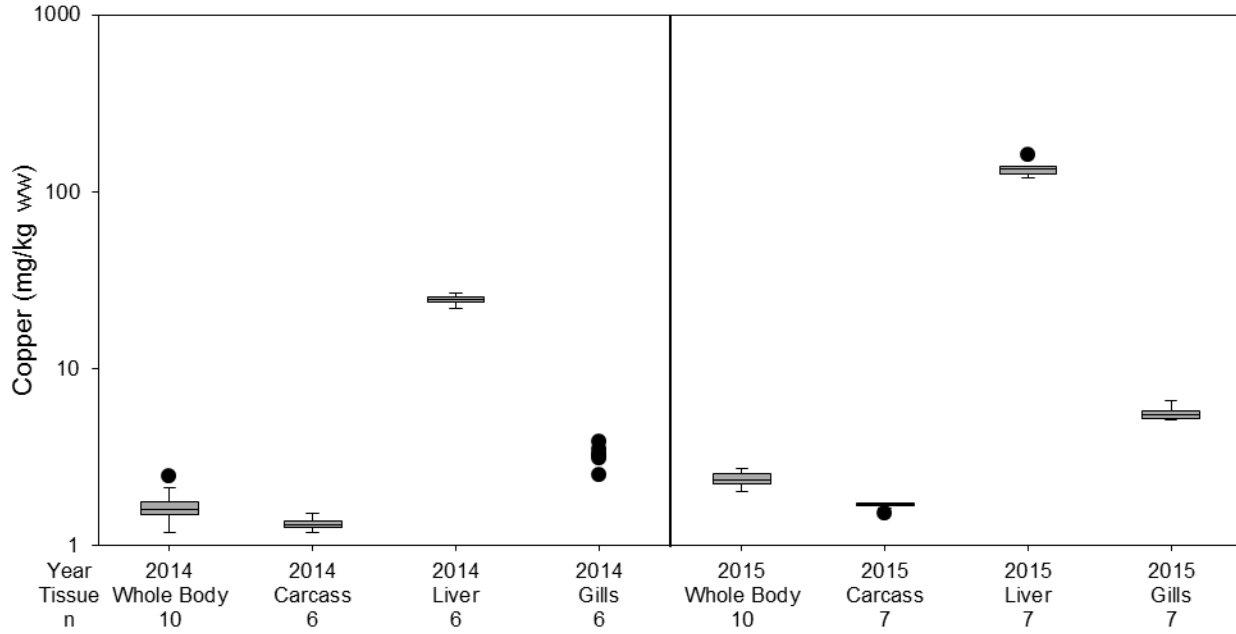


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



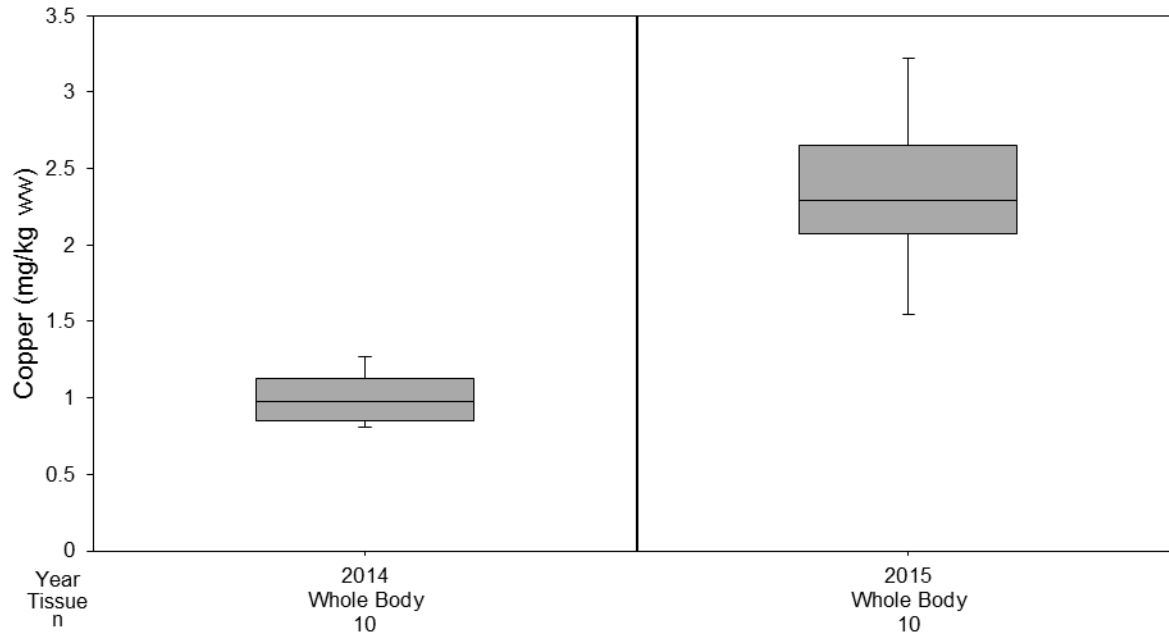
ATTACHMENT 3
Fish Tissue Chemistry Censored Boxplots

Figure 411: Copper Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – West in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

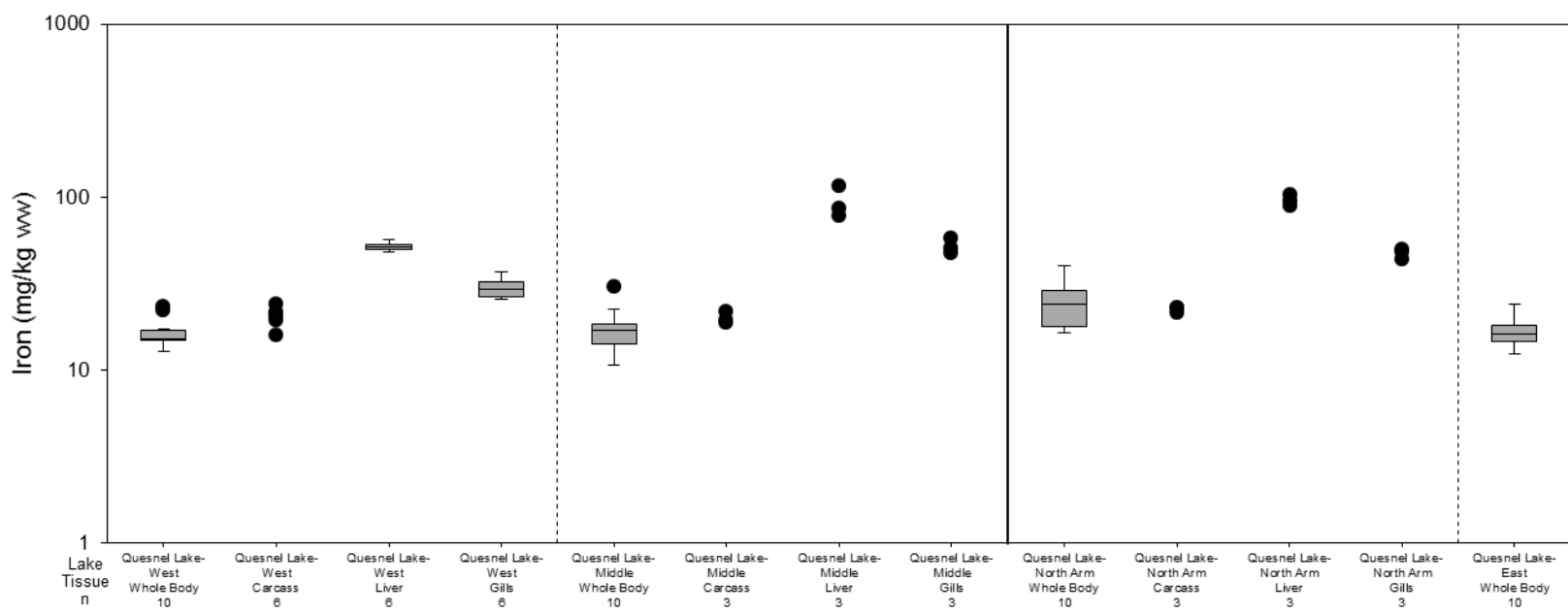
Figure 412: Copper Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – Middle in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

10.9 Iron

Figure 413: Iron Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2014

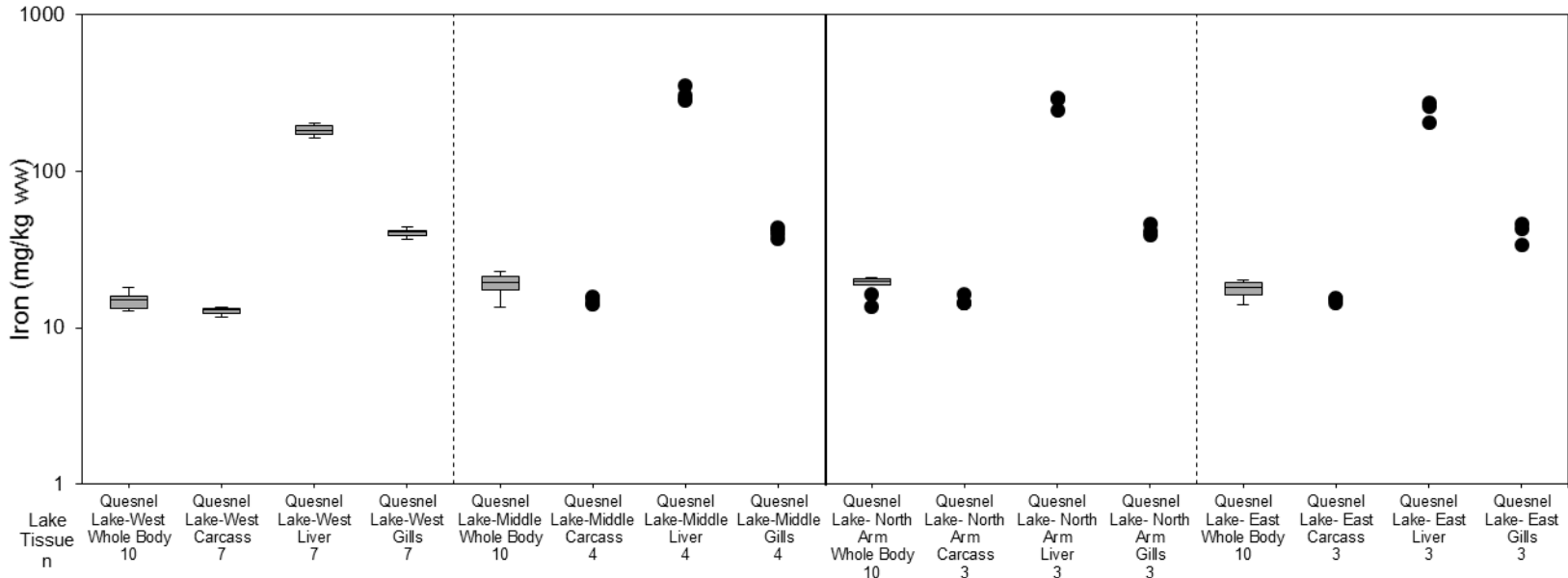


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



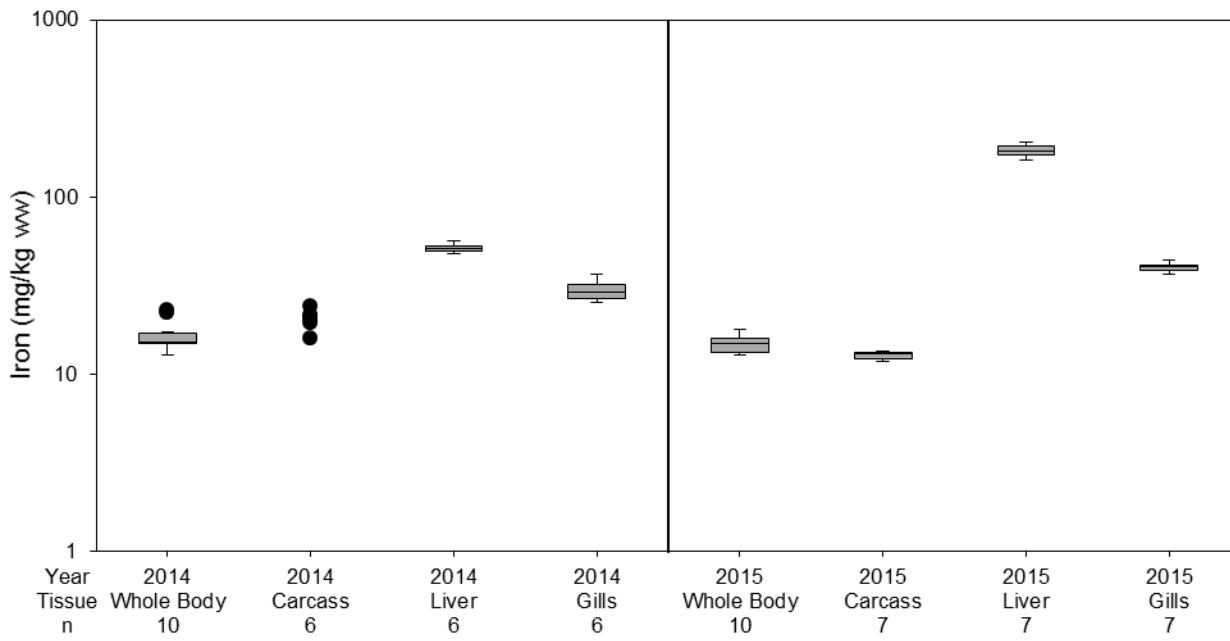
ATTACHMENT 3
Fish Tissue Chemistry Censored Boxplots

Figure 414: Iron Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2015



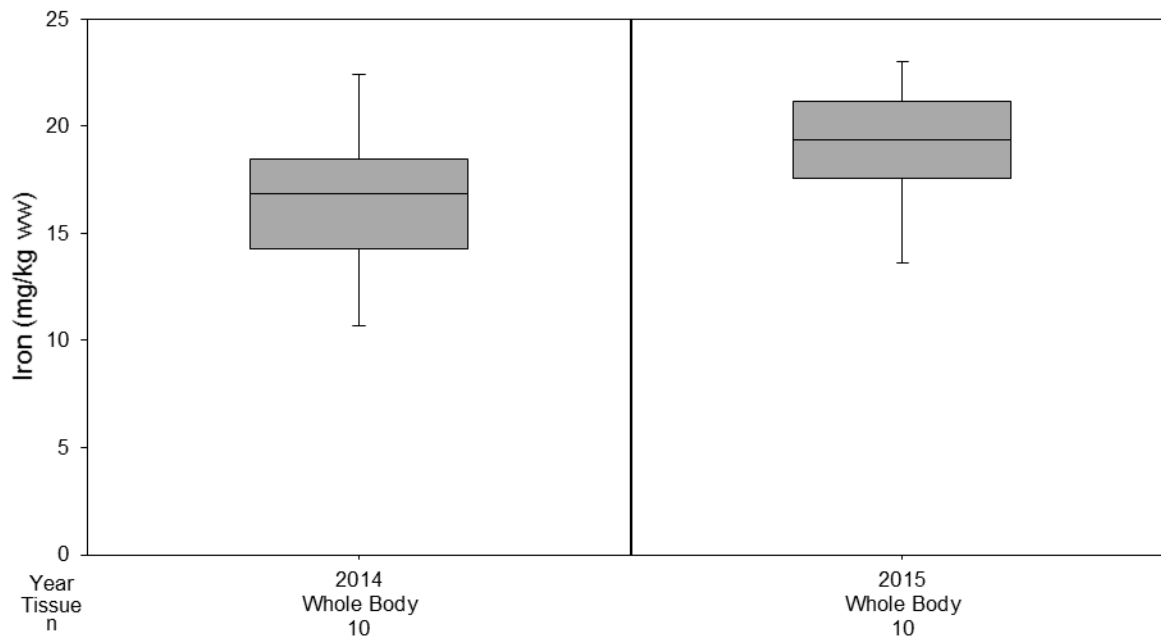
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 415: Iron Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – West in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 416: Iron Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – Middle in 2014 and 2015

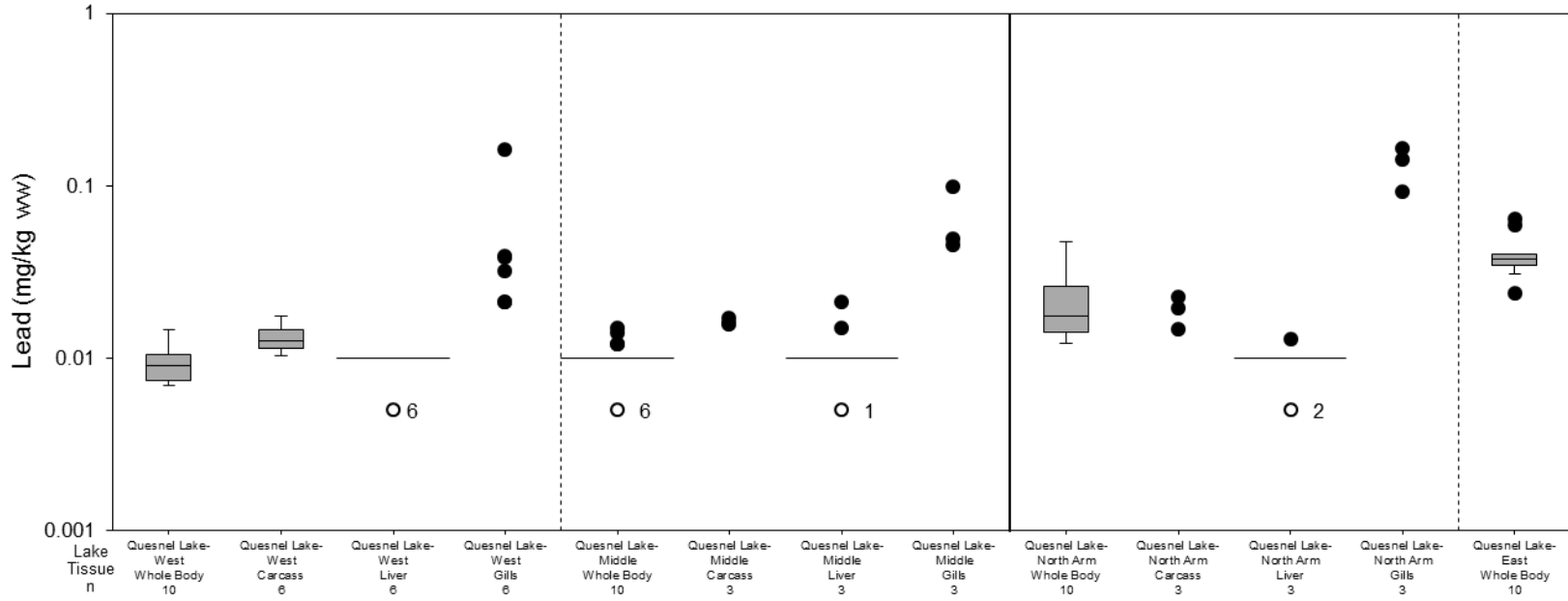


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (---) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



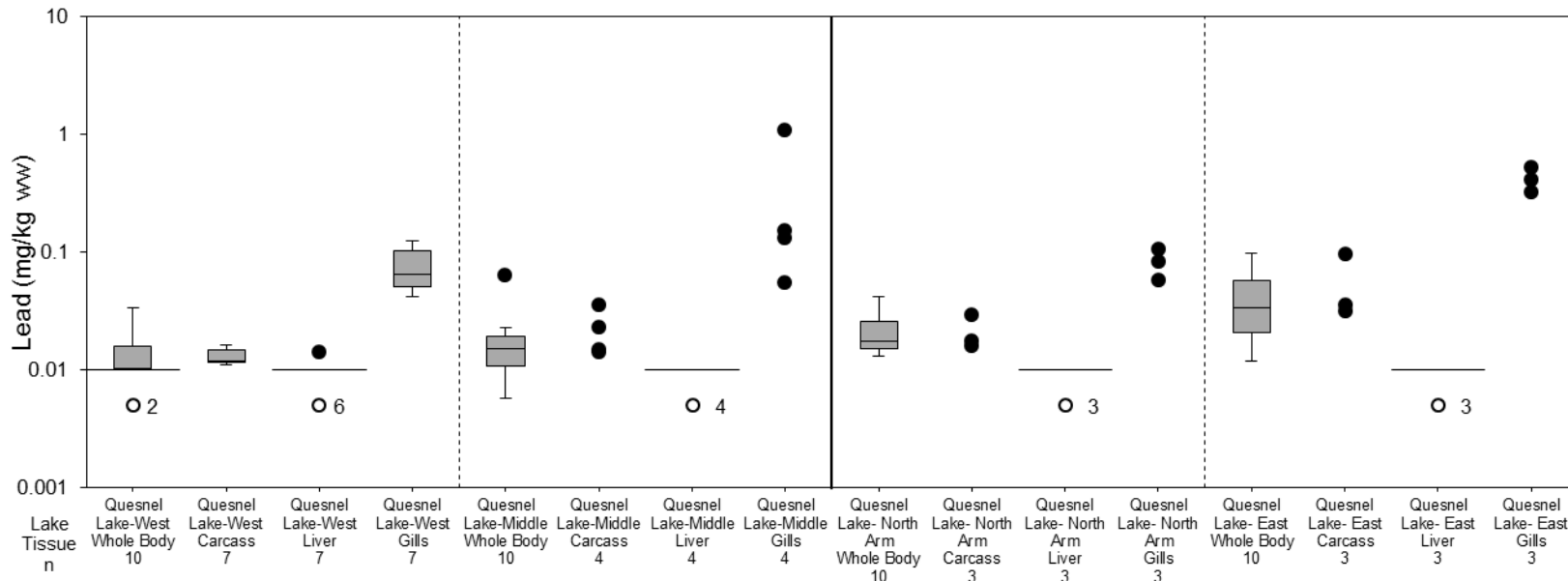
10.10 Lead

Figure 417: Lead Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2014



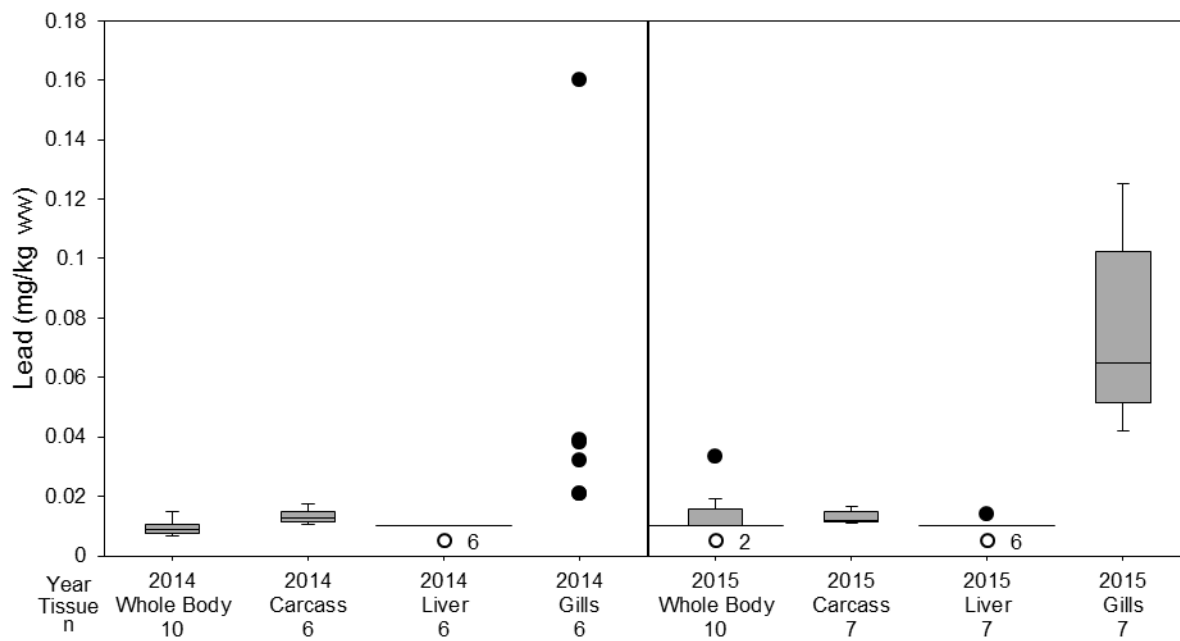
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 418: Lead Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 419: Lead Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – West in 2014 and 2015

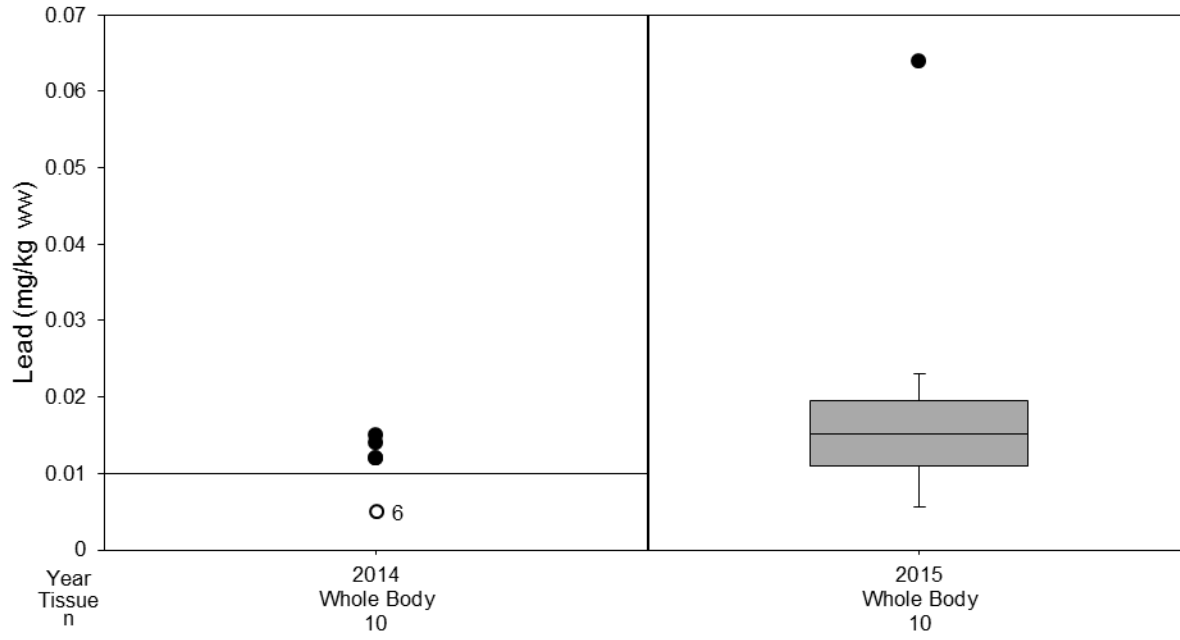


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



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Fish Tissue Chemistry Censored Boxplots

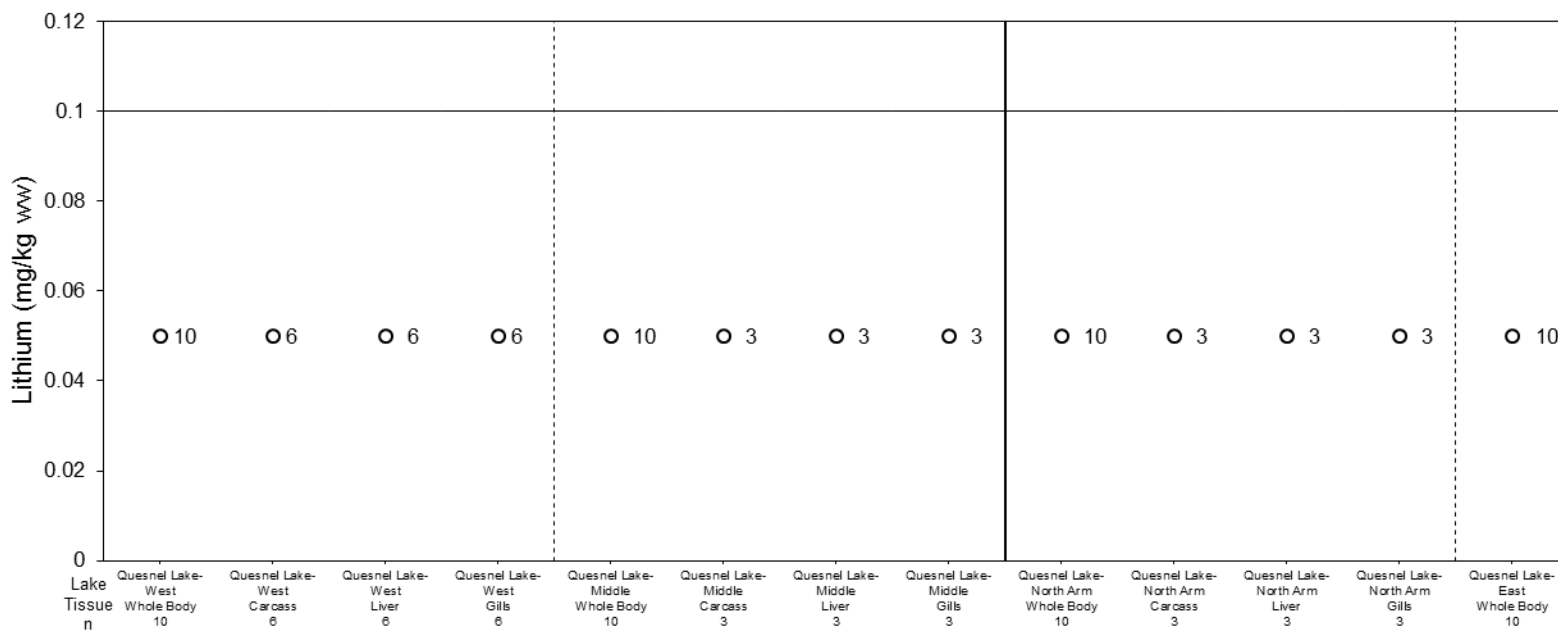
Figure 420: Lead Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – Middle in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

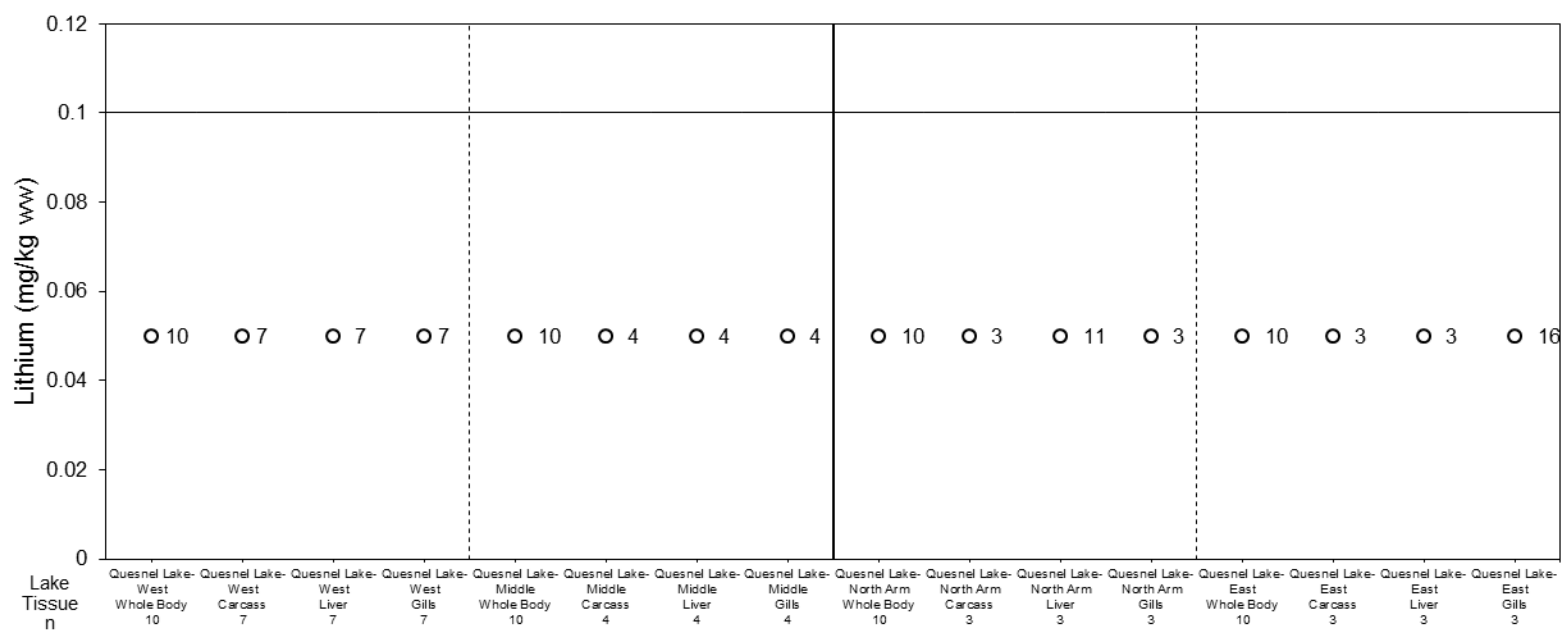
10.11 Lithium

Figure 421: Lithium Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 422: Lithium Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2015

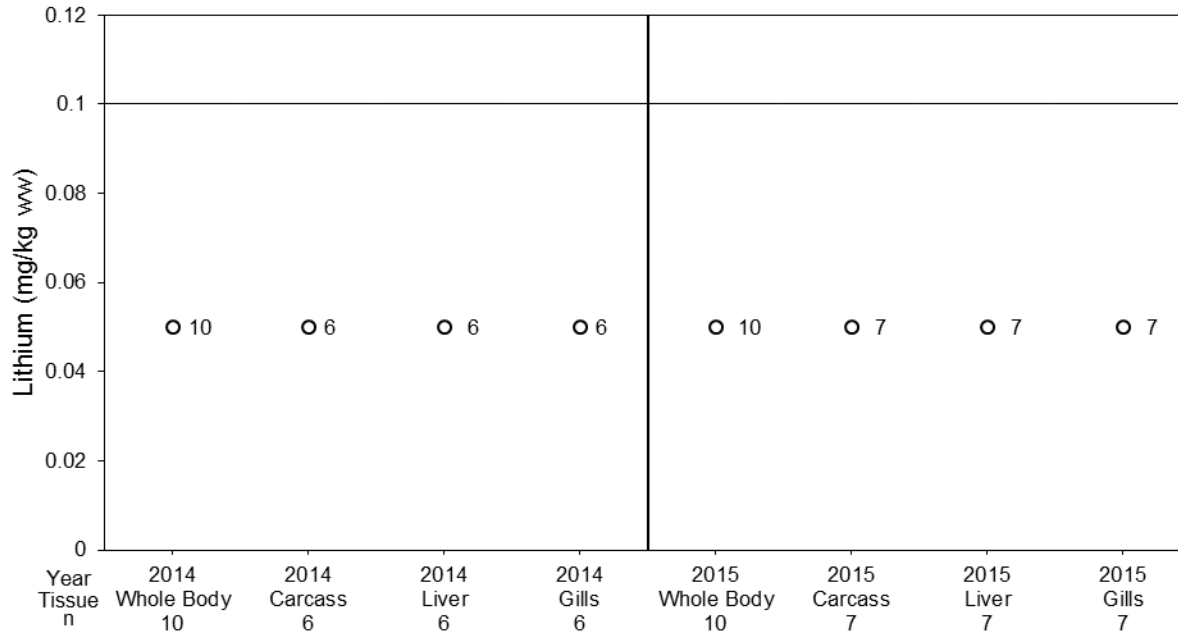


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



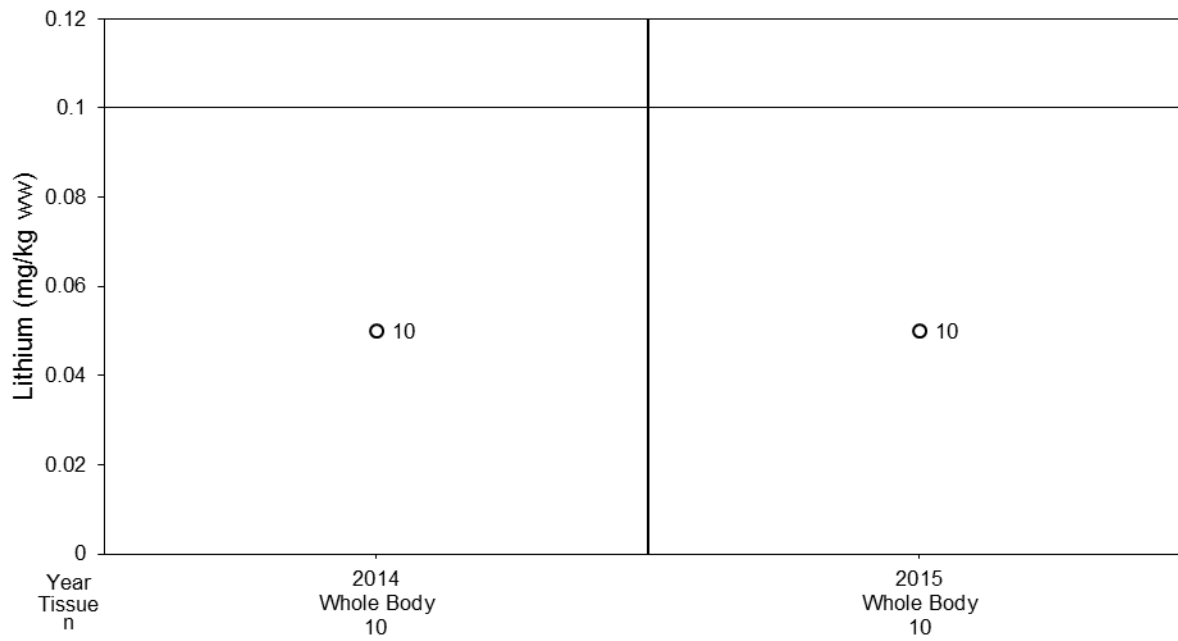
ATTACHMENT 3
Fish Tissue Chemistry Censored Boxplots

Figure 423: Lithium Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – West in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

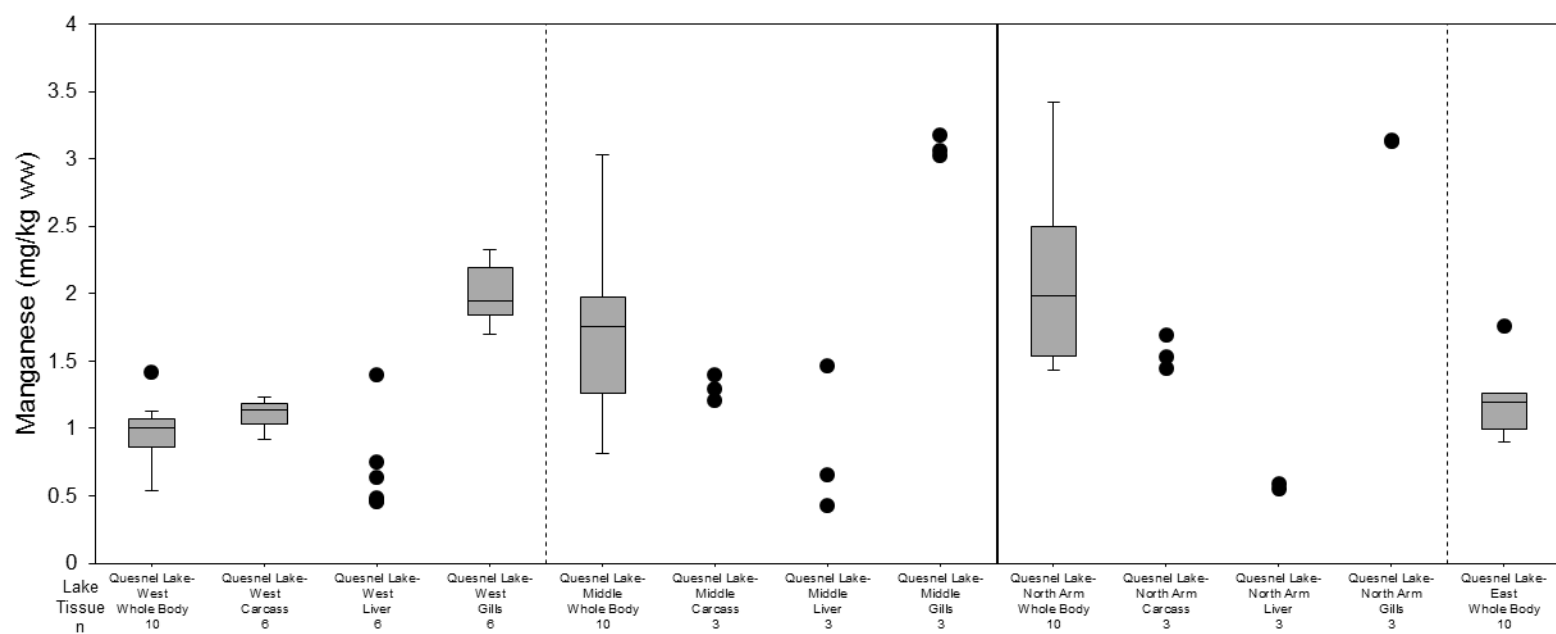
Figure 424: Lithium Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – Middle in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

10.12 Manganese

Figure 425: Manganese Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2014

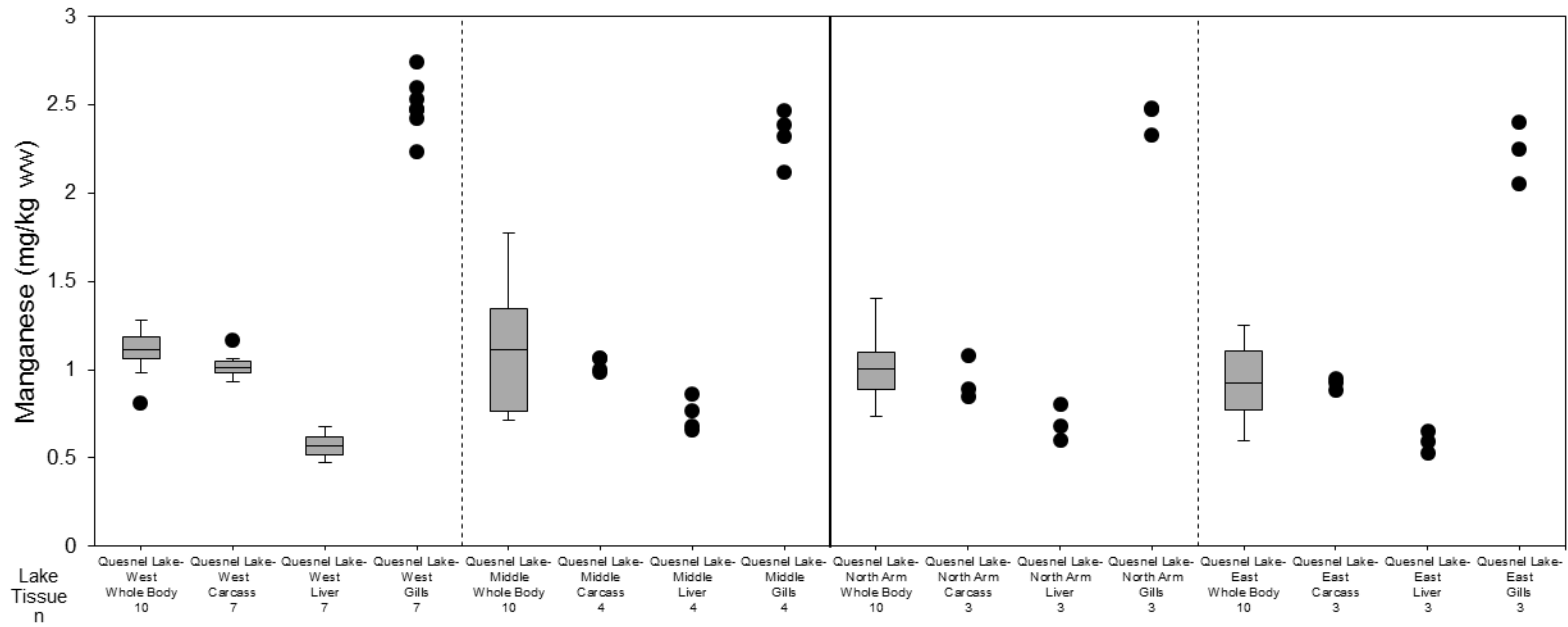


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



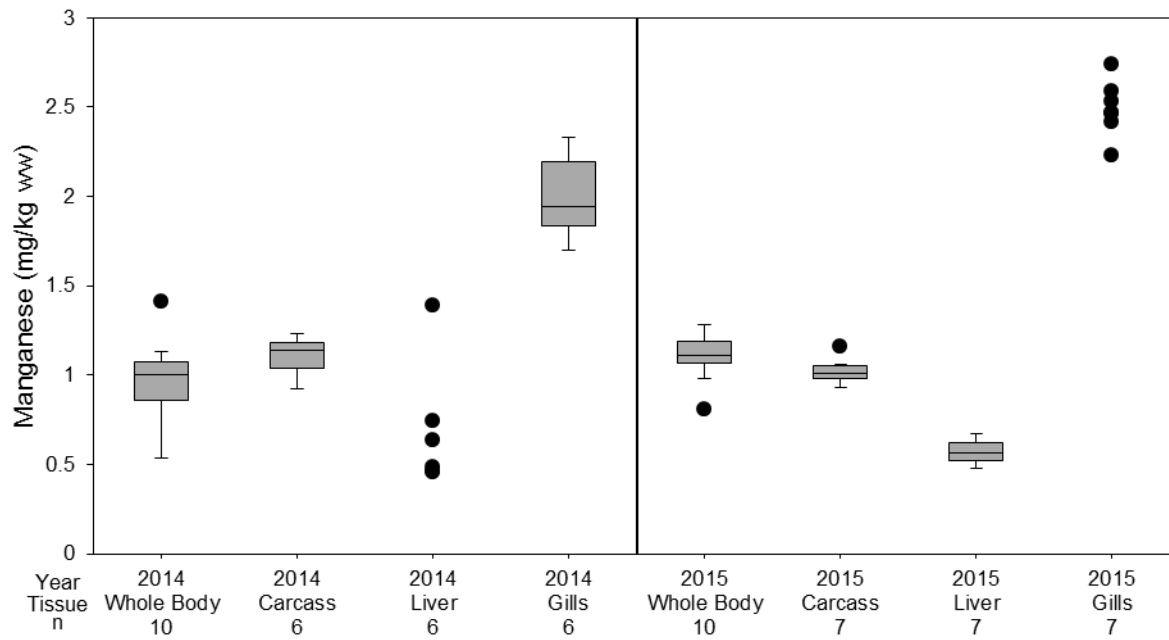
ATTACHMENT 3
Fish Tissue Chemistry Censored Boxplots

Figure 426: Manganese Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2015



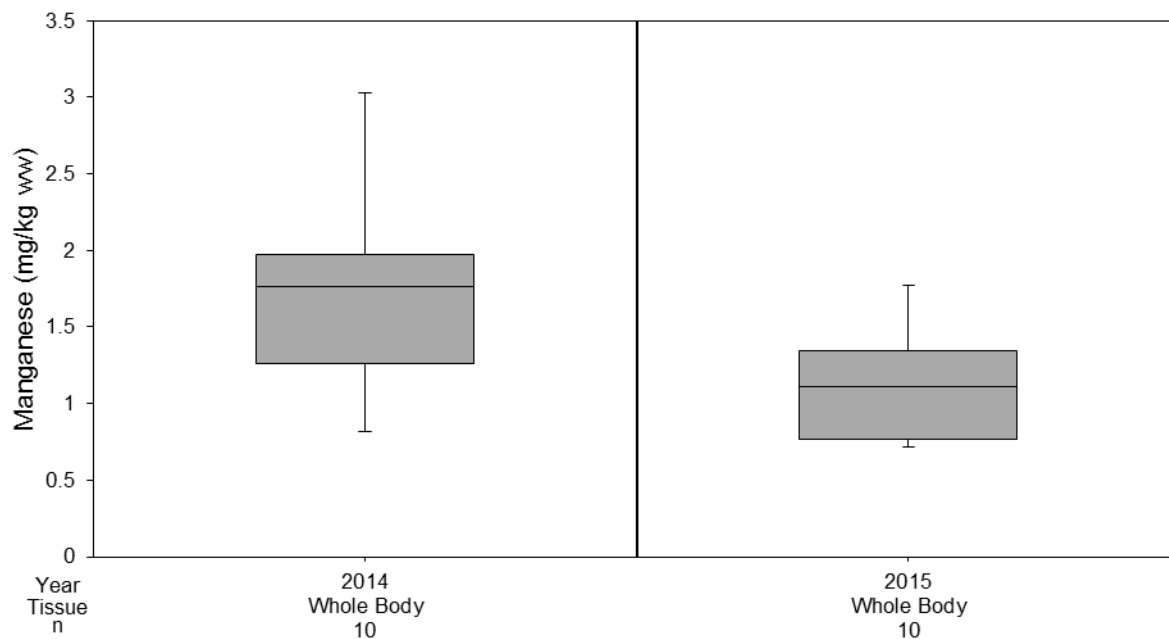
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 427: Manganese Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – West in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 428: Manganese Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – Middle in 2014 and 2015

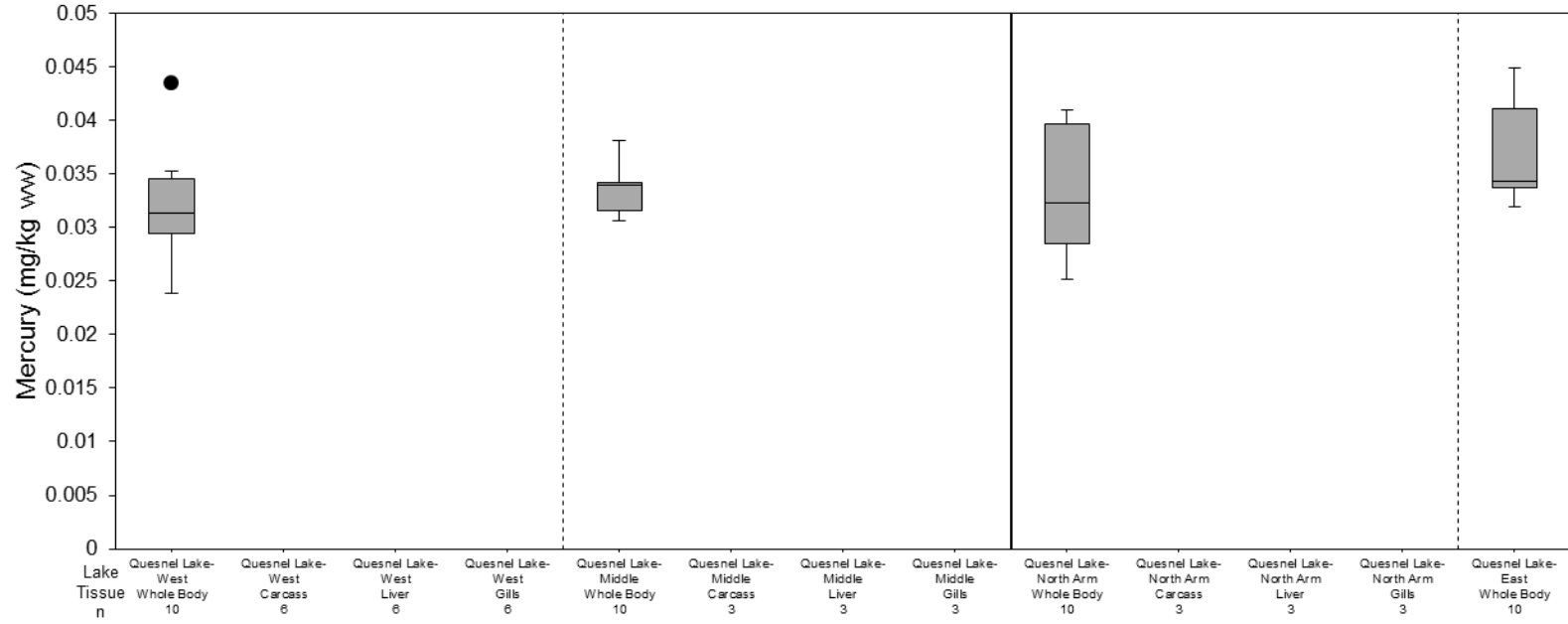


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



10.13 Mercury

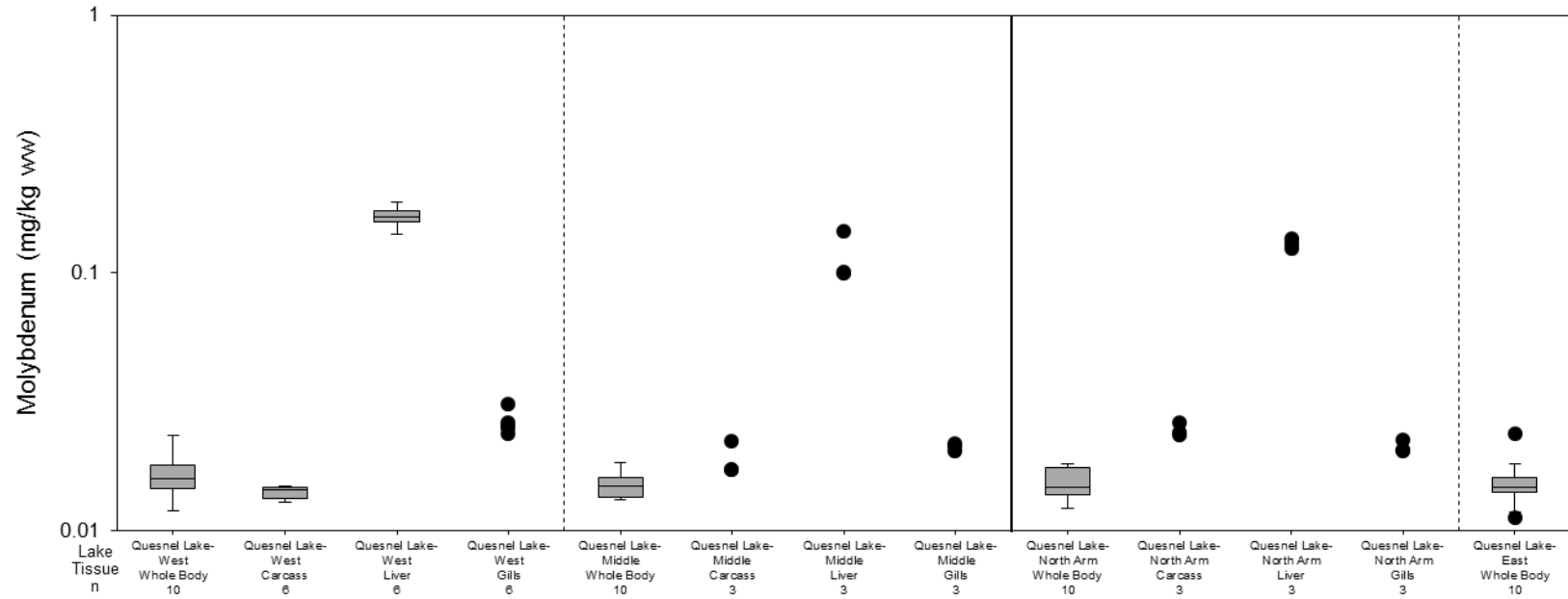
Figure 429: Mercury Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years. Mercury data was not analyzed in 2015.

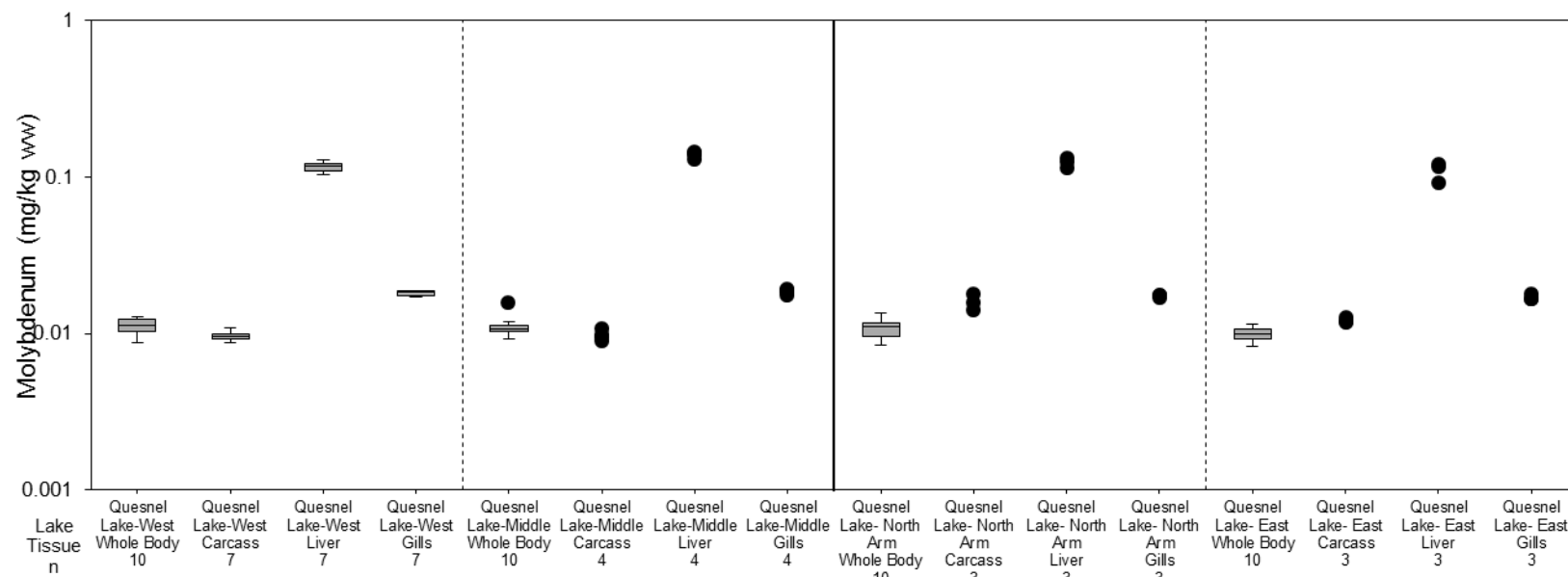
10.14 Molybdenum

Figure 430: Molybdenum Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 431: Molybdenum Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2015

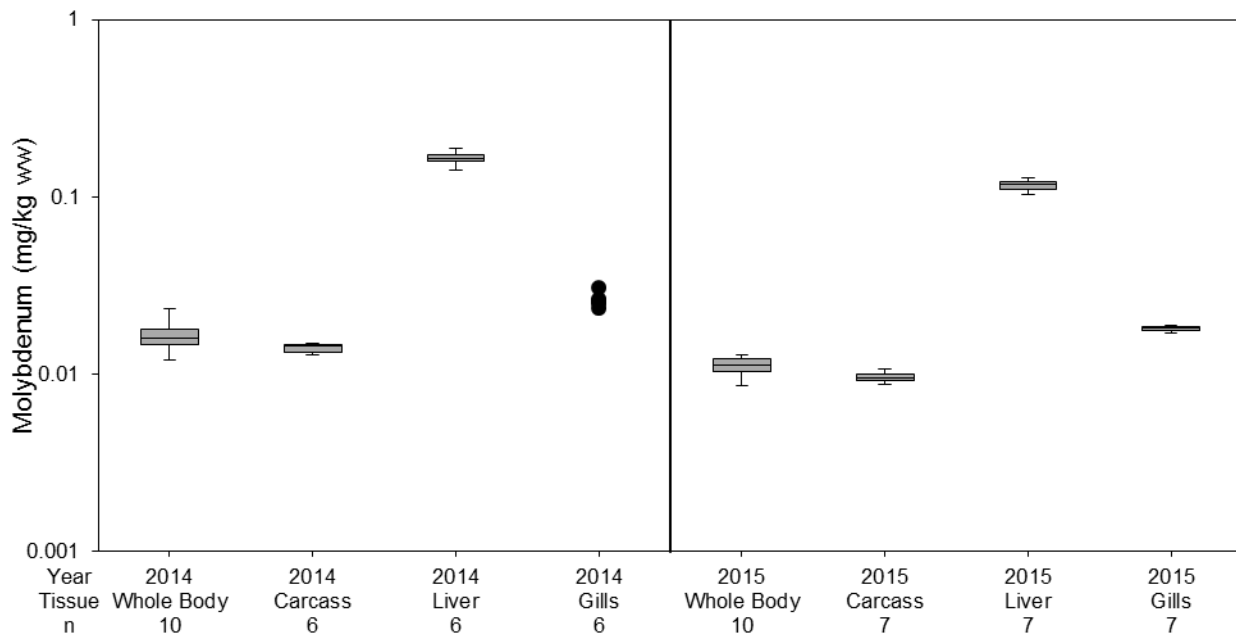


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



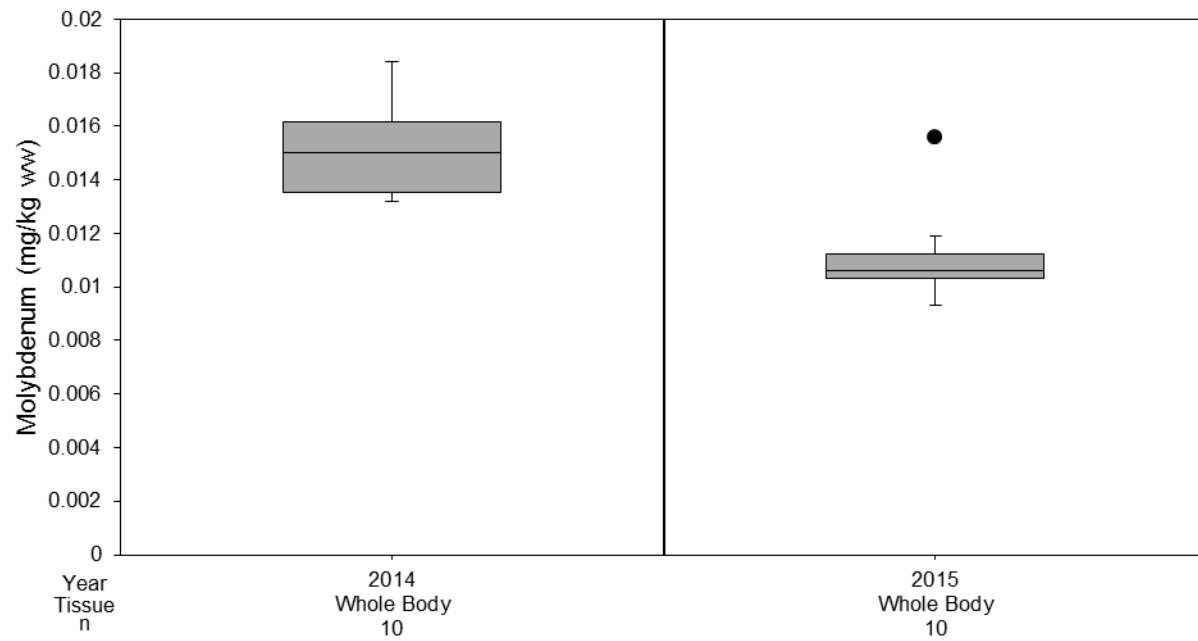
ATTACHMENT 3
Fish Tissue Chemistry Censored Boxplots

Figure 432: Molybdenum Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – West in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

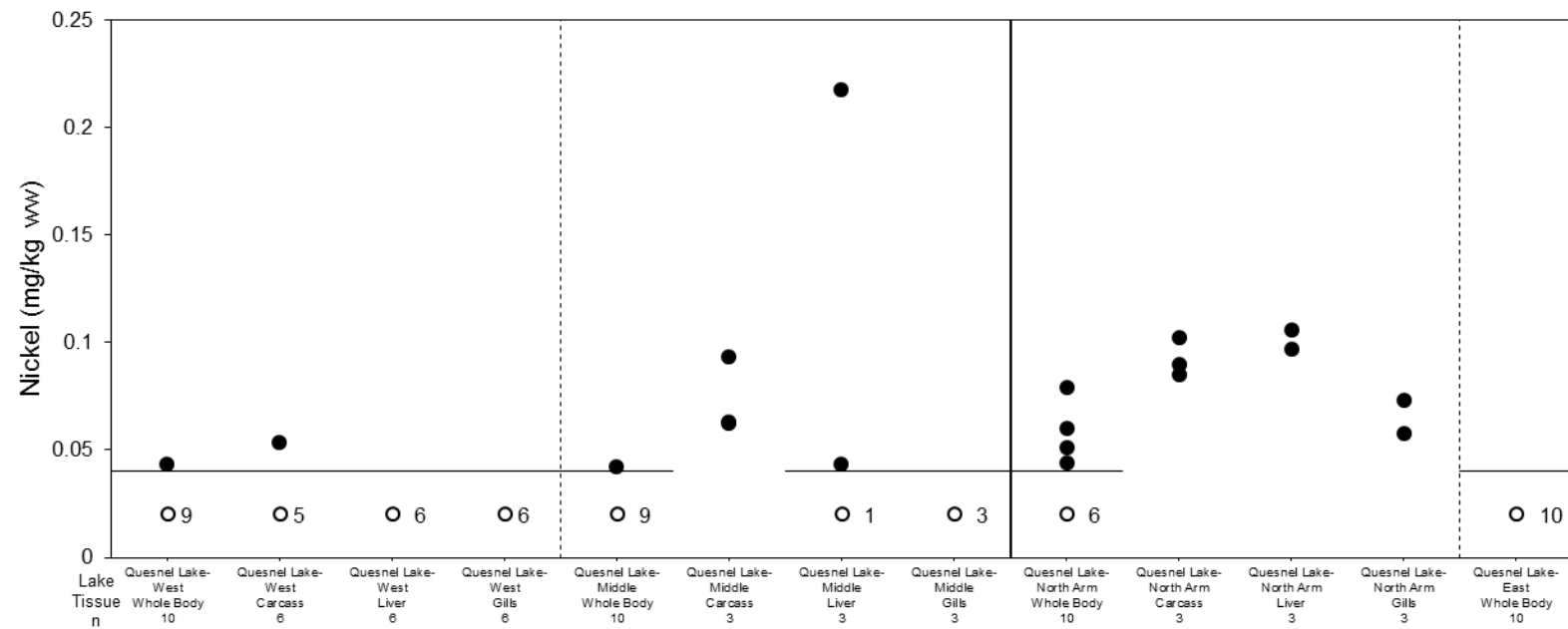
Figure 433: Molybdenum Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – Middle in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

10.15 Nickel

Figure 434: Nickel Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2014

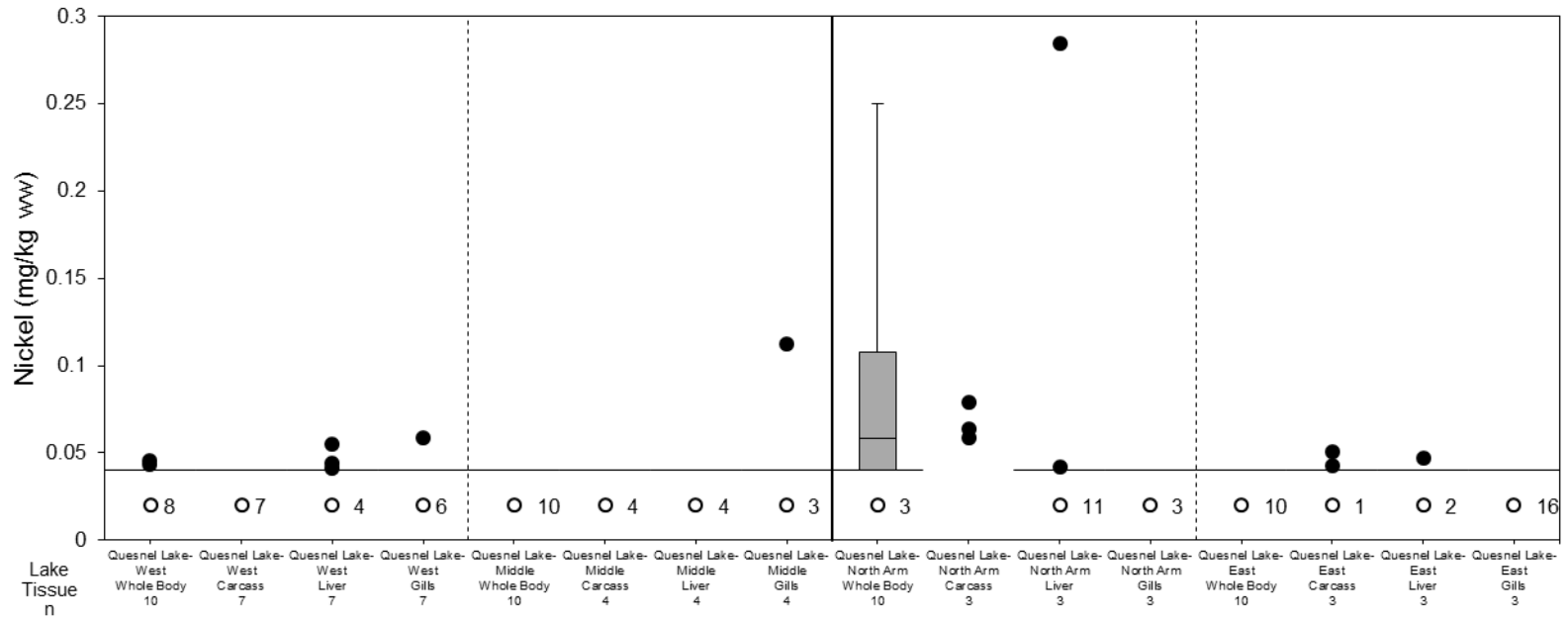


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



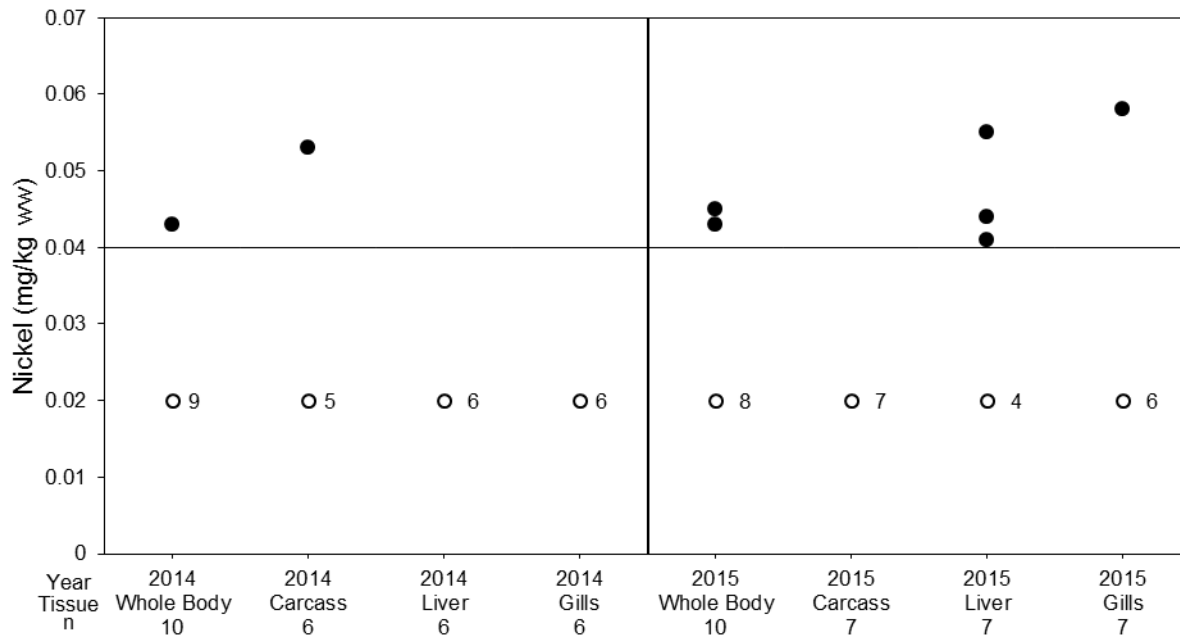
ATTACHMENT 3
Fish Tissue Chemistry Censored Boxplots

Figure 435: Nickel Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2015



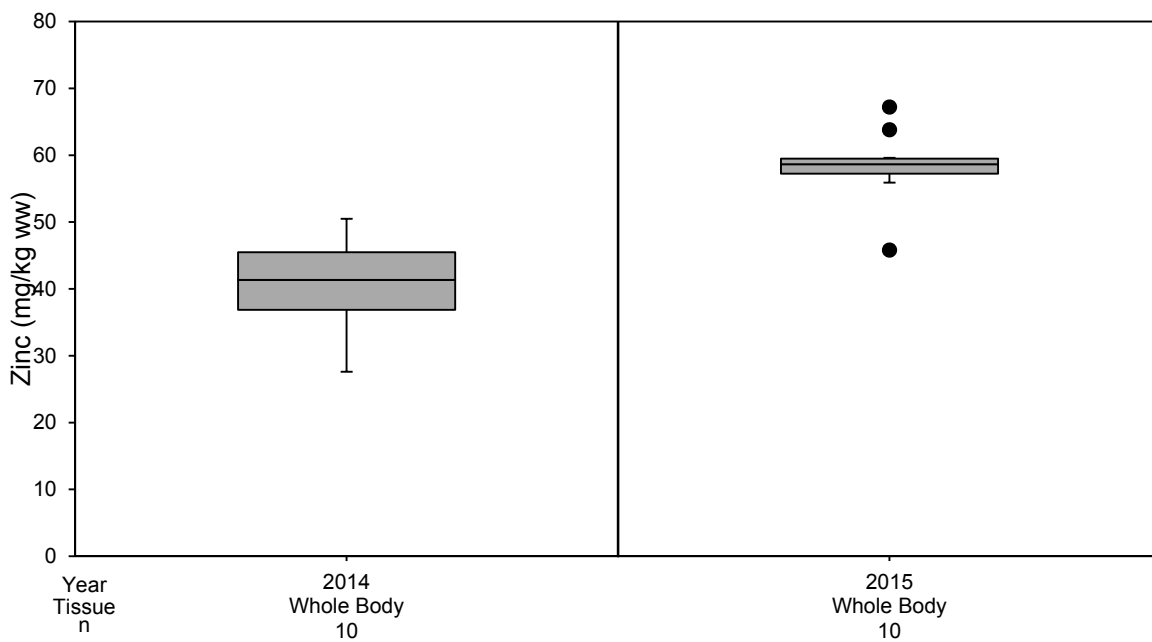
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 436: Nickel Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – West in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 437: Nickel Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – Middle in 2014 and 2015

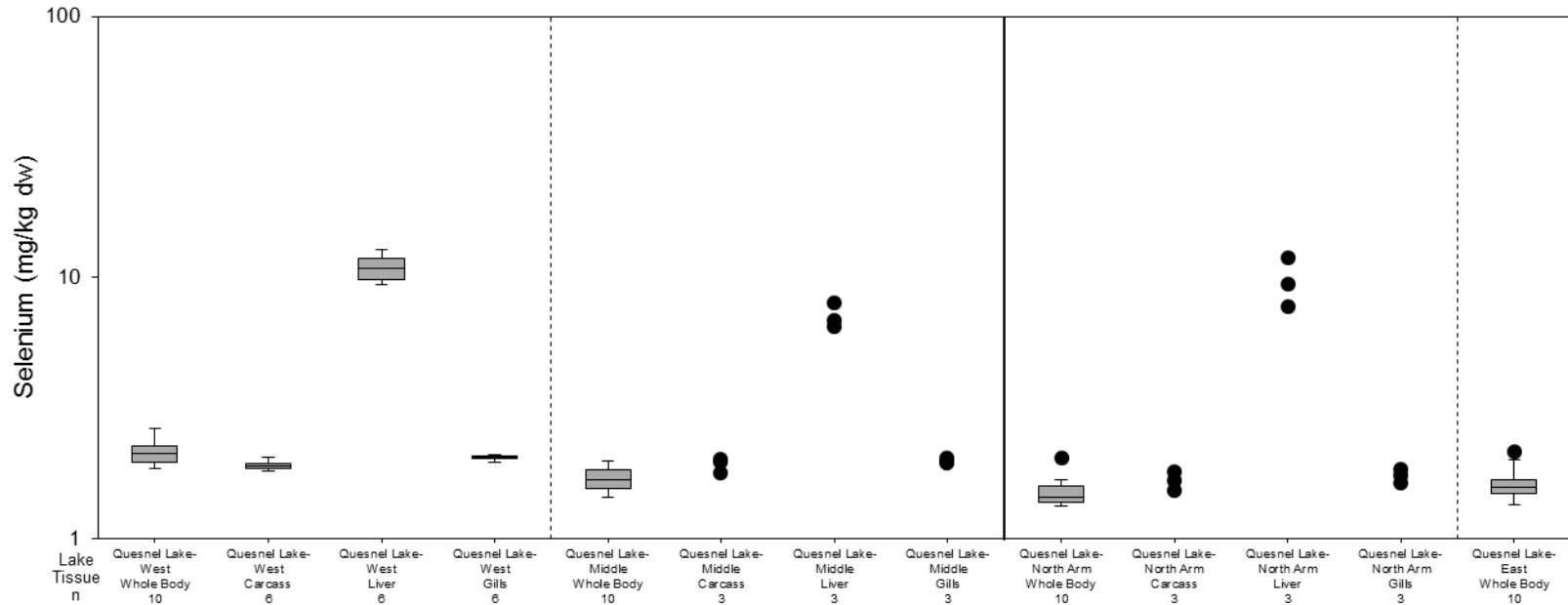


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



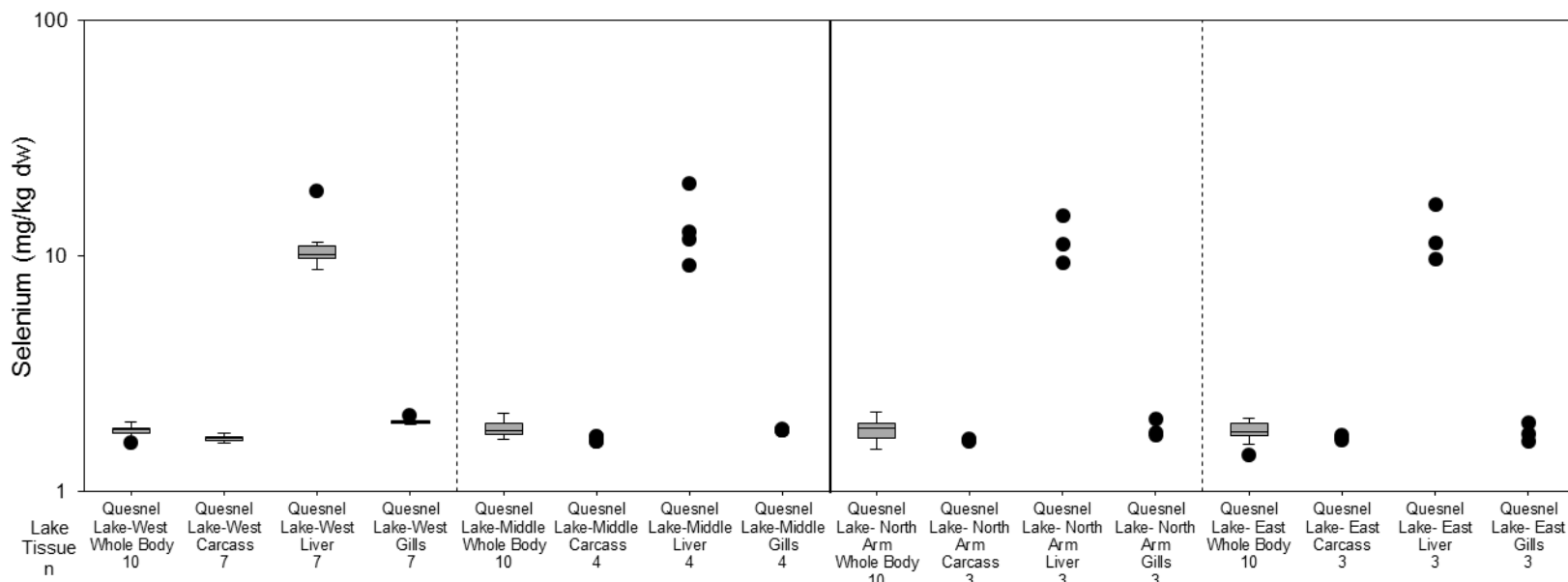
10.16 Selenium

Figure 438: Selenium Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2014



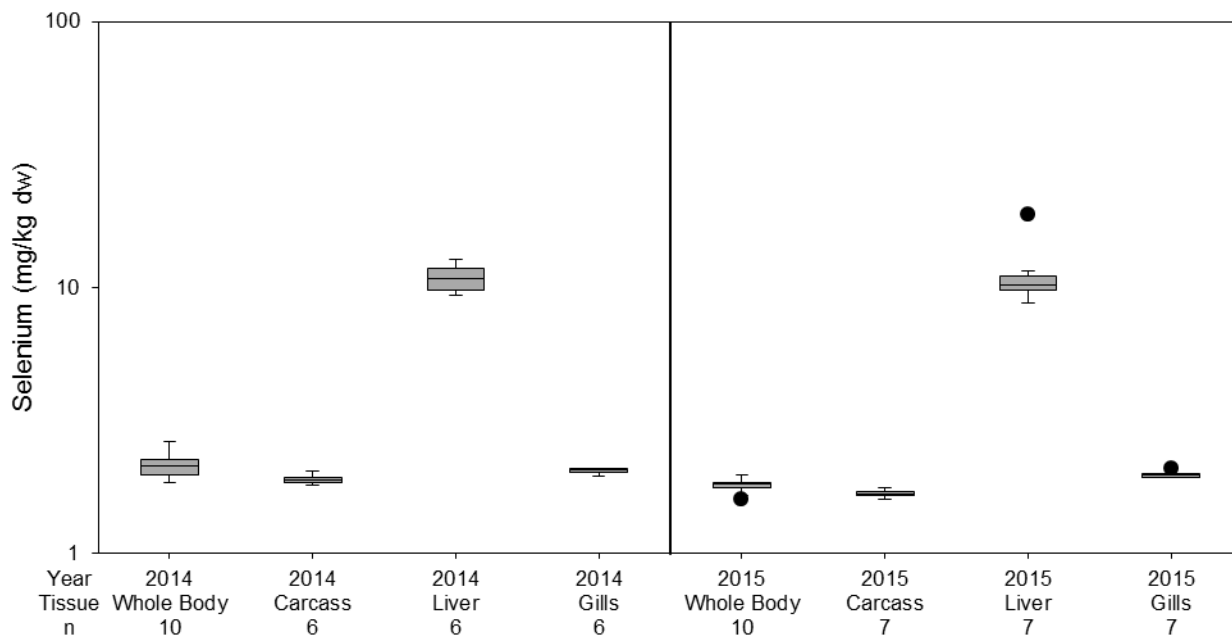
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 439: Selenium Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.

Figure 440: Selenium Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – West in 2014 and 2015

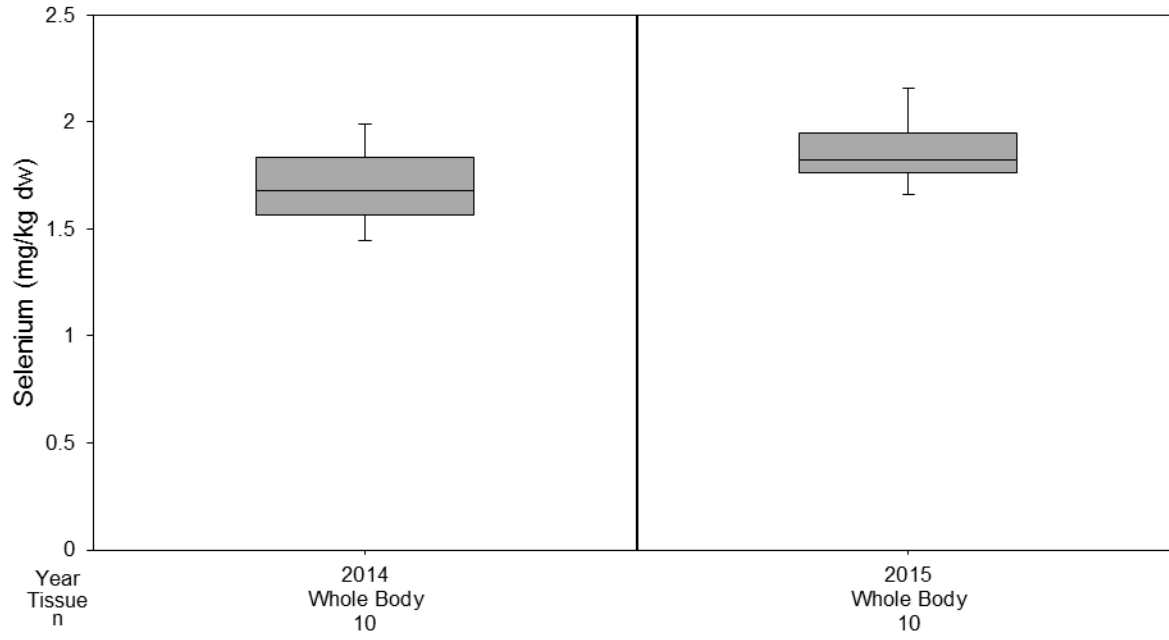


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (- -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years; y-axis is a logarithmic scale.



ATTACHMENT 3
Fish Tissue Chemistry Censored Boxplots

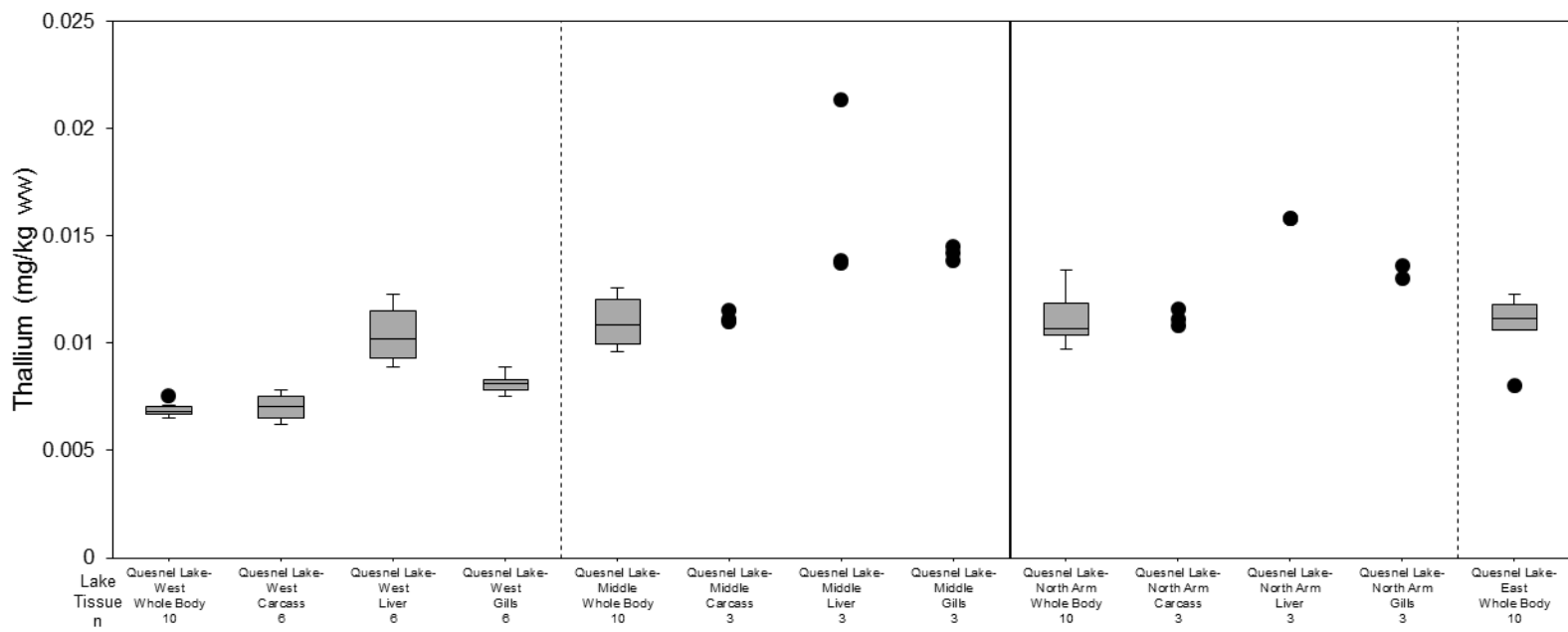
Figure 441: Selenium Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – Middle in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg dw = milligrams per kilogram dry weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

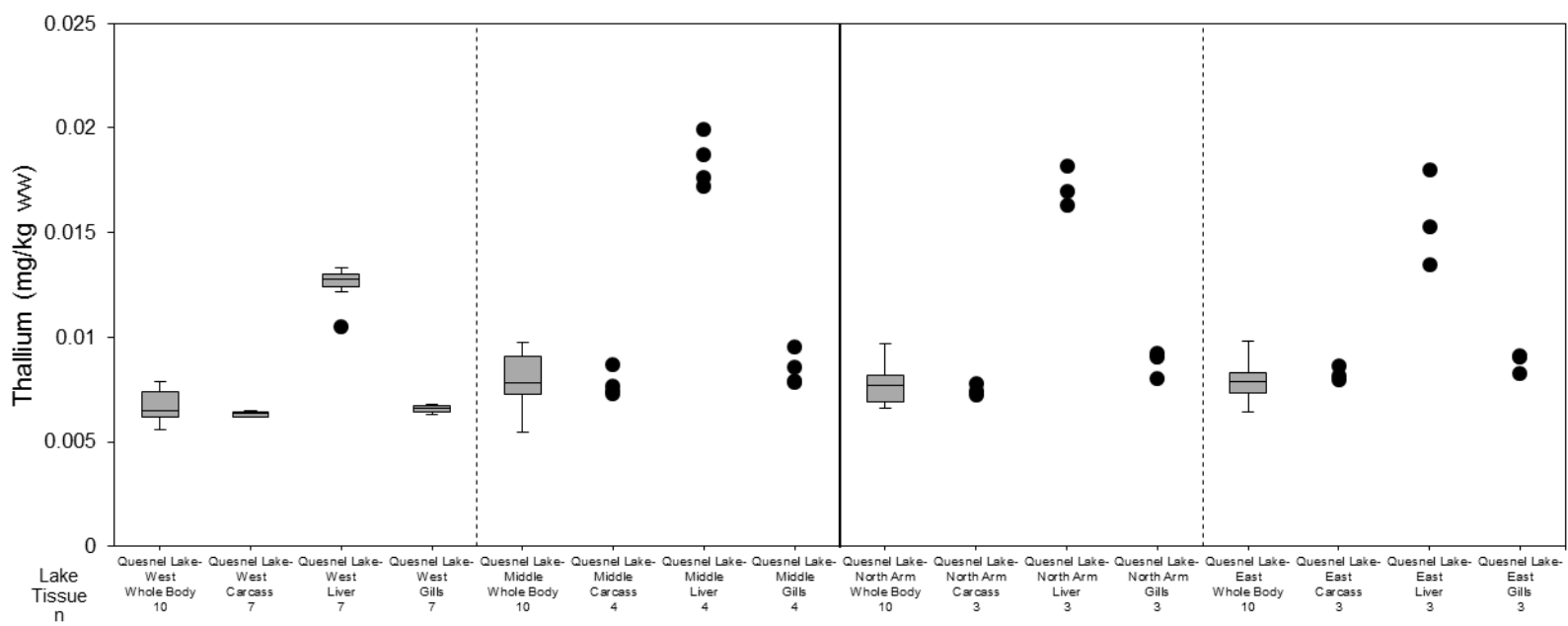
10.17Thallium

Figure 442: Thallium Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2014



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 443: Thallium Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2015

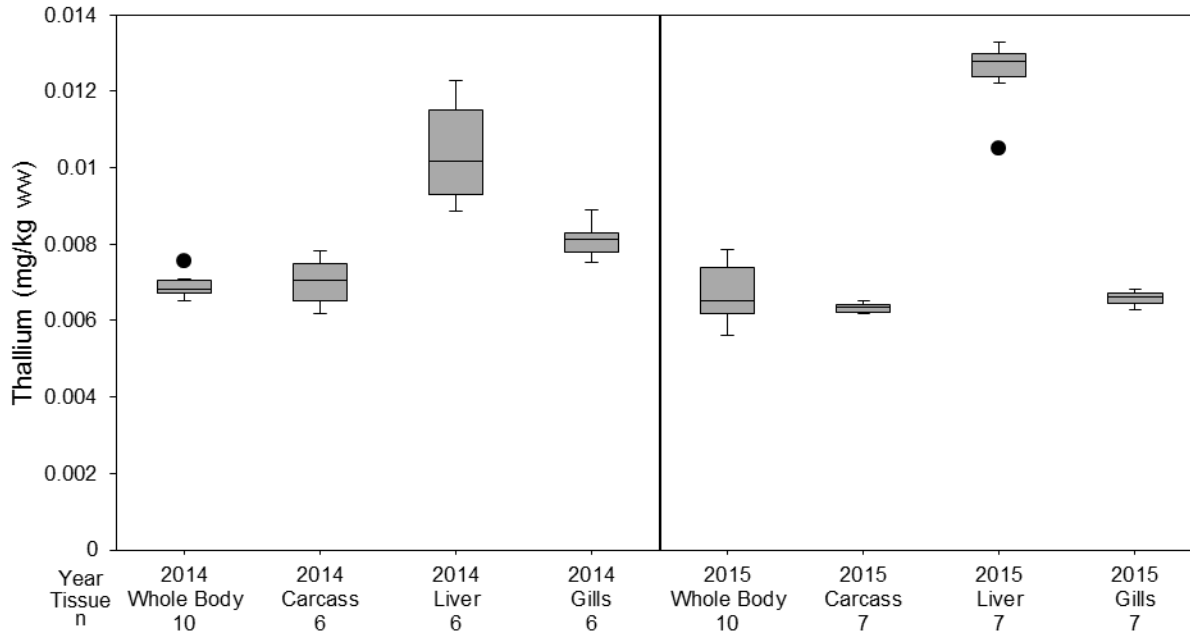


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



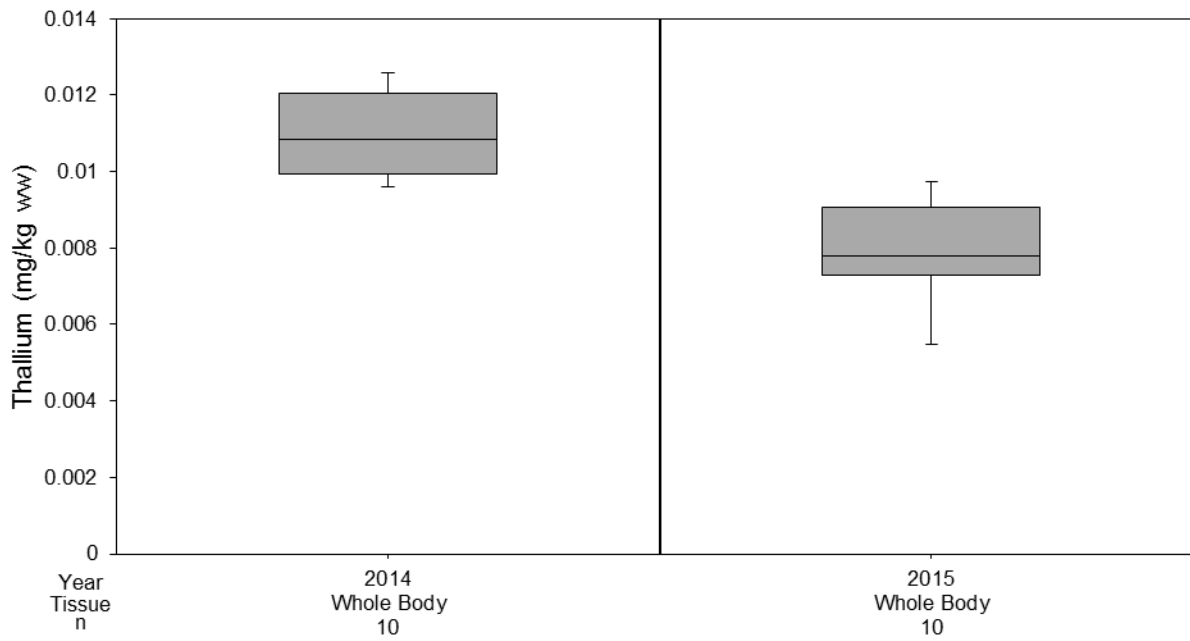
ATTACHMENT 3
Fish Tissue Chemistry Censored Boxplots

Figure 444: Thallium Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – West in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

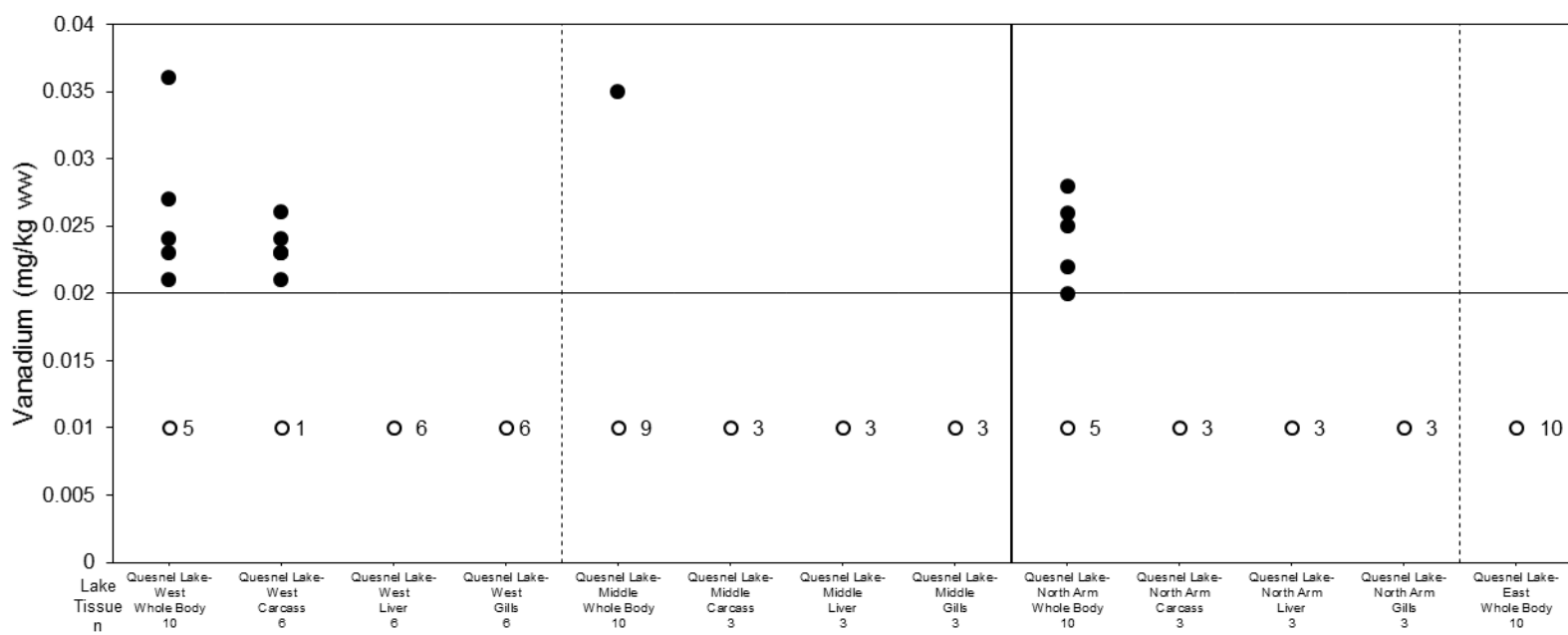
Figure 445: Thallium Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – Middle in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

10.18 Vanadium

Figure 446: Vanadium Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2014

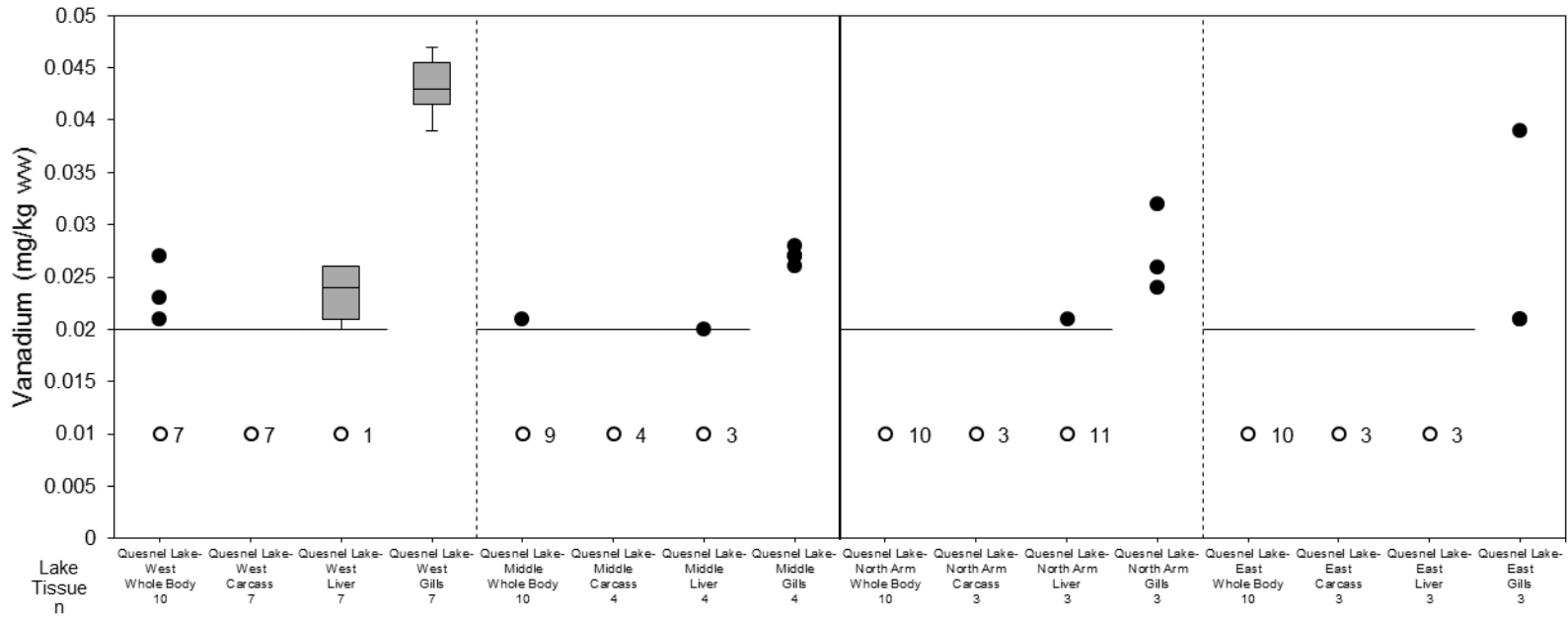


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



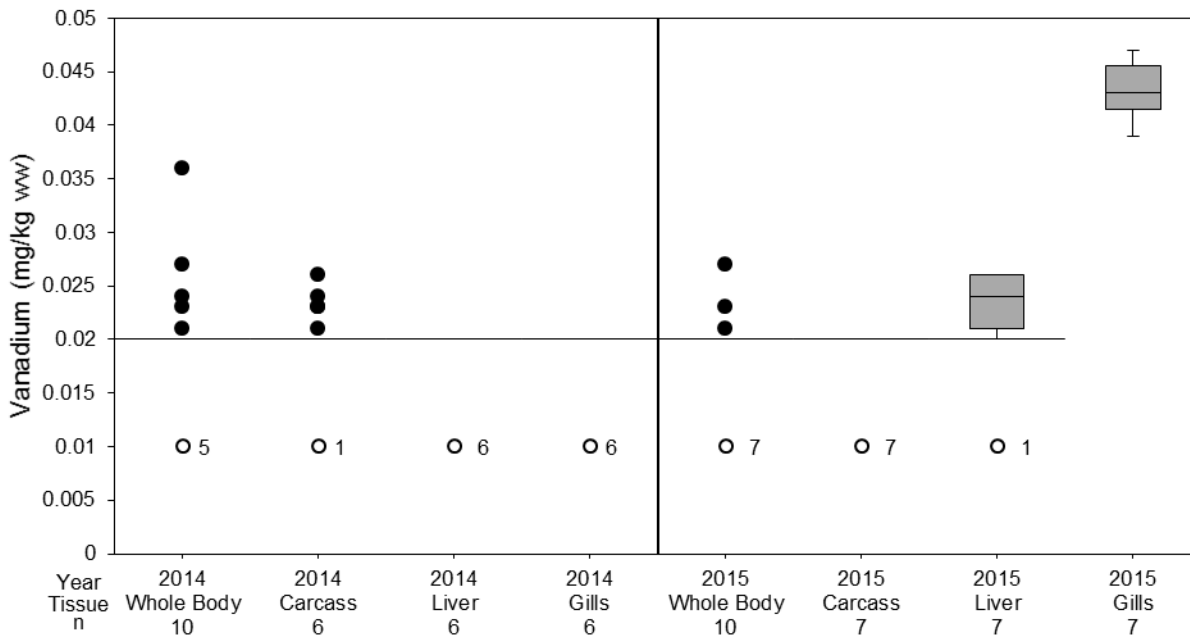
ATTACHMENT 3
Fish Tissue Chemistry Censored Boxplots

Figure 447: Vanadium Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2015



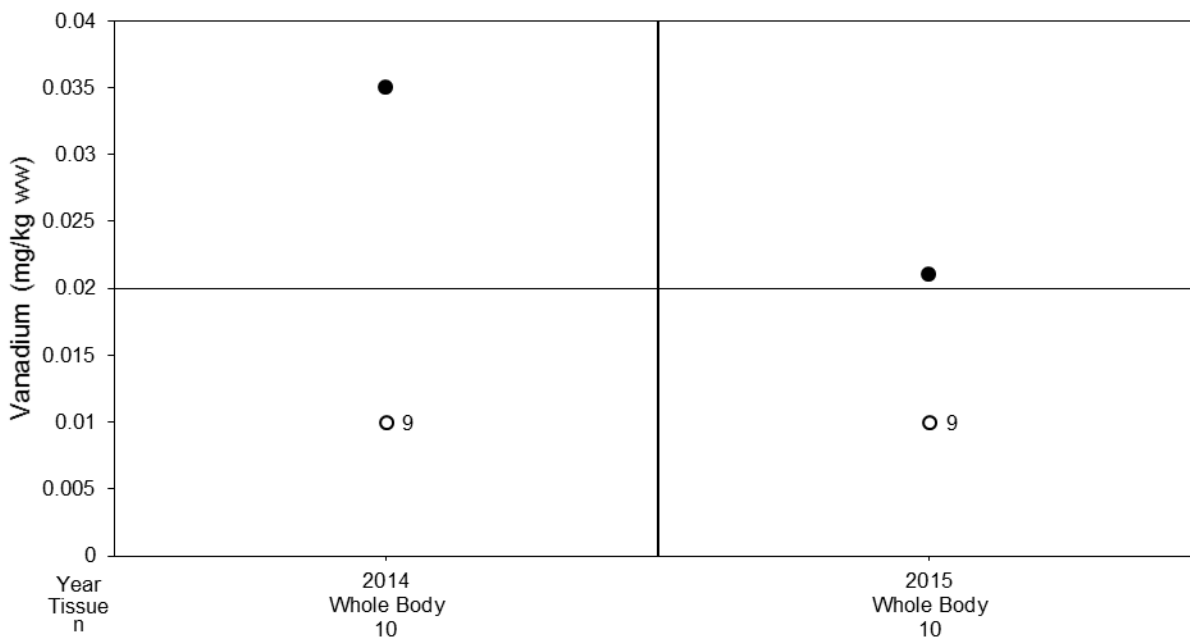
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 448: Vanadium Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – West in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 449: Vanadium Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – Middle in 2014 and 2015

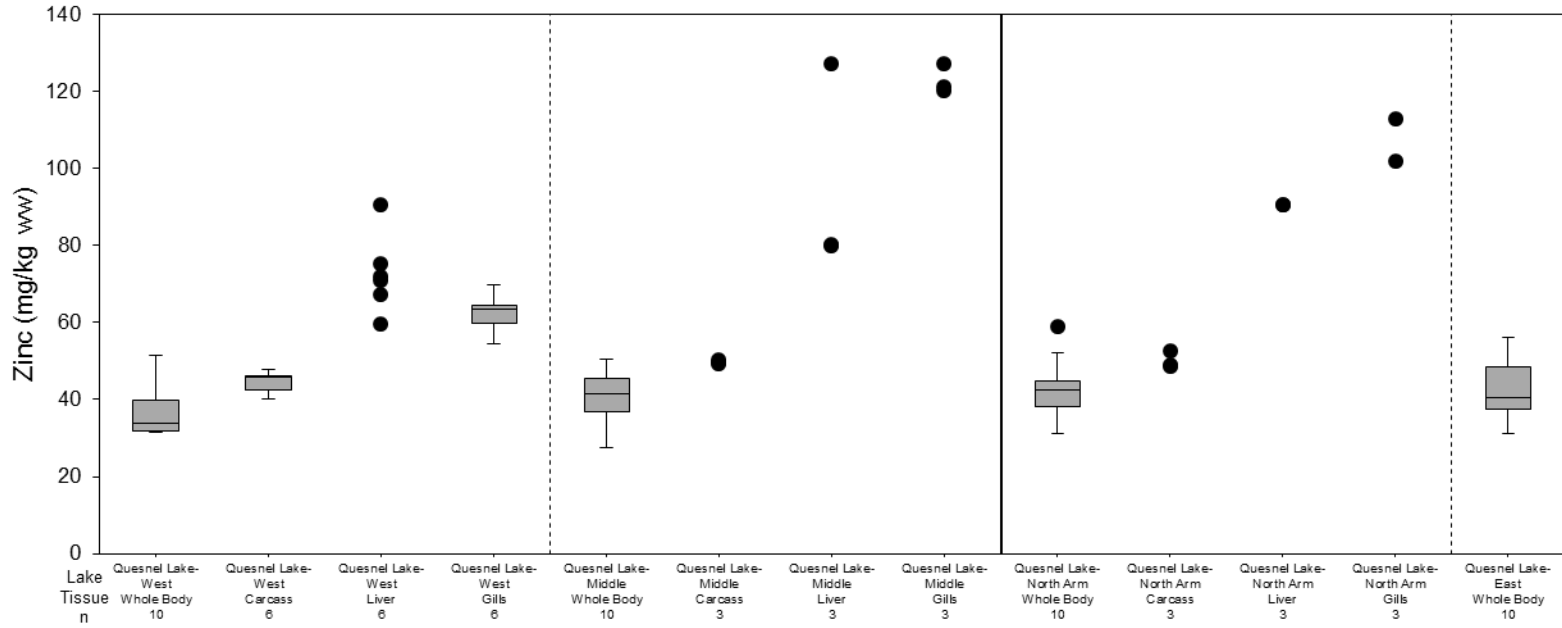


Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



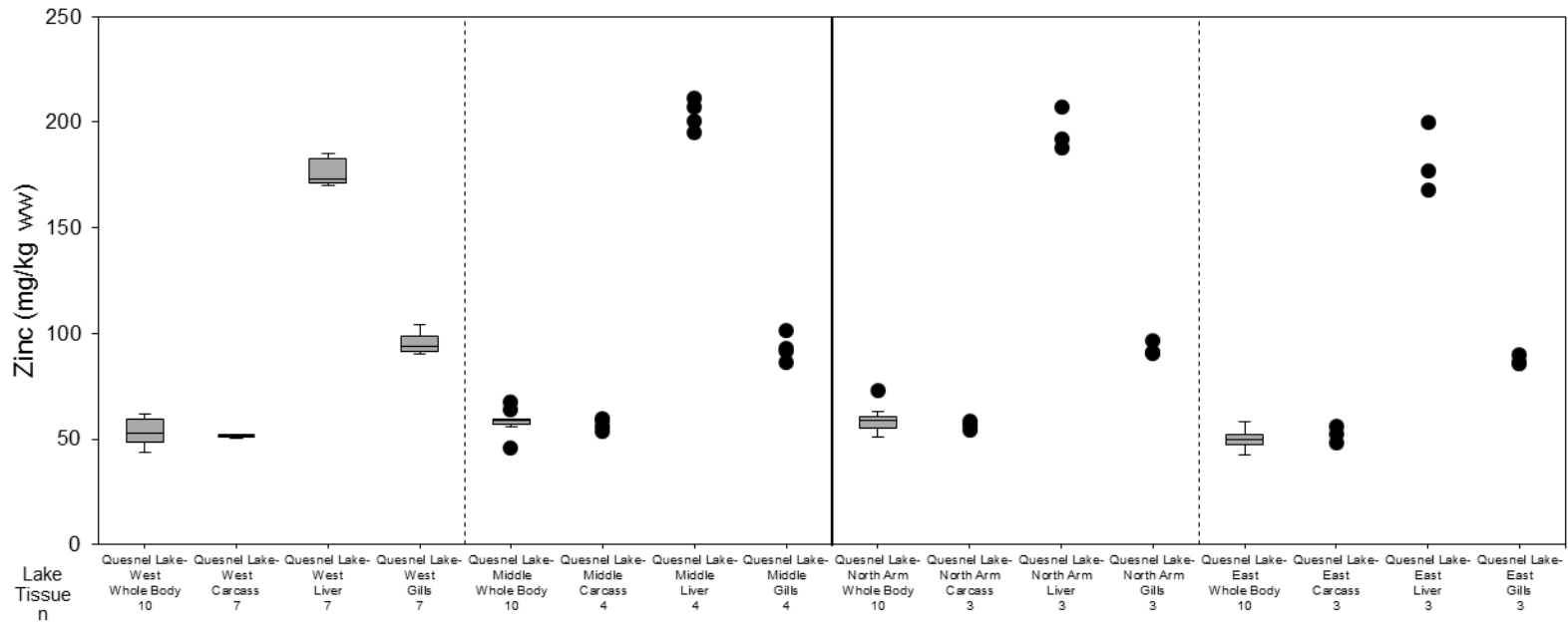
10.19Zinc

Figure 450: Zinc Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2014



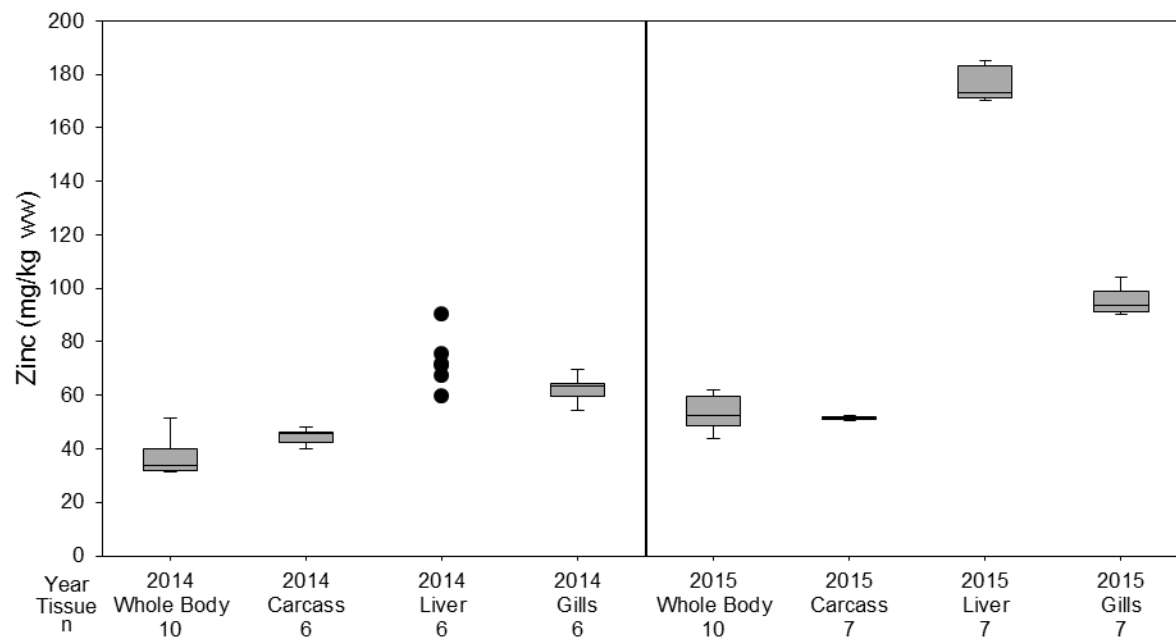
Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

Figure 451: Zinc Concentrations in Sockeye Salmon Juvenile Tissues Collected in 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

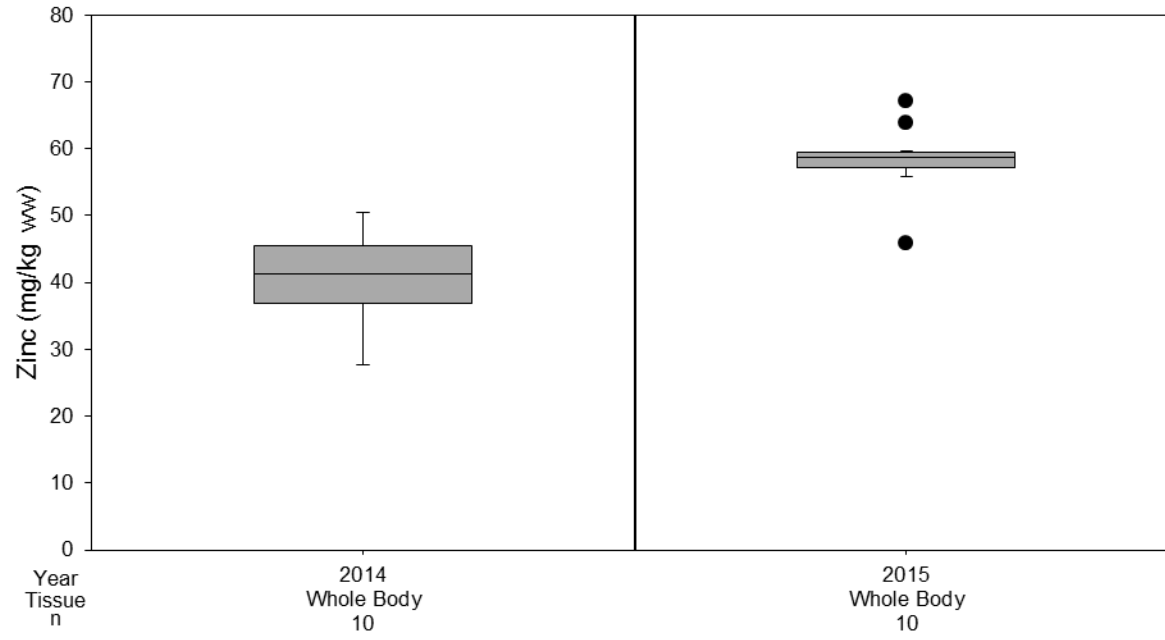
Figure 452: Zinc Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – West in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.



Figure 453: Zinc Concentrations in Sockeye Salmon Juvenile Tissues Collected from the Quesnel Lake – Middle in 2014 and 2015



Note: Boxplots are censored at the detection limit (DL = solid horizontal line). Concentrations below the DL are plotted as an open symbol at half the DL. Extreme values are plotted as individual values. mg/kg ww = milligrams per kilogram wet weight; n = sample size; dashed lines (- - -) indicate the separation of sites; solid lines (-) indicate the separation of exposure and reference or separation of years.

ATTACHMENT 4
FISH TISSUE CHEMISTRY REGRESSION PLOTS



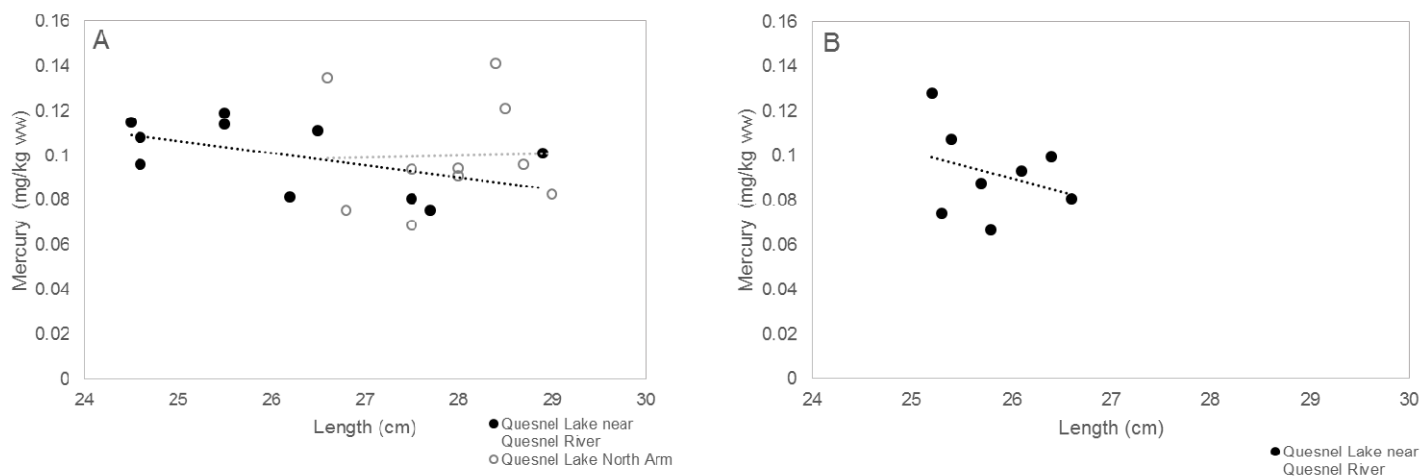
1.0 BURBOT

The type of samples collected from Burbot were not consistent among locations and years, therefore, no comparisons were made for Burbot tissue chemistry and regressions are not presented.

2.0 KOKANEE

2.1 Mercury

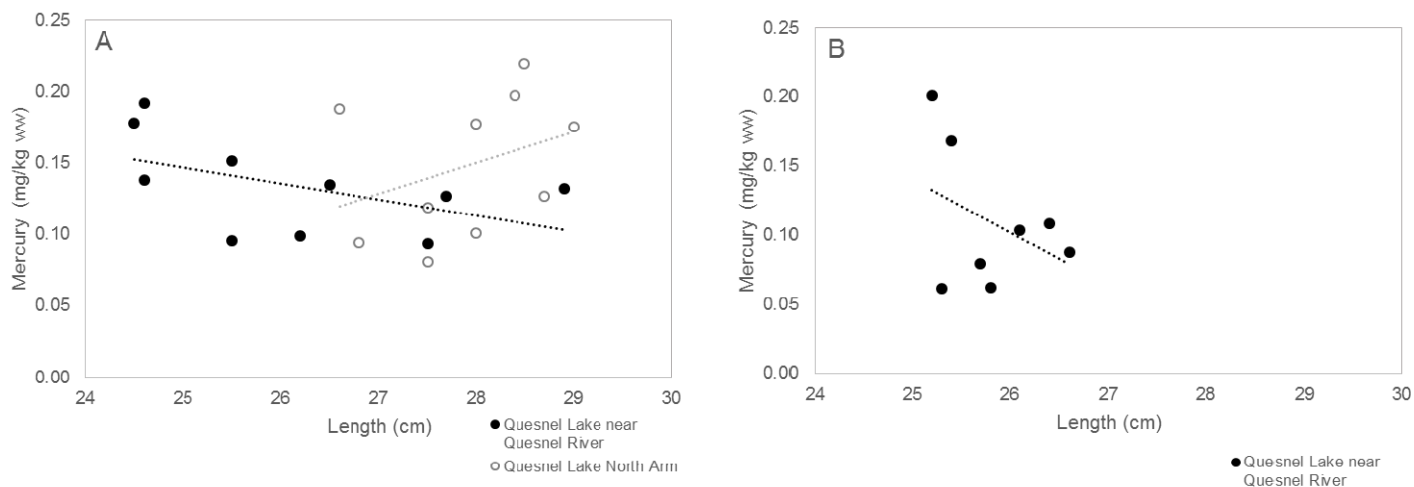
Figure 1: Mercury Concentration in Kokanee Muscle Tissue Collected in (A) 2014 and (B) 2015 Relative to Fish Length



Regression equations: **(A)** Quesnel Lake near Quesnel River (exposure) $y = -0.0054x + 0.2425$, $R^2 = 0.2621$; $P = 0.130$; **Quesnel Lake North Arm (reference)** $y = 0.0010x + 0.0728$, $R^2 = 0.0010$; $P = 0.931$; **(B)** Quesnel Lake near Quesnel River (exposure) $y = -0.0119x + 0.4001$, $R^2 = 0.099$; $P = 0.448$.

mg/kg ww = milligrams per kilogram wet weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.

Figure 2: Mercury Concentration in Kokanee Liver Tissue Collected in (A) 2014 and (B) 2015 Relative to Fish Length

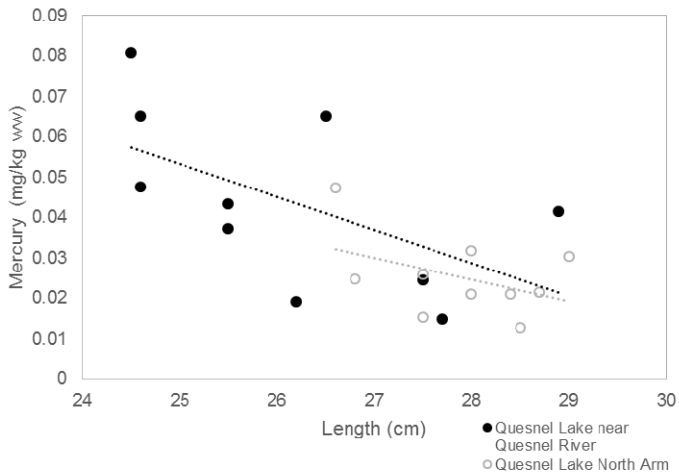


Regression equations: **(A)** Quesnel Lake near Quesnel River (exposure) $y = -0.0112x + 0.4263$, $R^2 = 0.2534$; $P = 0.138$; Quesnel Lake North Arm (reference) $y = 0.0218x - 0.4597$, $R^2 = 0.1256$; $P = 0.315$; **(B)** Quesnel Lake near Quesnel River (exposure) $y = -0.0382x + 1.0954$, $R^2 = 0.1535$; $P = 0.337$.

mg/kg ww = milligrams per kilogram wet weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.



Figure 3: Mercury Concentration in Kokanee Ovary Tissue Collected in 2014 Relative to Fish Length



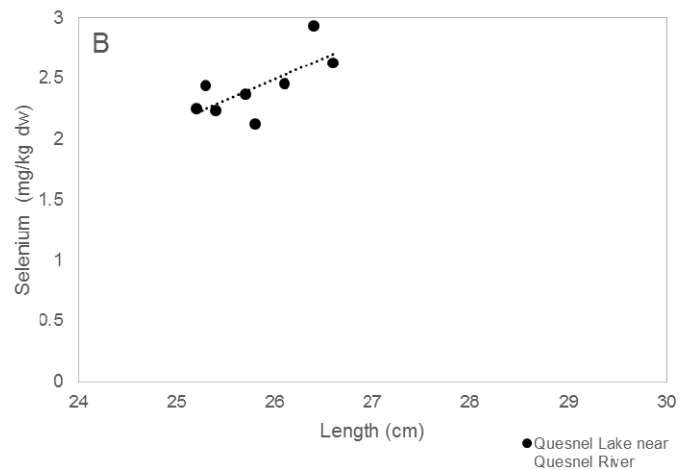
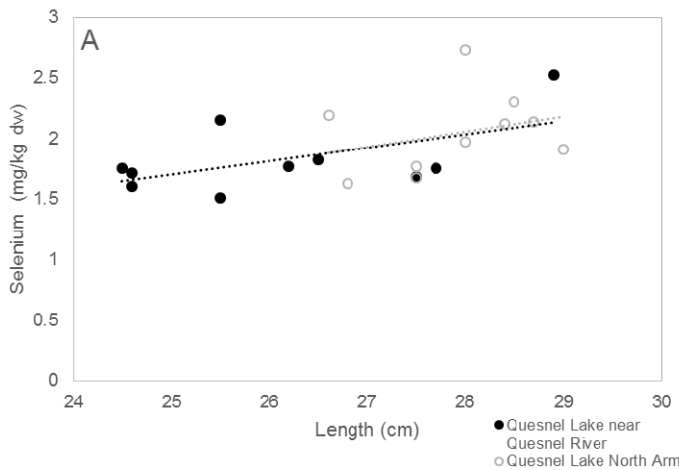
Sample size < 5 for Kokanee ovary collected in 2015.

Regression equations: **Quesnel Lake near Quesnel River (exposure) $y = -0.0082x + 0.2585$, $R^2 = 0.3291$; $P = 0.083$** ; Quesnel Lake North Arm (reference) $y = -0.0055x + 0.1773$, $R^2 = 0.1962$; $P = 0.200$.

mg/kg ww = milligrams per kilogram wet weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.

2.2 Selenium

Figure 4: Selenium Concentrations in Kokanee Muscle Tissue Collected in (A) 2014 and (B) 2015 Relative to Fish Length



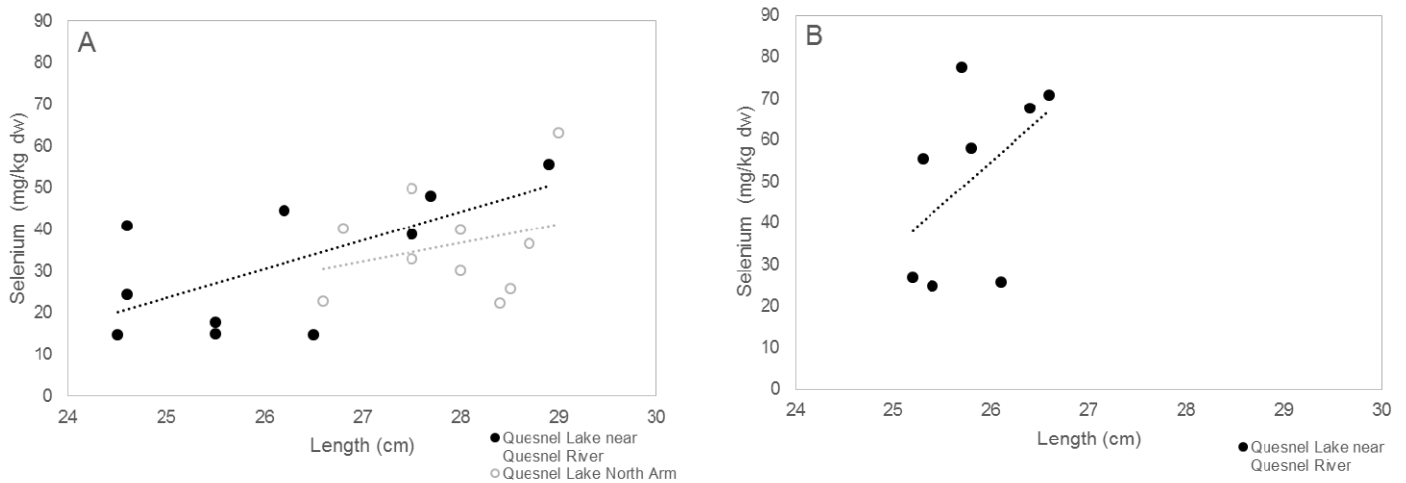
Regression equations: **(A) Quesnel Lake near Quesnel River (exposure) $y = 0.1096x - 1.0365$, $R^2 = 0.3123$; $P = 0.093$** ; Quesnel Lake North Arm (reference) $y = 0.1245x - 1.4291$, $R^2 = 0.0892$; $P = 0.402$; **(B) Quesnel Lake near Quesnel River (exposure) $y = 0.3509x - 6.6276$, $R^2 = 0.0501$; $P = 0.049$.**

mg/kg dw = milligrams per kilogram dry weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.



ATTACHMENT 4 Fish Tissue Chemistry Regression Boxplots

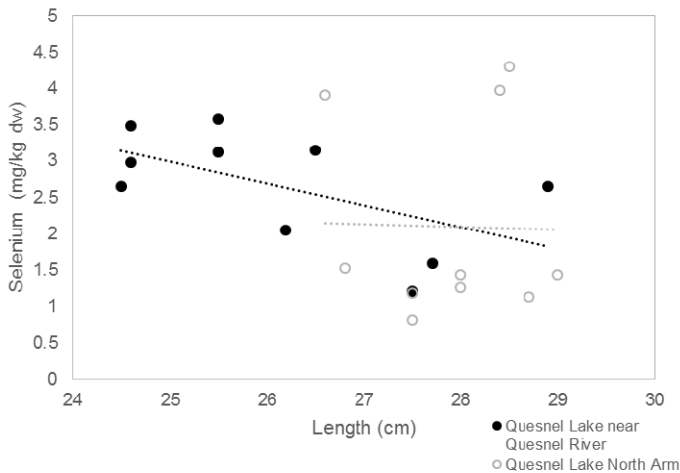
Figure 5: Selenium Concentrations in Kokanee Liver Tissue Collected in (A) 2014 and (B) 2015 Relative to Fish Length



Regression equations: **(A) Quesnel Lake near Quesnel River (exposure) $y = 6.9058x - 149.0965$, $R^2 = 0.4326$; $P = 0.039$** ; Quesnel Lake North Arm (reference) $y = 4.4129x - 86.7912$, $R^2 = 0.0758$; $P = 0.441$; **(B) Quesnel Lake near Quesnel River (exposure) $y = 20.5727x - 480.1874$, $R^2 = 0.2348$; $P = 0.224$.**

mg/kg dw = milligrams per kilogram dry weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.

Figure 6: Selenium Concentrations in Kokanee Ovary Tissue Collected in 2014 Relative to Fish Length



Sample size < 5 for Kokanee ovary collected in 2015.

Regression equations: **Quesnel Lake near Quesnel River (exposure) $y = -0.3031x - 10.5742$, $R^2 = 0.3294$; $P = 0.082$** ; Quesnel Lake North Arm (reference) $y = -0.0408x - 3.2400$, $R^2 = 0.0006$; $P = 0.948$.

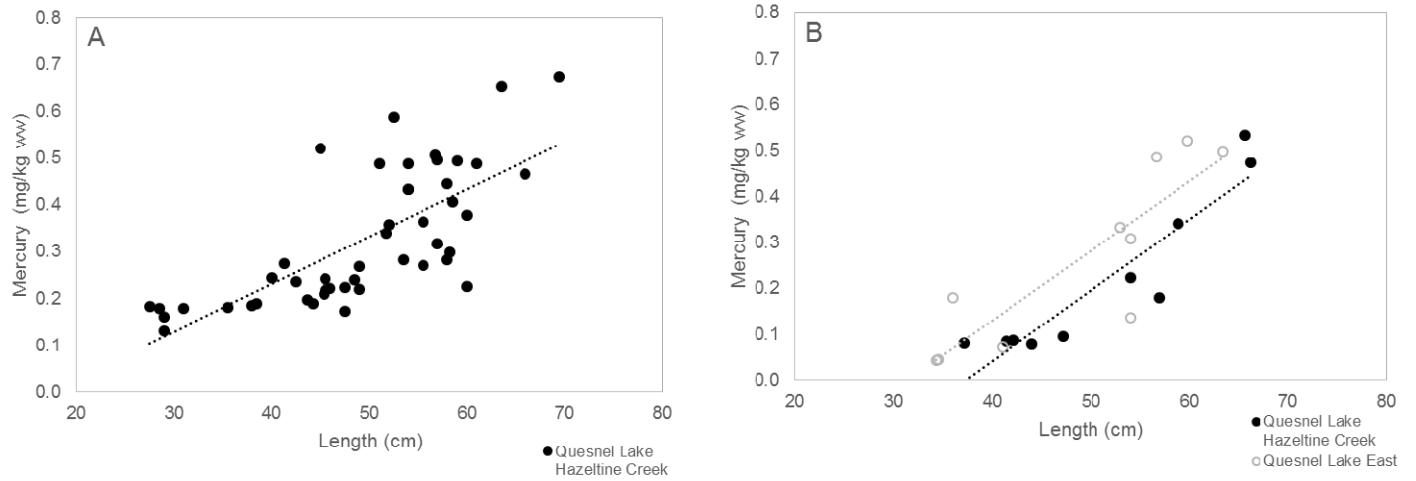
mg/kg dw = milligrams per kilogram dry weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.



3.0 LAKE TROUT

3.1 Mercury

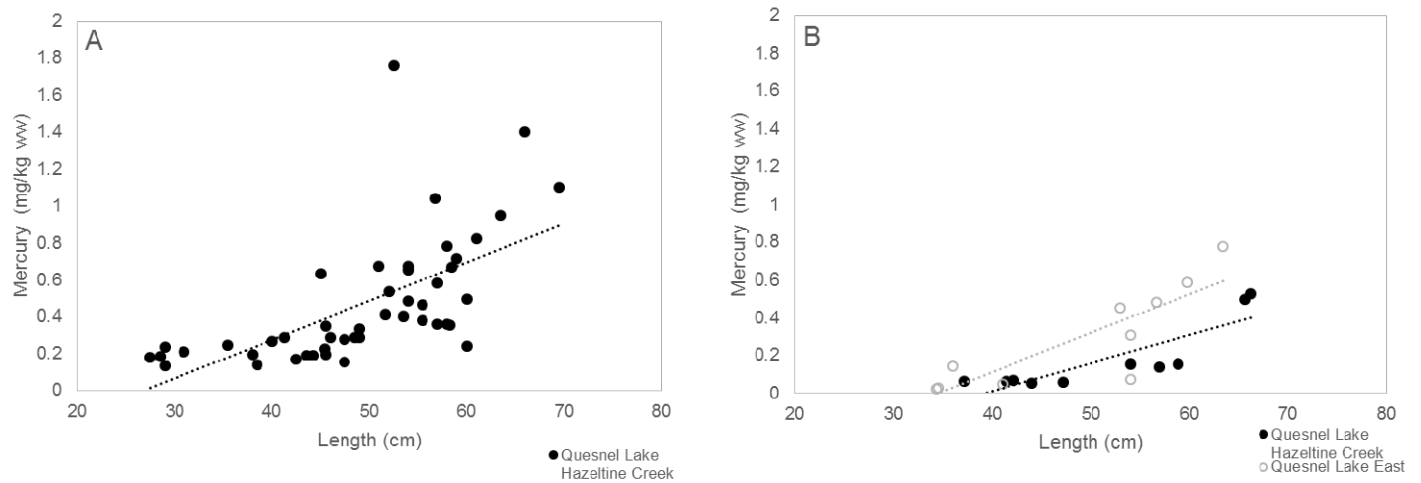
Figure 7: Mercury Concentrations in Lake Trout Muscle Tissue Collected in (A) 2014 and (B) 2015 Relative to Fish Length



Regression equations: (A) Quesnel Lake Hazeltine Creek (exposure) $y = 0.0101x - 0.1750$, $R^2 = 0.5363$; $P = <0.001$; (B) Quesnel Lake Hazeltine Creek (exposure) $y = 0.0154x - 0.5748$, $R^2 = 0.8602$; $P = <0.001$; Quesnel Lake East (reference) $y = 0.0152x - 0.4773$, $R^2 = 0.7599$; $P = 0.001$.

mg/kg ww = milligrams per kilogram wet weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.

Figure 8: Mercury Concentrations in Lake Trout Liver Tissue Collected in (A) 2014 and (B) 2015 Relative to Fish Length



Regression equations: (A) Quesnel Lake Hazeltine Creek (exposure) $y = 0.0210x - 0.5642$, $R^2 = 0.3943$; $P = <0.001$; (B) Quesnel Lake Hazeltine Creek (exposure) $y = 0.0148x - 0.5788$, $R^2 = 0.7267$; $P = 0.002$; Quesnel Lake East (reference) $y = 0.0207x - 0.7123$, $R^2 = 0.7231$; $P = 0.002$.

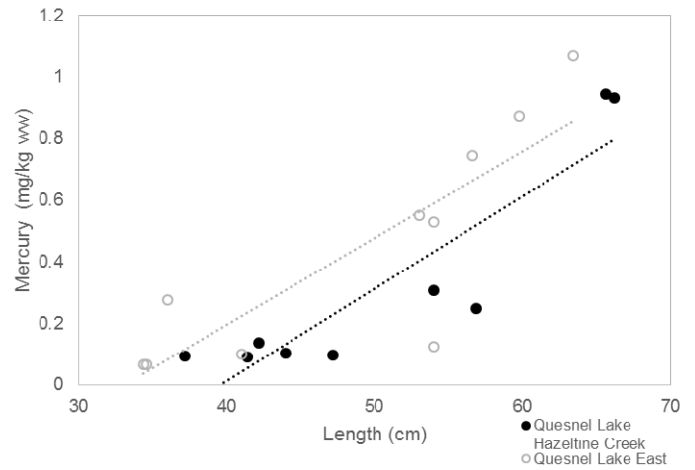
mg/kg ww = milligrams per kilogram wet weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.



ATTACHMENT 4 Fish Tissue Chemistry Regression Boxplots

Figure 9: Mercury Concentrations in Lake Trout Kidney Tissue Collected in 2015 Relative to Fish Length

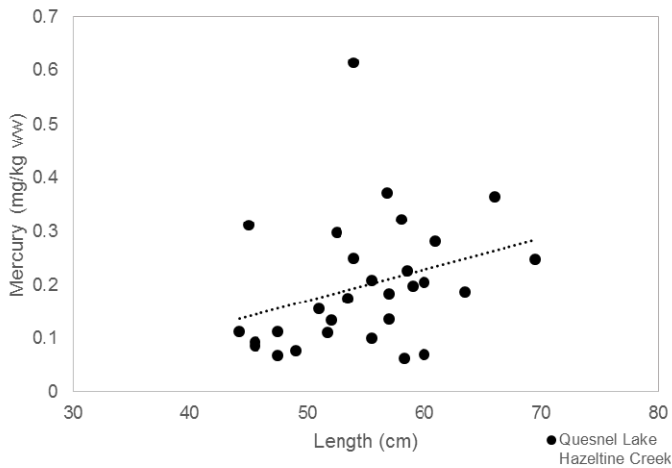
Lake Trout kidney was not collected in 2014.



Regression equations: **Quesnel Lake Hazeltine Creek (exposure) $y = 0.0300x - 1.1904$, $R^2 = 0.8167$; $P = <0.001$** ; **Quesnel Lake East (reference) $y = 0.0283x - 0.9358$, $R^2 = 0.7202$; $P = 0.002$.**

mg/kg ww = milligrams per kilogram wet weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.

Figure 10: Mercury Concentrations in Lake Trout Ovary Tissue Collected in 2014 Relative to Fish Length



Sample size < 5 for Lake Trout ovary collected in 2015.

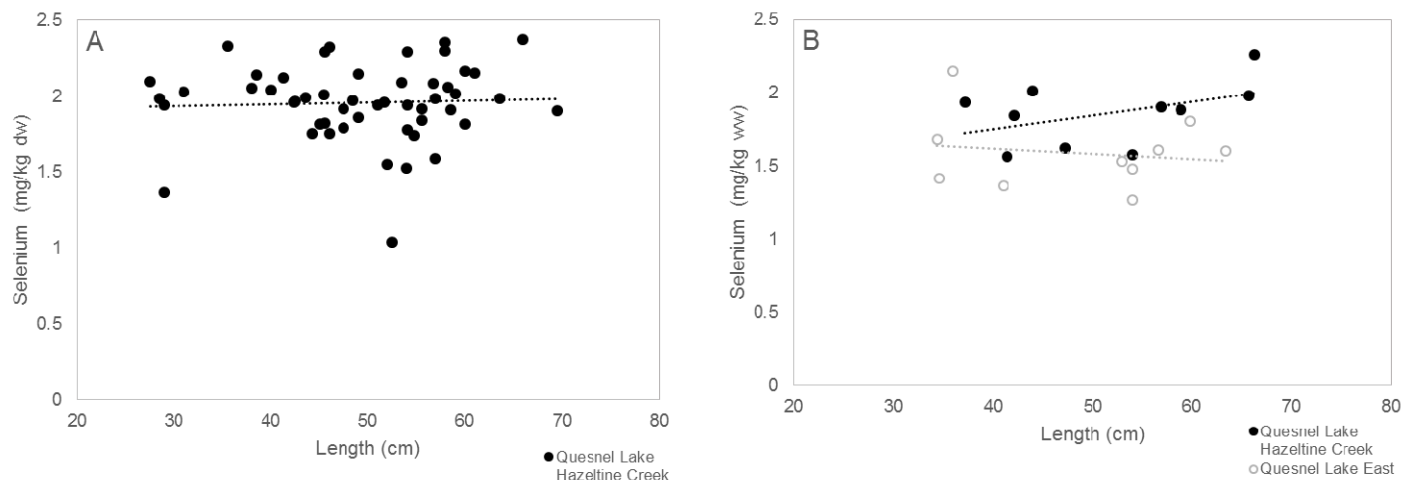
Regression equation: Quesnel Lake Hazeltine Creek (exposure) $y = 0.0058x - 0.1195$, $R^2 = 0.0933$; $P = 0.107$.

mg/kg ww = milligrams per kilogram wet weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.



3.2 Selenium

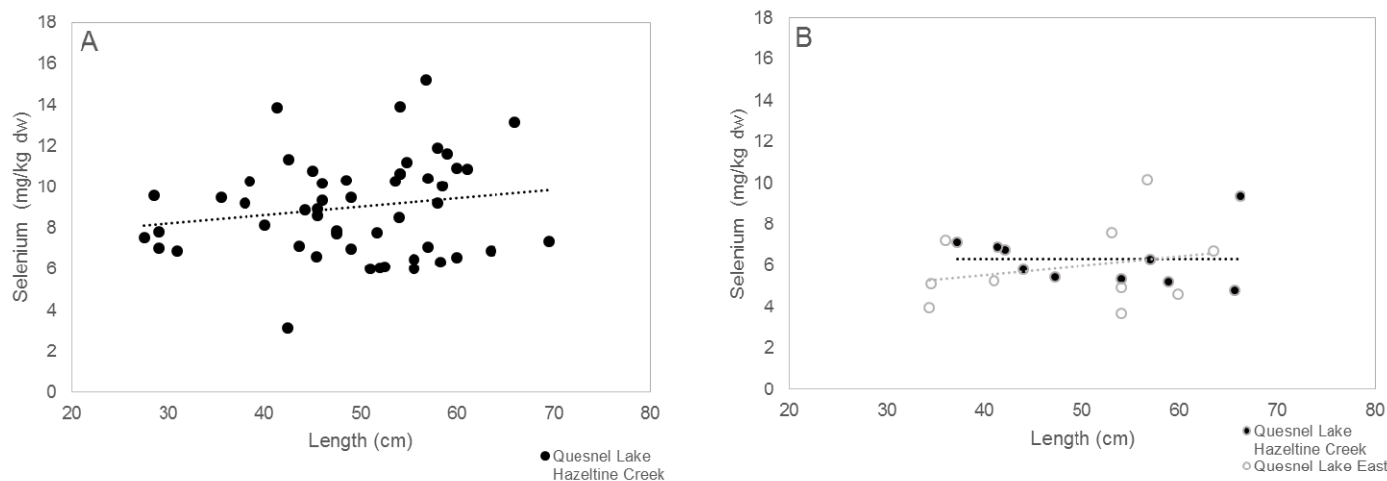
Figure 11: Selenium Concentrations in Lake Trout Muscle Tissue Collected in (A) 2014 and (B) 2015 Relative to Fish Length



Regression equations: **(A)** Quesnel Lake Hazeltine Creek (exposure) $y = 0.0011x + 1.9040$, $R^2 = 0.0018$; $P = 0.766$; **(B)** Quesnel Lake Hazeltine Creek (exposure) $y = 0.0095x + 1.3692$, $R^2 = 0.2038$; $P = 0.190$; Quesnel Lake East (reference) $y = -0.0036x + 1.7682$, $R^2 = 0.0254$; $P = 0.660$.

mg/kg dw = milligrams per kilogram dry weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.

Figure 12: Selenium Concentrations in Lake Trout Liver Tissue Collected in (A) 2014 and (B) 2015 Relative to Fish Length



Regression equations: **(A)** Quesnel Lake Hazeltine Creek (exposure) $y = 0.0407x + 6.9842$, $R^2 = 0.0290$; $P = 0.233$; **(B)** Quesnel Lake Hazeltine Creek (exposure) $y = -0.0008x + 6.3557$, $R^2 = <0.0001$; $P = 0.986$; Quesnel Lake East (reference) $y = 0.0445x + 3.7542$, $R^2 = 0.0614$; $P = 0.490$.

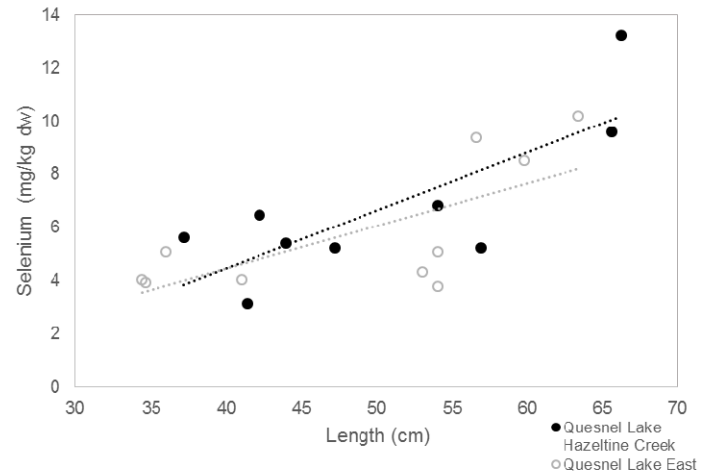
mg/kg dw = milligrams per kilogram dry weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.



ATTACHMENT 4 Fish Tissue Chemistry Regression Boxplots

Figure 13: Selenium Concentrations in Lake Trout Kidney Tissue Collected in 2015 Relative to Fish Length

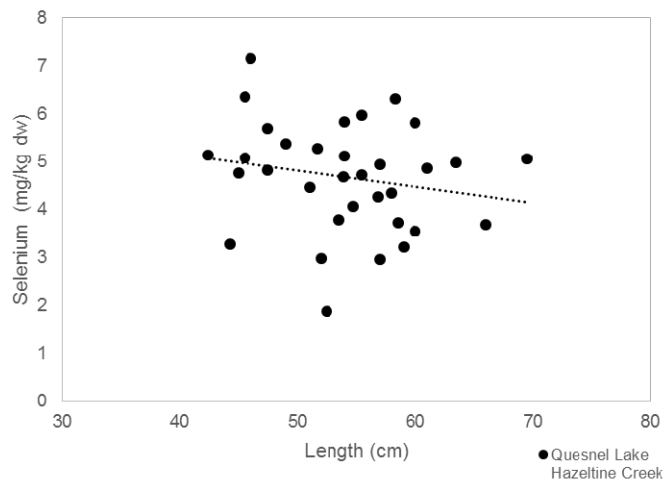
Lake Trout kidney was not collected in 2014.



Regression equations: **Quesnel Lake Hazeltine Creek (exposure) $y = 0.2193x - 4.3360$, $R^2 = 0.6158$; $P = 0.012$** ; **Quesnel Lake East (reference) $y = 0.1606x - 1.9804$, $R^2 = 0.5007$, $P = 0.022$** .

mg/kg dw = milligrams per kilogram dry weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.

Figure 14: Selenium Concentrations in Lake Trout Ovary Tissue Collected in 2014 Relative to Fish Length



Sample size < 5 for Lake Trout ovary collected in 2015.

Regression equation: Quesnel Lake Hazeltine Creek (exposure) $y = -0.0332x + 6.4665$, $R^2 = 0.0362$; $P = 0.289$.

mg/kg dw = milligrams per kilogram dry weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.

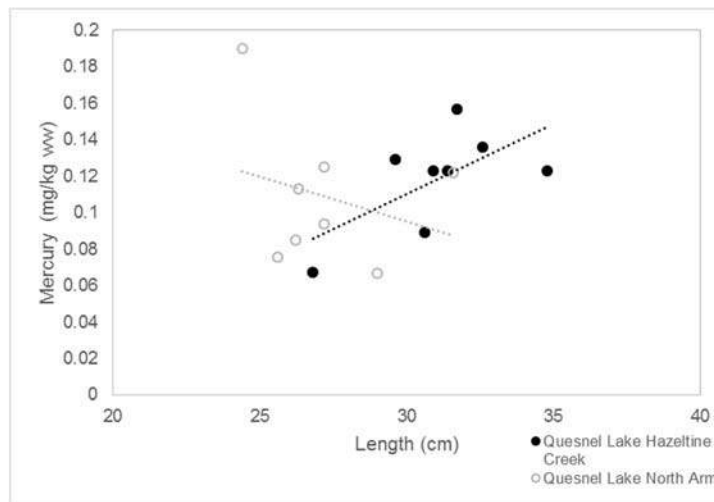


4.0 LARGESCALE SUCKER

4.1 Mercury

Figure 15: Mercury Concentrations in Largescale Sucker Muscle Tissue Collected in 2015 Relative to Fish Length

Largescale Sucker muscle was not collected in 2014.



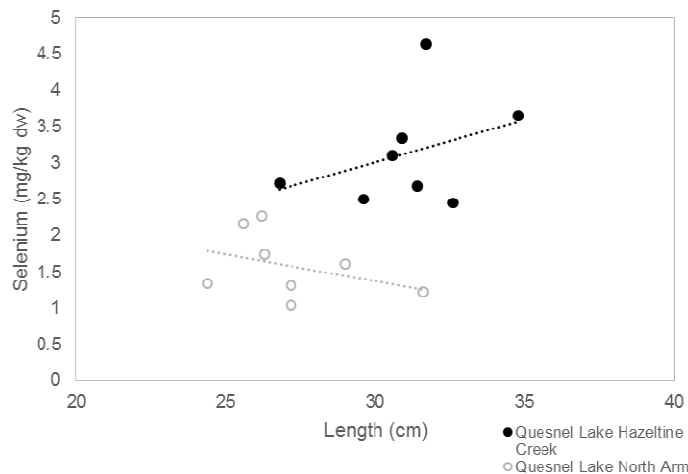
Regression equation: **Quesnel Lake Hazeltine Creek (exposure) $y = 0.0076x - 0.1186$, $R^2 = 0.4003$; $P = 0.092$** ; Quesnel Lake North Arm (reference) $y = -0.0049x + 0.2431$, $R^2 = 0.0792$, $P = 0.499$.

mg/kg ww = milligrams per kilogram wet weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.

4.2 Selenium

Figure 16: Selenium Concentrations in Largescale Sucker Muscle Tissue Collected in 2015 Relative to Fish Length

Largescale Sucker muscle was not collected in 2014.



Regression equation: Quesnel Lake Hazeltine Creek (exposure) $y = 0.1172x - 0.5040$, $R^2 = 0.1353$; $P = 0.370$; Quesnel Lake North Arm (reference) $y = -0.0752x + 3.6305$, $R^2 = 0.1407$, $P = 0.360$.

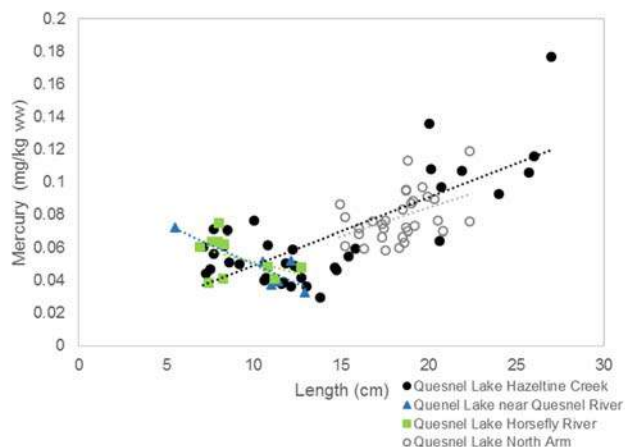
mg/kg dw = milligrams per kilogram dry weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.



5.0 NORTHERN PIKEMINNOW

5.1 Mercury

Figure 17: Mercury Concentrations in Northern Pikeminnow Whole Body Tissue Collected in 2014 Relative to Fish Length



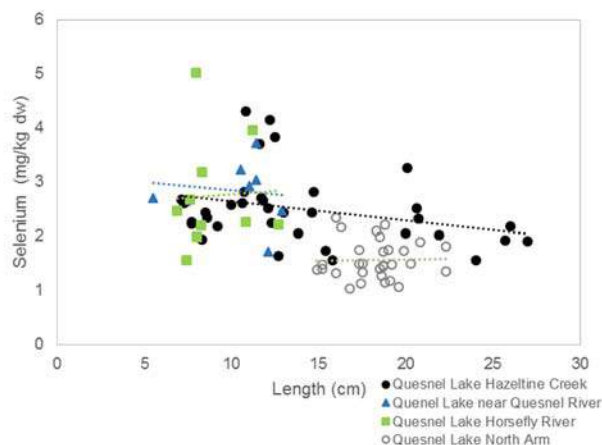
Northern Pikeminnow whole body was not collected in 2015.

Regression equations: **Quesnel Lake Hazeltine Creek (exposure) $y = 0.0041x + 0.0082$, $R^2 = 0.5595$; $P < 0.001$** ; **Quesnel Lake near Quesnel River (exposure) $y = -0.0048x + 0.0978$, $R^2 = 0.7500$, $P = 0.012$** ; Quesnel Lake Horsefly River (exposure) $y = -0.0027x + 0.0782$, $R^2 = 0.1769$, $P = 0.226$; **Quesnel Lake North Arm (reference) $y = 0.0035x + 0.0154$, $R^2 = 0.1913$, $P = 0.014$** .

mg/kg ww = milligrams per kilogram wet weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.

5.2 Selenium

Figure 18: Selenium Concentrations in Northern Pikeminnow Whole Body Tissue Collected in 2014 Relative to Fish Length



Northern Pikeminnow whole body was not collected in 2015.

Regression equations: **Quesnel Lake Hazeltine Creek (exposure) $y = -0.0350x + 2.9851$, $R^2 = 0.0947$; $P = 0.068$** ; Quesnel Lake near Quesnel River (exposure) $y = -0.0290x + 3.1352$, $R^2 = 0.0123$, $P = 0.813$; Quesnel Lake Horsefly River (exposure) $y = 0.0251x + 2.5260$, $R^2 = 0.0022$, $P = 0.898$; Quesnel Lake North Arm (reference) $y = 0.0050x + 1.4732$, $R^2 = 0.0007$, $P = 0.888$.

mg/kg dw = milligrams per kilogram dry weight; cm = centimetre.

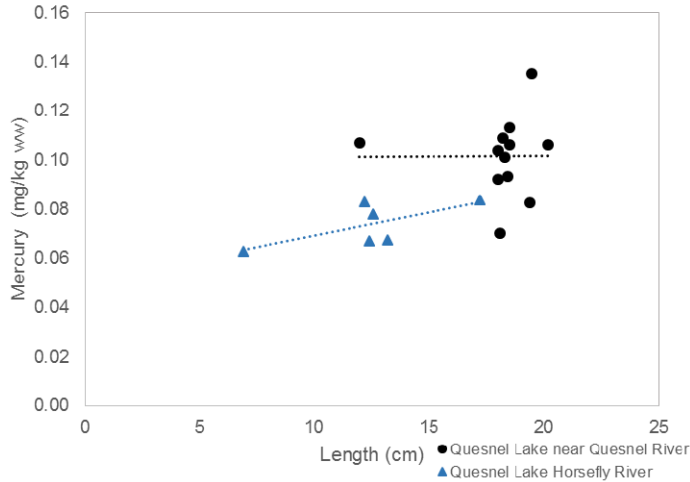
Note: One statistical outlier from Quesnel Lake North Arm was removed (i.e. standardized residual > 3); regression equations that are significant ($P < 0.1$) are bolded.



6.0 PEAMOUTH CHUB

6.1 Mercury

Figure 19: Mercury Concentrations in Peamouth Chub Whole Body Tissue Collected in 2014 Relative to Fish Length



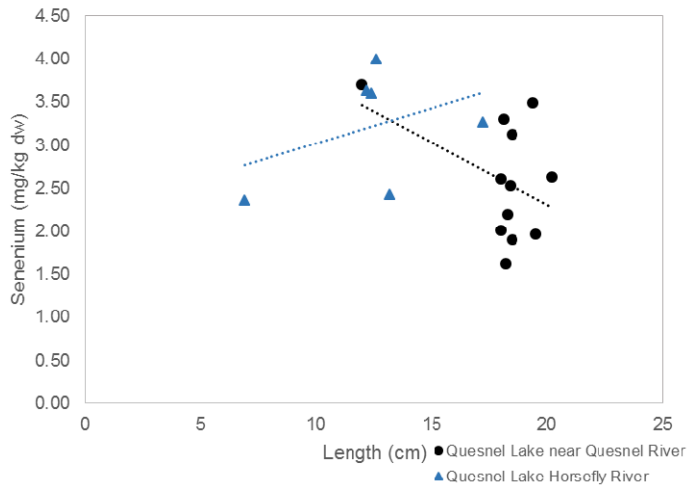
Insufficient data for 2015 Peamouth Chub (i.e., no lengths).

Regression equations: Quesnel Lake near Quesnel River (exposure) $y = 7E-05x + 0.1003$, $R^2 = <0.0001$, $P = 0.978$; Quesnel Lake Horsefly River (exposure) $y = 0.0019x + 0.0504$, $R^2 = 0.4739$, $P = 0.131$.

mg/kg ww = milligrams per kilogram wet weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.

6.2 Selenium

Figure 20: Selenium Concentrations in Peamouth Chub Collected from Quesnel Lake near Quesnel River in 2014 and 2015



Insufficient data for 2015 Peamouth Chub (i.e., no lengths).

Regression equations: Quesnel Lake near Quesnel River (exposure) $y = 0.0812x + 2.2082$, $R^2 = 0.1550$, $P = 0.440$; Quesnel Lake Horsefly River (exposure) $y = -0.1439x + 5.1930$, $R^2 = 0.1842$, $P = 0.164$.

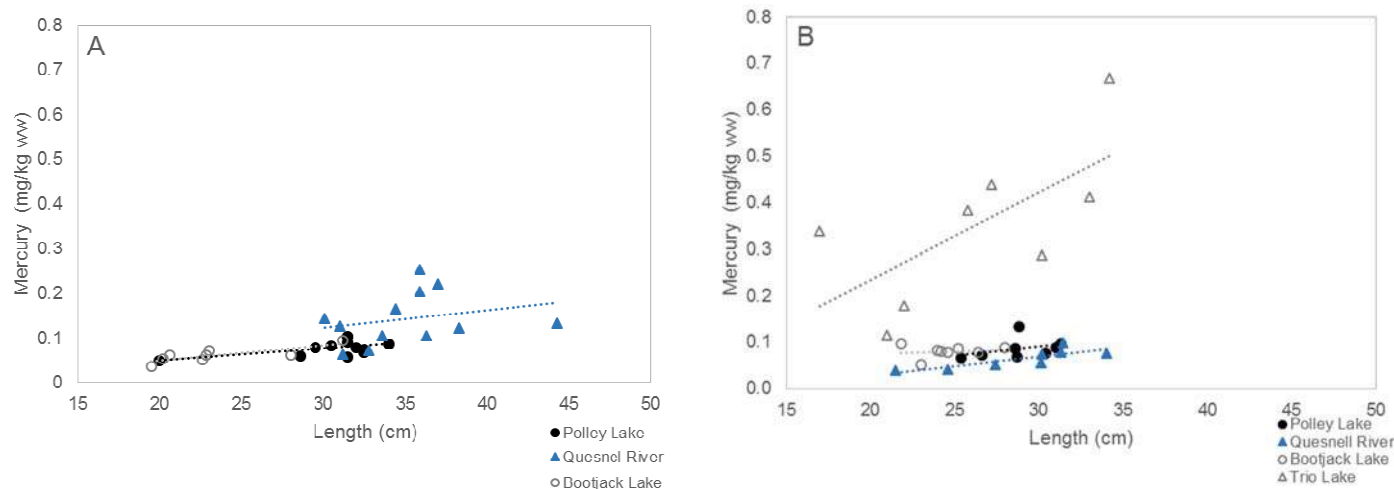
mg/kg dw = milligrams per kilogram dry weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.



7.0 RAINBOW TROUT

7.1 Mercury

Figure 21: Mercury Concentrations in Rainbow Trout Muscle Tissue Collected in (A) 2014 and (B) 2015 Relative to Fish Length

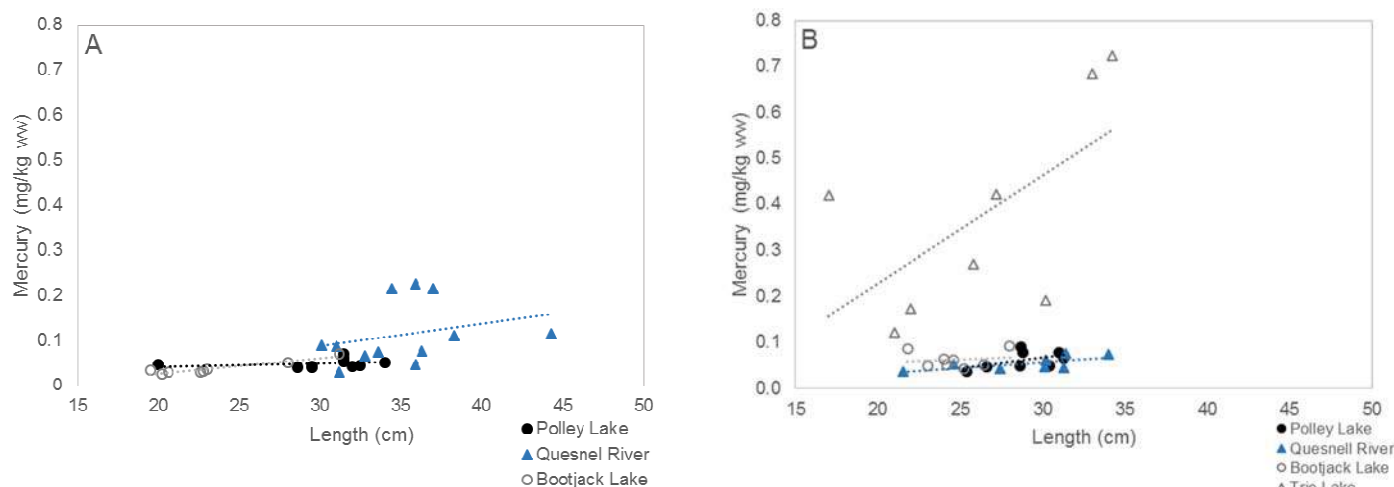


Regression equations: **(A) Polley Lake (exposure) $y = 0.0027x - 0.0054$, $R^2 = 0.3131$, $P = 0.047$** ; Quesnel River (exposure) $y = 0.0040x + 0.0034$, $R^2 = 0.0708$, $P = 0.403$; **Bootjack Lake (reference) $y = 0.0035x - 0.0202$, $R^2 = 0.6563$, $P = 0.015$** ; **(B) Polley Lake (exposure) $y = 0.0038x - 0.0235$, $R^2 = 0.1326$, $P = 0.375$** ; **Quesnel River (exposure) $y = 0.0042x - 0.0552$, $R^2 = 0.6627$, $P = 0.014$** ; Bootjack Lake (reference) $y = 0.0013x + 0.0492$, $R^2 = 0.0346$, $P = 0.659$; Trio Lake (reference) $y = 0.0234x - 0.2385$, $R^2 = 0.3790$, $P = 0.104$.

mg/kg ww = milligrams per kilogram wet weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.

Note: One statistical outlier from (A) Quesnel River was removed (i.e. standardized residual > 3).

Figure 22: Mercury Concentrations in Rainbow Trout Liver Tissue Collected in (A) 2014 and (B) 2015 Relative to Fish Length



Regression equations: **(A) Polley Lake (exposure) $y = 0.0008x + 0.0265$, $R^2 = 0.0879$, $P = 0.325$** ; Quesnel River (exposure) $y = 0.0050x - 0.0631$, $R^2 = 0.0811$, $P = 0.370$; **Bootjack Lake (reference) $y = 0.0034x - 0.0419$, $R^2 = 0.8936$, $P = < 0.001$** ; **(B) Polley Lake (exposure) $y = 0.0048x - 0.0750$, $R^2 = 0.2655$, $P = 0.191$** ; **Quesnel River (exposure) $y = 0.0025x - 0.0166$, $R^2 = 0.4741$, $P = 0.059$** ; Bootjack Lake (reference) $y = 0.0012x + 0.0320$, $R^2 = 0.0182$, $P = 0.750$; Trio Lake (reference) $y = 0.0027x + 0.0178$, $R^2 = 0.0264$, $P = 0.701$.

mg/kg ww = milligrams per kilogram wet weight; cm = centimetre.

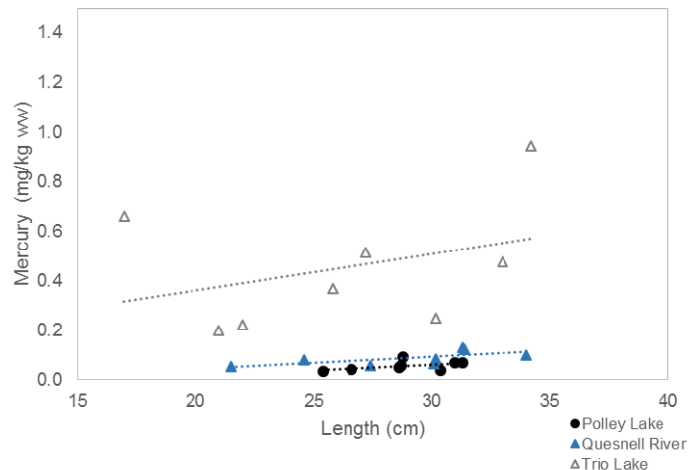
Note: One statistical outlier from (A) Polley Lake was removed (i.e. standardized residual > 3); regression equations that are significant ($P < 0.1$) are bolded.



ATTACHMENT 4 Fish Tissue Chemistry Regression Boxplots

Figure 23: Mercury Concentrations in Rainbow Trout Kidney Tissue Collected in 2015 Relative to Fish Length

Rainbow Trout kidney was not collected in 2014.

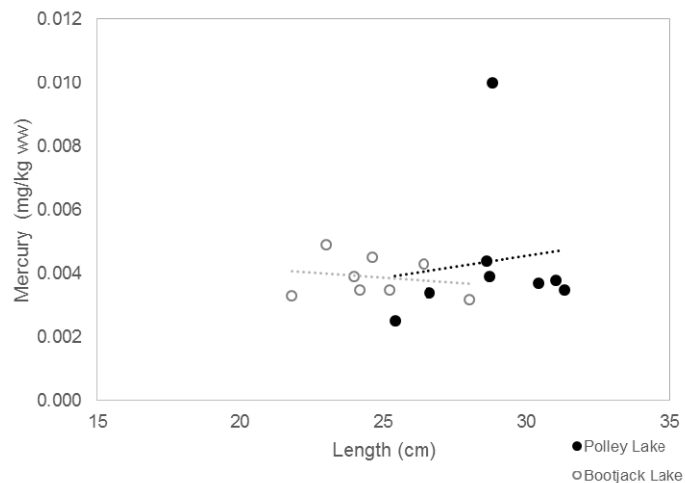


Regression equations: Polley Lake (exposure) $y = 0.0049x - 0.0837$, $R^2 = 0.2738$, $P = 0.183$; **Quesnell River (exposure) $y = 0.0048x - 0.0521$, $R^2 = 0.4540$, $P = 0.067$** ; Trio Lake (reference) $y = 0.0146x + 0.0696$, $R^2 = 0.1200$, $P = 0.401$.

mg/kg ww = milligrams per kilogram wet weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.

Figure 24: Mercury Concentrations in Rainbow Trout Ovary Tissue Collected in 2015 Relative to Fish Length

Sample size < 5 for Rainbow Trout ovary collected in 2014.



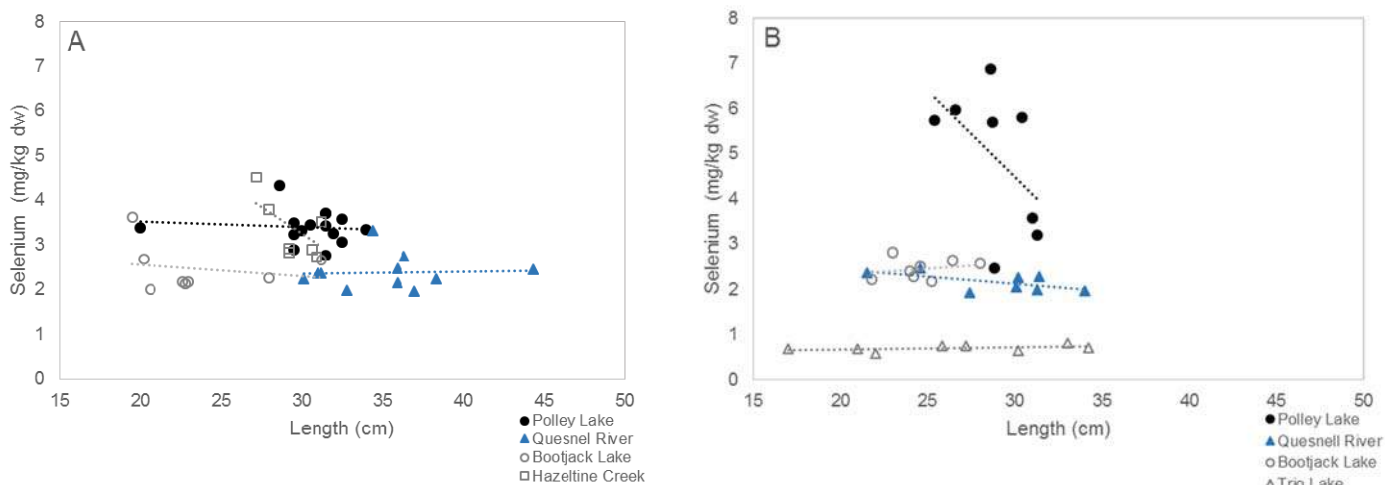
Regression equations: Polley Lake (exposure) $y = 0.0001x + 0.0005$, $R^2 = 0.0142$, $P = 0.779$; Bootjack Lake (reference) $y = -6E-05x + 0.0055$, $R^2 = 0.0391$, $P = 0.639$.

mg/kg ww = milligrams per kilogram wet weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.



7.2 Selenium

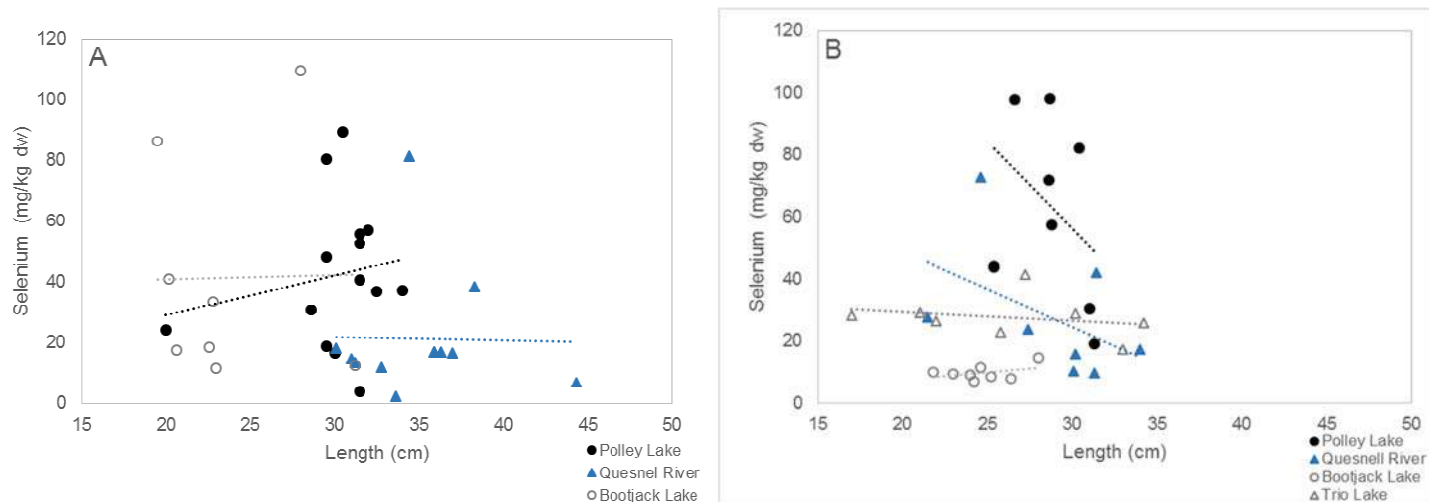
Figure 25: Selenium Concentrations in Rainbow Trout Muscle Tissue Collected in (A) 2014 and (B) 2015 Relative to Fish Length



Regression equations: **(A)** Polley Lake (exposure) $y = -0.0119x + 3.7628$, $R^2 = 0.0107$, $P = 0.714$; Quesnel River (exposure) $y = 0.0045x + 2.2334$, $R^2 = 0.0022$, $P = 0.890$; Bootjack Lake (reference) $y = -0.0241x + 3.0359$, $R^2 = 0.0344$, $P = 0.660$; **(B)** Polley Lake (exposure) $y = -0.3815x + 15.9216$, $R^2 = 0.2455$, $P = 0.212$; Quesnel River (exposure) $y = -0.0310x + 3.0620$, $R^2 = 0.3657$, $P = 0.112$; Bootjack Lake (reference) $y = 0.0282x + 1.7665$, $R^2 = 0.0616$, $P = 0.553$; Trio Lake (reference) $y = 0.0050x + 0.5735$, $R^2 = 0.2063$, $P = 0.258$.

mg/kg dw = milligrams per kilogram dry weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.

Figure 26: Selenium Concentrations in Rainbow Trout Liver Tissue Collected in (A) 2014 and (B) 2015 Relative to Fish Length



Regression equations: **(A)** Polley Lake (exposure) $y = 1.3235x - 2.4468$, $R^2 = 0.0326$, $P = 0.537$; Quesnel River (exposure) $y = -0.1013x + 24.8301$, $R^2 = 0.0004$, $P = 0.953$; Bootjack Lake (reference) $y = 0.1300x + 38.3498$, $R^2 = 0.0002$, $P = 0.973$; **(B)** Polley Lake (exposure) $y = -5.5811x + 223.6408$, $R^2 = 0.1498$, $P = 0.343$; Quesnel River (exposure) $y = -2.4281x + 97.4570$, $R^2 = 0.2201$, $P = 0.241$; Bootjack Lake (reference) $y = 0.5084x - 2.7753$, $R^2 = 0.1673$, $P = 0.314$; Trio Lake (reference) $y = -0.2888x + 35.2176$, $R^2 = 0.0649$, $P = 0.543$.

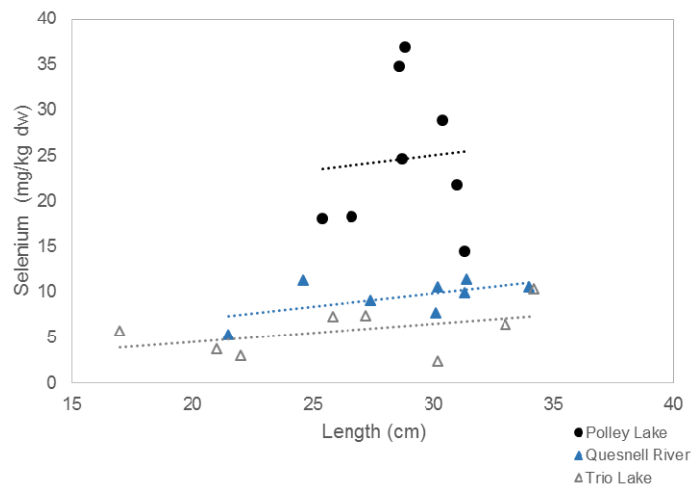
mg/kg dw = milligrams per kilogram dry weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.



ATTACHMENT 4 Fish Tissue Chemistry Regression Boxplots

Figure 27: Selenium Concentrations in Rainbow Trout Kidney Tissue Collected in 2015 Relative to Fish Length

Rainbow Trout kidney was not collected in 2014.

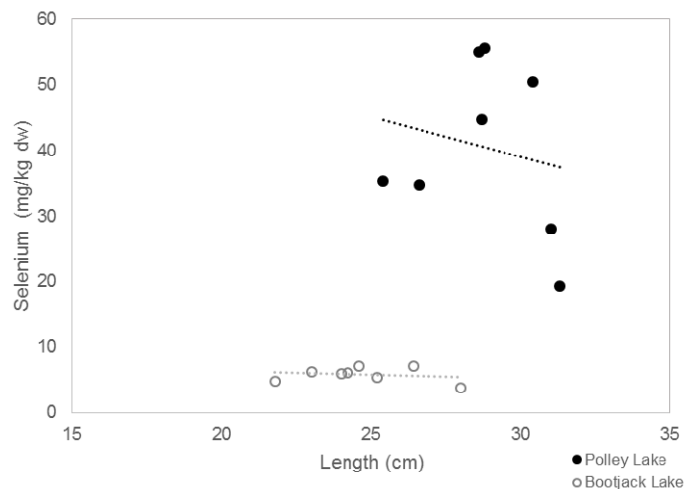


Regression equations: Polley Lake (exposure) $y = 0.3150x + 15.4823$, $R^2 = 0.0066$, $P = 0.848$; Quesnel River (exposure) $y = 0.2917x + 1.0800$, $R^2 = 0.3316$, $P = 0.135$; Trio Lake (reference) $y = 0.2000x + 0.5509$, $R^2 = 0.2090$, $P = 0.255$.

mg/kg dw = milligrams per kilogram dry weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.

Figure 28: Selenium Concentrations in Rainbow Trout Ovary Tissue Collected in 2015 Relative to Fish Length

Sample size < 5 for Rainbow Trout ovary collected in 2014.



Regression equations: Polley Lake (exposure) $y = -1.2396x + 76.1761$, $R^2 = 0.0378$, $P = 0.645$; Bootjack Lake (reference) $y = -0.1191x + 8.8001$, $R^2 = 0.0402$, $P = 0.634$.

mg/kg dw = milligrams per kilogram dry weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.



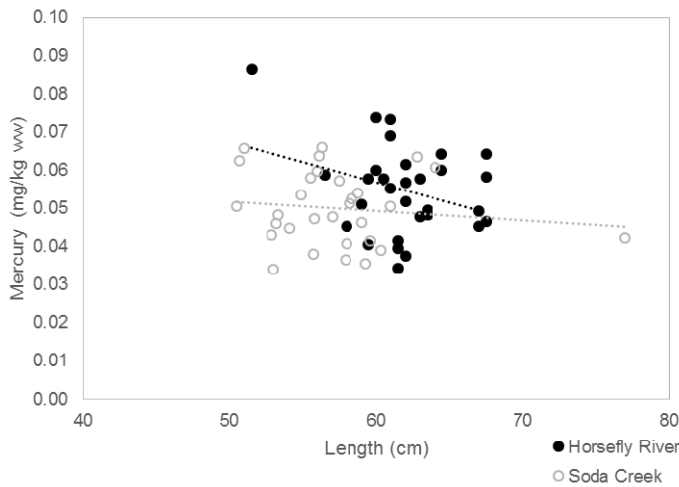
8.0 REDSIDE SHINER

Redside Shiner samples collected in 2014 had sample sizes < 5. Samples collected in 2015 did have a robust sample size, however length data was not available. Therefore, regressions could not be completed.

9.0 SOCKEYE SALMON ADULTS

9.1 Mercury

Figure 29: Mercury Concentrations in Sockeye Salmon Muscle Tissue Collected in 2014 Relative to Fish Length

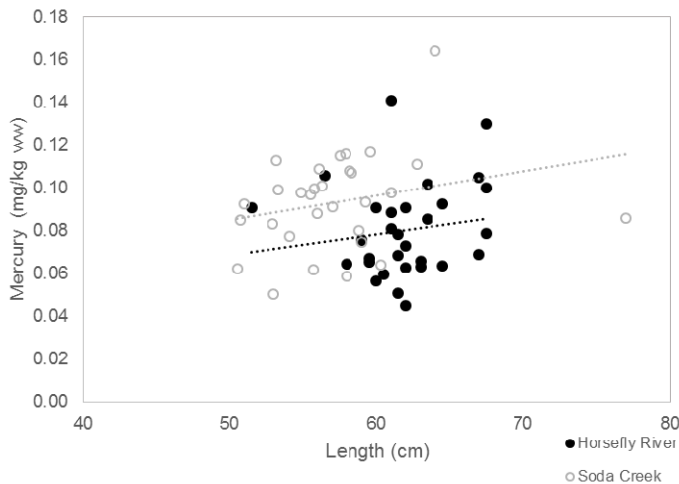


Sockeye Salmon were not collected in 2015.

Regression equations: **Horsefly River (exposure) $y = -0.0011x + 0.1200$, $R^2 = 0.0983$ $P = 0.092$** ; Soda Creek (reference) $y = -0.0002x + 0.0643$, $R^2 = 0.0173$, $P = 0.489$.

mg/kg ww = milligrams per kilogram wet weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.

Figure 30: Mercury Concentrations in Sockeye Salmon Liver Tissue Collected in 2014 Relative to Fish Length



Sockeye Salmon were not collected in 2015.

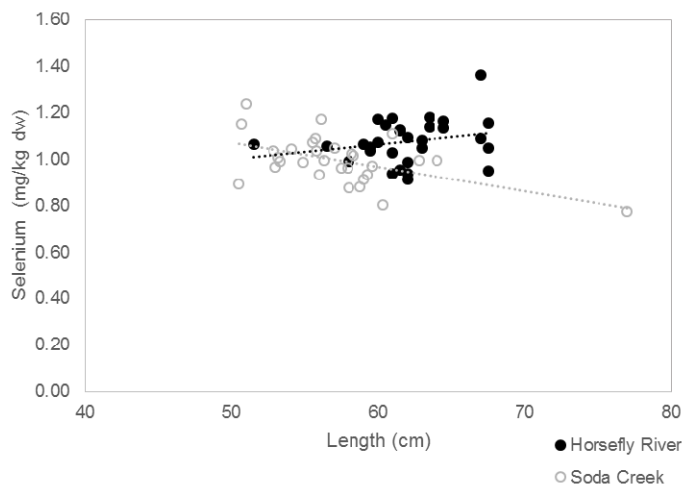
Regression equations: Horsefly River (exposure) $y = 0.0010x + 0.0194$, $R^2 = 0.0242$ $P = 0.412$; Soda Creek (reference) $y = 0.0011x + 0.0284$, $R^2 = 0.0628$, $P = 0.182$.

mg/kg ww = milligrams per kilogram wet weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.



9.2 Selenium

Figure 31: Selenium Concentrations in Sockeye Salmon Muscle Tissue Collected in 2014 Relative to Fish Length

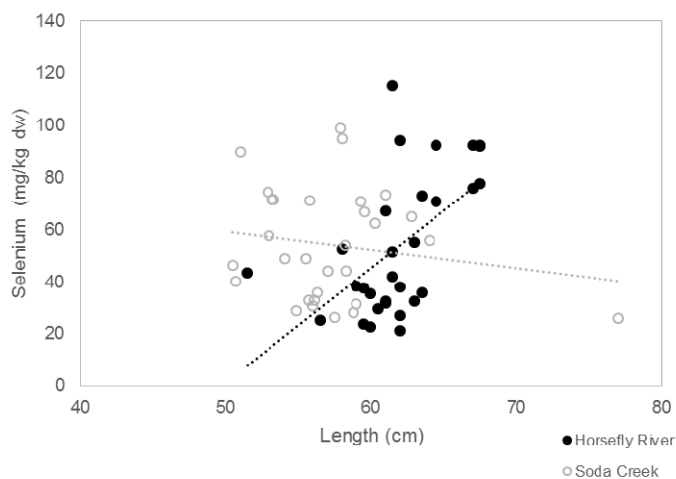


Sockeye Salmon were not collected in 2015.

Regression equations: Horsefly River (exposure) $y = 0.0064x + 0.6787$, $R^2 = 0.0561$ $P = 0.208$; **Soda Creek (reference) $y = -0.0105x + 1.5991$, $R^2 = 0.2747$, $P = 0.003$.**

mg/kg dw = milligrams per kilogram dry weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.

Figure 32: Selenium Concentrations in Sockeye Salmon Liver Tissue Collected in 2014 Relative to Fish Length



Sockeye Salmon were not collected in 2015.

Regression equations: **Horsefly River (exposure) $y = 4.4067x + 219.0123$, $R^2 = 0.3215$ $P = 0.001$** ; Soda Creek (reference) $y = -0.6943x + 93.8863$, $R^2 = 0.0273$, $P = 0.383$.

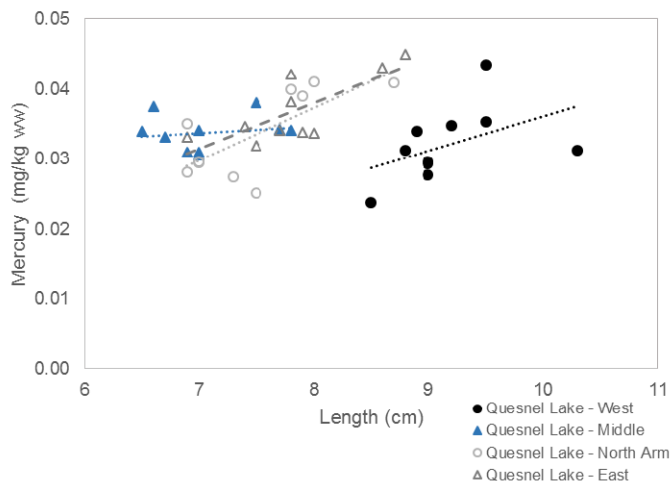
mg/kg dw = milligrams per kilogram dry weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.



10.0 SOCKEYE SALMON JUVENILE

10.1 Mercury

Figure 33: Mercury Concentrations in Sockeye Salmon Whole Body Tissue Collected in 2014 Relative to Fish Length



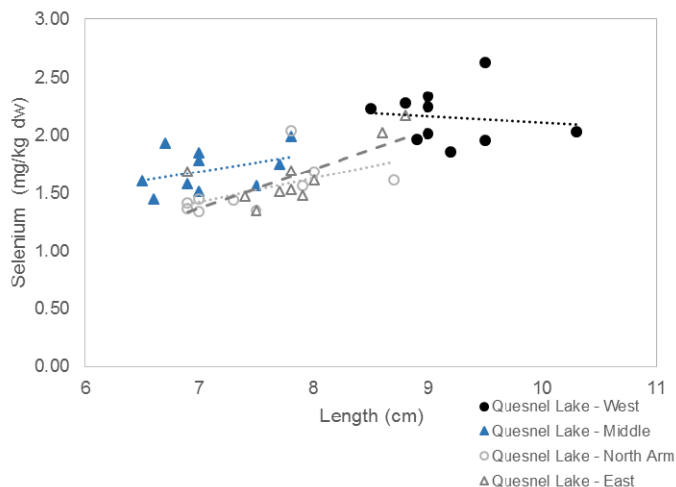
Sockeye Salmon were not collected in 2015.

Regression equations: Quesnel Lake - West (exposure) $y = 0.0049x - 0.0130$, $R^2 = 0.2129$, $P = 0.180$; Quesnel Lake - Middle (exposure) $y = 0.0009x + 0.0273$, $R^2 = 0.0256$, $P = 0.659$; **Quesnel Lake - North Arm (reference) $y = 0.0076x - 0.0233$, $R^2 = 0.5216$, $P = 0.018$** ; **Quesnel Lake - East (reference) $y = 0.0065x - 0.0143$, $R^2 = 0.5818$, $P = 0.010$** .

mg/kg ww = milligrams per kilogram wet weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.

10.2 Selenium

Figure 34: Selenium Concentrations in Sockeye Salmon Whole Body Tissue Collected in 2014 Relative to Fish Length



Sockeye Salmon were not collected in 2015.

Regression equations: Quesnel Lake - West (exposure) $y = -0.0532x + 2.6404$, $R^2 = 0.0131$, $P = 0.753$; Quesnel Lake - Middle (exposure) $y = 0.1589x + 0.5772$, $R^2 = 0.1494$, $P = 0.270$; **Quesnel Lake - North Arm (reference) $y = 0.2054x - 0.0145$, $R^2 = 0.3285$, $P = 0.083$** ; **Quesnel Lake - East (reference) $y = 0.3377x - 0.9939$, $R^2 = 0.5316$, $P = 0.017$** .

mg/kg dw = milligrams per kilogram dry weight; cm = centimetre; regression equations that are significant ($P < 0.1$) are bolded.

ATTACHMENT 5
LABORATORY DATA FILES



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC V0L 1N0

Date Received: 11-JUN-14
Report Date: 11-SEP-14 12:55 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1468984
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: 1, 2
Legal Site Desc:

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1468984-1 Tissue 21-MAY-14 W7-RBT-1 OVARY	L1468984-2 Tissue 21-MAY-14 W7-RBT-2 OVARY	L1468984-3 Tissue 21-MAY-14 W7-RBT-3 OVARY	L1468984-4 Tissue 21-MAY-14 W7-RBT-4 OVARY	L1468984-5 Tissue 21-MAY-14 W7-RBT-5 OVARY
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	61.7	91.4	67.1	68.0	68.5
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<5.0	<5.0	<5.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	0.49	<1.0	<1.0	<1.0	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.022	<0.030	<0.030	<0.030	<0.020
	Arsenic (As)-Total (mg/kg wwt)	0.0085	<0.0060	<0.0060	0.0070	0.0057
	Barium (Ba)-Total (mg/kg)	0.126	0.099	0.099	0.106	0.130
	Barium (Ba)-Total (mg/kg wwt)	0.048	<0.010	0.033	0.034	0.041
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	<0.010	<0.010	<0.010	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	0.0018	<0.0020	<0.0020	<0.0020	<0.0010
	Calcium (Ca)-Total (mg/kg)	1310	1960	1170	1350	1180
	Calcium (Ca)-Total (mg/kg wwt)	503	170	387	431	372
	Cesium (Cs)-Total (mg/kg)	<0.0050	<0.0050	0.0058	<0.0050	0.0062
	Cesium (Cs)-Total (mg/kg wwt)	0.0018	<0.0010	0.0019	0.0015	0.0019
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.20	<0.20	<0.20	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.040	<0.040	<0.040	<0.010
	Cobalt (Co)-Total (mg/kg)	0.066	0.137	0.072	0.075	0.101
	Cobalt (Co)-Total (mg/kg wwt)	0.0254	0.0119	0.0239	0.0241	0.0318
	Copper (Cu)-Total (mg/kg)	8.61	6.78	7.03	5.04	5.80
	Copper (Cu)-Total (mg/kg wwt)	3.29	0.586	2.32	1.62	1.83
	Iron (Fe)-Total (mg/kg)	43.4	84.8	39.5	40.2	61.3
	Iron (Fe)-Total (mg/kg wwt)	16.6	7.3	13.0	12.9	19.3
	Lead (Pb)-Total (mg/kg)	0.026	<0.050	<0.050	<0.050	<0.020
	Lead (Pb)-Total (mg/kg wwt)	0.0099	<0.010	<0.010	<0.010	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1560	309	1290	1290	1550
	Magnesium (Mg)-Total (mg/kg wwt)	598	26.7	426	414	489
	Manganese (Mn)-Total (mg/kg)	4.46	0.776	5.18	2.51	3.79
	Manganese (Mn)-Total (mg/kg wwt)	1.71	0.067	1.71	0.806	1.20

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1468984-6 Tissue 21-MAY-14 W7-RBT-6 OVARY	L1468984-7 Tissue 21-MAY-14 W7-RBT-7 OVARY	L1468984-8 Tissue 21-MAY-14 W7-RBT-8 OVARY	L1468984-9 Tissue 21-MAY-14 W7-RBT-1X OVARY	L1468984-10 Tissue 21-MAY-14 W7-RBT-2A OVARY
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	62.5	59.7	68.2	61.8	70.1
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	<2.0	<5.0	<2.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	<0.40	<1.0	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	<0.030	<0.020	<0.030	0.020	<0.020
	Arsenic (As)-Total (mg/kg wwt)	0.0077	0.0063	0.0076	0.0078	0.0043
	Barium (Ba)-Total (mg/kg)	0.088	0.106	0.142	0.113	0.124
	Barium (Ba)-Total (mg/kg wwt)	0.033	0.043	0.045	0.043	0.037
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.010	<0.0050	<0.010	<0.0050	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0020	<0.0010	<0.0030 ^{DLB}	0.0015	<0.0010
	Calcium (Ca)-Total (mg/kg)	1430	1200	1330	1260	1180
	Calcium (Ca)-Total (mg/kg wwt)	535	485	423	482	352
	Cesium (Cs)-Total (mg/kg)	0.0056	<0.0050	<0.0050	<0.0050	0.0060
	Cesium (Cs)-Total (mg/kg wwt)	0.0021	0.0018	0.0014	0.0017	0.0018
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.050	<0.20	<0.050	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	<0.010	<0.040	<0.010	<0.010
	Cobalt (Co)-Total (mg/kg)	0.081	0.064	0.096	0.063	0.132
	Cobalt (Co)-Total (mg/kg wwt)	0.0305	0.0258	0.0305	0.0239	0.0393
	Copper (Cu)-Total (mg/kg)	8.96	7.18	7.00	8.43	6.60
	Copper (Cu)-Total (mg/kg wwt)	3.36	2.90	2.23	3.22	1.97
	Iron (Fe)-Total (mg/kg)	44.4	41.7	46.6	41.6	47.7
	Iron (Fe)-Total (mg/kg wwt)	16.6	16.8	14.8	15.9	14.3
	Lead (Pb)-Total (mg/kg)	<0.050	<0.020	<0.050	0.028	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.0040	<0.010	0.0108	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1510	1440	1480	1510	1630
	Magnesium (Mg)-Total (mg/kg wwt)	567	579	469	579	488
	Manganese (Mn)-Total (mg/kg)	7.91	4.37	5.29	4.28	2.84
	Manganese (Mn)-Total (mg/kg wwt)	2.97	1.76	1.68	1.63	0.850

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID Description Sampled Date Sampled Time Client ID	L1468984-11 Tissue 21-MAY-14 W7-RBT-1 TISSUE	L1468984-12 Tissue 21-MAY-14 W7-RBT-2 TISSUE	L1468984-13 Tissue 21-MAY-14 W7-RBT-3 TISSUE	L1468984-14 Tissue 21-MAY-14 W7-RBT-4 TISSUE	L1468984-15 Tissue 21-MAY-14 W7-RBT-5 TISSUE
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)	78.6	83.7	78.4	78.2	81.4	
Metals	Aluminum (Al)-Total (mg/kg)	3.2	3.7	2.8	2.0	3.4	
	Aluminum (Al)-Total (mg/kg wwt)	0.68	0.60	0.61	0.44	0.63	
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010	
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Arsenic (As)-Total (mg/kg)	0.054	0.037	0.051	0.068	0.065	
	Arsenic (As)-Total (mg/kg wwt)	0.0115	0.0060	0.0111	0.0148	0.0120	
	Barium (Ba)-Total (mg/kg)	0.150	0.268	0.160	0.140	0.164	
	Barium (Ba)-Total (mg/kg wwt)	0.032	0.044	0.035	0.030	0.030	
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010	
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010	
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0	
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Cadmium (Cd)-Total (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
	Calcium (Ca)-Total (mg/kg)	3760	6240	3230	3110	3830	
	Calcium (Ca)-Total (mg/kg wwt)	805	1020	700	677	713	
	Cesium (Cs)-Total (mg/kg)	0.0187	0.0260	0.0193	0.0188	0.0219	
	Cesium (Cs)-Total (mg/kg wwt)	0.0040	0.0042	0.0042	0.0041	0.0041	
	Chromium (Cr)-Total (mg/kg)	0.522	0.719	0.566	0.693	0.711	
	Chromium (Cr)-Total (mg/kg wwt)	0.112	0.117	0.123	0.151	0.132	
	Cobalt (Co)-Total (mg/kg)	0.037	0.040	0.031	0.032	0.029	
	Cobalt (Co)-Total (mg/kg wwt)	0.0079	0.0065	0.0067	0.0071	0.0054	
	Copper (Cu)-Total (mg/kg)	2.72	2.40	2.28	2.36	2.54	
	Copper (Cu)-Total (mg/kg wwt)	0.583	0.391	0.494	0.514	0.472	
	Iron (Fe)-Total (mg/kg)	31.6	53.8	30.0	31.3	36.8	
	Iron (Fe)-Total (mg/kg wwt)	6.76	8.77	6.49	6.81	6.85	
	Lead (Pb)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50	
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Magnesium (Mg)-Total (mg/kg)	1230	1310	1230	1230	1450	
	Magnesium (Mg)-Total (mg/kg wwt)	262	213	267	268	270	
	Manganese (Mn)-Total (mg/kg)	1.28	1.85	1.27	1.11	1.28	
	Manganese (Mn)-Total (mg/kg wwt)	0.274	0.301	0.275	0.241	0.239	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID Description Sampled Date Sampled Time Client ID	L1468984-16 Tissue 21-MAY-14 W7-RBT-6 TISSUE	L1468984-17 Tissue 21-MAY-14 W7-RBT-7 TISSUE	L1468984-18 Tissue 21-MAY-14 W7-RBT-8 TISSUE	L1468984-19 Tissue 21-MAY-14 W7-RBT-1X TISSUE
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)		79.3	76.5	79.6	79.0
Metals	Aluminum (Al)-Total (mg/kg)		4.3	<2.0	2.4	<2.0
	Aluminum (Al)-Total (mg/kg wwt)		0.90	<0.40	0.50	<0.40
	Antimony (Sb)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)		0.053	0.059	0.078	0.054
	Arsenic (As)-Total (mg/kg wwt)		0.0110	0.0139	0.0160	0.0114
	Barium (Ba)-Total (mg/kg)		0.167	0.124	0.167	0.167
	Barium (Ba)-Total (mg/kg wwt)		0.035	0.029	0.034	0.035
	Beryllium (Be)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)		<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)		<0.0050	<0.0050	<0.0050	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)		<0.0010	<0.0010	<0.0010	<0.0010
	Calcium (Ca)-Total (mg/kg)		3870	2850	3050	3750
	Calcium (Ca)-Total (mg/kg wwt)		803	669	624	788
	Cesium (Cs)-Total (mg/kg)		0.0201	0.0133	0.0202	0.0202
	Cesium (Cs)-Total (mg/kg wwt)		0.0042	0.0031	0.0041	0.0042
	Chromium (Cr)-Total (mg/kg)		0.716	0.268	0.857	0.343
	Chromium (Cr)-Total (mg/kg wwt)		0.148	0.063	0.175	0.072
	Cobalt (Co)-Total (mg/kg)		0.029	0.026	0.039	0.022
	Cobalt (Co)-Total (mg/kg wwt)		0.0059	0.0060	0.0080	0.0046
	Copper (Cu)-Total (mg/kg)		2.58	2.59	2.00	2.57
	Copper (Cu)-Total (mg/kg wwt)		0.535	0.608	0.408	0.540
	Iron (Fe)-Total (mg/kg)		38.9	25.7	46.2	26.2
	Iron (Fe)-Total (mg/kg wwt)		8.06	6.05	9.45	5.51
	Lead (Pb)-Total (mg/kg)		<0.020	<0.020	<0.020	<0.020
	Lead (Pb)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg)		<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)		1290	1180	1220	1300
	Magnesium (Mg)-Total (mg/kg wwt)		268	277	250	273
	Manganese (Mn)-Total (mg/kg)		1.26	1.11	1.37	1.20
	Manganese (Mn)-Total (mg/kg wwt)		0.260	0.262	0.280	0.251

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

11-SEP-14 12:55 (MT)

Version: FINAL

Sample ID Description Sampled Date Sampled Time Client ID		L1468984-1 Tissue 21-MAY-14 W7-RBT-1 OVARY	L1468984-2 Tissue 21-MAY-14 W7-RBT-2 OVARY	L1468984-3 Tissue 21-MAY-14 W7-RBT-3 OVARY	L1468984-4 Tissue 21-MAY-14 W7-RBT-4 OVARY	L1468984-5 Tissue 21-MAY-14 W7-RBT-5 OVARY
Grouping	Analyte					
TISSUE						
Metals	Molybdenum (Mo)-Total (mg/kg)	0.024	<0.040	<0.040	<0.040	0.032
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0092	<0.0080	0.0084	<0.0080	0.0100
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	12200	3180	10500	10200	12200
	Phosphorus (P)-Total (mg/kg wwt)	4670	274	3450	3270	3850
	Potassium (K)-Total (mg/kg)	8470	1700	7760	7530	8240
	Potassium (K)-Total (mg/kg wwt)	3240	147	2560	2410	2600
	Rubidium (Rb)-Total (mg/kg)	2.76	0.508	2.83	2.59	3.40
	Rubidium (Rb)-Total (mg/kg wwt)	1.06	0.044	0.932	0.830	1.07
	Selenium (Se)-Total (mg/kg)	6.70	2.97	6.00	5.48	5.97
	Selenium (Se)-Total (mg/kg wwt)	2.56	0.256	1.98	1.76	1.88
	Sodium (Na)-Total (mg/kg)	2170	35400	4460	4630	3450
	Sodium (Na)-Total (mg/kg wwt)	830	3050	1470	1480	1090
	Strontium (Sr)-Total (mg/kg)	3.17	3.10	3.48	3.62	3.53
	Strontium (Sr)-Total (mg/kg wwt)	1.21	0.268	1.15	1.16	1.11
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Thallium (Tl)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	78.1	67.2	54.8	66.7	65.7
	Zinc (Zn)-Total (mg/kg wwt)	29.9	5.80	18.0	21.4	20.7
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1468984-6 Tissue 21-MAY-14 W7-RBT-6 OVARY	L1468984-7 Tissue 21-MAY-14 W7-RBT-7 OVARY	L1468984-8 Tissue 21-MAY-14 W7-RBT-8 OVARY	L1468984-9 Tissue 21-MAY-14 W7-RBT-1X OVARY	L1468984-10 Tissue 21-MAY-14 W7-RBT-2A OVARY
Grouping	Analyte					
TISSUE						
Metals	Molybdenum (Mo)-Total (mg/kg)	<0.040	0.031	<0.040	0.022	0.031
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0080	0.0124	<0.0080	0.0085	0.0092
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	0.048	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	10800	11000	11400	11900	11400
	Phosphorus (P)-Total (mg/kg wwt)	4060	4450	3610	4560	3410
	Potassium (K)-Total (mg/kg)	7330	6970	7880	8290	7650
	Potassium (K)-Total (mg/kg wwt)	2750	2810	2510	3170	2290
	Rubidium (Rb)-Total (mg/kg)	2.79	1.77	2.27	2.66	3.12
	Rubidium (Rb)-Total (mg/kg wwt)	1.05	0.713	0.723	1.02	0.933
	Selenium (Se)-Total (mg/kg)	6.36	7.01	5.61	6.28	7.45
	Selenium (Se)-Total (mg/kg wwt)	2.38	2.83	1.78	2.40	2.23
	Sodium (Na)-Total (mg/kg)	2530	1520	2210	2100	3450
	Sodium (Na)-Total (mg/kg wwt)	949	614	702	801	1030
	Strontium (Sr)-Total (mg/kg)	3.18	3.03	4.55	3.01	3.50
	Strontium (Sr)-Total (mg/kg wwt)	1.19	1.22	1.45	1.15	1.05
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Thallium (Tl)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	71.6	63.7	54.0	76.4	62.3
	Zinc (Zn)-Total (mg/kg wwt)	26.8	25.7	17.2	29.2	18.6
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID Description Sampled Date Sampled Time Client ID	L1468984-11 Tissue 21-MAY-14 W7-RBT-1 TISSUE	L1468984-12 Tissue 21-MAY-14 W7-RBT-2 TISSUE	L1468984-13 Tissue 21-MAY-14 W7-RBT-3 TISSUE	L1468984-14 Tissue 21-MAY-14 W7-RBT-4 TISSUE	L1468984-15 Tissue 21-MAY-14 W7-RBT-5 TISSUE
Grouping	Analyte						
TISSUE							
Metals	Molybdenum (Mo)-Total (mg/kg)	0.050	0.058	0.062	0.072	0.084	
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0107	0.0095	0.0135	0.0157	0.0156	
	Nickel (Ni)-Total (mg/kg)	0.22	0.26	0.27	0.29	0.31	
	Nickel (Ni)-Total (mg/kg wwt)	0.047	0.043	0.058	0.063	0.058	
	Phosphorus (P)-Total (mg/kg)	12600	16100	13300	13200	14400	
	Phosphorus (P)-Total (mg/kg wwt)	2700	2620	2890	2870	2680	
	Potassium (K)-Total (mg/kg)	19100	22700	19600	19500	22700	
	Potassium (K)-Total (mg/kg wwt)	4080	3700	4250	4240	4230	
	Rubidium (Rb)-Total (mg/kg)	5.30	7.78	6.27	6.48	7.73	
	Rubidium (Rb)-Total (mg/kg wwt)	1.13	1.27	1.36	1.41	1.44	
	Selenium (Se)-Total (mg/kg)	2.73	3.51	4.50	2.84	3.51	
	Selenium (Se)-Total (mg/kg wwt)	0.583	0.572	0.975	0.618	0.653	
	Sodium (Na)-Total (mg/kg)	2480	2690	1990	2350	2520	
	Sodium (Na)-Total (mg/kg wwt)	531	438	430	512	469	
	Strontium (Sr)-Total (mg/kg)	5.46	9.58	5.14	4.81	6.18	
	Strontium (Sr)-Total (mg/kg wwt)	1.17	1.56	1.11	1.05	1.15	
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg)	0.0053	0.0081	0.0060	0.0071	0.0064	
	Thallium (Tl)-Total (mg/kg wwt)	0.00114	0.00132	0.00130	0.00155	0.00120	
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Zinc (Zn)-Total (mg/kg)	51.3	105	46.1	40.8	59.2	
	Zinc (Zn)-Total (mg/kg wwt)	11.0	17.2	9.98	8.88	11.0	
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID Description Sampled Date Sampled Time Client ID	L1468984-16 Tissue 21-MAY-14 W7-RBT-6 TISSUE	L1468984-17 Tissue 21-MAY-14 W7-RBT-7 TISSUE	L1468984-18 Tissue 21-MAY-14 W7-RBT-8 TISSUE	L1468984-19 Tissue 21-MAY-14 W7-RBT-1X TISSUE
Grouping	Analyte					
TISSUE						
Metals	Molybdenum (Mo)-Total (mg/kg)	0.061	0.031	0.025	0.027	
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0127	0.0073	0.0051	0.0057	
	Nickel (Ni)-Total (mg/kg)	0.27	<0.20	<0.20	<0.20	
	Nickel (Ni)-Total (mg/kg wwt)	0.057	<0.040	<0.040	<0.040	
	Phosphorus (P)-Total (mg/kg)	13900	12900	12900	13600	
	Phosphorus (P)-Total (mg/kg wwt)	2880	3030	2630	2850	
	Potassium (K)-Total (mg/kg)	20600	19100	19200	20800	
	Potassium (K)-Total (mg/kg wwt)	4260	4500	3920	4360	
	Rubidium (Rb)-Total (mg/kg)	6.74	4.02	5.32	5.58	
	Rubidium (Rb)-Total (mg/kg wwt)	1.40	0.944	1.09	1.17	
	Selenium (Se)-Total (mg/kg)	3.79	2.93	2.91	2.89	
	Selenium (Se)-Total (mg/kg wwt)	0.785	0.689	0.594	0.607	
	Sodium (Na)-Total (mg/kg)	2180	2010	2040	2370	
	Sodium (Na)-Total (mg/kg wwt)	452	472	418	497	
	Strontium (Sr)-Total (mg/kg)	5.62	4.13	5.09	5.54	
	Strontium (Sr)-Total (mg/kg wwt)	1.16	0.971	1.04	1.16	
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg)	0.0065	0.0054	0.0062	0.0057	
	Thallium (Tl)-Total (mg/kg wwt)	0.00135	0.00128	0.00126	0.00119	
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	
	Zinc (Zn)-Total (mg/kg)	48.7	45.0	65.1	56.2	
	Zinc (Zn)-Total (mg/kg wwt)	10.1	10.6	13.3	11.8	
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Cadmium (Cd)-Total	DLB	L1468984-2, -3, -4, -6, -8

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLB	Detection Limit was raised due to detection of analyte at comparable level in Method Blank.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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MET-DRY-CCMS-VA Tissue Metals in Tissue by CRC ICPMS (DRY) EPA 200.3/6020A
 This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MET-DRY-MICR-HRMS-VA Tissue Metals in Tissue by HR-ICPMS Micro (DRY) EPA 200.3/200.8
 Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MET-WET-CCMS-VA Tissue Metals in Tissue by CRC ICPMS (WET) EPA 200.3/6020A
 This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MET-WET-MICR-HRMS-VA Tissue Metals in Tissue by HR-ICPMS Micro (WET) EPA 200.3/200.8
 Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on wet weight basis.

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MOISTURE-TISS-VA Tissue % Moisture in Tissues ASTM D2974-00 Method A
 This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

1	2
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Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Environmental Division

Report to:		<input type="checkbox"/> Standard <input checked="checked" type="checkbox"/> Report Format / Distribution			<input checked="checked" type="radio"/> Regular (Default)		Service Requested: (rush - subject to availability)												
Company: MOUNT POLLEY MINING CORP.		<input checked="checked" type="checkbox"/> PDF <input checked="checked" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-3 Business Days) 50% Surcharge														
Contact: Colleen Hughes					<input type="radio"/> Emergency (1 Business Day) 100% surcharge														
Address: PO BOX 12, Likely, BC, VOL 1N0		Email 1: on file			<input type="radio"/> For-Emergency - 1 Day, ASP or Weekend - Contact ALS														
Phone: 250-790-2215 Fax:		Email 2: pstecko@minnow-environmental.com			Analysis Request														
Invoice To: Same as Report?		Client / Project Information:			Please indicate below Filtered, Preserved or both (F, P, F/P)										Number of Containers				
Company:		Job #:																	
Contact:		PO / APE:																	
Address:		Legal Site Description:																	
Phone: Fax:		Quote #:																	
Lab Work Order # (lab use only)		ALS Contact: Can Dang		Sampler: Colleen Hughes															
L1468984																			
Sample #	Sample Identification	Date (dd-mm-yy)	Time (hr:mm)	Sample Type	Moisture	T-Se (IR ICP-MS) (Wet & D)													
(This description will appear on the report)																			
W7-RBT-1 Ovary	Short Holding Time Rush Processing	21-May-14		Tissue	X	X								1					
W7-RBT-2 Ovary		21-May-14		Tissue	X	X								1					
W7-RBT-3 Ovary		21-May-14		Tissue	X	X								1					
W7-RBT-4 Ovary		21-May-14		Tissue	X	X								1					
W7-RBT-5 Ovary		21-May-14		Tissue	X	X								1					
W7-RBT-6 Ovary		21-May-14		Tissue	X	X								1					
W7-RBT-7 Ovary		21-May-14		Tissue	X	X								1					
W7-RBT-8 Ovary		21-May-14		Tissue	X	X								1					
W7-RBT-1X Ovary		21-May-14		Tissue	X	X								1					
W7-RBT-2a Ovary		21-May-14		Tissue	X	X								1					
W7-RBT-1 Tissue		21-May-14		Tissue	X	X								1					
W7-RBT-2 Tissue		21-May-14		Tissue	X	X								1					
Special Instructions / Regulations / Hazardous Details																			
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.																			
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.																			
SHIPMENT RELEASE (client use)					SHIPMENT RECEPTION (lab use only)					SHIPMENT VERIFICATION (lab use only)									
Released by: Norm Zumbelt		Date & Time: 1600hrs June 5/14		Received by: JK		Date: Jun 11		Time: 9:12		Temperature: 2.6		Verified by:		Date & Time:		Observations: Yes / No? If Yes attach SIF			



Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Colleen Hughes	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
Phone: 250-790-2215 Fax:	Email 2:	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Analysis Request	
Company:	Job #:	Please indicate below Filtered, Preserved or both (F, P, F/P)	
Contact:	PO / AFE:	Moisture	T-Se (HRICP-MIS)(Wet & Dry)
Address:	Legal Site Description:		
Phone:	Quote #:		

Lab Work Order # (lab use only)	ALS Contact: Can Dang	Sampler: Colleen Hughes
---------------------------------	-----------------------	-------------------------

Sample #	Sample Identification (This description will)	Date (dd-mmm-yy)	Time (hr:mm)	Sample Type	Moisture	T-Se (HRICP-MIS)(Wet & Dry)	Number of Containers
	W7-RBT-3 Tissue	21-May-14		Tissue	X	X	1
	W7-RBT-4 Tissue	21-May-14		Tissue	X	X	1
	W7-RBT-5 Tissue	21-May-14		Tissue	X	X	1
	W7-RBT-6 Tissue	21-May-14		Tissue	X	X	1
	W7-RBT-7 Tissue	21-May-14		Tissue	X	X	1
	W7-RBT-8 Tissue	21-May-14		Tissue	X	X	1
	W7-RBT-1X Tissue	21-May-14		Tissue	X	X	1

Short Holding Time
Rush Processing



Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)			
Released by: Norm Zumbelt	Date & Time: 1600hrs June 5/14	Received by: JK	Date: June 11	Time: 9:12	Temperature: 2.6	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF



MOUNT POLLEY MINING CORP.
ATTN: Jack Love
PO Box 12
Likely BC V0L 1N0

Date Received: 21-AUG-14
Report Date: 16-OCT-14 11:06 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1506160
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: 1, 2
Legal Site Desc:

Comments: Please see the attached document for the total weights of Liver and Gonad samples.

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1506160-1	L1506160-2	L1506160-3	L1506160-4	L1506160-5
		Description	Fish	Fish	Fish	Fish	Fish
		Sampled Date	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14
		Sampled Time	11:00	11:00	11:00	11:00	11:00
		Client ID	SK-1 TAG#02567 MUSCLE	SK-2 TAG#02566 MUSCLE	SK-3 TAG#02565 MUSCLE	SK-4 TAG#02564 MUSCLE	SK-5 TAG#02563 MUSCLE
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)	71.3	71.8	69.7	73.5	75.3	
Metals	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<0.40	<0.40	<0.40	<0.40	
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Arsenic (As)-Total (mg/kg wwt)	0.687	0.457	0.807	0.299	0.318	
	Barium (Ba)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010	
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Cadmium (Cd)-Total (mg/kg wwt)	0.0075	0.0044	0.0084	0.0040	0.0040	
	Calcium (Ca)-Total (mg/kg wwt)	70.9	67.3	68.0	77.8	60.4	
	Cesium (Cs)-Total (mg/kg wwt)	0.0178	0.0204	0.0198	0.0193	0.0258	
	Chromium (Cr)-Total (mg/kg wwt)	0.016	<0.010	0.017	0.016	<0.010	
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040	0.0062	0.0074	0.0046	0.0058	
	Copper (Cu)-Total (mg/kg wwt)	0.537	0.946	1.11	0.699	1.00	
	Iron (Fe)-Total (mg/kg wwt)	4.26	6.91	7.85	5.09	7.32	
	Lead (Pb)-Total (mg/kg wwt)	0.0369	0.0672	0.0140	<0.0040	<0.0040	
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Magnesium (Mg)-Total (mg/kg wwt)	282	270	299	264	261	
	Manganese (Mn)-Total (mg/kg wwt)	0.065	0.090	0.086	0.073	0.092	
	Mercury (Hg)-Total (mg/kg wwt)	0.0463	0.0477	0.0341	0.0506	0.0472	
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.0050	0.0061	0.0051	0.0051	
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	
	Phosphorus (P)-Total (mg/kg wwt)	2670	2570	2950	2520	2560	
	Potassium (K)-Total (mg/kg wwt)	3880	3700	4150	3790	3710	
	Rubidium (Rb)-Total (mg/kg wwt)	0.973	0.928	1.08	0.905	0.992	
	Selenium (Se)-Total (mg/kg wwt)	0.262	0.296	0.293	0.294	0.256	
	Sodium (Na)-Total (mg/kg wwt)	380	432	398	524	462	
	Strontium (Sr)-Total (mg/kg wwt)	0.186	0.185	0.180	0.219	0.167	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg wwt)	0.00043	0.00131	0.00099	0.00065	0.00124	
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	0.036	0.034	0.020	
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Zinc (Zn)-Total (mg/kg wwt)	3.21	3.94	4.31	3.74	3.97	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1506160-6	L1506160-7	L1506160-8	L1506160-9	L1506160-10
		Description	Fish	Fish	Fish	Fish	Fish
		Sampled Date	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14
		Sampled Time	11:00	11:00	11:00	11:00	11:00
		Client ID	SK-6 TAG#02562 MUSCLE	SK-7 TAG#02561 MUSCLE	SK-8 TAG#02560 MUSCLE	SK-9 TAG#02559 MUSCLE	SK-10 TAG#02558 MUSCLE
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		71.9	71.3	74.2	69.0	71.8
Metals	Aluminum (Al)-Total (mg/kg wwt)		0.81	1.96	<0.40	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)		0.527	0.884	0.413	0.558	0.456
	Barium (Ba)-Total (mg/kg wwt)		0.012	0.065	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)		0.0050	0.0048	0.0044	0.0043	0.0041
	Calcium (Ca)-Total (mg/kg wwt)		82.8	91.3	90.1	74.5	84.0
	Cesium (Cs)-Total (mg/kg wwt)		0.0224	0.0173	0.0213	0.0195	0.0171
	Chromium (Cr)-Total (mg/kg wwt)		0.021	0.080	0.018	<0.010	0.012
	Cobalt (Co)-Total (mg/kg wwt)		0.0055	0.0081	0.0050	0.0051	0.0070
	Copper (Cu)-Total (mg/kg wwt)		0.857	1.03	0.767	0.644	0.975
	Iron (Fe)-Total (mg/kg wwt)		5.74	8.70	5.65	5.33	6.10
	Lead (Pb)-Total (mg/kg wwt)		<0.0040	0.0111	0.0130	0.0051	<0.0040
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)		278	235	264	243	237
	Manganese (Mn)-Total (mg/kg wwt)		0.081	0.109	0.078	0.066	0.081
	Mercury (Hg)-Total (mg/kg wwt)		0.0407	0.0597	0.0625	0.0525	0.0659
	Molybdenum (Mo)-Total (mg/kg wwt)		0.0052	0.0066	0.0044	<0.0040	0.0049
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	0.041	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg wwt)		2660	2360	2650	2420	2430
	Potassium (K)-Total (mg/kg wwt)		3660	3330	3780	3620	3390
	Rubidium (Rb)-Total (mg/kg wwt)		0.917	0.809	0.915	0.884	0.827
	Selenium (Se)-Total (mg/kg wwt)		0.246	0.268	0.297	0.315	0.281
	Sodium (Na)-Total (mg/kg wwt)		419	395	415	306	375
	Strontium (Sr)-Total (mg/kg wwt)		0.218	0.328	0.320	0.222	0.261
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)		0.00102	0.00086	0.00055	0.00113	0.00068
	Tin (Sn)-Total (mg/kg wwt)		0.029	0.026	0.038	<0.020	0.026
	Uranium (U)-Total (mg/kg wwt)		<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg wwt)		3.57	4.34	3.75	3.27	3.78
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1506160-11	L1506160-12	L1506160-13	L1506160-14	L1506160-15
		Description	Fish	Fish	Fish	Fish	Fish
		Sampled Date	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14
		Sampled Time	11:00	11:00	11:00	11:00	11:00
		Client ID	SK-11 TAG#02557 MUSCLE	SK-12 TAG#02556 MUSCLE	SK-1 TAG#02567 LIVER	SK-2 TAG#02566 LIVER	SK-3 TAG#02565 LIVER
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)	71.7	73.7	77.7	77.3	75.7	
Metals	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<0.40	<0.40	<0.40	1.58	
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Arsenic (As)-Total (mg/kg wwt)	0.337	0.353	0.422	0.446	0.716	
	Barium (Ba)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010	
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Cadmium (Cd)-Total (mg/kg wwt)	0.0028	0.0056	1.33	0.966	1.02	
	Calcium (Ca)-Total (mg/kg wwt)	82.8	61.5	76.0	78.0	82.4	
	Cesium (Cs)-Total (mg/kg wwt)	0.0194	0.0231	0.0072	0.0088	0.0073	
	Chromium (Cr)-Total (mg/kg wwt)	0.097	0.018	0.054	0.034	0.542	
	Cobalt (Co)-Total (mg/kg wwt)	0.0072	0.0065	0.0177	0.0295	0.0233	
	Copper (Cu)-Total (mg/kg wwt)	0.972	0.932	145	99.2	176	
	Iron (Fe)-Total (mg/kg wwt)	6.20	7.23	125	71.9	118	
	Lead (Pb)-Total (mg/kg wwt)	0.0061	<0.0040	<0.0040	<0.0040	<0.0040	
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Magnesium (Mg)-Total (mg/kg wwt)	261	271	167	206	162	
	Manganese (Mn)-Total (mg/kg wwt)	0.086	0.076	1.15	1.61	1.25	
	Mercury (Hg)-Total (mg/kg wwt)	0.0504	0.0513	0.0746	0.0913	0.0501	
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0142	0.0055	0.130	0.195	0.210	
	Nickel (Ni)-Total (mg/kg wwt)	0.061	<0.040	0.041	<0.040	0.364	
	Phosphorus (P)-Total (mg/kg wwt)	2520	2610	3180	3730	3070	
	Potassium (K)-Total (mg/kg wwt)	3560	3780	3550	3800	3350	
	Rubidium (Rb)-Total (mg/kg wwt)	0.886	0.946	1.03	1.19	1.03	
	Selenium (Se)-Total (mg/kg wwt)	0.253	0.269	7.05	10.0	14.0	
	Sodium (Na)-Total (mg/kg wwt)	374	423	1070	1080	919	
	Strontium (Sr)-Total (mg/kg wwt)	0.283	0.146	0.198	0.258	0.205	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg wwt)	0.00124	0.00082	0.00209	0.0108	0.00332	
	Tin (Sn)-Total (mg/kg wwt)	0.028	0.028	<0.020	<0.020	0.026	
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	0.00050	0.00153	<0.00040	
	Vanadium (V)-Total (mg/kg wwt)	0.111	<0.020	0.147	0.169	0.883	
	Zinc (Zn)-Total (mg/kg wwt)	3.72	3.87	32.5	34.9	42.6	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1506160-16	L1506160-17	L1506160-18	L1506160-19	L1506160-20
		Description	Fish	Fish	Fish	Fish	Fish
		Sampled Date	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14
		Sampled Time	11:00	11:00	11:00	11:00	11:00
		Client ID	SK-4 TAG#02564 LIVER	SK-5 TAG#02563 LIVER	SK-6 TAG#02562 LIVER	SK-7 TAG#02561 LIVER	SK-8 TAG#02560 LIVER
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		78.2	79.6	78.1	77.3	79.3
Metals	Aluminum (Al)-Total (mg/kg wwt)		<0.40	<0.40	1.70	2.44	0.51
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)		0.250	0.302	0.372	0.531	0.550
	Barium (Ba)-Total (mg/kg wwt)		<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)		1.04	0.765	1.24	0.970	0.964
	Calcium (Ca)-Total (mg/kg wwt)		79.9	81.7	71.6	86.8	101
	Cesium (Cs)-Total (mg/kg wwt)		0.0088	0.0103	0.0094	0.0078	0.0064
	Chromium (Cr)-Total (mg/kg wwt)		0.039	0.014	0.511	0.831	0.257
	Cobalt (Co)-Total (mg/kg wwt)		0.0299	0.0227	0.0345	0.0376	0.0209
	Copper (Cu)-Total (mg/kg wwt)		226	235	270	96.9	144
	Iron (Fe)-Total (mg/kg wwt)		108	99.3	81.1	52.5	80.4
	Lead (Pb)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)		156	145	152	207	175
	Manganese (Mn)-Total (mg/kg wwt)		1.05	1.21	1.24	1.90	1.31
	Mercury (Hg)-Total (mg/kg wwt)		0.0978	0.0997	0.0587	0.0879	0.0850
	Molybdenum (Mo)-Total (mg/kg wwt)		0.156	0.173	0.227	0.281	0.176
	Nickel (Ni)-Total (mg/kg wwt)		0.058	<0.040	0.338	0.556	0.182
	Phosphorus (P)-Total (mg/kg wwt)		2980	2910	3020	3900	3240
	Potassium (K)-Total (mg/kg wwt)		2980	3430	3340	3950	3680
	Rubidium (Rb)-Total (mg/kg wwt)		0.776	0.942	0.890	1.13	0.938
	Selenium (Se)-Total (mg/kg wwt)		16.0	14.5	20.8	6.94	8.29
	Sodium (Na)-Total (mg/kg wwt)		1310	1310	1230	1030	1010
	Strontium (Sr)-Total (mg/kg wwt)		0.224	0.263	0.191	0.324	0.346
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)		0.00287	0.00465	0.00520	0.00492	0.00231
	Tin (Sn)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg wwt)		0.00053	0.00105	0.00058	0.00167	0.00274
	Vanadium (V)-Total (mg/kg wwt)		0.113	0.130	0.940	1.25	0.333
	Zinc (Zn)-Total (mg/kg wwt)		56.4	35.6	37.4	37.1	39.5
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

16-OCT-14 11:06 (MT)

Version: FINAL

		Sample ID	L1506160-21	L1506160-22	L1506160-23	L1506160-24	L1506160-25
		Description	Fish	Fish	Fish	Fish	Fish
		Sampled Date	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14
		Sampled Time	11:00	11:00	11:00	11:00	11:00
		Client ID	SK-9 TAG#02559 LIVER	SK-10 TAG#02558 LIVER	SK-11 TAG#02557 LIVER	SK-12 TAG#02556 LIVER	SK-1 TAG#02567 GONADS
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		78.3	79.0	76.9	77.4	77.4
Metals	Aluminum (Al)-Total (mg/kg wwt)		<0.40	<0.40	<0.40	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)		0.650	0.377	0.357	0.545	0.175
	Barium (Ba)-Total (mg/kg wwt)		<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)		1.30	0.773	0.612	1.70	0.0597
	Calcium (Ca)-Total (mg/kg wwt)		89.0	81.2	84.0	74.0	54.1
	Cesium (Cs)-Total (mg/kg wwt)		0.0106	0.0075	0.0100	0.0072	0.0108
	Chromium (Cr)-Total (mg/kg wwt)		1.01	0.016	0.042	<0.010	0.022
	Cobalt (Co)-Total (mg/kg wwt)		0.0371	0.0276	0.0245	0.0241	0.0169
	Copper (Cu)-Total (mg/kg wwt)		62.0	84.5	78.1	120	1.35
	Iron (Fe)-Total (mg/kg wwt)		163	59.4	91.1	56.3	21.8
	Lead (Pb)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)		199	187	219	214	166
	Manganese (Mn)-Total (mg/kg wwt)		2.20	1.33	1.59	1.51	0.150
	Mercury (Hg)-Total (mg/kg wwt)		0.107	0.101	0.0625	0.108	0.0213
	Molybdenum (Mo)-Total (mg/kg wwt)		0.213	0.147	0.173	0.231	0.0069
	Nickel (Ni)-Total (mg/kg wwt)		0.078	<0.040	0.044	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg wwt)		3650	3430	3980	3930	8380
	Potassium (K)-Total (mg/kg wwt)		3640	3420	3880	4270	3350
	Rubidium (Rb)-Total (mg/kg wwt)		0.929	0.979	1.15	1.22	1.11
	Selenium (Se)-Total (mg/kg wwt)		9.59	7.49	10.7	12.2	0.279
	Sodium (Na)-Total (mg/kg wwt)		1150	1140	939	883	1020
	Strontium (Sr)-Total (mg/kg wwt)		0.317	0.302	0.311	0.210	0.169
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)		0.00755	0.00355	0.00958	0.00545	0.00094
	Tin (Sn)-Total (mg/kg wwt)		<0.020	<0.020	0.026	<0.020	<0.020
	Uranium (U)-Total (mg/kg wwt)		0.00130	0.00107	0.00067	0.00189	<0.00040
	Vanadium (V)-Total (mg/kg wwt)		0.344	0.080	0.046	0.042	0.037
	Zinc (Zn)-Total (mg/kg wwt)		39.8	38.1	40.2	54.1	18.3
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1506160-26	L1506160-27	L1506160-28	L1506160-29	L1506160-30
		Description	Fish	Fish	Fish	Fish	Fish
		Sampled Date	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14
		Sampled Time	11:00	11:00	11:00	11:00	11:00
		Client ID	SK-2 TAG#02566 GONADS	SK-3 TAG#02565 GONADS	SK-4 TAG#02564 GONADS	SK-5 TAG#02563 GONADS	SK-6 TAG#02562 GONADS
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		55.2	80.1	76.1	77.4	80.1
Metals	Aluminum (Al)-Total (mg/kg wwt)		0.49	1.61	1.27	1.42	<0.40
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)		0.212	0.257	0.149	0.131	0.120
	Barium (Ba)-Total (mg/kg wwt)		0.168	0.063	0.025	<0.010	0.012
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	0.0029	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)		0.0169	0.0352	0.0340	0.0119	0.0148
	Calcium (Ca)-Total (mg/kg wwt)		525	54.8	78.2	55.0	50.1
	Cesium (Cs)-Total (mg/kg wwt)		0.0090	0.0151	0.0132	0.0145	0.0149
	Chromium (Cr)-Total (mg/kg wwt)		<0.010	0.019	<0.010	0.017	0.030
	Cobalt (Co)-Total (mg/kg wwt)		0.0221	0.0157	0.0168	0.0084	0.0127
	Copper (Cu)-Total (mg/kg wwt)		57.9	1.27	2.13	0.525	0.762
	Iron (Fe)-Total (mg/kg wwt)		21.5	19.5	21.6	15.4	11.5
	Lead (Pb)-Total (mg/kg wwt)		0.0525	<0.0040	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)		638	168	216	179	185
	Manganese (Mn)-Total (mg/kg wwt)		1.12	0.267	0.175	0.180	0.159
	Mercury (Hg)-Total (mg/kg wwt)		0.0069	0.0180	0.0187	0.0163	0.0124
	Molybdenum (Mo)-Total (mg/kg wwt)		0.0085	0.0085	0.0052	0.0058	0.0050
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg wwt)		4030	7030	10200	9340	7420
	Potassium (K)-Total (mg/kg wwt)		2040	4070	3590	3750	3770
	Rubidium (Rb)-Total (mg/kg wwt)		0.528	1.35	1.01	1.13	1.14
	Selenium (Se)-Total (mg/kg wwt)		3.10	0.339	0.355	0.298	0.262
	Sodium (Na)-Total (mg/kg wwt)		585	1030	1190	1100	1010
	Strontium (Sr)-Total (mg/kg wwt)		3.91	0.177	0.260	0.202	0.164
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)		0.00118	0.00225	0.00091	0.00156	0.00148
	Tin (Sn)-Total (mg/kg wwt)		<0.020	0.034	<0.020	<0.020	0.040
	Uranium (U)-Total (mg/kg wwt)		0.00147	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg wwt)		34.6	19.6	23.9	15.0	10.7
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1506160-31	L1506160-32	L1506160-33	L1506160-34	L1506160-35
		Description	Fish	Fish	Fish	Fish	Fish
		Sampled Date	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14
		Sampled Time	11:00	11:00	11:00	11:00	11:00
		Client ID	SK-7 TAG#02561 GONADS	SK-8 TAG#02560 GONADS	SK-9 TAG#02559 GONADS	SK-10 TAG#02558 GONADS	SK-11 TAG#02557 GONADS
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		56.6	58.9	55.2	54.6	55.3
Metals	Aluminum (Al)-Total (mg/kg wwt)		1.09	<0.40	<0.40	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)		0.433	0.310	0.334	0.318	0.209
	Barium (Ba)-Total (mg/kg wwt)		0.117	0.031	0.075	0.071	0.063
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)		0.0204	0.0351	0.0337	0.0317	0.0159
	Calcium (Ca)-Total (mg/kg wwt)		450	434	384	262	356
	Cesium (Cs)-Total (mg/kg wwt)		0.0083	0.0077	0.0105	0.0083	0.0100
	Chromium (Cr)-Total (mg/kg wwt)		0.011	<0.010	<0.010	<0.010	<0.010
	Cobalt (Co)-Total (mg/kg wwt)		0.0368	0.0474	0.0453	0.0438	0.0305
	Copper (Cu)-Total (mg/kg wwt)		53.4	96.8	75.2	83.6	60.7
	Iron (Fe)-Total (mg/kg wwt)		24.3	42.0	34.8	36.2	25.0
	Lead (Pb)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)		561	463	511	463	514
	Manganese (Mn)-Total (mg/kg wwt)		0.941	0.988	1.12	1.30	0.824
	Mercury (Hg)-Total (mg/kg wwt)		0.0084	0.0084	0.0083	0.0088	0.0055
	Molybdenum (Mo)-Total (mg/kg wwt)		0.0095	0.0072	0.0098	0.0089	0.0077
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg wwt)		4100	3240	3640	3660	3840
	Potassium (K)-Total (mg/kg wwt)		2110	1930	2070	2140	2140
	Rubidium (Rb)-Total (mg/kg wwt)		0.493	0.501	0.546	0.500	0.534
	Selenium (Se)-Total (mg/kg wwt)		2.72	3.42	1.60	3.22	2.79
	Sodium (Na)-Total (mg/kg wwt)		682	849	669	730	644
	Strontium (Sr)-Total (mg/kg wwt)		3.42	3.43	2.54	2.49	3.08
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)		0.00070	<0.00040	0.00100	0.00058	0.00090
	Tin (Sn)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg wwt)		0.00136	0.00171	0.00122	0.00098	0.00068
	Vanadium (V)-Total (mg/kg wwt)		0.033	<0.020	0.096	0.030	<0.020
	Zinc (Zn)-Total (mg/kg wwt)		35.5	63.4	56.7	54.6	38.9
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID				
	L1506160-36 Fish 20-AUG-14 11:00 SK-12 TAG#02556 GONADS				
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)	55.7			
Metals	Aluminum (Al)-Total (mg/kg wwt)	<0.40			
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020			
	Arsenic (As)-Total (mg/kg wwt)	0.193			
	Barium (Ba)-Total (mg/kg wwt)	0.104			
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020			
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020			
	Boron (B)-Total (mg/kg wwt)	<0.20			
	Cadmium (Cd)-Total (mg/kg wwt)	0.0180			
	Calcium (Ca)-Total (mg/kg wwt)	515			
	Cesium (Cs)-Total (mg/kg wwt)	0.0092			
	Chromium (Cr)-Total (mg/kg wwt)	0.012			
	Cobalt (Co)-Total (mg/kg wwt)	0.0336			
	Copper (Cu)-Total (mg/kg wwt)	51.9			
	Iron (Fe)-Total (mg/kg wwt)	21.3			
	Lead (Pb)-Total (mg/kg wwt)	<0.0040			
	Lithium (Li)-Total (mg/kg wwt)	<0.10			
	Magnesium (Mg)-Total (mg/kg wwt)	637			
	Manganese (Mn)-Total (mg/kg wwt)	0.760			
	Mercury (Hg)-Total (mg/kg wwt)	0.0052			
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0066			
	Nickel (Ni)-Total (mg/kg wwt)	<0.040			
	Phosphorus (P)-Total (mg/kg wwt)	4080			
	Potassium (K)-Total (mg/kg wwt)	2020			
	Rubidium (Rb)-Total (mg/kg wwt)	0.549			
	Selenium (Se)-Total (mg/kg wwt)	2.61			
	Sodium (Na)-Total (mg/kg wwt)	571			
	Strontium (Sr)-Total (mg/kg wwt)	4.14			
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040			
	Thallium (Tl)-Total (mg/kg wwt)	0.00068			
	Tin (Sn)-Total (mg/kg wwt)	<0.020			
	Uranium (U)-Total (mg/kg wwt)	0.00164			
	Vanadium (V)-Total (mg/kg wwt)	<0.020			
	Zinc (Zn)-Total (mg/kg wwt)	31.7			
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Aluminum (Al)-Total	DUP-H	L1506160-14, -15, -16, -17, -18, -19, -20, -21, -23, -24, -26, -27, -28, -29, -31, -32, -33, -34, -35

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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HG-WET-CVAFS-VA Tissue Mercury in Tissue by CVAFS (WET) EPA 200.3, EPA 245.7

This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7. This digestion procedure was implemented on October 5, 2009.

MET-WET-CCMS-VA Tissue Metals in Tissue by CRC ICPMS (WET) EPA 200.3/6020A

This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MOISTURE-TISS-VA Tissue % Moisture in Tissues ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

1 2

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1506160

Report Date: 16-OCT-14

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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0
 Contact: Jack Love

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-WET-CVAFS-VA		Tissue						
Batch	R2969674							
WG1957338-4	CRM	VA-NRC-TORT3						
Mercury (Hg)-Total			105.6		%		70-130	02-OCT-14
WG1957338-5	CRM	VA-NIST-1566B						
Mercury (Hg)-Total			97.9		%		70-130	02-OCT-14
WG1959296-4	CRM	VA-NRC-TORT3						
Mercury (Hg)-Total			101.6		%		70-130	02-OCT-14
WG1959296-5	CRM	VA-NIST-1566B						
Mercury (Hg)-Total			99.7		%		70-130	02-OCT-14
WG1957338-3	DUP	L1506160-6						
Mercury (Hg)-Total		0.0407	0.0400		mg/kg wwt	1.6	40	02-OCT-14
WG1959296-3	DUP	L1506160-31						
Mercury (Hg)-Total		0.0084	0.0079		mg/kg wwt	5.7	40	02-OCT-14
WG1957338-1	MB							
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	02-OCT-14
WG1957338-2	MB							
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	02-OCT-14
WG1959296-1	MB							
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	02-OCT-14
WG1959296-2	MB							
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	02-OCT-14
MET-WET-CCMS-VA		Tissue						
Batch	R2977175							
WG1959296-4	CRM	VA-NRC-TORT3						
Arsenic (As)-Total			116.4		%		70-130	07-OCT-14
Cadmium (Cd)-Total			104.0		%		70-130	07-OCT-14
Chromium (Cr)-Total			103.0		%		70-130	07-OCT-14
Cobalt (Co)-Total			106.0		%		70-130	07-OCT-14
Copper (Cu)-Total			95.9		%		70-130	07-OCT-14
Iron (Fe)-Total			98.0		%		70-130	07-OCT-14
Lead (Pb)-Total			91.8		%		70-130	07-OCT-14
Manganese (Mn)-Total			100.8		%		70-130	07-OCT-14
Molybdenum (Mo)-Total			102.5		%		70-130	07-OCT-14
Nickel (Ni)-Total			101.8		%		70-130	07-OCT-14
Selenium (Se)-Total			99.9		%		70-130	07-OCT-14
Strontium (Sr)-Total			102.2		%		70-130	07-OCT-14
Vanadium (V)-Total			105.1		%		70-130	07-OCT-14
Zinc (Zn)-Total			102.1		%		70-130	07-OCT-14



Quality Control Report

Workorder: L1506160

Report Date: 16-OCT-14

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA		Tissue						
Batch	R2977175							
WG1959296-5	CRM	VA-NIST-1566B						
Antimony (Sb)-Total			0.0088		mg/kg wwt		0.001-0.021	07-OCT-14
Arsenic (As)-Total			102.1		%		70-130	07-OCT-14
Barium (Ba)-Total			84.3		%		70-130	07-OCT-14
Boron (B)-Total			4.90		mg/kg wwt		3.5-5.5	07-OCT-14
Cadmium (Cd)-Total			103.3		%		70-130	07-OCT-14
Calcium (Ca)-Total			98.4		%		70-130	07-OCT-14
Cobalt (Co)-Total			102.6		%		70-130	07-OCT-14
Copper (Cu)-Total			98.4		%		70-130	07-OCT-14
Iron (Fe)-Total			95.6		%		70-130	07-OCT-14
Lead (Pb)-Total			95.9		%		70-130	07-OCT-14
Magnesium (Mg)-Total			99.5		%		70-130	07-OCT-14
Manganese (Mn)-Total			100.4		%		70-130	07-OCT-14
Nickel (Ni)-Total			97.6		%		70-130	07-OCT-14
Potassium (K)-Total			102.2		%		70-130	07-OCT-14
Rubidium (Rb)-Total			99.0		%		70-130	07-OCT-14
Selenium (Se)-Total			101.6		%		70-130	07-OCT-14
Sodium (Na)-Total			99.2		%		70-130	07-OCT-14
Strontium (Sr)-Total			96.7		%		70-130	07-OCT-14
Uranium (U)-Total			100.8		%		70-130	07-OCT-14
Vanadium (V)-Total			93.3		%		70-130	07-OCT-14
Zinc (Zn)-Total			102.1		%		70-130	07-OCT-14
WG1959296-3	DUP	L1506160-31						
Aluminum (Al)-Total		1.09	<0.40	DUP-H	mg/kg wwt	N/A	40	07-OCT-14
Antimony (Sb)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Arsenic (As)-Total		0.433	0.410		mg/kg wwt	5.4	40	07-OCT-14
Barium (Ba)-Total		0.117	0.107		mg/kg wwt	8.8	40	07-OCT-14
Beryllium (Be)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Bismuth (Bi)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Boron (B)-Total		<0.20	<0.20	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Cadmium (Cd)-Total		0.0204	0.0198		mg/kg wwt	3.4	40	07-OCT-14
Calcium (Ca)-Total		450	426		mg/kg wwt	5.3	60	07-OCT-14
Cesium (Cs)-Total		0.0083	0.0077		mg/kg wwt	8.0	40	07-OCT-14
Chromium (Cr)-Total		0.011	0.015		mg/kg wwt	30	40	07-OCT-14
Cobalt (Co)-Total		0.0368	0.0344		mg/kg wwt	6.8	40	07-OCT-14



Quality Control Report

Workorder: L1506160

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R2977175							
WG1959296-3	DUP	L1506160-31						
Copper (Cu)-Total		53.4	50.5		mg/kg wwt	5.5	40	07-OCT-14
Iron (Fe)-Total		24.3	20.6		mg/kg wwt	16	40	07-OCT-14
Lead (Pb)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Lithium (Li)-Total		<0.10	<0.10	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Magnesium (Mg)-Total		561	537		mg/kg wwt	4.5	40	07-OCT-14
Manganese (Mn)-Total		0.941	0.856		mg/kg wwt	9.4	40	07-OCT-14
Molybdenum (Mo)-Total		0.0095	0.0087		mg/kg wwt	8.1	40	07-OCT-14
Nickel (Ni)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Phosphorus (P)-Total		4100	3850		mg/kg wwt	6.3	40	07-OCT-14
Potassium (K)-Total		2110	2000		mg/kg wwt	5.7	40	07-OCT-14
Rubidium (Rb)-Total		0.493	0.460		mg/kg wwt	6.9	40	07-OCT-14
Selenium (Se)-Total		2.72	2.56		mg/kg wwt	6.0	40	07-OCT-14
Sodium (Na)-Total		682	645		mg/kg wwt	5.6	40	07-OCT-14
Strontium (Sr)-Total		3.42	3.20		mg/kg wwt	6.4	60	07-OCT-14
Tellurium (Te)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Thallium (Tl)-Total		0.00070	0.00063		mg/kg wwt	12	40	07-OCT-14
Tin (Sn)-Total		<0.020	<0.020	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Uranium (U)-Total		0.00136	0.00119		mg/kg wwt	13	40	07-OCT-14
Vanadium (V)-Total		0.033	0.026		mg/kg wwt	25	40	07-OCT-14
Zinc (Zn)-Total		35.5	33.3		mg/kg wwt	6.3	40	07-OCT-14
Zirconium (Zr)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
WG1959296-1	MB							
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	07-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	07-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	07-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	07-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	07-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	07-OCT-14
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	07-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	07-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	07-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	07-OCT-14



Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA	Tissue							
Batch	R2977175							
WG1959296-1 MB								
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	07-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	07-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	07-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	07-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	07-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	07-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	07-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	07-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	07-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	07-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	07-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	07-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	07-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	07-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	07-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	07-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	07-OCT-14
WG1959296-2 MB								
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	07-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	07-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	07-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	07-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	07-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	07-OCT-14
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	07-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	07-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	07-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	07-OCT-14



Quality Control Report

Workorder: L1506160

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R2977175							
WG1959296-2	MB							
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	07-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	07-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	07-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	07-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	07-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	07-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	07-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	07-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	07-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	07-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	07-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	07-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	07-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	07-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	07-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	07-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	07-OCT-14
Batch	R2981408							
WG1957338-4	CRM	VA-NRC-TORT3						
Arsenic (As)-Total			109.1		%		70-130	10-OCT-14
Cadmium (Cd)-Total			96.2		%		70-130	10-OCT-14
Chromium (Cr)-Total			90.2		%		70-130	10-OCT-14
Cobalt (Co)-Total			100.9		%		70-130	10-OCT-14
Copper (Cu)-Total			89.5		%		70-130	10-OCT-14
Iron (Fe)-Total			93.1		%		70-130	10-OCT-14
Lead (Pb)-Total			85.6		%		70-130	10-OCT-14
Manganese (Mn)-Total			94.6		%		70-130	10-OCT-14
Molybdenum (Mo)-Total			94.2		%		70-130	10-OCT-14
Nickel (Ni)-Total			94.6		%		70-130	10-OCT-14
Selenium (Se)-Total			93.7		%		70-130	10-OCT-14



Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R2981408							
WG1957338-4	CRM	VA-NRC-TORT3						
Strontium (Sr)-Total			93.0		%		70-130	10-OCT-14
Vanadium (V)-Total			100.4		%		70-130	10-OCT-14
Zinc (Zn)-Total			90.0		%		70-130	10-OCT-14
WG1957338-5	CRM	VA-NIST-1566B						
Antimony (Sb)-Total			0.0082		mg/kg wwt		0.001-0.021	10-OCT-14
Arsenic (As)-Total			111.5		%		70-130	10-OCT-14
Barium (Ba)-Total			89.8		%		70-130	10-OCT-14
Boron (B)-Total			5.03		mg/kg wwt		3.5-5.5	10-OCT-14
Cadmium (Cd)-Total			111.8		%		70-130	10-OCT-14
Calcium (Ca)-Total			104.9		%		70-130	10-OCT-14
Cobalt (Co)-Total			105.2		%		70-130	10-OCT-14
Copper (Cu)-Total			105.4		%		70-130	10-OCT-14
Iron (Fe)-Total			104.9		%		70-130	10-OCT-14
Lead (Pb)-Total			100.5		%		70-130	10-OCT-14
Magnesium (Mg)-Total			106.6		%		70-130	10-OCT-14
Manganese (Mn)-Total			105.9		%		70-130	10-OCT-14
Nickel (Ni)-Total			103.9		%		70-130	10-OCT-14
Potassium (K)-Total			106.2		%		70-130	10-OCT-14
Rubidium (Rb)-Total			107.0		%		70-130	10-OCT-14
Selenium (Se)-Total			109.8		%		70-130	10-OCT-14
Sodium (Na)-Total			100.8		%		70-130	10-OCT-14
Strontium (Sr)-Total			101.7		%		70-130	10-OCT-14
Uranium (U)-Total			106.4		%		70-130	10-OCT-14
Vanadium (V)-Total			102.2		%		70-130	10-OCT-14
Zinc (Zn)-Total			102.2		%		70-130	10-OCT-14
WG1971710-4	CRM	VA-NRC-TORT3						
Arsenic (As)-Total			109.1		%		70-130	10-OCT-14
Cadmium (Cd)-Total			96.2		%		70-130	10-OCT-14
Chromium (Cr)-Total			90.2		%		70-130	10-OCT-14
Cobalt (Co)-Total			100.9		%		70-130	10-OCT-14
Copper (Cu)-Total			89.5		%		70-130	10-OCT-14
Iron (Fe)-Total			93.1		%		70-130	10-OCT-14
Lead (Pb)-Total			85.6		%		70-130	10-OCT-14
Manganese (Mn)-Total			94.6		%		70-130	10-OCT-14
Molybdenum (Mo)-Total			94.2		%		70-130	10-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R2981408							
WG1971710-4	CRM	VA-NRC-TORT3						
Nickel (Ni)-Total			94.6		%		70-130	10-OCT-14
Selenium (Se)-Total			93.7		%		70-130	10-OCT-14
Strontium (Sr)-Total			93.0		%		70-130	10-OCT-14
Vanadium (V)-Total			100.5		%		70-130	10-OCT-14
Zinc (Zn)-Total			90.0		%		70-130	10-OCT-14
WG1971710-5	CRM	VA-NIST-1566B						
Antimony (Sb)-Total			0.0082		mg/kg wwt		0.001-0.021	10-OCT-14
Arsenic (As)-Total			111.4		%		70-130	10-OCT-14
Barium (Ba)-Total			89.8		%		70-130	10-OCT-14
Boron (B)-Total			5.03		mg/kg wwt		3.5-5.5	10-OCT-14
Cadmium (Cd)-Total			111.8		%		70-130	10-OCT-14
Calcium (Ca)-Total			104.9		%		70-130	10-OCT-14
Cobalt (Co)-Total			105.2		%		70-130	10-OCT-14
Copper (Cu)-Total			105.4		%		70-130	10-OCT-14
Iron (Fe)-Total			104.9		%		70-130	10-OCT-14
Lead (Pb)-Total			100.5		%		70-130	10-OCT-14
Magnesium (Mg)-Total			106.6		%		70-130	10-OCT-14
Manganese (Mn)-Total			105.9		%		70-130	10-OCT-14
Nickel (Ni)-Total			103.9		%		70-130	10-OCT-14
Potassium (K)-Total			106.2		%		70-130	10-OCT-14
Rubidium (Rb)-Total			107.1		%		70-130	10-OCT-14
Selenium (Se)-Total			109.8		%		70-130	10-OCT-14
Sodium (Na)-Total			100.7		%		70-130	10-OCT-14
Strontium (Sr)-Total			101.7		%		70-130	10-OCT-14
Uranium (U)-Total			106.4		%		70-130	10-OCT-14
Vanadium (V)-Total			102.2		%		70-130	10-OCT-14
Zinc (Zn)-Total			102.2		%		70-130	10-OCT-14
WG1957338-1	MB							
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	10-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	10-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	10-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	10-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	10-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA		Tissue						
Batch	R2981408							
WG1957338-1 MB								
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	10-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	10-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	10-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	10-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	10-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	10-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	10-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	10-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	10-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	10-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	10-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	10-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	10-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	10-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	10-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	10-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	10-OCT-14
WG1957338-2 MB								
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	10-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	10-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	10-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	10-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	10-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA		Tissue						
Batch	R2981408							
WG1957338-2 MB								
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	10-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	10-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	10-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	10-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	10-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	10-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	10-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	10-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	10-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	10-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	10-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	10-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	10-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	10-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	10-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	10-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	10-OCT-14
WG1971710-1 MB								
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	10-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	10-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	10-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	10-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	10-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R2981408							
WG1971710-1	MB							
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	10-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	10-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	10-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	10-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	10-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	10-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	10-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	10-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	10-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	10-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	10-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	10-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	10-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	10-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	10-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	10-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	10-OCT-14
WG1971710-2	MB							
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	10-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	10-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	10-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	10-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	10-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R2981408							
WG1971710-2	MB							
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	10-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	10-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	10-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	10-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	10-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	10-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	10-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	10-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	10-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	10-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	10-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	10-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	10-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	10-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	10-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	10-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	10-OCT-14
Batch	R2991248							
WG1957338-3	DUP	L1506160-6						
Aluminum (Al)-Total		0.81	1.04		mg/kg wwt	25	40	10-OCT-14
Antimony (Sb)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Arsenic (As)-Total		0.527	0.422		mg/kg wwt	22	40	10-OCT-14
Barium (Ba)-Total		0.012	0.018		mg/kg wwt	38	40	10-OCT-14
Beryllium (Be)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Bismuth (Bi)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R2991248							
WG1957338-3	DUP	L1506160-6						
Boron (B)-Total		<0.20	<0.20	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Cadmium (Cd)-Total		0.0050	0.0040		mg/kg wwt	23	40	10-OCT-14
Calcium (Ca)-Total		82.8	66.0		mg/kg wwt	23	60	10-OCT-14
Cesium (Cs)-Total		0.0224	0.0183		mg/kg wwt	20	40	10-OCT-14
Chromium (Cr)-Total		0.021	0.024		mg/kg wwt	11	40	10-OCT-14
Cobalt (Co)-Total		0.0055	0.0055		mg/kg wwt	1.0	40	10-OCT-14
Copper (Cu)-Total		0.857	0.713		mg/kg wwt	18	40	10-OCT-14
Iron (Fe)-Total		5.74	5.75		mg/kg wwt	0.2	40	10-OCT-14
Lead (Pb)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Lithium (Li)-Total		<0.10	<0.10	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Magnesium (Mg)-Total		278	224		mg/kg wwt	21	40	10-OCT-14
Manganese (Mn)-Total		0.081	0.080		mg/kg wwt	1.2	40	10-OCT-14
Molybdenum (Mo)-Total		0.0052	0.0048		mg/kg wwt	7.4	40	10-OCT-14
Nickel (Ni)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Phosphorus (P)-Total		2660	2180		mg/kg wwt	20	40	10-OCT-14
Potassium (K)-Total		3660	3030		mg/kg wwt	19	40	10-OCT-14
Rubidium (Rb)-Total		0.917	0.750		mg/kg wwt	20	40	10-OCT-14
Selenium (Se)-Total		0.246	0.204		mg/kg wwt	19	40	10-OCT-14
Sodium (Na)-Total		419	349		mg/kg wwt	18	40	10-OCT-14
Strontium (Sr)-Total		0.218	0.175		mg/kg wwt	22	60	10-OCT-14
Tellurium (Te)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Thallium (Tl)-Total		0.00102	0.00086		mg/kg wwt	17	40	10-OCT-14
Tin (Sn)-Total		0.029	0.028		mg/kg wwt	2.7	40	10-OCT-14
Uranium (U)-Total		<0.00040	<0.00040	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Vanadium (V)-Total		<0.020	<0.020	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Zinc (Zn)-Total		3.57	2.98		mg/kg wwt	18	40	10-OCT-14
Zirconium (Zr)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
MOISTURE-TISS-VA								
	Tissue							
Batch	R2953158							
WG1954883-1	DUP	L1506160-9						
% Moisture		69.0	69.2		%	0.3	20	18-SEP-14
WG1954883-2	DUP	L1506160-31						
% Moisture		56.6	56.1		%	0.8	20	18-SEP-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-TISS-VA	Tissue							
Batch	R2955709							
WG1956326-1	DUP	L1506160-33						
% Moisture		55.2	53.6		%	3.0	20	21-SEP-14

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS LABORATORY GROUP ANALYTICAL REPORT

ALS Lab WO#: L1506160

Client ID	Liver - Total Weight (g)	Gonad - Total Weight (g)
SK-1 TAG#02567	55.090	29.529
SK-2 TAG#02566	34.463	143.245
SK-3 TAG#02565	32.355	16.882
SK-4 TAG#02564	29.695	42.178
SK-5 TAG#02563	33.460	30.318
SK-6 TAG#02562	32.708	62.834
SK-7 TAG#02561	30.182	96.156
SK-8 TAG#02560	24.711	25.756
SK-9 TAG#02559	31.754	83.699
SK-10 TAG#02558	31.834	84.929
SK-11 TAG#02557	22.787	85.940
SK-12 TAG#02556	39.348	141.554



L1506160-COFC

Report To			Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)									
Company: Red Chris Development Company			<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other				<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)									
Contact: Jack Love/Heather Hawkins			<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax				<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT									
Address: 200-580 Hornby St. Vancouver, BC V6C 3B6			Email 1: jlove@redchrismine.ca				<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT									
Phone: 604-800-9200 329 Fax:			Email 2: willie.sellars@williamslakeband.ca				<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT									
Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			Client / Project Information				Please indicate below Filtered, Preserved or both (F, P, F/P)									
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No			Job #:													
Company:			PO / AFE:													
Contact:			LSD:													
Address:			Quote #:													
Lab Work Order # (lab use only)			ALS Contact: Can Dang		Sampler: CK, ML, KK, GS,											
Sample #	Sample Identification (This description will appear on the report)		Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Liver(METALS)	Gonads(METALS)	Muscle(METALS)	% moisture content	Sex (Confirmation)					Number of Containers	
SK-1 tag#02567			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X						
SK-2 tag#02566			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X						
SK-3 tag#02565			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X						
SK-4 tag#02564			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X						
SK-5 tag#02563			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X						
SK-6 tag#02562			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X						
SK-7 tag#02561			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X						
SK-8 tag#02560			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X						
SK-9 tag#02559			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X						
SK-10 tag#02558			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X						
SK-11 tag#02557			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X						
SK-12 tag#02556			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X						
Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details																
* Please include following addresses: kym.keogh@gov.bc.ca and have a COPY mailed to: Confidential lab results, Soda creek SK sampling, 2672 Indian Drive, Williams Lake, BC, V0K2G0																
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.																
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.																
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.																
SHIPMENT RELEASE (client use)					SHIPMENT RECEPTION (lab use only)					SHIPMENT VERIFICATION (lab use only)						
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:						
C.Koenig						°C				Yes / No ? If Yes add SIF						



Sample Receipt Confirmation

36 Samples received at ALS in VANCOUVER

Job Reference #: N/A
Project PO #: N/A
Legal Site Description: N/A
Quote #: Q47599
Lab Work Order #: L1506160
Estimated Completion Date: 10/6/2014

Date Sampled: 8/20/2014
Date Received: 8/21/2014
Sampled By:
Chain of Custody: 1,2
Account Manager: Can Dang
Estimated Sample Disposal Date: 11/5/2014

Sample Integrity Observations:

Observation	Details
Sample integrity compromised	Sample integrity compromised: Samples not individually isolated within cooler and possible cross-contamination between fish specimens.
No CofC with Shipment	No CofC with Shipment.

Report Distribution:

Company Name: MOUNT POLLEY MINING CORP.
Contact: Jack Love
Address: PO Box 12
Likely, BC V0L 1N0
Phone: 250-790-2215
Fax: 250-790-2268
Email: chughes@mountpolley.com
Natalie.neufeld@snclavalin.com
kmcmaheh@mountpolley.com
mia.sakelariou@snclavalin.com
Report Name: CROSSTAB_ALSQC
Digital Type: EHS_MOUNTP
Digital Email: chughes@mountpolley.com
Natalie.neufeld@snclavalin.com
mia.sakelariou@snclavalin.com
kmcmaheh@mountpolley.com
Distribution: **Hard Copy:** N **Email:** Y **Fax:** N

Invoice Distribution:

Acct Name: MOUNT POLLEY MINING CORP. ~LIKELY
Contact: Accounts Payable
Address: PO Box 12,
Likely, BC, VOL 1N0
Phone: 250-790-2215
Fax: --
Invoice Email: prosette@mountpolley.com
chughes@mountpolley.com
Project #: N/A
Account #: MPM100
Distribution: **Hard Copy:** Y **Email:** Y

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type
L1506160-1	SK-1 TAG#02567 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-2	SK-2 TAG#02566 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-3	SK-3 TAG#02565 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-4	SK-4 TAG#02564 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-5	SK-5 TAG#02563 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700

ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company



Sample Receipt Confirmation

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type
L1506160-6	SK-6 TAG#02562 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-7	SK-7 TAG#02561 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-8	SK-8 TAG#02560 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-9	SK-9 TAG#02559 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-10	SK-10 TAG#02558 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-11	SK-11 TAG#02557 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-12	SK-12 TAG#02556 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-13	SK-1 TAG#02567 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-14	SK-2 TAG#02566 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-15	SK-3 TAG#02565 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-16	SK-4 TAG#02564 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-17	SK-5 TAG#02563 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-18	SK-6 TAG#02562 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-19	SK-7 TAG#02561 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-20	SK-8 TAG#02560 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-21	SK-9 TAG#02559 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-22	SK-10 TAG#02558 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-23	SK-11 TAG#02557 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-24	SK-12 TAG#02556 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-25	SK-1 TAG#02567 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-26	SK-2 TAG#02566 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-27	SK-3 TAG#02565 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-28	SK-4 TAG#02564 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-29	SK-5 TAG#02563 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-30	SK-6 TAG#02562 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-31	SK-7 TAG#02561 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-32	SK-8 TAG#02560 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-33	SK-9 TAG#02559 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-34	SK-10 TAG#02558 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish
L1506160-35	SK-11 TAG#02557 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish



Sample Receipt Confirmation

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type
L1506160-36	SK-12 TAG#02556 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/6/2014 5:00 PM		Fish



Sample Receipt Confirmation

Analysis Requested:

	Sample Handling and Disposal Fee	Mercury in Tissue by CVAFS (WET)	Metals in Tissue by CRC ICPMS (WET)	% Moisture in Tissues	Tissue/Vegetation Sample Preparation
SK-1 TAG#02567 MUSCLE	X	X	X	X	X
SK-2 TAG#02566 MUSCLE	X	X	X	X	X
SK-3 TAG#02565 MUSCLE	X	X	X	X	X
SK-4 TAG#02564 MUSCLE	X	X	X	X	X
SK-5 TAG#02563 MUSCLE	X	X	X	X	X
SK-6 TAG#02562 MUSCLE	X	X	X	X	X
SK-7 TAG#02561 MUSCLE	X	X	X	X	X
SK-8 TAG#02560 MUSCLE	X	X	X	X	X
SK-9 TAG#02559 MUSCLE	X	X	X	X	X
SK-10 TAG#02558 MUSCLE	X	X	X	X	X
SK-11 TAG#02557 MUSCLE	X	X	X	X	X
SK-12 TAG#02556 MUSCLE	X	X	X	X	X
SK-1 TAG#02567 LIVER	X	X	X	X	X
SK-2 TAG#02566 LIVER	X	X	X	X	X
SK-3 TAG#02565 LIVER	X	X	X	X	X
SK-4 TAG#02564 LIVER	X	X	X	X	X
SK-5 TAG#02563 LIVER	X	X	X	X	X
SK-6 TAG#02562 LIVER	X	X	X	X	X
SK-7 TAG#02561 LIVER	X	X	X	X	X



Sample Receipt Confirmation

Analysis Requested:

	Sample Handling and Disposal Fee	Mercury in Tissue by CVAFS (WET)	Metals in Tissue by CRC ICPMS (WET)	% Moisture in Tissues	Tissue/Vegetation Sample Preparation
SK-8 TAG#02560 LIVER	X	X	X	X	X
SK-9 TAG#02559 LIVER	X	X	X	X	X
SK-10 TAG#02558 LIVER	X	X	X	X	X
SK-11 TAG#02557 LIVER	X	X	X	X	X
SK-12 TAG#02556 LIVER	X	X	X	X	X
SK-1 TAG#02567 GONADS	X	X	X	X	X
SK-2 TAG#02566 GONADS	X	X	X	X	X
SK-3 TAG#02565 GONADS	X	X	X	X	X
SK-4 TAG#02564 GONADS	X	X	X	X	X
SK-5 TAG#02563 GONADS	X	X	X	X	X
SK-6 TAG#02562 GONADS	X	X	X	X	X
SK-7 TAG#02561 GONADS	X	X	X	X	X
SK-8 TAG#02560 GONADS	X	X	X	X	X
SK-9 TAG#02559 GONADS	X	X	X	X	X
SK-10 TAG#02558 GONADS	X	X	X	X	X
SK-11 TAG#02557 GONADS	X	X	X	X	X
SK-12 TAG#02556 GONADS	X	X	X	X	X



Sample Receipt Confirmation

ALS Group strives to deliver on-time results to our clients at all times. However, there are times when due to capacity issues or other unforeseen circumstances we are unable to meet our expected turnaround times. The information above is related to a recent workorder you have submitted to our laboratory. In the event that you have an inquiry, please refer to the Lab Work Order # L1506160 when calling your Account Manager.

ALS Group appreciates your business. Thank you for the opportunity to work with you.



L1506160-COFC

Report To: Red Chris Development Company. Report Format / Distribution: Standard, PDF, Excel, Digital. Service Requested: Regular. Analysis Request table with 12 samples (SK-1 to SK-12) and columns for Liver, Gonads, Muscle, % moisture content, Sex.

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

* Please include following addresses: kym.keogh@gov.bc.ca and have a COPY mailed to: Confidential lab results, Soda creek SK sampling, 2672 Indian Drive, Williams Lake, BC, V0K2G0

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use), SHIPMENT RECEPTION (lab use only), SHIPMENT VERIFICATION (lab use only) table with fields for Released by, Date, Time, Received by, Date, Time, Temperature, Verified by, Date, Time, Observations.



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC V0L 1N0

Date Received: 21-AUG-14
Report Date: 27-OCT-14 17:13 (MT)
Version: FINAL REV. 2

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1506196
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: 1
Legal Site Desc:

Comments: Addendum.

27-OCT-2014 Revision 2: This report was originally processed under Red Chris Development Company Ltd. It was transferred to Mount Polley Mining Corp's possession as per Jack Love's requests.

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1506196-1	L1506196-2	L1506196-3	L1506196-4	L1506196-5
		Description	Fish	Fish	Fish	Fish	Fish
		Sampled Date	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14
		Sampled Time	11:00	11:00	11:00	11:00	11:00
		Client ID	SK-13 TAG#02555 MUSCLE	SK-14 TAG#02554 MUSCLE	SK-15 TAG#02553 MUSCLE	SK-16 TAG#02552 MUSCLE	SK-17 TAG#71726 MUSCLE
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		73.4	75.3	72.9	72.6	73.4
Metals	Aluminum (Al)-Total (mg/kg wwt)		<0.40	<0.40	<0.40	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)		0.453	0.318	0.428	0.418	0.377
	Barium (Ba)-Total (mg/kg wwt)		<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)		0.0040	0.0053	0.0052	0.0044	0.0053
	Calcium (Ca)-Total (mg/kg wwt)		64.7	59.2	60.4	64.5	101
	Cesium (Cs)-Total (mg/kg wwt)		0.0176	0.0200	0.0172	0.0172	0.0235
	Chromium (Cr)-Total (mg/kg wwt)		<0.010	0.019	0.023	0.022	<0.010
	Cobalt (Co)-Total (mg/kg wwt)		0.0070	0.0055	0.0059	0.0075	0.0052
	Copper (Cu)-Total (mg/kg wwt)		0.736	0.777	0.694	0.731	0.698
	Iron (Fe)-Total (mg/kg wwt)		7.52	6.18	4.19	4.51	5.85
	Lead (Pb)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)		262	246	265	265	292
	Manganese (Mn)-Total (mg/kg wwt)		0.073	0.085	0.066	0.057	0.060
	Mercury (Hg)-Total (mg/kg wwt)		0.0535	0.0379	0.0414	0.0459	0.0447
	Molybdenum (Mo)-Total (mg/kg wwt)		<0.0040	0.0044	0.0061	0.0049	<0.0040
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg wwt)		2580	2430	2460	2540	2820
	Potassium (K)-Total (mg/kg wwt)		3660	3690	3680	3680	3980
	Rubidium (Rb)-Total (mg/kg wwt)		0.937	0.915	0.894	0.885	1.02
	Selenium (Se)-Total (mg/kg wwt)		0.263	0.269	0.263	0.276	0.278
	Sodium (Na)-Total (mg/kg wwt)		364	472	431	361	338
	Strontium (Sr)-Total (mg/kg wwt)		0.184	0.140	0.168	0.180	0.310
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)		0.00097	0.00042	0.00041	0.00073	0.00148
	Tin (Sn)-Total (mg/kg wwt)		<0.020	0.027	<0.020	<0.020	0.034
	Uranium (U)-Total (mg/kg wwt)		<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg wwt)		<0.020	<0.020	0.027	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg wwt)		3.72	3.52	3.79	3.55	3.67
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1506196-6	L1506196-7	L1506196-8	L1506196-9	L1506196-10
		Description	Fish	Fish	Fish	Fish	Fish
		Sampled Date	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14
		Sampled Time	11:00	11:00	11:00	11:00	11:00
		Client ID	SK-18 TAG#71727 MUSCLE	SK-19 TAG#71728 MUSCLE	SK-20 TAG#71729 MUSCLE	SK-21 TAG#71730 MUSCLE	SK-22 TAG#71731 MUSCLE
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		71.4	71.8	71.4	72.8	72.8
Metals	Aluminum (Al)-Total (mg/kg wwt)		<0.40	<0.40	<0.40	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)		0.559	0.567	0.741	0.502	0.351
	Barium (Ba)-Total (mg/kg wwt)		<0.010	<0.010	<0.010	<0.010	0.010
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)		0.0090	0.0065	0.0074	0.0053	0.0037
	Calcium (Ca)-Total (mg/kg wwt)		55.0	101	63.9	81.8	115
	Cesium (Cs)-Total (mg/kg wwt)		0.0160	0.0168	0.0143	0.0191	0.0223
	Chromium (Cr)-Total (mg/kg wwt)		<0.010	0.016	<0.010	<0.010	0.011
	Cobalt (Co)-Total (mg/kg wwt)		0.0062	0.0058	0.0049	0.0057	0.0061
	Copper (Cu)-Total (mg/kg wwt)		0.793	0.891	0.613	0.987	0.576
	Iron (Fe)-Total (mg/kg wwt)		5.12	6.52	4.19	5.67	4.63
	Lead (Pb)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)		257	253	254	283	283
	Manganese (Mn)-Total (mg/kg wwt)		0.070	0.082	0.060	0.075	0.063
	Mercury (Hg)-Total (mg/kg wwt)		0.0634	0.0573	0.0423	0.0637	0.0365
	Molybdenum (Mo)-Total (mg/kg wwt)		<0.0040	0.0049	0.0041	<0.0040	<0.0040
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	0.052	<0.040
	Phosphorus (P)-Total (mg/kg wwt)		2540	2570	2360	2660	2780
	Potassium (K)-Total (mg/kg wwt)		3840	3770	3490	3880	3990
	Rubidium (Rb)-Total (mg/kg wwt)		0.859	0.882	0.857	0.957	0.957
	Selenium (Se)-Total (mg/kg wwt)		0.285	0.271	0.221	0.319	0.262
	Sodium (Na)-Total (mg/kg wwt)		404	396	304	355	366
	Strontium (Sr)-Total (mg/kg wwt)		0.151	0.330	0.176	0.262	0.387
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)		<0.00040	0.00078	0.00056	0.00056	0.00093
	Tin (Sn)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	<0.020	0.022
	Uranium (U)-Total (mg/kg wwt)		<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg wwt)		3.74	3.78	3.27	4.45	3.33
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1506196-11	L1506196-12	L1506196-13	L1506196-14	L1506196-15
		Description	Fish	Fish	Fish	Fish	Fish
		Sampled Date	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14
		Sampled Time	11:00	11:00	11:00	11:00	11:00
		Client ID	SK-23 TAG#71732 MUSCLE	SK-24 TAG#71733 MUSCLE	SK-13 TAG#02555 LIVER	SK-14 TAG#02554 LIVER	SK-15 TAG#02553 LIVER
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		71.2	74.0	78.0	78.2	77.8
Metals	Aluminum (Al)-Total (mg/kg wwt)		<0.40	<0.40	<0.40	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)		0.450	0.271	0.566	0.244	0.253
	Barium (Ba)-Total (mg/kg wwt)		<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)		0.0051	0.0076	0.852	0.721	1.25
	Calcium (Ca)-Total (mg/kg wwt)		76.6	64.3	72.5	98.6	67.3
	Cesium (Cs)-Total (mg/kg wwt)		0.0201	0.0207	0.0066	0.0060	0.0071
	Chromium (Cr)-Total (mg/kg wwt)		<0.010	0.014	0.027	<0.010	0.023
	Cobalt (Co)-Total (mg/kg wwt)		0.0049	0.0064	0.0367	0.0169	0.0338
	Copper (Cu)-Total (mg/kg wwt)		0.845	0.700	47.5	85.4	252
	Iron (Fe)-Total (mg/kg wwt)		4.44	4.62	99.4	32.5	98.6
	Lead (Pb)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	0.0851
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)		276	288	181	221	150
	Manganese (Mn)-Total (mg/kg wwt)		0.059	0.058	1.47	1.53	1.16
	Mercury (Hg)-Total (mg/kg wwt)		0.0482	0.0657	0.0978	0.0617	0.117
	Molybdenum (Mo)-Total (mg/kg wwt)		<0.0040	<0.0040	0.181	0.155	0.176
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	0.059
	Phosphorus (P)-Total (mg/kg wwt)		2690	2830	3410	3980	2950
	Potassium (K)-Total (mg/kg wwt)		3800	3970	3720	4560	3160
	Rubidium (Rb)-Total (mg/kg wwt)		0.934	0.929	1.10	1.15	0.845
	Selenium (Se)-Total (mg/kg wwt)		0.286	0.322	6.38	7.21	14.8
	Sodium (Na)-Total (mg/kg wwt)		433	377	1070	725	1290
	Strontium (Sr)-Total (mg/kg wwt)		0.215	0.210	0.234	0.268	0.253
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)		0.00111	0.00111	0.00476	0.00263	0.00196
	Tin (Sn)-Total (mg/kg wwt)		0.025	0.039	0.020	<0.020	0.028
	Uranium (U)-Total (mg/kg wwt)		<0.00040	<0.00040	0.00114	0.00148	0.00085
	Vanadium (V)-Total (mg/kg wwt)		<0.020	<0.020	0.181	0.104	0.235
	Zinc (Zn)-Total (mg/kg wwt)		3.63	3.92	34.1	33.2	42.1
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

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		Sample ID	L1506196-16	L1506196-17	L1506196-18	L1506196-19	L1506196-20
		Description	Fish	Fish	Fish	Fish	Fish
		Sampled Date	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14
		Sampled Time	11:00	11:00	11:00	11:00	11:00
		Client ID	SK-16 TAG#02552 LIVER	SK-17 TAG#71726 LIVER	SK-18 TAG#71727 LIVER	SK-19 TAG#71728 LIVER	SK-20 TAG#71729 LIVER
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		75.8	78.3	76.5	76.4	76.0
Metals	Aluminum (Al)-Total (mg/kg wwt)		<0.40	<0.40	<0.40	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)		0.383	0.382	0.592	0.566	0.566
	Barium (Ba)-Total (mg/kg wwt)		<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	0.0027	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)		1.17	1.60	2.41	1.57	2.63
	Calcium (Ca)-Total (mg/kg wwt)		70.5	75.4	65.4	78.6	83.0
	Cesium (Cs)-Total (mg/kg wwt)		0.0086	0.0075	0.0060	0.0069	0.0073
	Chromium (Cr)-Total (mg/kg wwt)		0.055	0.015	<0.010	0.036	0.014
	Cobalt (Co)-Total (mg/kg wwt)		0.0483	0.0188	0.0272	0.0258	0.0382
	Copper (Cu)-Total (mg/kg wwt)		343	103	318	47.2	84.4
	Iron (Fe)-Total (mg/kg wwt)		129	102	144	81.9	78.8
	Lead (Pb)-Total (mg/kg wwt)		0.0062	<0.0040	0.0046	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)		153	181	158	209	199
	Manganese (Mn)-Total (mg/kg wwt)		1.28	1.45	1.46	1.45	1.78
	Mercury (Hg)-Total (mg/kg wwt)		0.113	0.0773	0.111	0.115	0.0858
	Molybdenum (Mo)-Total (mg/kg wwt)		0.171	0.180	0.166	0.200	0.187
	Nickel (Ni)-Total (mg/kg wwt)		0.061	<0.040	<0.040	0.041	<0.040
	Phosphorus (P)-Total (mg/kg wwt)		2970	3410	3220	3660	3660
	Potassium (K)-Total (mg/kg wwt)		3090	3860	3390	3580	3620
	Rubidium (Rb)-Total (mg/kg wwt)		0.805	1.10	0.838	0.930	1.05
	Selenium (Se)-Total (mg/kg wwt)		17.3	10.6	15.3	6.19	6.28
	Sodium (Na)-Total (mg/kg wwt)		1160	1030	1140	1050	996
	Strontium (Sr)-Total (mg/kg wwt)		0.258	0.193	0.169	0.325	0.256
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)		0.00284	0.00741	0.00218	0.00493	0.00314
	Tin (Sn)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg wwt)		0.00079	0.00124	0.00098	0.00175	0.00128
	Vanadium (V)-Total (mg/kg wwt)		0.119	0.053	0.256	0.089	0.096
	Zinc (Zn)-Total (mg/kg wwt)		80.4	38.2	42.6	33.3	41.9
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

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		Sample ID	L1506196-21	L1506196-22	L1506196-23	L1506196-24	L1506196-25
		Description	Fish	Fish	Fish	Fish	Fish
		Sampled Date	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14
		Sampled Time	11:00	11:00	11:00	11:00	11:00
		Client ID	SK-21 TAG#71730 LIVER	SK-22 TAG#71731 LIVER	SK-23 TAG#71732 LIVER	SK-24 TAG#71733 LIVER	SK-13 TAG#02555 GONADS
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		77.2	77.1	77.5	77.8	55.4
Metals	Aluminum (Al)-Total (mg/kg wwt)		<0.40	<0.40	<0.40	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)		0.653	0.384	0.465	0.411	0.253
	Barium (Ba)-Total (mg/kg wwt)		<0.010	<0.010	<0.010	<0.010	0.068
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)		0.894	1.07	1.10	0.954	0.0212
	Calcium (Ca)-Total (mg/kg wwt)		109	61.1	71.1	83.8	460
	Cesium (Cs)-Total (mg/kg wwt)		0.0082	0.0085	0.0095	0.0088	0.0076
	Chromium (Cr)-Total (mg/kg wwt)		0.018	0.019	0.054	0.024	<0.010
	Cobalt (Co)-Total (mg/kg wwt)		0.0356	0.0394	0.0394	0.0367	0.0375
	Copper (Cu)-Total (mg/kg wwt)		87.9	292	253	254	61.8
	Iron (Fe)-Total (mg/kg wwt)		113	193	122	98.6	26.4
	Lead (Pb)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)		201	144	159	150	583
	Manganese (Mn)-Total (mg/kg wwt)		1.51	1.15	1.32	1.33	0.835
	Mercury (Hg)-Total (mg/kg wwt)		0.109	0.116	0.0991	0.0923	0.0060
	Molybdenum (Mo)-Total (mg/kg wwt)		0.195	0.150	0.183	0.155	0.0083
	Nickel (Ni)-Total (mg/kg wwt)		0.070	0.049	0.069	0.045	<0.040
	Phosphorus (P)-Total (mg/kg wwt)		3380	2860	3140	2950	4360
	Potassium (K)-Total (mg/kg wwt)		3210	3070	3230	3220	2180
	Rubidium (Rb)-Total (mg/kg wwt)		0.936	0.812	0.887	0.851	0.558
	Selenium (Se)-Total (mg/kg wwt)		7.54	22.6	16.1	19.9	3.41
	Sodium (Na)-Total (mg/kg wwt)		1040	1250	1280	1230	636
	Strontium (Sr)-Total (mg/kg wwt)		0.469	0.242	0.244	0.352	3.47
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)		0.00381	0.00391	0.00599	0.00437	0.00077
	Tin (Sn)-Total (mg/kg wwt)		<0.020	<0.020	0.021	0.042	<0.020
	Uranium (U)-Total (mg/kg wwt)		0.00092	0.00062	0.00097	0.00094	0.00116
	Vanadium (V)-Total (mg/kg wwt)		0.201	0.079	0.131	0.273	<0.020
	Zinc (Zn)-Total (mg/kg wwt)		51.1	48.2	37.8	35.3	44.3
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

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		Sample ID	L1506196-26	L1506196-27	L1506196-28	L1506196-29	L1506196-30
		Description	Fish	Fish	Fish	Fish	Fish
		Sampled Date	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14
		Sampled Time	11:00	11:00	11:00	11:00	11:00
		Client ID	SK-14 TAG#02554 GONADS	SK-15 TAG#02553 GONADS	SK-16 TAG#02552 GONADS	SK-17 TAG#71726 GONADS	SK-18 TAG#71727 GONADS
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		56.8	77.6	78.2	55.5	80.3
Metals	Aluminum (Al)-Total (mg/kg wwt)		<0.40	<0.40	<0.40	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)		0.182	0.115	0.191	0.251	0.234
	Barium (Ba)-Total (mg/kg wwt)		0.033	<0.010	<0.010	0.079	<0.010
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)		0.0199	0.0276	0.0314	0.0400	0.0261
	Calcium (Ca)-Total (mg/kg wwt)		505	44.3	56.1	379	44.3
	Cesium (Cs)-Total (mg/kg wwt)		0.0080	0.0106	0.0129	0.0089	0.0089
	Chromium (Cr)-Total (mg/kg wwt)		<0.010	0.019	<0.010	<0.010	<0.010
	Cobalt (Co)-Total (mg/kg wwt)		0.0212	0.0160	0.0256	0.0577	0.0171
	Copper (Cu)-Total (mg/kg wwt)		35.5	0.808	1.50	87.4	0.821
	Iron (Fe)-Total (mg/kg wwt)		13.4	8.83	13.0	36.4	6.14
	Lead (Pb)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	0.0042	<0.0040
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)		569	191	189	525	178
	Manganese (Mn)-Total (mg/kg wwt)		0.978	0.140	0.154	1.43	0.134
	Mercury (Hg)-Total (mg/kg wwt)		0.0040	0.0142	0.0175	0.0073	0.0187
	Molybdenum (Mo)-Total (mg/kg wwt)		0.0070	0.0054	0.0065	0.0085	0.0053
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg wwt)		4550	9550	7440	3480	7630
	Potassium (K)-Total (mg/kg wwt)		2430	3840	3890	1850	4020
	Rubidium (Rb)-Total (mg/kg wwt)		0.563	1.18	1.10	0.491	1.14
	Selenium (Se)-Total (mg/kg wwt)		2.51	0.314	0.382	3.43	0.298
	Sodium (Na)-Total (mg/kg wwt)		583	1130	959	720	1130
	Strontium (Sr)-Total (mg/kg wwt)		3.64	0.157	0.220	2.90	0.147
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)		<0.00040	0.00079	0.00144	0.00083	0.00084
	Tin (Sn)-Total (mg/kg wwt)		<0.020	0.031	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg wwt)		0.00122	<0.00040	<0.00040	0.00143	<0.00040
	Vanadium (V)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg wwt)		25.8	10.2	27.4	58.8	12.3
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

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		Sample ID	L1506196-31	L1506196-32	L1506196-33	L1506196-34	L1506196-35
		Description	Fish	Fish	Fish	Fish	Fish
		Sampled Date	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14
		Sampled Time	11:00	11:00	11:00	11:00	11:00
		Client ID	SK-19 TAG#71728 GONADS	SK-20 TAG#71729 GONADS	SK-21 TAG#71730 GONADS	SK-22 TAG#71731 GONADS	SK-23 TAG#71732 GONADS
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		55.6	55.5	55.4	79.6	79.4
Metals	Aluminum (Al)-Total (mg/kg wwt)		<0.40	<0.40	<0.40	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)		0.293	0.503	0.368	0.180	0.187
	Barium (Ba)-Total (mg/kg wwt)		0.079	0.035	0.042	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)		0.0330	0.0780	0.0371	0.0137	0.0174
	Calcium (Ca)-Total (mg/kg wwt)		509	487	369	51.0	51.2
	Cesium (Cs)-Total (mg/kg wwt)		0.0081	0.0080	0.0082	0.0137	0.0145
	Chromium (Cr)-Total (mg/kg wwt)		<0.010	<0.010	<0.010	0.018	0.011
	Cobalt (Co)-Total (mg/kg wwt)		0.0212	0.0448	0.0490	0.0172	0.0158
	Copper (Cu)-Total (mg/kg wwt)		40.9	76.4	78.0	0.597	0.782
	Iron (Fe)-Total (mg/kg wwt)		23.3	29.2	36.2	15.6	16.2
	Lead (Pb)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)		657	555	613	176	177
	Manganese (Mn)-Total (mg/kg wwt)		0.636	1.58	1.12	0.142	0.129
	Mercury (Hg)-Total (mg/kg wwt)		0.0071	0.0065	0.0103	0.0151	0.0170
	Molybdenum (Mo)-Total (mg/kg wwt)		0.0081	0.0084	0.0083	0.0072	<0.0040
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	0.052	0.041	<0.040
	Phosphorus (P)-Total (mg/kg wwt)		4330	4180	3680	7550	8680
	Potassium (K)-Total (mg/kg wwt)		2190	2100	1910	4160	4210
	Rubidium (Rb)-Total (mg/kg wwt)		0.513	0.577	0.514	1.19	1.23
	Selenium (Se)-Total (mg/kg wwt)		2.87	3.10	3.64	0.332	0.371
	Sodium (Na)-Total (mg/kg wwt)		583	707	672	965	1110
	Strontium (Sr)-Total (mg/kg wwt)		4.08	3.17	3.11	0.201	0.186
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)		0.00065	<0.00040	0.00049	0.00200	0.00230
	Tin (Sn)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg wwt)		0.00191	0.00102	0.00080	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg wwt)		29.2	45.3	58.4	15.3	12.6
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1506196-36				
Description	Fish				
Sampled Date	20-AUG-14				
Sampled Time	11:00				
Client ID	SK-24 TAG#71733 GONADS				
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)	78.9			
Metals	Aluminum (Al)-Total (mg/kg wwt)	<0.40			
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020			
	Arsenic (As)-Total (mg/kg wwt)	0.192			
	Barium (Ba)-Total (mg/kg wwt)	<0.010			
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020			
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020			
	Boron (B)-Total (mg/kg wwt)	<0.20			
	Cadmium (Cd)-Total (mg/kg wwt)	0.0130			
	Calcium (Ca)-Total (mg/kg wwt)	59.0			
	Cesium (Cs)-Total (mg/kg wwt)	0.0139			
	Chromium (Cr)-Total (mg/kg wwt)	<0.010			
	Cobalt (Co)-Total (mg/kg wwt)	0.0185			
	Copper (Cu)-Total (mg/kg wwt)	0.754			
	Iron (Fe)-Total (mg/kg wwt)	9.92			
	Lead (Pb)-Total (mg/kg wwt)	<0.0040			
	Lithium (Li)-Total (mg/kg wwt)	<0.10			
	Magnesium (Mg)-Total (mg/kg wwt)	182			
	Manganese (Mn)-Total (mg/kg wwt)	0.144			
	Mercury (Hg)-Total (mg/kg wwt)	0.0160			
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0058			
	Nickel (Ni)-Total (mg/kg wwt)	<0.040			
	Phosphorus (P)-Total (mg/kg wwt)	8280			
	Potassium (K)-Total (mg/kg wwt)	4240			
	Rubidium (Rb)-Total (mg/kg wwt)	1.32			
	Selenium (Se)-Total (mg/kg wwt)	0.355			
	Sodium (Na)-Total (mg/kg wwt)	1010			
	Strontium (Sr)-Total (mg/kg wwt)	0.259			
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040			
	Thallium (Tl)-Total (mg/kg wwt)	0.00192			
	Tin (Sn)-Total (mg/kg wwt)	<0.020			
	Uranium (U)-Total (mg/kg wwt)	<0.00040			
	Vanadium (V)-Total (mg/kg wwt)	<0.020			
	Zinc (Zn)-Total (mg/kg wwt)	12.2			
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-WET-CVAFS-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7. This digestion procedure was implemented on October 5, 2009.</p>			
MET-WET-CCMS-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p>			
<p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
<p>This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

1

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1506196

Report Date: 27-OCT-14

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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0
 Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-WET-CVAFS-VA		Tissue						
Batch R2959657								
WG1957194-4 CRM		VA-NRC-TORT3						
Mercury (Hg)-Total			101.8		%		70-130	25-SEP-14
WG1957194-5 CRM		VA-NIST-1566B						
Mercury (Hg)-Total			92.2		%		70-130	25-SEP-14
WG1957194-3 DUP		L1506196-7						
Mercury (Hg)-Total		0.0573	0.0487		mg/kg wwt	16	40	25-SEP-14
WG1957194-1 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	25-SEP-14
WG1957194-2 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	25-SEP-14
Batch R2969674								
WG1959368-4 CRM		VA-NRC-TORT3						
Mercury (Hg)-Total			116.6		%		70-130	02-OCT-14
WG1959368-5 CRM		VA-NIST-1566B						
Mercury (Hg)-Total			119.4		%		70-130	02-OCT-14
WG1959368-3 DUP		L1506196-6						
Mercury (Hg)-Total		0.0634	0.0633		mg/kg wwt	0.2	40	02-OCT-14
WG1959368-1 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	02-OCT-14
WG1959368-2 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	02-OCT-14
MET-WET-CCMS-VA		Tissue						
Batch R2975828								
WG1959368-4 CRM		VA-NRC-TORT3						
Arsenic (As)-Total			108.0		%		70-130	07-OCT-14
Cadmium (Cd)-Total			104.1		%		70-130	07-OCT-14
Chromium (Cr)-Total			102.1		%		70-130	07-OCT-14
Cobalt (Co)-Total			108.2		%		70-130	07-OCT-14
Copper (Cu)-Total			96.9		%		70-130	07-OCT-14
Iron (Fe)-Total			98.6		%		70-130	07-OCT-14
Lead (Pb)-Total			92.7		%		70-130	07-OCT-14
Manganese (Mn)-Total			100.7		%		70-130	07-OCT-14
Molybdenum (Mo)-Total			104.5		%		70-130	07-OCT-14
Nickel (Ni)-Total			102.3		%		70-130	07-OCT-14
Selenium (Se)-Total			102.3		%		70-130	07-OCT-14
Strontium (Sr)-Total			100.4		%		70-130	07-OCT-14
Vanadium (V)-Total			104.5		%		70-130	07-OCT-14



Quality Control Report

Workorder: L1506196

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA		Tissue						
Batch	R2975828							
WG1959368-4	CRM	VA-NRC-TORT3						
Zinc (Zn)-Total			101.5		%		70-130	07-OCT-14
WG1959368-5	CRM	VA-NIST-1566B						
Antimony (Sb)-Total			0.0090		mg/kg wwt		0.001-0.021	07-OCT-14
Arsenic (As)-Total			94.6		%		70-130	07-OCT-14
Barium (Ba)-Total			85.1		%		70-130	07-OCT-14
Boron (B)-Total			4.65		mg/kg wwt		3.5-5.5	07-OCT-14
Cadmium (Cd)-Total			105.0		%		70-130	07-OCT-14
Calcium (Ca)-Total			97.9		%		70-130	07-OCT-14
Cobalt (Co)-Total			101.6		%		70-130	07-OCT-14
Copper (Cu)-Total			98.7		%		70-130	07-OCT-14
Iron (Fe)-Total			95.2		%		70-130	07-OCT-14
Lead (Pb)-Total			95.7		%		70-130	07-OCT-14
Magnesium (Mg)-Total			101.9		%		70-130	07-OCT-14
Manganese (Mn)-Total			100.3		%		70-130	07-OCT-14
Nickel (Ni)-Total			98.0		%		70-130	07-OCT-14
Potassium (K)-Total			103.4		%		70-130	07-OCT-14
Rubidium (Rb)-Total			101.5		%		70-130	07-OCT-14
Selenium (Se)-Total			103.8		%		70-130	07-OCT-14
Sodium (Na)-Total			96.0		%		70-130	07-OCT-14
Strontium (Sr)-Total			95.7		%		70-130	07-OCT-14
Uranium (U)-Total			99.6		%		70-130	07-OCT-14
Vanadium (V)-Total			93.2		%		70-130	07-OCT-14
Zinc (Zn)-Total			99.8		%		70-130	07-OCT-14
WG1959368-3	DUP	L1506196-6						
Aluminum (Al)-Total		<0.40	<0.40	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Antimony (Sb)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Arsenic (As)-Total		0.559	0.493		mg/kg wwt	13	40	07-OCT-14
Barium (Ba)-Total		<0.010	<0.010	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Beryllium (Be)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Bismuth (Bi)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Boron (B)-Total		<0.20	<0.20	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Cadmium (Cd)-Total		0.0090	0.0080		mg/kg wwt	12	40	07-OCT-14
Calcium (Ca)-Total		55.0	68.9		mg/kg wwt	22	60	07-OCT-14
Cesium (Cs)-Total		0.0160	0.0158		mg/kg wwt	1.4	40	07-OCT-14
Chromium (Cr)-Total		<0.010	<0.010	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14



Quality Control Report

Workorder: L1506196

Report Date: 27-OCT-14

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R2975828							
WG1959368-3	DUP	L1506196-6						
Cobalt (Co)-Total		0.0062	0.0054		mg/kg wwt	14	40	07-OCT-14
Copper (Cu)-Total		0.793	0.627		mg/kg wwt	23	40	07-OCT-14
Iron (Fe)-Total		5.12	4.32		mg/kg wwt	17	40	07-OCT-14
Lead (Pb)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Lithium (Li)-Total		<0.10	<0.10	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Magnesium (Mg)-Total		257	257		mg/kg wwt	0.0	40	07-OCT-14
Manganese (Mn)-Total		0.070	0.063		mg/kg wwt	11	40	07-OCT-14
Molybdenum (Mo)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Nickel (Ni)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Phosphorus (P)-Total		2540	2490		mg/kg wwt	2.0	40	07-OCT-14
Potassium (K)-Total		3840	3790		mg/kg wwt	1.5	40	07-OCT-14
Rubidium (Rb)-Total		0.859	0.833		mg/kg wwt	3.1	40	07-OCT-14
Selenium (Se)-Total		0.285	0.278		mg/kg wwt	2.3	40	07-OCT-14
Sodium (Na)-Total		404	386		mg/kg wwt	4.6	40	07-OCT-14
Strontium (Sr)-Total		0.151	0.214		mg/kg wwt	35	60	07-OCT-14
Tellurium (Te)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Thallium (Tl)-Total		<0.00040	<0.00040	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Tin (Sn)-Total		<0.020	<0.020	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Uranium (U)-Total		<0.00040	<0.00040	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Vanadium (V)-Total		<0.020	<0.020	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
Zinc (Zn)-Total		3.74	3.44		mg/kg wwt	8.3	40	07-OCT-14
Zirconium (Zr)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	07-OCT-14
WG1959368-1								
MB								
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	07-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	07-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	07-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	07-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	07-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	07-OCT-14
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	07-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	07-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	07-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14



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Workorder: L1506196

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA		Tissue						
Batch	R2975828							
WG1959368-1 MB								
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	07-OCT-14
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	07-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	07-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	07-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	07-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	07-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	07-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	07-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	07-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	07-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	07-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	07-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	07-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	07-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	07-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	07-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	07-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	07-OCT-14
WG1959368-2 MB								
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	07-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	07-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	07-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	07-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	07-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	07-OCT-14
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	07-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	07-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	07-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14



Quality Control Report

Workorder: L1506196

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R2975828							
WG1959368-2	MB							
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	07-OCT-14
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	07-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	07-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	07-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	07-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	07-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	07-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	07-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	07-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	07-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	07-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	07-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	07-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	07-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	07-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	07-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	07-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	07-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	07-OCT-14
Batch	R2977828							
WG1969607-4	CRM	VA-NRC-TORT3						
Arsenic (As)-Total			110.6		%		70-130	08-OCT-14
Cadmium (Cd)-Total			99.5		%		70-130	08-OCT-14
Chromium (Cr)-Total			112.9		%		70-130	08-OCT-14
Cobalt (Co)-Total			102.7		%		70-130	08-OCT-14
Copper (Cu)-Total			90.0		%		70-130	08-OCT-14
Iron (Fe)-Total			95.9		%		70-130	08-OCT-14
Lead (Pb)-Total			87.8		%		70-130	08-OCT-14
Manganese (Mn)-Total			96.1		%		70-130	08-OCT-14
Molybdenum (Mo)-Total			98.8		%		70-130	08-OCT-14
Nickel (Ni)-Total			99.1		%		70-130	08-OCT-14



Quality Control Report

Workorder: L1506196

Report Date: 27-OCT-14

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA		Tissue						
Batch	R2977828							
WG1969607-4	CRM	VA-NRC-TORT3						
Selenium (Se)-Total			96.0		%		70-130	08-OCT-14
Strontium (Sr)-Total			94.6		%		70-130	08-OCT-14
Vanadium (V)-Total			100.5		%		70-130	08-OCT-14
Zinc (Zn)-Total			90.2		%		70-130	08-OCT-14
WG1969607-5	CRM	VA-NIST-1566B						
Antimony (Sb)-Total			0.0064		mg/kg wwt		0.001-0.021	08-OCT-14
Arsenic (As)-Total			94.5		%		70-130	08-OCT-14
Barium (Ba)-Total			79.9		%		70-130	08-OCT-14
Boron (B)-Total			4.45		mg/kg wwt		3.5-5.5	08-OCT-14
Cadmium (Cd)-Total			99.3		%		70-130	08-OCT-14
Calcium (Ca)-Total			94.1		%		70-130	08-OCT-14
Cobalt (Co)-Total			95.1		%		70-130	08-OCT-14
Copper (Cu)-Total			93.6		%		70-130	08-OCT-14
Iron (Fe)-Total			91.7		%		70-130	08-OCT-14
Lead (Pb)-Total			91.3		%		70-130	08-OCT-14
Magnesium (Mg)-Total			94.3		%		70-130	08-OCT-14
Manganese (Mn)-Total			93.6		%		70-130	08-OCT-14
Nickel (Ni)-Total			92.0		%		70-130	08-OCT-14
Potassium (K)-Total			93.0		%		70-130	08-OCT-14
Rubidium (Rb)-Total			93.8		%		70-130	08-OCT-14
Selenium (Se)-Total			94.4		%		70-130	08-OCT-14
Sodium (Na)-Total			90.6		%		70-130	08-OCT-14
Strontium (Sr)-Total			91.4		%		70-130	08-OCT-14
Uranium (U)-Total			95.7		%		70-130	08-OCT-14
Vanadium (V)-Total			90.0		%		70-130	08-OCT-14
Zinc (Zn)-Total			88.3		%		70-130	08-OCT-14
WG1969607-3	DUP	L1506196-7						
Aluminum (Al)-Total		<0.40	<0.40	RPD-NA	mg/kg wwt	N/A	40	08-OCT-14
Antimony (Sb)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	08-OCT-14
Arsenic (As)-Total		0.567	0.585		mg/kg wwt	3.1	40	08-OCT-14
Barium (Ba)-Total		<0.010	<0.010	RPD-NA	mg/kg wwt	N/A	40	08-OCT-14
Beryllium (Be)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	08-OCT-14
Bismuth (Bi)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	08-OCT-14
Boron (B)-Total		<0.20	<0.20	RPD-NA	mg/kg wwt	N/A	40	08-OCT-14
Cadmium (Cd)-Total		0.0065	0.0068		mg/kg wwt	5.3	40	08-OCT-14



Quality Control Report

Workorder: L1506196

Report Date: 27-OCT-14

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R2977828							
WG1969607-3	DUP	L1506196-7						
Calcium (Ca)-Total		101	94.5		mg/kg wwt	6.4	60	08-OCT-14
Cesium (Cs)-Total		0.0168	0.0171		mg/kg wwt	1.7	40	08-OCT-14
Chromium (Cr)-Total		0.016	<0.010	RPD-NA	mg/kg wwt	N/A	40	08-OCT-14
Cobalt (Co)-Total		0.0058	0.0061		mg/kg wwt	5.5	40	08-OCT-14
Copper (Cu)-Total		0.891	1.03		mg/kg wwt	15	40	08-OCT-14
Iron (Fe)-Total		6.52	7.18		mg/kg wwt	9.6	40	08-OCT-14
Lead (Pb)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	08-OCT-14
Lithium (Li)-Total		<0.10	<0.10	RPD-NA	mg/kg wwt	N/A	40	08-OCT-14
Magnesium (Mg)-Total		253	258		mg/kg wwt	1.8	40	08-OCT-14
Manganese (Mn)-Total		0.082	0.089		mg/kg wwt	8.2	40	08-OCT-14
Molybdenum (Mo)-Total		0.0049	0.0046		mg/kg wwt	6.5	40	08-OCT-14
Nickel (Ni)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	08-OCT-14
Phosphorus (P)-Total		2570	2630		mg/kg wwt	2.4	40	08-OCT-14
Potassium (K)-Total		3770	3940		mg/kg wwt	4.3	40	08-OCT-14
Rubidium (Rb)-Total		0.882	0.894		mg/kg wwt	1.3	40	08-OCT-14
Selenium (Se)-Total		0.271	0.278		mg/kg wwt	2.4	40	08-OCT-14
Sodium (Na)-Total		396	415		mg/kg wwt	4.7	40	08-OCT-14
Strontium (Sr)-Total		0.330	0.307		mg/kg wwt	7.2	60	08-OCT-14
Tellurium (Te)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	08-OCT-14
Thallium (Tl)-Total		0.00078	0.00084		mg/kg wwt	7.7	40	08-OCT-14
Tin (Sn)-Total		<0.020	0.020	RPD-NA	mg/kg wwt	N/A	40	08-OCT-14
Uranium (U)-Total		<0.00040	<0.00040	RPD-NA	mg/kg wwt	N/A	40	08-OCT-14
Vanadium (V)-Total		<0.020	<0.020	RPD-NA	mg/kg wwt	N/A	40	08-OCT-14
Zinc (Zn)-Total		3.78	3.92		mg/kg wwt	3.6	40	08-OCT-14
Zirconium (Zr)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	08-OCT-14
WG1969607-1	MB							
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	08-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	08-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	08-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	08-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	08-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	08-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	08-OCT-14
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	08-OCT-14



Quality Control Report

Workorder: L1506196

Report Date: 27-OCT-14

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA	Tissue							
Batch	R2977828							
WG1969607-1 MB								
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	08-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	08-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	08-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	08-OCT-14
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	08-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	08-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	08-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	08-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	08-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	08-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	08-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	08-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	08-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	08-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	08-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	08-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	08-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	08-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	08-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	08-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	08-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	08-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	08-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	08-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	08-OCT-14
WG1969607-2 MB								
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	08-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	08-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	08-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	08-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	08-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	08-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	08-OCT-14
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	08-OCT-14



Quality Control Report

Workorder: L1506196

Report Date: 27-OCT-14

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R2977828							
WG1969607-2	MB							
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	08-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	08-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	08-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	08-OCT-14
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	08-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	08-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	08-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	08-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	08-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	08-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	08-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	08-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	08-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	08-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	08-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	08-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	08-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	08-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	08-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	08-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	08-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	08-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	08-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	08-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	08-OCT-14
MOISTURE-TISS-VA								
	Tissue							
Batch	R2953158							
WG1954883-3	DUP	L1506196-7						
% Moisture		71.8	72.0		%	0.3	20	18-SEP-14
WG1954883-4	DUP	L1506196-26						
% Moisture		56.8	57.6		%	1.5	20	18-SEP-14
Batch	R2955709							
WG1956326-2	DUP	L1506196-27						
% Moisture		77.6	77.5		%	0.2	20	21-SEP-14

Quality Control Report

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS LABORATORY GROUP ANALYTICAL REPORT

ALS Lab WO#: L1506196

Client ID	Liver - Total Weight (g)	Gonad - Total Weight (g)
SK-13 TAG#02555	48.637	126.64
SK-14 TAG#02554	63.196	212.84
SK-15 TAG#02553	48.262	70.053
SK-16 TAG#02552	15.179	31.847
SK-17 TAG#71726	30.653	56.002
SK-18 TAG#71727	50.622	62.059
SK-19 TAG#71728	50.479	174.01
SK-20 TAG#71729	43.601	98.249
SK-21 TAG#71730	27.891	80.284
SK-22 TAG#71731	23.273	27.714
SK-23 TAG#71732	18.145	34.514
SK-24 TAG#71733	16.498	22.523



L1506196-COFC

Report To		Report Format / Distribution			Service Requested (Rush for routine analysis subject to availability)																																																																																																				
Company: Red Chris Development Company		<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)																																																																																																				
Contact: Jack Love/Heather Hawkins		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT																																																																																																				
Address: 200-580 Hornby St. Vancouver, BC V6C 3B6		Email 1: jlove@redchrismine.ca			<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT																																																																																																				
Phone: 604-800-9200 329 Fax:		Email 2: willie.setlars@williamslakeband.ca			<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT																																																																																																				
Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Client / Project Information			Analysis Request																																																																																																				
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		Job #:			Please indicate below Filtered, Preserved or both (F, P, F/P)																																																																																																				
Company:		PO / AFE:			<table border="1"> <tr> <td rowspan="4">Liver(METALS)</td> <td rowspan="4">Gonads(METALS)</td> <td rowspan="4">Muscle(METALS)</td> <td rowspan="4">% moisture content</td> <td rowspan="4">Sex(Confirmation)</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>											Liver(METALS)	Gonads(METALS)	Muscle(METALS)	% moisture content	Sex(Confirmation)																																																																																					
Liver(METALS)	Gonads(METALS)	Muscle(METALS)	% moisture content	Sex(Confirmation)																																																																																																					
Contact:		LSD:																																																																																																							
Address:		Quote #:																																																																																																							
Phone: Fax:		ALS Contact: Can Dang			Sampler: CK,ML,KK,GS,																																																																																																				
Lab Work Order # (lab use only)																																																																																																									
Sample #	Sample Identification (This description will appear on the report)			Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Number of Containers																																																																																																		
	SK-13 tag#02555			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X																																																																																														
	SK-14 tag#02554			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X																																																																																														
	SK-15 tag#02553			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X																																																																																														
	SK-16 tag#02552			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X																																																																																														
	SK-17 tag#71726			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X																																																																																														
	SK-18 tag#71727			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X																																																																																														
	SK-19 tag#71728			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X																																																																																														
	SK-20 tag#71729			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X																																																																																														
	SK-21 tag#71730			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X																																																																																														
	SK-22 tag#71731			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X																																																																																														
	SK-23 tag#71732			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X																																																																																														
	SK-24 tag#71733			Aug 20/2014	11:00-12:30	Other	X	X	X	X	X																																																																																														
Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details																																																																																																									
* Please include following addresses: kym.keogh@gov.bc.ca and have a COPY mailed to: Confidential lab results, Soda creek SK sampling, 2672 Indian Drive, Williams Lake, BC, V0K2G0																																																																																																									
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.																																																																																																									
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.																																																																																																									
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.																																																																																																									
SHIPMENT RELEASE (client use)						SHIPMENT RECEPTION (lab use only)						SHIPMENT VERIFICATION (lab use only)																																																																																													
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:																																																																																															
C. Koenig			DJ	Aug 21	9:30	20C °C				Yes / No ? If Yes add SIF																																																																																															



Sample Receipt Confirmation

36 Samples received at ALS in VANCOUVER

Job Reference #: N/A
Project PO #: N/A
Legal Site Description: N/A
Quote #: Q47599
Lab Work Order #: L1506196
Estimated Completion Date: 10/3/2014

Date Sampled: 8/20/2014
Date Received: 8/21/2014
Sampled By: CK,ML,KK,GS
Chain of Custody: 1
Account Manager: Can Dang
Estimated Sample Disposal Date: 11/2/2014

Sample Integrity Observations:

Observation

Sample integrity compromised
No CofC with Shipment

Details

Sample integrity compromised: Samples not individually isolated within cooler and possible cross-contamination between fish specimens.
No CofC with Shipment.

Report Distribution:

Company Name: MOUNT POLLEY MINING CORP.
Contact: Colleen Hughes
Address: PO Box 12
Likely, BC V0L 1N0
Phone: 250-790-2215
Fax: 250-790-2268
Email: chughes@mountpolley.com
Natalie.neufeld@snclavalin.com
kmcmaheh@mountpolley.com
mia.sakelariou@snclavalin.com
Report Name: CROSSTAB_ALSQC
Digital Type: EHS_MOUNTP
Digital Email: chughes@mountpolley.com
Natalie.neufeld@snclavalin.com
mia.sakelariou@snclavalin.com
kmcmaheh@mountpolley.com
Distribution: **Hard Copy:** N **Email:** Y **Fax:** N

Invoice Distribution:

Acct Name: MOUNT POLLEY MINING CORP. ~LIKELY
Contact: Accounts Payable
Address: PO Box 12,
Likely, BC, VOL 1N0
Phone: 250-790-2215
Fax: --
Invoice Email: prosette@mountpolley.com
chughes@mountpolley.com
Project #: N/A
Account #: MPM100
Distribution: **Hard Copy:** Y **Email:** Y

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type
L1506196-1	SK-13 TAG#02555 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-2	SK-14 TAG#02554 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-3	SK-15 TAG#02553 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-4	SK-16 TAG#02552 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-5	SK-17 TAG#71726 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700

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Sample Receipt Confirmation

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type
L1506196-6	SK-18 TAG#71727 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-7	SK-19 TAG#71728 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-8	SK-20 TAG#71729 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-9	SK-21 TAG#71730 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-10	SK-22 TAG#71731 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-11	SK-23 TAG#71732 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-12	SK-24 TAG#71733 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-13	SK-13 TAG#02555 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-14	SK-14 TAG#02554 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-15	SK-15 TAG#02553 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-16	SK-16 TAG#02552 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-17	SK-17 TAG#71726 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-18	SK-18 TAG#71727 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-19	SK-19 TAG#71728 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-20	SK-20 TAG#71729 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-21	SK-21 TAG#71730 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-22	SK-22 TAG#71731 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-23	SK-23 TAG#71732 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-24	SK-24 TAG#71733 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-25	SK-13 TAG#02555 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-26	SK-14 TAG#02554 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-27	SK-15 TAG#02553 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-28	SK-16 TAG#02552 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-29	SK-17 TAG#71726 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-30	SK-18 TAG#71727 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-31	SK-19 TAG#71728 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-32	SK-20 TAG#71729 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-33	SK-21 TAG#71730 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-34	SK-22 TAG#71731 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506196-35	SK-23 TAG#71732 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish



Sample Receipt Confirmation

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type
L1506196-36	SK-24 TAG#71733 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish



Sample Receipt Confirmation

Analysis Requested:

	Sample Handling and Disposal Fee	Special Request	Mercury in Tissue by CVAFS (WET)	Metals in Tissue by CRC ICPMS (WET)	% Moisture in Tissues	Tissue/Vegetation Sample Preparation
SK-13 TAG#02555 MUSCLE	X	X	X	X	X	X
SK-14 TAG#02554 MUSCLE	X	X	X	X	X	X
SK-15 TAG#02553 MUSCLE	X	X	X	X	X	X
SK-16 TAG#02552 MUSCLE	X	X	X	X	X	X
SK-17 TAG#71726 MUSCLE	X	X	X	X	X	X
SK-18 TAG#71727 MUSCLE	X	X	X	X	X	X
SK-19 TAG#71728 MUSCLE	X	X	X	X	X	X
SK-20 TAG#71729 MUSCLE	X	X	X	X	X	X
SK-21 TAG#71730 MUSCLE	X	X	X	X	X	X
SK-22 TAG#71731 MUSCLE	X	X	X	X	X	X
SK-23 TAG#71732 MUSCLE	X	X	X	X	X	X
SK-24 TAG#71733 MUSCLE	X	X	X	X	X	X
SK-13 TAG#02555 LIVER	X		X	X	X	X
SK-14 TAG#02554 LIVER	X		X	X	X	X
SK-15 TAG#02553 LIVER	X		X	X	X	X
SK-16 TAG#02552 LIVER	X		X	X	X	X
SK-17 TAG#71726 LIVER	X		X	X	X	X
SK-18 TAG#71727 LIVER	X		X	X	X	X
SK-19 TAG#71728 LIVER	X		X	X	X	X



Sample Receipt Confirmation

Analysis Requested:

	Sample Handling and Disposal Fee	Special Request	Mercury in Tissue by CVAFS (WET)	Metals in Tissue by CRC ICPMS (WET)	% Moisture in Tissues	Tissue/Vegetation Sample Preparation
SK-20 TAG#71729 LIVER	X		X	X	X	X
SK-21 TAG#71730 LIVER	X		X	X	X	X
SK-22 TAG#71731 LIVER	X		X	X	X	X
SK-23 TAG#71732 LIVER	X		X	X	X	X
SK-24 TAG#71733 LIVER	X		X	X	X	X
SK-13 TAG#02555 GONADS	X		X	X	X	X
SK-14 TAG#02554 GONADS	X		X	X	X	X
SK-15 TAG#02553 GONADS	X		X	X	X	X
SK-16 TAG#02552 GONADS	X		X	X	X	X
SK-17 TAG#71726 GONADS	X		X	X	X	X
SK-18 TAG#71727 GONADS	X		X	X	X	X
SK-19 TAG#71728 GONADS	X		X	X	X	X
SK-20 TAG#71729 GONADS	X		X	X	X	X
SK-21 TAG#71730 GONADS	X		X	X	X	X
SK-22 TAG#71731 GONADS	X		X	X	X	X
SK-23 TAG#71732 GONADS	X		X	X	X	X
SK-24 TAG#71733 GONADS	X		X	X	X	X



Sample Receipt Confirmation

Analysis Completion Date (if different than sample due date):

Analysis Requested	Matrix	Due date	Lab Samples ID
Special Request	Misc.	10/17/2014	L1506196-1, 2, 3, 4, 5,

ALS Group strives to deliver on-time results to our clients at all times. However, there are times when due to capacity issues or other unforeseen circumstances we are unable to meet our expected turnaround times. The information above is related to a recent workorder you have submitted to our laboratory. In the event that you have an inquiry, please refer to the Lab Work Order # L1506196 when calling your Account Manager.

ALS Group appreciates your business. Thank you for the opportunity to work with you.



L1506196-COFC

Report To Company: Red Chris Development Company Contact: Jack Love/Heather Hawkins Address: 200-580 Hornby St. Vancouver, BC V6C 3B6 Phone: 604-800-9200 329 Fax: Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No			Report Format / Distribution <input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax Email 1: jlove@redchrismine.ca Email 2: willie.setlars@williamslakeband.ca Email 3: ckoenig@redchrismine.ca			Service Requested (Rush for routine analysis subject to availability) <input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days) <input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT <input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT <input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT																																				
Company: Contact: Address: Phone: Fax:			Client / Project Information Job #: PO / AFE: LSD: Quote #:			Analysis Request Please indicate below Filtered, Preserved or both (F, P, F/P)																																				
Lab Work Order # (lab use only)			ALS Contact: Can Dang Sampler: CK,ML,KK,GS,			Number of Containers																																				
Sample #												Sample Identification (This description will appear on the report)				Date (dd-mm-yy)		Time (hh:mm)		Sample Type		Liver(METALS)	Gonads(METALS)	Muscle(METALS)	% moisture content	Sex(Confirmation)																
SK-13 tag#02555												Aug 20/2014				11:00-12:30		Other		X	X	X	X	X																		
SK-14 tag#02554												Aug 20/2014				11:00-12:30		Other		X	X	X	X	X																		
SK-15 tag#02553												Aug 20/2014				11:00-12:30		Other		X	X	X	X	X																		
SK-16 tag#02552												Aug 20/2014				11:00-12:30		Other		X	X	X	X	X																		
SK-17 tag#71726												Aug 20/2014				11:00-12:30		Other		X	X	X	X	X																		
SK-18 tag#71727												Aug 20/2014				11:00-12:30		Other		X	X	X	X	X																		
SK-19 tag#71728												Aug 20/2014				11:00-12:30		Other		X	X	X	X	X																		
SK-20 tag#71729												Aug 20/2014				11:00-12:30		Other		X	X	X	X	X																		
SK-21 tag#71730												Aug 20/2014				11:00-12:30		Other		X	X	X	X	X																		
SK-22 tag#71731												Aug 20/2014				11:00-12:30		Other		X	X	X	X	X																		
SK-23 tag#71732												Aug 20/2014				11:00-12:30		Other		X	X	X	X	X																		
SK-24 tag#71733												Aug 20/2014				11:00-12:30		Other		X	X	X	X	X																		

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

* Please include following addresses: kym.keogh@gov.bc.ca and have a COPY mailed to: Confidential lab results, Soda creek SK sampling, 2672 Indian Drive, Williams Lake, BC, V0K2G0

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)				SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mm-yy)	Time (hh:mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:	
C.Koenig			DJ	Aug 21	9:30	20C °C				Yes / No ? If Yes add SIF	



MOUNT POLLEY MINING CORP.
ATTN: Jack Love
PO Box 12
Likely BC V0L 1N0

Date Received: 21-AUG-14
Report Date: 17-OCT-14 14:38 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1506204
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: 1
Legal Site Desc:

Comments: Please see the attached document for details regarding the Total weight of Liver and Gonad samples.

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
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ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1506204-1	L1506204-2	L1506204-3	L1506204-4	L1506204-5
		Description	Fish	Fish	Fish	Fish	Fish
		Sampled Date	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14
		Sampled Time	11:00	11:00	11:00	11:00	11:00
		Client ID	SK-25 TAG#71734 MUSCLE	SK-26 TAG#71735 MUSCLE	SK-27 TAG#71736 MUSCLE	SK-28 TAG#71737 MUSCLE	SK-29 TAG#71738 MUSCLE
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		73.6	71.2	73.8	70.7	73.6
Metals	Aluminum (Al)-Total (mg/kg wwt)		<0.40	<0.40	<0.40	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)		0.365	0.535	0.384	0.399	0.572
	Barium (Ba)-Total (mg/kg wwt)		<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)		0.0084	0.0078	0.0032	0.0026	0.0112
	Calcium (Ca)-Total (mg/kg wwt)		66.8	72.4	77.2	55.8	70.5
	Cesium (Cs)-Total (mg/kg wwt)		0.0245	0.0176	0.0210	0.0187	0.0214
	Chromium (Cr)-Total (mg/kg wwt)		0.026	<0.010	<0.010	<0.010	0.016
	Cobalt (Co)-Total (mg/kg wwt)		0.0054	0.0058	0.0048	0.0062	<0.0040
	Copper (Cu)-Total (mg/kg wwt)		0.766	0.750	0.762	0.862	0.613
	Iron (Fe)-Total (mg/kg wwt)		5.55	7.85	5.49	5.35	4.58
	Lead (Pb)-Total (mg/kg wwt)		<0.0040	<0.0040	0.0049	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)		277	267	272	264	269
	Manganese (Mn)-Total (mg/kg wwt)		0.068	0.072	0.062	0.074	0.055
	Mercury (Hg)-Total (mg/kg wwt)		0.0429	0.0607	0.0580	0.0355	0.0539
	Molybdenum (Mo)-Total (mg/kg wwt)		0.0076	0.0044	0.0051	0.0055	0.0059
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg wwt)		2790	2640	2770	2680	2630
	Potassium (K)-Total (mg/kg wwt)		3930	3720	3690	3770	3650
	Rubidium (Rb)-Total (mg/kg wwt)		0.970	0.889	0.951	0.842	0.917
	Selenium (Se)-Total (mg/kg wwt)		0.274	0.287	0.281	0.274	0.233
	Sodium (Na)-Total (mg/kg wwt)		375	424	441	507	358
	Strontium (Sr)-Total (mg/kg wwt)		0.193	0.176	0.212	0.124	0.210
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)		0.00128	0.00061	0.00077	0.00094	0.00061
	Tin (Sn)-Total (mg/kg wwt)		<0.020	<0.020	0.028	<0.020	0.029
	Uranium (U)-Total (mg/kg wwt)		<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg wwt)		0.048	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg wwt)		3.87	3.78	3.49	3.72	3.22
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1506204-6	L1506204-7	L1506204-8	L1506204-9	L1506204-10
		Description	Fish	Fish	Fish	Fish	Fish
		Sampled Date	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14
		Sampled Time	11:00	11:00	11:00	11:00	11:00
		Client ID	SK-30 TAG#71739 MUSCLE	SK-25 TAG#71734 LIVER	SK-26 TAG#71735 LIVER	SK-27 TAG#71736 LIVER	SK-28 TAG#71737 LIVER
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		68.7	79.3	76.4	78.4	78.0
Metals	Aluminum (Al)-Total (mg/kg wwt)		<0.40	<0.40	<0.40	1.05	0.43
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)		0.719	0.382	0.380	0.649	0.257
	Barium (Ba)-Total (mg/kg wwt)		<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)		0.0091	1.35	1.26	0.517	0.503
	Calcium (Ca)-Total (mg/kg wwt)		49.9	73.1	84.3	88.0	67.9
	Cesium (Cs)-Total (mg/kg wwt)		0.0174	0.0093	0.0065	0.0095	0.0072
	Chromium (Cr)-Total (mg/kg wwt)		<0.010	0.012	0.013	0.310	0.017
	Cobalt (Co)-Total (mg/kg wwt)		0.0064	0.0214	0.0254	0.0219	0.0242
	Copper (Cu)-Total (mg/kg wwt)		1.04	240	245	161	211
	Iron (Fe)-Total (mg/kg wwt)		5.46	136	135	112	107
	Lead (Pb)-Total (mg/kg wwt)		<0.0040	<0.0040	0.0042	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)		271	150	155	170	155
	Manganese (Mn)-Total (mg/kg wwt)		0.090	1.13	1.22	1.19	1.19
	Mercury (Hg)-Total (mg/kg wwt)		0.0391	0.0830	0.164	0.0968	0.0935
	Molybdenum (Mo)-Total (mg/kg wwt)		0.0051	0.156	0.143	0.170	0.153
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	0.206	<0.040
	Phosphorus (P)-Total (mg/kg wwt)		2690	2990	3170	3300	3030
	Potassium (K)-Total (mg/kg wwt)		3770	3300	3440	3570	3280
	Rubidium (Rb)-Total (mg/kg wwt)		0.905	0.890	0.857	0.953	0.782
	Selenium (Se)-Total (mg/kg wwt)		0.251	15.4	13.2	10.6	15.6
	Sodium (Na)-Total (mg/kg wwt)		376	1290	1190	1240	1350
	Strontium (Sr)-Total (mg/kg wwt)		0.121	0.227	0.217	0.224	0.182
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)		0.00062	0.00448	0.00259	0.00336	0.00356
	Tin (Sn)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	<0.020	0.037
	Uranium (U)-Total (mg/kg wwt)		<0.00040	0.00059	0.00078	0.00061	<0.00040
	Vanadium (V)-Total (mg/kg wwt)		<0.020	0.066	0.077	0.440	0.137
	Zinc (Zn)-Total (mg/kg wwt)		3.72	32.1	42.6	37.9	26.0
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1506204-11	L1506204-12	L1506204-13	L1506204-14	L1506204-15
		Description	Fish	Fish	Fish	Fish	Fish
		Sampled Date	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14	20-AUG-14
		Sampled Time	11:00	11:00	11:00	11:00	11:00
		Client ID	SK-29 TAG#71738 LIVER	SK-30 TAG#71739 LIVER	SK-25 TAG#71734 GONADS	SK-26 TAG#71735 GONADS	SK-27 TAG#71736 GONADS
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		78.6	76.5	77.7	76.8	78.8
Metals	Aluminum (Al)-Total (mg/kg wwt)		0.46	0.46	<0.40	<0.40	1.94
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)		0.678	0.519	0.186	0.194	0.306
	Barium (Ba)-Total (mg/kg wwt)		<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)		1.94	1.50	0.0308	0.0466	0.0127
	Calcium (Ca)-Total (mg/kg wwt)		113	79.4	69.6	60.5	63.3
	Cesium (Cs)-Total (mg/kg wwt)		0.0078	0.0071	0.0139	0.0110	0.0135
	Chromium (Cr)-Total (mg/kg wwt)		0.022	0.032	0.014	0.016	0.921
	Cobalt (Co)-Total (mg/kg wwt)		0.0178	0.0234	0.0144	0.0213	0.0228
	Copper (Cu)-Total (mg/kg wwt)		70.9	295	1.23	1.10	0.856
	Iron (Fe)-Total (mg/kg wwt)		123	71.4	25.7	25.4	26.3
	Lead (Pb)-Total (mg/kg wwt)		0.0054	<0.0040	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)		216	163	173	173	183
	Manganese (Mn)-Total (mg/kg wwt)		1.47	1.26	0.147	0.127	0.200
	Mercury (Hg)-Total (mg/kg wwt)		0.0802	0.0640	0.0133	0.0307	0.0242
	Molybdenum (Mo)-Total (mg/kg wwt)		0.164	0.156	0.0071	0.0073	0.112
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	0.047	<0.040	<0.040	0.554
	Phosphorus (P)-Total (mg/kg wwt)		4010	3230	8830	9330	8610
	Potassium (K)-Total (mg/kg wwt)		4000	3560	3550	3810	4000
	Rubidium (Rb)-Total (mg/kg wwt)		1.04	0.990	1.18	1.11	1.19
	Selenium (Se)-Total (mg/kg wwt)		6.02	14.7	0.323	0.267	0.309
	Sodium (Na)-Total (mg/kg wwt)		980	1170	1200	1130	1140
	Strontium (Sr)-Total (mg/kg wwt)		0.336	0.231	0.243	0.190	0.211
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)		0.00540	0.00283	0.00143	0.00110	0.00105
	Tin (Sn)-Total (mg/kg wwt)		0.050	0.031	0.079	0.034	<0.020
	Uranium (U)-Total (mg/kg wwt)		0.00209	0.00089	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg wwt)		0.068	0.095	<0.020	<0.020	0.907
	Zinc (Zn)-Total (mg/kg wwt)		42.0	38.8	11.2	17.2	12.3
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1506204-16	L1506204-17	L1506204-18		
		Description	Fish	Fish	Fish		
		Sampled Date	20-AUG-14	20-AUG-14	20-AUG-14		
		Sampled Time	11:00	11:00	11:00		
		Client ID	SK-28 TAG#71737 GONADS	SK-29 TAG#71738 GONADS	SK-30 TAG#71739 GONADS		
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		74.1	54.8	80.2		
Metals	Aluminum (Al)-Total (mg/kg wwt)		<0.40	<0.40	0.45		
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020		
	Arsenic (As)-Total (mg/kg wwt)		0.168	0.408	0.202		
	Barium (Ba)-Total (mg/kg wwt)		<0.010	0.045	<0.010		
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020		
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020		
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20		
	Cadmium (Cd)-Total (mg/kg wwt)		0.0112	0.0795	0.0473		
	Calcium (Ca)-Total (mg/kg wwt)		69.3	333	46.4		
	Cesium (Cs)-Total (mg/kg wwt)		0.0119	0.0101	0.0131		
	Chromium (Cr)-Total (mg/kg wwt)		0.027	0.015	0.044		
	Cobalt (Co)-Total (mg/kg wwt)		0.0173	0.0376	0.0138		
	Copper (Cu)-Total (mg/kg wwt)		0.687	67.6	1.24		
	Iron (Fe)-Total (mg/kg wwt)		13.2	29.6	17.5		
	Lead (Pb)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040		
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10		
	Magnesium (Mg)-Total (mg/kg wwt)		203	533	179		
	Manganese (Mn)-Total (mg/kg wwt)		0.118	0.932	0.132		
	Mercury (Hg)-Total (mg/kg wwt)		0.0139	0.0062	0.0164		
	Molybdenum (Mo)-Total (mg/kg wwt)		0.0087	0.0095	0.0106		
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	<0.040		
	Phosphorus (P)-Total (mg/kg wwt)		11800	3930	7450		
	Potassium (K)-Total (mg/kg wwt)		3510	1960	4390		
	Rubidium (Rb)-Total (mg/kg wwt)		1.04	0.507	1.34		
	Selenium (Se)-Total (mg/kg wwt)		0.262	3.12	0.316		
	Sodium (Na)-Total (mg/kg wwt)		1280	582	1050		
	Strontium (Sr)-Total (mg/kg wwt)		0.199	3.24	0.155		
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040		
	Thallium (Tl)-Total (mg/kg wwt)		0.00178	0.00058	0.00121		
	Tin (Sn)-Total (mg/kg wwt)		0.069	<0.020	<0.020		
	Uranium (U)-Total (mg/kg wwt)		<0.00040	0.00280	<0.00040		
	Vanadium (V)-Total (mg/kg wwt)		<0.020	<0.020	0.052		
	Zinc (Zn)-Total (mg/kg wwt)		9.62	43.9	13.9		
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040		

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-WET-CVAFS-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7. This digestion procedure was implemented on October 5, 2009.</p>			
MET-WET-CCMS-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p>			
<p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
<p>This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

1

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1506204

Report Date: 17-OCT-14

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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0
 Contact: Jack Love

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-WET-CVAFS-VA		Tissue						
Batch	R2961882							
WG1956434-4 CRM		VA-NRC-TORT3						
Mercury (Hg)-Total			97.2		%		70-130	27-SEP-14
WG1956434-5 CRM		VA-NIST-1566B						
Mercury (Hg)-Total			97.6		%		70-130	27-SEP-14
WG1956434-3 DUP		L1506204-5						
Mercury (Hg)-Total		0.0539	0.0542		mg/kg wwt	0.6	40	27-SEP-14
WG1956434-1 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	27-SEP-14
WG1956434-2 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	27-SEP-14
MET-WET-CCMS-VA		Tissue						
Batch	R2998022							
WG1975728-4 CRM		VA-NIST-1566B						
Antimony (Sb)-Total			0.0157		mg/kg wwt		0.001-0.021	16-OCT-14
Arsenic (As)-Total			104.9		%		70-130	16-OCT-14
Barium (Ba)-Total			89.7		%		70-130	16-OCT-14
Boron (B)-Total			5.03		mg/kg wwt		3.5-5.5	16-OCT-14
Cadmium (Cd)-Total			108.4		%		70-130	16-OCT-14
Calcium (Ca)-Total			105.2		%		70-130	16-OCT-14
Cobalt (Co)-Total			103.0		%		70-130	16-OCT-14
Copper (Cu)-Total			101.3		%		70-130	16-OCT-14
Iron (Fe)-Total			101.8		%		70-130	16-OCT-14
Lead (Pb)-Total			102.4		%		70-130	16-OCT-14
Magnesium (Mg)-Total			103.0		%		70-130	16-OCT-14
Manganese (Mn)-Total			104.0		%		70-130	16-OCT-14
Nickel (Ni)-Total			100.8		%		70-130	16-OCT-14
Potassium (K)-Total			103.0		%		70-130	16-OCT-14
Rubidium (Rb)-Total			101.8		%		70-130	16-OCT-14
Selenium (Se)-Total			106.1		%		70-130	16-OCT-14
Sodium (Na)-Total			100.7		%		70-130	16-OCT-14
Strontium (Sr)-Total			99.8		%		70-130	16-OCT-14
Uranium (U)-Total			106.3		%		70-130	16-OCT-14
Vanadium (V)-Total			95.3		%		70-130	16-OCT-14
Zinc (Zn)-Total			95.0		%		70-130	16-OCT-14
WG1975728-5 CRM		VA-NIST-1566B						
Antimony (Sb)-Total			0.0146		mg/kg wwt		0.001-0.021	16-OCT-14



Quality Control Report

Workorder: L1506204

Report Date: 17-OCT-14

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA		Tissue						
Batch	R2998022							
WG1975728-5	CRM	VA-NIST-1566B						
Arsenic (As)-Total			104.0		%		70-130	16-OCT-14
Barium (Ba)-Total			86.2		%		70-130	16-OCT-14
Boron (B)-Total			4.85		mg/kg wwt		3.5-5.5	16-OCT-14
Cadmium (Cd)-Total			105.0		%		70-130	16-OCT-14
Calcium (Ca)-Total			101.8		%		70-130	16-OCT-14
Cobalt (Co)-Total			103.2		%		70-130	16-OCT-14
Copper (Cu)-Total			100.0		%		70-130	16-OCT-14
Iron (Fe)-Total			98.8		%		70-130	16-OCT-14
Lead (Pb)-Total			98.2		%		70-130	16-OCT-14
Magnesium (Mg)-Total			101.9		%		70-130	16-OCT-14
Manganese (Mn)-Total			100.6		%		70-130	16-OCT-14
Nickel (Ni)-Total			99.3		%		70-130	16-OCT-14
Potassium (K)-Total			101.5		%		70-130	16-OCT-14
Rubidium (Rb)-Total			98.2		%		70-130	16-OCT-14
Selenium (Se)-Total			98.3		%		70-130	16-OCT-14
Sodium (Na)-Total			100.0		%		70-130	16-OCT-14
Strontium (Sr)-Total			96.0		%		70-130	16-OCT-14
Uranium (U)-Total			101.7		%		70-130	16-OCT-14
Vanadium (V)-Total			97.0		%		70-130	16-OCT-14
Zinc (Zn)-Total			93.5		%		70-130	16-OCT-14
WG1975728-3	DUP	L1506204-5						
Aluminum (Al)-Total		<0.40	<0.40	RPD-NA	mg/kg wwt	N/A	40	16-OCT-14
Antimony (Sb)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	16-OCT-14
Arsenic (As)-Total		0.572	0.581		mg/kg wwt	1.7	40	16-OCT-14
Barium (Ba)-Total		<0.010	<0.010	RPD-NA	mg/kg wwt	N/A	40	16-OCT-14
Beryllium (Be)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	16-OCT-14
Bismuth (Bi)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	16-OCT-14
Boron (B)-Total		<0.20	<0.20	RPD-NA	mg/kg wwt	N/A	40	16-OCT-14
Cadmium (Cd)-Total		0.0112	0.0114		mg/kg wwt	2.0	40	16-OCT-14
Calcium (Ca)-Total		70.5	68.7		mg/kg wwt	2.5	60	16-OCT-14
Cesium (Cs)-Total		0.0214	0.0220		mg/kg wwt	3.0	40	16-OCT-14
Chromium (Cr)-Total		0.016	0.016		mg/kg wwt	0.2	40	16-OCT-14
Cobalt (Co)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	16-OCT-14
Copper (Cu)-Total		0.613	0.629		mg/kg wwt	2.6	40	16-OCT-14



Quality Control Report

Workorder: L1506204

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R2998022							
WG1975728-3	DUP	L1506204-5						
Iron (Fe)-Total		4.58	4.47		mg/kg wwt	2.4	40	16-OCT-14
Lead (Pb)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	16-OCT-14
Lithium (Li)-Total		<0.10	<0.10	RPD-NA	mg/kg wwt	N/A	40	16-OCT-14
Magnesium (Mg)-Total		269	268		mg/kg wwt	0.6	40	16-OCT-14
Manganese (Mn)-Total		0.055	0.059		mg/kg wwt	5.6	40	16-OCT-14
Molybdenum (Mo)-Total		0.0059	0.0059		mg/kg wwt	0.0	40	16-OCT-14
Nickel (Ni)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	16-OCT-14
Phosphorus (P)-Total		2630	2620		mg/kg wwt	0.3	40	16-OCT-14
Potassium (K)-Total		3650	3720		mg/kg wwt	2.0	40	16-OCT-14
Rubidium (Rb)-Total		0.917	0.924		mg/kg wwt	0.8	40	16-OCT-14
Selenium (Se)-Total		0.233	0.237		mg/kg wwt	1.8	40	16-OCT-14
Sodium (Na)-Total		358	361		mg/kg wwt	0.8	40	16-OCT-14
Strontium (Sr)-Total		0.210	0.207		mg/kg wwt	1.5	60	16-OCT-14
Tellurium (Te)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	16-OCT-14
Thallium (Tl)-Total		0.00061	0.00061		mg/kg wwt	0.8	40	16-OCT-14
Tin (Sn)-Total		0.029	0.021		mg/kg wwt	34	40	16-OCT-14
Uranium (U)-Total		<0.00040	<0.00040	RPD-NA	mg/kg wwt	N/A	40	16-OCT-14
Vanadium (V)-Total		<0.020	<0.020	RPD-NA	mg/kg wwt	N/A	40	16-OCT-14
Zinc (Zn)-Total		3.22	3.30		mg/kg wwt	2.5	40	16-OCT-14
Zirconium (Zr)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	16-OCT-14
WG1975728-1								
MB								
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	16-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	16-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	16-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	16-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	16-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	16-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	16-OCT-14
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	16-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	16-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	16-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	16-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	16-OCT-14
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	16-OCT-14



Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA		Tissue						
Batch	R2998022							
WG1975728-1 MB								
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	16-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	16-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	16-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	16-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	16-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	16-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	16-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	16-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	16-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	16-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	16-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	16-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	16-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	16-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	16-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	16-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	16-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	16-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	16-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	16-OCT-14
WG1975728-2 MB								
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	16-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	16-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	16-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	16-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	16-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	16-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	16-OCT-14
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	16-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	16-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	16-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	16-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	16-OCT-14
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	16-OCT-14



Quality Control Report

Workorder: L1506204

Report Date: 17-OCT-14

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R2998022							
WG1975728-2	MB							
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	16-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	16-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	16-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	16-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	16-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	16-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	16-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	16-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	16-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	16-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	16-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	16-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	16-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	16-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	16-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	16-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	16-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	16-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	16-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	16-OCT-14
MOISTURE-TISS-VA								
	Tissue							
Batch	R2953158							
WG1954883-5	DUP	L1506204-6						
% Moisture		68.7	68.9		%	0.3	20	18-SEP-14
Batch	R2955709							
WG1956326-3	DUP	L1506204-11						
% Moisture		78.6	78.8		%	0.3	20	21-SEP-14

Quality Control Report

Workorder: L1506204

Report Date: 17-OCT-14

Page 6 of 6

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS LABORATORY GROUP ANALYTICAL REPORT

ALS Lab WO#: L1506204

Client ID	Liver - Total Weight (g)	Gonad - Total Weight (g)
SK-25 TAG#71734	32.420	71.628
SK-26 TAG#71735	49.232	27.773
SK-27 TAG#71736	42.458	27.512
SK-28 TAG#71737	38.620	29.347
SK-29 TAG#71738	26.572	58.560
SK-30 TAG#71739	44.365	50.630



L1506204-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # SCFR Sockeye sampling

Page 3 of 3

Report To: Red Chris Development Company
Report Format / Distribution: Standard, PDF, Excel, Digital
Service Requested: Regular (Standard Turnaround Times - Business Days)
Analysis Request: Table with columns for Sample, Date, Time, Sample Type, Liver(METALS), Gonads(METALS), Muscle(METALS), % moisture content, Sex(Confirmation), Number of Containers

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/IAB Tier 1 - Natural, etc) / Hazardous Details

* Please include following addresses: kym.keogh@gov.bc.ca and have a COPY mailed to: Confidential lab results, Soda creek SK sampling, 2672 Indian Drive, Williams Lake, BC, V0K2G0

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

Table with 3 main sections: SHIPMENT RELEASE (client use), SHIPMENT RECEPTION (lab use only), and SHIPMENT VERIFICATION (lab use only). Includes fields for Released by, Date, Time, Received by, Date, Time, Temperature, Verified by, Date, Time, and Observations.



Sample Receipt Confirmation

18 Samples received at ALS in VANCOUVER

Job Reference #: N/A
Project PO #: N/A
Legal Site Description: N/A
Quote #: Q47599
Lab Work Order #: L1506204
Estimated Completion Date: 10/3/2014

Date Sampled: 8/20/2014
Date Received: 8/21/2014
Sampled By: CK,ML,KK,GS
Chain of Custody: 1
Account Manager: Can Dang
Estimated Sample Disposal Date: 11/2/2014

Sample Integrity Observations:

Observation

Sample integrity compromised
No CofC with Shipment

Details

Sample integrity compromised: Samples not individually isolated within cooler and possible cross-contamination between fish specimens.
No CofC with Shipment

Report Distribution:

Company Name: MOUNT POLLEY MINING CORP.

Contact: Jack Love

Address: PO Box 12

Likely, BC V0L 1N0

Phone: 250-790-2215

Fax: 250-790-2268

Email: chughes@mountpolley.com
Natalie.neufeld@snclavalin.com
kmcmaheh@mountpolley.com
mia.sakelariou@snclavalin.com

Report Name: CROSSTAB_ALSQC

Digital Type: EHS_MOUNTP

Digital Email: chughes@mountpolley.com
Natalie.neufeld@snclavalin.com
mia.sakelariou@snclavalin.com
kmcmaheh@mountpolley.com

Distribution: **Hard Copy:** N **Email:** Y **Fax:** N

Invoice Distribution:

Acct Name: MOUNT POLLEY MINING CORP. ~LIKELY

Contact: Accounts Payable

Address: PO Box 12,

Likely, BC, V0L 1N0

Phone: 250-790-2215

Fax: --

Invoice Email: prosette@mountpolley.com
chughes@mountpolley.com

Project #: N/A

Account #: MPM100

Distribution: **Hard Copy:** Y **Email:** Y



Sample Receipt Confirmation

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type
L1506204-1	SK-25 TAG#71734 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506204-2	SK-26 TAG#71735 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506204-3	SK-27 TAG#71736 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506204-4	SK-28 TAG#71737 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506204-5	SK-29 TAG#71738 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506204-6	SK-30 TAG#71739 MUSCLE	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506204-7	SK-25 TAG#71734 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506204-8	SK-26 TAG#71735 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506204-9	SK-27 TAG#71736 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506204-10	SK-28 TAG#71737 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506204-11	SK-29 TAG#71738 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506204-12	SK-30 TAG#71739 LIVER	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506204-13	SK-25 TAG#71734 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506204-14	SK-26 TAG#71735 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506204-15	SK-27 TAG#71736 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506204-16	SK-28 TAG#71737 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506204-17	SK-29 TAG#71738 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish
L1506204-18	SK-30 TAG#71739 GONADS	8/20/2014 11:00 AM	8/21/2014 9:30 AM	10/3/2014 5:00 PM		Fish



Sample Receipt Confirmation

Analysis Requested:

	Sample Handling and Disposal Fee	Mercury in Tissue by CVAFS (WET)	Metals in Tissue by CRC ICPMS (WET)	% Moisture in Tissues	Tissue/Vegetation Sample Preparation
SK-25 TAG#71734 MUSCLE	X	X	X	X	X
SK-26 TAG#71735 MUSCLE	X	X	X	X	X
SK-27 TAG#71736 MUSCLE	X	X	X	X	X
SK-28 TAG#71737 MUSCLE	X	X	X	X	X
SK-29 TAG#71738 MUSCLE	X	X	X	X	X
SK-30 TAG#71739 MUSCLE	X	X	X	X	X
SK-25 TAG#71734 LIVER	X	X	X	X	X
SK-26 TAG#71735 LIVER	X	X	X	X	X
SK-27 TAG#71736 LIVER	X	X	X	X	X
SK-28 TAG#71737 LIVER	X	X	X	X	X
SK-29 TAG#71738 LIVER	X	X	X	X	X
SK-30 TAG#71739 LIVER	X	X	X	X	X
SK-25 TAG#71734 GONADS	X	X	X	X	X
SK-26 TAG#71735 GONADS	X	X	X	X	X
SK-27 TAG#71736 GONADS	X	X	X	X	X
SK-28 TAG#71737 GONADS	X	X	X	X	X
SK-29 TAG#71738 GONADS	X	X	X	X	X
SK-30 TAG#71739 GONADS	X	X	X	X	X



Sample Receipt Confirmation

ALS Group strives to deliver on-time results to our clients at all times. However, there are times when due to capacity issues or other unforeseen circumstances we are unable to meet our expected turnaround times. The information above is related to a recent workorder you have submitted to our laboratory. In the event that you have an inquiry, please refer to the Lab Work Order # L1506204 when calling your Account Manager.

ALS Group appreciates your business. Thank you for the opportunity to work with you.



L1506204-COFC

Report To Company: <i>Red Chris Development Company</i>	Report Format / Distribution <input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other	Service Requested (Rush for routine analysis subject to availability) <input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)	
Contact: <i>Jack Love/Heather Hawkins</i>	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT	
Address: <i>200-580 Hornby St. Vancouver, BC V6C 3B6</i>	Email 1: <i>jlove@redchrismine.ca</i>	<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT	
Phone: <i>604-800-9200 329</i> Fax:	Email 2: <i>willie.sellars@williamslakeband.ca</i>	<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT	
Invoice To <i>Same as Report?</i> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Client / Project Information	Analysis Request	

Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No	Job #:	Please indicate below Filtered, Preserved or both (F, P, F/P)													
Company:	PO / AFE:	Liver(METALS)	Gonads(METALS)	Muscle(METALS)	% moisture content	Sex(Confirmation)									Number of Containers
Contact:	LSD:														
Address:															
Phone:	Fax:														
Quote #:															

Lab Work Order # (lab use only)	ALS Contact: <i>Can Dang</i>	Sampler: <i>CK,ML,KK,GS,</i>
---------------------------------	------------------------------	------------------------------

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Liver(METALS)	Gonads(METALS)	Muscle(METALS)	% moisture content	Sex(Confirmation)									
SK-25 tag#71734		Aug 20/2014	11:00-12:30	Other	X	X	X	X	X									
SK-26 tag#71735		Aug 20/2014	11:00-12:30	Other	X	X	X	X	X									
SK-27 tag#71736		Aug 20/2014	11:00-12:30	Other	X	X	X	X	X									
SK-28 tag#71737		Aug 20/2014	11:00-12:30	Other	X	X	X	X	X									
SK-29 tag#71738		Aug 20/2014	11:00-12:30	Other	X	X	X	X	X									
SK-30 tag#71739		Aug 20/2014	11:00-12:30	Other	X	X	X	X	X									

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

* Please include following addresses: kym.keogh@gov.bc.ca and have a COPY mailed to: Confidential lab results, Soda creek SK sampling, 2672 Indian Drive, Williams Lake, BC, V0K2G0

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
C.Koenig			DJ	Aug 21	9:30	2°C				



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 09-SEP-14
Report Date: 14-SEP-15 16:57 (MT)
Version: FINAL REV. 3

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1514793
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: Horsefly River
Legal Site Desc:

Comments: Please see the attached document for details regarding the Total weight of Liver and Muscle samples.
9-SEP-2015 Revision 2: The sample collection date and time was modified for the samples ALS identify as L1514793 - (28 to 30 and 58 to 60) as requested.
14-SEP-2015 Revision 3: The sample collection time for all samples were modified.

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1514793-1	L1514793-2	L1514793-3	L1514793-4	L1514793-5
		Description	FISH	FISH	FISH	FISH	FISH
		Sampled Date	02-SEP-14	02-SEP-14	02-SEP-14	02-SEP-14	02-SEP-14
		Sampled Time	11:30	11:30	11:30	11:30	11:30
		Client ID	SK-1 LIVER	SK-2 LIVER	SK-3 LIVER	SK-4 LIVER	SK-5 LIVER
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)	76.0	76.6	76.2	79.0	77.6	
Metals	Aluminum (Al)-Total (mg/kg wwt)	0.83	0.51	0.42	0.55	1.37	
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	0.0021	
	Arsenic (As)-Total (mg/kg wwt)	0.252	0.293	0.363	0.331	0.577	
	Barium (Ba)-Total (mg/kg wwt)	0.012	<0.010	<0.010	<0.010	0.012	
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Cadmium (Cd)-Total (mg/kg wwt)	1.13	0.580	0.646	1.73	1.78	
	Calcium (Ca)-Total (mg/kg wwt)	71.6	55.4	68.1	36.0	38.7	
	Cesium (Cs)-Total (mg/kg wwt)	0.0072	0.0048	0.0060	0.0050	0.0062	
	Chromium (Cr)-Total (mg/kg wwt)	0.241	0.061	0.130	0.118	0.162	
	Cobalt (Co)-Total (mg/kg wwt)	0.0286	0.0146	0.0202	0.0195	0.0254	
	Copper (Cu)-Total (mg/kg wwt)	121	52.6	97.7	204	302	
	Iron (Fe)-Total (mg/kg wwt)	37.0	25.7	85.8	24.4	51.7	
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	0.0052	
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Magnesium (Mg)-Total (mg/kg wwt)	228	227	254	160	165	
	Manganese (Mn)-Total (mg/kg wwt)	1.35	1.17	1.78	1.12	1.26	
	Mercury (Hg)-Total (mg/kg wwt)	0.0657	0.0754	0.0644	0.0924	0.0781	
	Molybdenum (Mo)-Total (mg/kg wwt)	0.205	0.124	0.171	0.179	0.200	
	Nickel (Ni)-Total (mg/kg wwt)	0.157	0.042	0.088	0.081	0.121	
	Phosphorus (P)-Total (mg/kg wwt)	4110	3850	4420	2940	3180	
	Potassium (K)-Total (mg/kg wwt)	4090	4100	4420	3450	3820	
	Rubidium (Rb)-Total (mg/kg wwt)	1.12	1.26	1.24	0.938	1.08	
	Selenium (Se)-Total (mg/kg wwt)	13.2	8.96	12.5	14.9	9.38	
	Sodium (Na)-Total (mg/kg wwt)	633	571	777	880	784	
	Strontium (Sr)-Total (mg/kg wwt)	0.131	0.115	0.167	0.086	0.083	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg wwt)	0.00471	0.00827	0.00732	0.00227	0.00463	
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	0.028	0.031	0.023	
	Uranium (U)-Total (mg/kg wwt)	0.00172	0.00099	0.00094	0.00118	0.00172	
	Vanadium (V)-Total (mg/kg wwt)	0.138	0.091	0.052	0.103	0.529	
	Zinc (Zn)-Total (mg/kg wwt)	47.7	24.2	31.5	31.3	42.1	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1514793-6	L1514793-7	L1514793-8	L1514793-9	L1514793-10
		Description	FISH	FISH	FISH	FISH	FISH
		Sampled Date	02-SEP-14	02-SEP-14	02-SEP-14	02-SEP-14	02-SEP-14
		Sampled Time	11:30	11:30	11:30	11:30	11:30
		Client ID	SK-6 LIVER	SK-7 LIVER	SK-8 LIVER	SK-9 LIVER	SK-10 LIVER
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)	79.1	79.2	75.9	76.0	76.0	
Metals	Aluminum (Al)-Total (mg/kg wwt)	1.19	<0.40	0.74	0.75	0.53	
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Arsenic (As)-Total (mg/kg wwt)	0.485	0.460	0.196	0.184	0.182	
	Barium (Ba)-Total (mg/kg wwt)	0.015	<0.010	<0.010	0.015	<0.010	
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Cadmium (Cd)-Total (mg/kg wwt)	2.23	1.59	0.584	0.628	1.46	
	Calcium (Ca)-Total (mg/kg wwt)	37.1	32.9	70.5	72.5	65.7	
	Cesium (Cs)-Total (mg/kg wwt)	0.0058	0.0049	0.0065	0.0067	0.0066	
	Chromium (Cr)-Total (mg/kg wwt)	0.113	0.328	0.178	0.152	0.244	
	Cobalt (Co)-Total (mg/kg wwt)	0.0232	0.0259	0.0178	0.0257	0.0288	
	Copper (Cu)-Total (mg/kg wwt)	313	178	33.3	74.2	52.1	
	Iron (Fe)-Total (mg/kg wwt)	17.8	34.3	19.5	26.7	23.0	
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Magnesium (Mg)-Total (mg/kg wwt)	170	159	246	252	230	
	Manganese (Mn)-Total (mg/kg wwt)	1.39	1.12	1.53	1.67	1.68	
	Mercury (Hg)-Total (mg/kg wwt)	0.0999	0.141	0.0628	0.0630	0.0885	
	Molybdenum (Mo)-Total (mg/kg wwt)	0.201	0.196	0.164	0.153	0.230	
	Nickel (Ni)-Total (mg/kg wwt)	0.084	0.220	0.105	0.109	0.160	
	Phosphorus (P)-Total (mg/kg wwt)	3220	2900	4330	4500	4280	
	Potassium (K)-Total (mg/kg wwt)	3620	3360	4770	4800	4470	
	Rubidium (Rb)-Total (mg/kg wwt)	1.02	0.862	1.67	1.46	1.26	
	Selenium (Se)-Total (mg/kg wwt)	19.3	14.0	6.57	7.83	7.84	
	Sodium (Na)-Total (mg/kg wwt)	1080	1030	767	645	648	
	Strontium (Sr)-Total (mg/kg wwt)	0.098	0.080	0.135	0.154	0.186	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg wwt)	0.00256	0.00192	0.0112	0.00994	0.0103	
	Tin (Sn)-Total (mg/kg wwt)	0.026	0.022	<0.020	<0.020	0.030	
	Uranium (U)-Total (mg/kg wwt)	0.00117	0.00077	0.00123	0.00076	0.00308	
	Vanadium (V)-Total (mg/kg wwt)	0.128	0.087	0.083	0.050	0.056	
	Zinc (Zn)-Total (mg/kg wwt)	41.2	31.3	22.3	31.4	24.5	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1514793-11	L1514793-12	L1514793-13	L1514793-14	L1514793-15
		Description	FISH	FISH	FISH	FISH	FISH
		Sampled Date	02-SEP-14	02-SEP-14	02-SEP-14	02-SEP-14	02-SEP-14
		Sampled Time	11:30	11:30	11:30	11:30	11:30
		Client ID	SK-11 LIVER	SK-12 LIVER	SK-13 LIVER	SK-14 LIVER	SK-15 LIVER
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		75.7	76.6	75.9	77.0	79.6
Metals	Aluminum (Al)-Total (mg/kg wwt)		1.82	0.87	1.49	1.40	0.85
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	0.0103
	Arsenic (As)-Total (mg/kg wwt)		0.252	0.273	0.261	0.258	0.274
	Barium (Ba)-Total (mg/kg wwt)		0.020	0.011	0.015	0.016	0.049
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)		1.11	0.610	0.960	0.710	0.991
	Calcium (Ca)-Total (mg/kg wwt)		59.2	65.1	65.7	63.6	37.4
	Cesium (Cs)-Total (mg/kg wwt)		0.0071	0.0064	0.0086	0.0062	0.0066
	Chromium (Cr)-Total (mg/kg wwt)		0.094	0.145	0.125	0.100	0.212
	Cobalt (Co)-Total (mg/kg wwt)		0.0220	0.0165	0.0289	0.0166	0.0244
	Copper (Cu)-Total (mg/kg wwt)		37.0	48.5	81.2	74.1	265
	Iron (Fe)-Total (mg/kg wwt)		30.6	48.7	48.3	30.6	60.1
	Lead (Pb)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	0.0587
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)		228	235	230	233	150
	Manganese (Mn)-Total (mg/kg wwt)		1.46	1.43	1.53	1.18	1.29
	Mercury (Hg)-Total (mg/kg wwt)		0.0728	0.106	0.0854	0.0808	0.0635
	Molybdenum (Mo)-Total (mg/kg wwt)		0.163	0.172	0.147	0.135	0.504
	Nickel (Ni)-Total (mg/kg wwt)		0.063	0.093	0.088	0.071	0.145
	Phosphorus (P)-Total (mg/kg wwt)		4190	3980	4200	4170	2940
	Potassium (K)-Total (mg/kg wwt)		4660	4410	4500	4670	3570
	Rubidium (Rb)-Total (mg/kg wwt)		1.38	1.25	1.53	1.44	0.993
	Selenium (Se)-Total (mg/kg wwt)		5.18	5.93	8.65	7.31	18.8
	Sodium (Na)-Total (mg/kg wwt)		684	520	681	661	965
	Strontium (Sr)-Total (mg/kg wwt)		0.125	0.133	0.123	0.129	0.089
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)		0.00749	0.00640	0.0113	0.00669	0.00345
	Tin (Sn)-Total (mg/kg wwt)		0.031	<0.020	0.022	0.027	<0.020
	Uranium (U)-Total (mg/kg wwt)		0.00107	0.00117	0.00099	0.00095	0.00082
	Vanadium (V)-Total (mg/kg wwt)		0.066	0.095	0.075	0.057	0.151
	Zinc (Zn)-Total (mg/kg wwt)		22.5	23.7	24.6	24.3	39.5
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1514793-16	L1514793-17	L1514793-18	L1514793-19	L1514793-20
		Description	FISH	FISH	FISH	FISH	FISH
		Sampled Date	02-SEP-14	02-SEP-14	02-SEP-14	02-SEP-14	02-SEP-14
		Sampled Time	11:30	11:30	11:30	11:30	11:30
		Client ID	SK-16 LIVER	SK-17 LIVER	SK-18 LIVER	SK-19 LIVER	SK-20 LIVER
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		78.8	79.0	76.7	80.0	77.6
Metals	Aluminum (Al)-Total (mg/kg wwt)		2.18	1.96	2.58	1.27	0.73
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)		0.173	0.464	0.162	0.316	0.410
	Barium (Ba)-Total (mg/kg wwt)		0.022	0.025	0.027	0.015	0.014
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)		0.935	1.12	0.635	3.44	1.24
	Calcium (Ca)-Total (mg/kg wwt)		37.3	37.6	65.3	46.9	63.1
	Cesium (Cs)-Total (mg/kg wwt)		0.0053	0.0060	0.0059	0.0028	0.0059
	Chromium (Cr)-Total (mg/kg wwt)		0.062	0.288	0.214	0.190	0.175
	Cobalt (Co)-Total (mg/kg wwt)		0.0201	0.0327	0.0189	0.0419	0.0192
	Copper (Cu)-Total (mg/kg wwt)		296	306	46.6	42.6	78.0
	Iron (Fe)-Total (mg/kg wwt)		30.5	29.1	53.1	50.3	35.7
	Lead (Pb)-Total (mg/kg wwt)		<0.0040	0.0049	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)		170	175	234	175	230
	Manganese (Mn)-Total (mg/kg wwt)		1.36	1.21	1.38	1.04	1.28
	Mercury (Hg)-Total (mg/kg wwt)		0.130	0.0690	0.0451	0.0652	0.0595
	Molybdenum (Mo)-Total (mg/kg wwt)		0.203	0.216	0.188	0.207	0.169
	Nickel (Ni)-Total (mg/kg wwt)		0.056	0.191	0.139	0.121	0.116
	Phosphorus (P)-Total (mg/kg wwt)		3110	3230	4160	3250	3970
	Potassium (K)-Total (mg/kg wwt)		3590	3710	4600	3530	4300
	Rubidium (Rb)-Total (mg/kg wwt)		0.955	1.01	1.41	0.865	1.46
	Selenium (Se)-Total (mg/kg wwt)		19.5	19.4	8.90	4.74	6.64
	Sodium (Na)-Total (mg/kg wwt)		969	1040	694	995	684
	Strontium (Sr)-Total (mg/kg wwt)		0.110	0.096	0.148	0.107	0.131
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)		0.00338	0.00351	0.00696	0.00351	0.00819
	Tin (Sn)-Total (mg/kg wwt)		<0.020	0.029	0.025	0.039	<0.020
	Uranium (U)-Total (mg/kg wwt)		0.00106	0.00130	0.00095	0.00256	0.00128
	Vanadium (V)-Total (mg/kg wwt)		0.191	0.207	0.049	0.095	0.059
	Zinc (Zn)-Total (mg/kg wwt)		33.3	33.6	24.8	32.0	25.0
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1514793-21	L1514793-22	L1514793-23	L1514793-24	L1514793-25
		Description	FISH	FISH	FISH	FISH	FISH
		Sampled Date	02-SEP-14	02-SEP-14	02-SEP-14	02-SEP-14	02-SEP-14
		Sampled Time	11:30	11:30	11:30	11:30	11:30
		Client ID	SK-21 LIVER	SK-22 LIVER	SK-23 LIVER	SK-24 LIVER	SK-25 LIVER
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		75.8	76.6	76.5	78.5	78.1
Metals	Aluminum (Al)-Total (mg/kg wwt)		<0.40	1.24	<0.40	0.85	0.62
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)		0.177	0.272	0.287	0.279	0.180
	Barium (Ba)-Total (mg/kg wwt)		<0.010	0.022	<0.010	0.019	<0.010
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)		1.02	1.69	0.897	1.84	1.08
	Calcium (Ca)-Total (mg/kg wwt)		74.0	73.1	68.4	43.6	45.8
	Cesium (Cs)-Total (mg/kg wwt)		0.0070	0.0068	0.0087	0.0049	0.0059
	Chromium (Cr)-Total (mg/kg wwt)		0.079	0.107	0.207	0.140	0.249
	Cobalt (Co)-Total (mg/kg wwt)		0.0239	0.0259	0.0231	0.0182	0.0364
	Copper (Cu)-Total (mg/kg wwt)		130	25.3	66.6	261	335
	Iron (Fe)-Total (mg/kg wwt)		70.8	46.5	60.1	40.5	65.0
	Lead (Pb)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)		248	239	250	179	168
	Manganese (Mn)-Total (mg/kg wwt)		1.55	1.72	1.36	1.38	1.28
	Mercury (Hg)-Total (mg/kg wwt)		0.0671	0.0907	0.0566	0.0787	0.0907
	Molybdenum (Mo)-Total (mg/kg wwt)		0.176	0.208	0.165	0.197	0.221
	Nickel (Ni)-Total (mg/kg wwt)		0.065	0.072	0.150	0.102	0.176
	Phosphorus (P)-Total (mg/kg wwt)		4460	4380	4520	3180	3030
	Potassium (K)-Total (mg/kg wwt)		4790	4240	4520	3690	3310
	Rubidium (Rb)-Total (mg/kg wwt)		1.40	1.29	1.71	1.04	0.914
	Selenium (Se)-Total (mg/kg wwt)		9.11	5.29	8.34	16.7	20.6
	Sodium (Na)-Total (mg/kg wwt)		745	895	734	969	1300
	Strontium (Sr)-Total (mg/kg wwt)		0.146	0.222	0.172	0.106	0.111
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)		0.00831	0.0143	0.0135	0.00286	0.00418
	Tin (Sn)-Total (mg/kg wwt)		0.021	0.022	<0.020	0.021	<0.020
	Uranium (U)-Total (mg/kg wwt)		0.00145	0.00314	0.00163	0.00113	0.00112
	Vanadium (V)-Total (mg/kg wwt)		0.087	0.057	0.083	0.090	0.142
	Zinc (Zn)-Total (mg/kg wwt)		39.0	24.4	29.9	31.5	39.4
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1514793-26	L1514793-27	L1514793-28	L1514793-29	L1514793-30
		Description	FISH	FISH	FISH	FISH	FISH
		Sampled Date	02-SEP-14	02-SEP-14	04-SEP-14	04-SEP-14	04-SEP-14
		Sampled Time	11:30	11:30	11:45	11:45	11:45
		Client ID	SK-26 LIVER	SK-27 LIVER	SK-28 LIVER	SK-29 LIVER	SK-30 LIVER
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		77.7	79.2	77.7	77.8	79.4
Metals	Aluminum (Al)-Total (mg/kg wwt)		0.69	1.03	0.62	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg wwt)		0.0031	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)		0.870	0.391	0.477	0.561	0.453
	Barium (Ba)-Total (mg/kg wwt)		<0.010	0.016	<0.010	<0.010	0.021
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)		0.874	2.53	1.70	0.891	0.822
	Calcium (Ca)-Total (mg/kg wwt)		42.9	42.5	58.8	37.1	40.7
	Cesium (Cs)-Total (mg/kg wwt)		0.0055	0.0050	0.0037	0.0063	0.0074
	Chromium (Cr)-Total (mg/kg wwt)		0.138	0.274	0.144	0.081	0.215
	Cobalt (Co)-Total (mg/kg wwt)		0.0223	0.0249	0.0232	0.0186	0.0327
	Copper (Cu)-Total (mg/kg wwt)		311	235	110	208	241
	Iron (Fe)-Total (mg/kg wwt)		99.4	54.7	141	44.0	60.7
	Lead (Pb)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)		177	160	256	176	145
	Manganese (Mn)-Total (mg/kg wwt)		1.08	1.11	1.78	1.20	1.27
	Mercury (Hg)-Total (mg/kg wwt)		0.105	0.102	0.0906	0.0684	0.0509
	Molybdenum (Mo)-Total (mg/kg wwt)		0.185	0.212	0.209	0.161	0.209
	Nickel (Ni)-Total (mg/kg wwt)		0.102	0.190	0.130	0.069	0.168
	Phosphorus (P)-Total (mg/kg wwt)		3310	2940	4140	3170	2850
	Potassium (K)-Total (mg/kg wwt)		3970	3160	3720	3900	3460
	Rubidium (Rb)-Total (mg/kg wwt)		1.08	0.908	0.966	1.01	0.884
	Selenium (Se)-Total (mg/kg wwt)		16.9	15.2	9.72	11.4	23.7
	Sodium (Na)-Total (mg/kg wwt)		920	1230	683	865	976
	Strontium (Sr)-Total (mg/kg wwt)		0.086	0.118	0.102	0.067	0.086
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)		0.00314	0.00440	0.00393	0.00214	0.00340
	Tin (Sn)-Total (mg/kg wwt)		<0.020	0.022	0.025	<0.020	0.037
	Uranium (U)-Total (mg/kg wwt)		0.00055	0.00121	0.00181	0.00088	0.00090
	Vanadium (V)-Total (mg/kg wwt)		0.142	0.168	0.121	0.131	0.117
	Zinc (Zn)-Total (mg/kg wwt)		36.2	32.3	36.1	37.3	37.4
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	Description	Sampled Date	Sampled Time	Client ID	L1514793-31	L1514793-32	L1514793-33	L1514793-34	L1514793-35
					FISH	FISH	FISH	FISH	FISH
					02-SEP-14	02-SEP-14	02-SEP-14	02-SEP-14	02-SEP-14
					11:30	11:30	11:30	11:30	11:30
					SK-1 MUSCLE	SK-2 MUSCLE	SK-3 MUSCLE	SK-4 MUSCLE	SK-5 MUSCLE
Grouping	Analyte								
TISSUE									
Physical Tests	% Moisture (%)								
					74.6	75.0	74.4	74.8	76.8
Metals	Aluminum (Al)-Total (mg/kg wwt)				3.06	0.72	1.15	0.89	<0.40
	Antimony (Sb)-Total (mg/kg wwt)				<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)				0.221	0.230	0.230	0.372	0.333
	Barium (Ba)-Total (mg/kg wwt)				0.034	<0.010	0.013	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)				<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)				<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)				<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)				0.0058	0.0035	0.0023	0.0075	0.0048
	Calcium (Ca)-Total (mg/kg wwt)				38.1	32.4	33.8	32.4	31.7
	Cesium (Cs)-Total (mg/kg wwt)				0.0299	0.0251	0.0243	0.0231	0.0196
	Chromium (Cr)-Total (mg/kg wwt)				0.104	0.065	0.058	0.055	0.051
	Cobalt (Co)-Total (mg/kg wwt)				0.0070	0.0061	0.0062	0.0046	0.0056
	Copper (Cu)-Total (mg/kg wwt)				1.12	0.884	1.02	0.746	1.01
	Iron (Fe)-Total (mg/kg wwt)				10.8	6.93	8.60	5.34	6.60
	Lead (Pb)-Total (mg/kg wwt)				0.0160	0.0046	<0.0040	0.0085	<0.0040
	Lithium (Li)-Total (mg/kg wwt)				<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)				271	260	284	279	275
	Manganese (Mn)-Total (mg/kg wwt)				0.145	0.075	0.113	0.076	0.072
	Mercury (Hg)-Total (mg/kg wwt)				0.0478	0.0509	0.0453	0.0599	0.0395
	Molybdenum (Mo)-Total (mg/kg wwt)				0.0153	0.0107	0.0103	0.0087	0.0078
	Nickel (Ni)-Total (mg/kg wwt)				0.063	0.057	<0.040	<0.040	0.041
	Phosphorus (P)-Total (mg/kg wwt)				2760	2550	2730	2610	2580
	Potassium (K)-Total (mg/kg wwt)				4200	3850	4290	3920	4040
	Rubidium (Rb)-Total (mg/kg wwt)				1.10	0.943	1.00	0.936	1.05
	Selenium (Se)-Total (mg/kg wwt)				0.275	0.266	0.254	0.286	0.260
	Sodium (Na)-Total (mg/kg wwt)				475	325	336	287	358
	Strontium (Sr)-Total (mg/kg wwt)				0.058	0.055	0.052	0.045	0.036
	Tellurium (Te)-Total (mg/kg wwt)				<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)				0.00103	0.00151	0.00123	0.00076	0.00108
	Tin (Sn)-Total (mg/kg wwt)				0.067	0.060	<0.020	<0.020	0.027
	Uranium (U)-Total (mg/kg wwt)				<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg wwt)				<0.020	<0.020	<0.020	<0.020	0.021
	Zinc (Zn)-Total (mg/kg wwt)				4.31	3.63	3.81	3.50	4.12
	Zirconium (Zr)-Total (mg/kg wwt)				<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1514793-36	L1514793-37	L1514793-38	L1514793-39	L1514793-40
		Description	FISH	FISH	FISH	FISH	FISH
		Sampled Date	02-SEP-14	02-SEP-14	02-SEP-14	02-SEP-14	02-SEP-14
		Sampled Time	11:30	11:30	11:30	11:30	11:30
		Client ID	SK-6 MUSCLE	SK-7 MUSCLE	SK-8 MUSCLE	SK-9 MUSCLE	SK-10 MUSCLE
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)	76.0	75.9	75.4	75.4	75.8	
Metals	Aluminum (Al)-Total (mg/kg wwt)	<0.40	0.98	2.97	0.41	<0.40	
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Arsenic (As)-Total (mg/kg wwt)	0.422	0.392	0.192	0.162	0.169	
	Barium (Ba)-Total (mg/kg wwt)	<0.010	<0.010	0.028	<0.010	<0.010	
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Cadmium (Cd)-Total (mg/kg wwt)	0.0062	0.0044	0.0029	0.0032	0.0068	
	Calcium (Ca)-Total (mg/kg wwt)	30.2	30.2	32.6	31.9	32.1	
	Cesium (Cs)-Total (mg/kg wwt)	0.0232	0.0195	0.0230	0.0228	0.0276	
	Chromium (Cr)-Total (mg/kg wwt)	0.701	0.148	0.082	0.026	0.074	
	Cobalt (Co)-Total (mg/kg wwt)	0.0148	0.0080	0.0059	0.0080	0.0065	
	Copper (Cu)-Total (mg/kg wwt)	0.956	1.02	0.758	1.05	1.02	
	Iron (Fe)-Total (mg/kg wwt)	8.50	8.23	7.99	8.56	6.06	
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	0.0048	<0.0040	<0.0040	<0.0040	
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Magnesium (Mg)-Total (mg/kg wwt)	266	258	245	249	271	
	Manganese (Mn)-Total (mg/kg wwt)	0.126	0.092	0.111	0.082	0.087	
	Mercury (Hg)-Total (mg/kg wwt)	0.0643	0.0553	0.0615	0.0576	0.0732	
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0918	0.0219	0.0117	0.0069	0.0138	
	Nickel (Ni)-Total (mg/kg wwt)	0.433	0.095	0.050	<0.040	0.049	
	Phosphorus (P)-Total (mg/kg wwt)	2570	2500	2360	2410	2670	
	Potassium (K)-Total (mg/kg wwt)	4170	4000	3630	3760	4510	
	Rubidium (Rb)-Total (mg/kg wwt)	0.993	0.922	0.935	0.944	1.06	
	Selenium (Se)-Total (mg/kg wwt)	0.252	0.283	0.231	0.258	0.227	
	Sodium (Na)-Total (mg/kg wwt)	351	360	322	361	384	
	Strontium (Sr)-Total (mg/kg wwt)	0.040	0.043	0.069	0.063	0.064	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg wwt)	0.00097	0.00072	0.00139	0.00151	0.00161	
	Tin (Sn)-Total (mg/kg wwt)	0.030	0.046	0.034	0.037	0.061	
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Zinc (Zn)-Total (mg/kg wwt)	3.80	4.08	3.37	3.78	4.05	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1514793-41	L1514793-42	L1514793-43	L1514793-44	L1514793-45
		Description	FISH	FISH	FISH	FISH	FISH
		Sampled Date	02-SEP-14	02-SEP-14	02-SEP-14	02-SEP-14	02-SEP-14
		Sampled Time	11:30	11:30	11:30	11:30	11:30
		Client ID	SK-11 MUSCLE	SK-12 MUSCLE	SK-13 MUSCLE	SK-14 MUSCLE	SK-15 MUSCLE
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)	75.5	74.8	76.5	74.7	77.3	
Metals	Aluminum (Al)-Total (mg/kg wwt)	0.74	1.94	1.46	0.83	1.71	
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Arsenic (As)-Total (mg/kg wwt)	0.202	0.197	0.269	0.175	0.179	
	Barium (Ba)-Total (mg/kg wwt)	<0.010	0.017	0.020	<0.010	0.015	
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Cadmium (Cd)-Total (mg/kg wwt)	0.0053	0.0039	0.0049	0.0038	0.0026	
	Calcium (Ca)-Total (mg/kg wwt)	35.2	34.8	34.1	38.9	30.9	
	Cesium (Cs)-Total (mg/kg wwt)	0.0247	0.0304	0.0273	0.0271	0.0226	
	Chromium (Cr)-Total (mg/kg wwt)	0.626	0.036	0.073	0.083	0.112	
	Cobalt (Co)-Total (mg/kg wwt)	0.0143	0.0045	0.0079	0.0055	0.0074	
	Copper (Cu)-Total (mg/kg wwt)	0.866	0.847	0.828	0.663	0.961	
	Iron (Fe)-Total (mg/kg wwt)	8.14	14.0	10.9	7.10	9.51	
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	0.0042	0.0058	
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Magnesium (Mg)-Total (mg/kg wwt)	267	273	252	287	240	
	Manganese (Mn)-Total (mg/kg wwt)	0.132	0.132	0.113	0.079	0.098	
	Mercury (Hg)-Total (mg/kg wwt)	0.0568	0.0586	0.0496	0.0689	0.0641	
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0800	0.0085	0.0136	0.0113	0.0175	
	Nickel (Ni)-Total (mg/kg wwt)	0.398	<0.040	0.052	0.051	0.073	
	Phosphorus (P)-Total (mg/kg wwt)	2530	2690	2420	2670	2410	
	Potassium (K)-Total (mg/kg wwt)	4210	4140	3920	4280	4040	
	Rubidium (Rb)-Total (mg/kg wwt)	0.994	1.01	1.02	1.06	1.01	
	Selenium (Se)-Total (mg/kg wwt)	0.224	0.266	0.277	0.260	0.264	
	Sodium (Na)-Total (mg/kg wwt)	346	329	368	304	393	
	Strontium (Sr)-Total (mg/kg wwt)	0.059	0.069	0.056	0.072	0.053	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg wwt)	0.00141	0.00130	0.00149	0.00105	0.00091	
	Tin (Sn)-Total (mg/kg wwt)	0.049	0.055	0.056	0.023	0.085	
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Zinc (Zn)-Total (mg/kg wwt)	3.68	3.82	3.80	3.42	3.62	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1514793-46 FISH 02-SEP-14 11:30 SK-16 MUSCLE	L1514793-47 FISH 02-SEP-14 11:30 SK-17 MUSCLE	L1514793-48 FISH 02-SEP-14 11:30 SK-18 MUSCLE	L1514793-49 FISH 02-SEP-14 11:30 SK-19 MUSCLE	L1514793-50 FISH 02-SEP-14 11:30 SK-20 MUSCLE
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	76.0	75.7	76.1	78.7	76.5
Metals	Aluminum (Al)-Total (mg/kg wwt)	2.25	0.47	4.22	4.53	2.51
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)	0.221	0.240	0.154	0.226	0.291
	Barium (Ba)-Total (mg/kg wwt)	0.018	<0.010	0.039	0.045	0.021
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)	0.0039	0.0059	0.0029	0.0077	0.0072
	Calcium (Ca)-Total (mg/kg wwt)	40.9	32.0	38.4	36.9	40.8
	Cesium (Cs)-Total (mg/kg wwt)	0.0215	0.0235	0.0245	0.0227	0.0239
	Chromium (Cr)-Total (mg/kg wwt)	0.225	0.051	0.214	0.118	0.052
	Cobalt (Co)-Total (mg/kg wwt)	0.0084	0.0067	0.0082	0.0076	0.0071
	Copper (Cu)-Total (mg/kg wwt)	0.998	1.02	0.781	0.662	0.923
	Iron (Fe)-Total (mg/kg wwt)	9.92	10.7	12.9	10.1	8.83
	Lead (Pb)-Total (mg/kg wwt)	0.0045	<0.0040	0.0046	0.0067	<0.0040
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)	271	272	264	228	260
	Manganese (Mn)-Total (mg/kg wwt)	0.133	0.091	0.170	0.154	0.112
	Mercury (Hg)-Total (mg/kg wwt)	0.0582	0.0493	0.0375	0.0576	0.0577
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0284	0.0087	0.0289	0.0141	0.0081
	Nickel (Ni)-Total (mg/kg wwt)	0.133	<0.040	0.135	0.068	<0.040
	Phosphorus (P)-Total (mg/kg wwt)	2770	2570	2520	2340	2570
	Potassium (K)-Total (mg/kg wwt)	4230	4080	4140	4110	4270
	Rubidium (Rb)-Total (mg/kg wwt)	1.00	0.974	0.980	1.04	0.993
	Selenium (Se)-Total (mg/kg wwt)	0.277	0.331	0.236	0.221	0.270
	Sodium (Na)-Total (mg/kg wwt)	377	357	342	453	307
	Strontium (Sr)-Total (mg/kg wwt)	0.092	0.043	0.077	0.074	0.097
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)	0.00103	0.00119	0.00103	0.00106	0.00154
	Tin (Sn)-Total (mg/kg wwt)	0.049	0.046	0.058	0.059	0.055
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg wwt)	3.84	4.00	3.51	3.44	3.60
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1514793-51	L1514793-52	L1514793-53	L1514793-54	L1514793-55
		Description	FISH	FISH	FISH	FISH	FISH
		Sampled Date	02-SEP-14	02-SEP-14	02-SEP-14	02-SEP-14	02-SEP-14
		Sampled Time	11:30	11:30	11:30	11:30	11:30
		Client ID	SK-21 MUSCLE	SK-22 MUSCLE	SK-23 MUSCLE	SK-24 MUSCLE	SK-25 MUSCLE
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)	75.3	76.3	76.0	75.4	75.7	
Metals	Aluminum (Al)-Total (mg/kg wwt)	12.3	3.82	8.68	<0.40	1.38	
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Arsenic (As)-Total (mg/kg wwt)	0.239	0.197	0.262	0.314	0.142	
	Barium (Ba)-Total (mg/kg wwt)	0.128	0.028	0.056	<0.010	<0.010	
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Cadmium (Cd)-Total (mg/kg wwt)	0.0038	0.0070	0.0056	0.0063	0.0029	
	Calcium (Ca)-Total (mg/kg wwt)	55.6	39.4	38.2	37.4	36.6	
	Cesium (Cs)-Total (mg/kg wwt)	0.0236	0.0258	0.0244	0.0210	0.0237	
	Chromium (Cr)-Total (mg/kg wwt)	0.226	0.102	0.156	0.079	0.046	
	Cobalt (Co)-Total (mg/kg wwt)	0.0124	0.0091	0.0096	0.0056	0.0057	
	Copper (Cu)-Total (mg/kg wwt)	0.804	0.985	0.803	0.867	0.714	
	Iron (Fe)-Total (mg/kg wwt)	21.3	11.2	15.3	5.22	5.50	
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Magnesium (Mg)-Total (mg/kg wwt)	276	266	267	268	269	
	Manganese (Mn)-Total (mg/kg wwt)	0.407	0.146	0.213	0.076	0.074	
	Mercury (Hg)-Total (mg/kg wwt)	0.0405	0.0736	0.0600	0.0465	0.0517	
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0284	0.0146	0.0203	0.0133	0.0089	
	Nickel (Ni)-Total (mg/kg wwt)	0.148	0.067	0.104	0.046	<0.040	
	Phosphorus (P)-Total (mg/kg wwt)	2500	2550	2600	2520	2500	
	Potassium (K)-Total (mg/kg wwt)	4030	4190	4370	3770	3800	
	Rubidium (Rb)-Total (mg/kg wwt)	0.971	1.12	1.08	0.946	0.925	
	Selenium (Se)-Total (mg/kg wwt)	0.260	0.254	0.281	0.234	0.266	
	Sodium (Na)-Total (mg/kg wwt)	336	363	331	307	324	
	Strontium (Sr)-Total (mg/kg wwt)	0.173	0.111	0.109	0.072	0.063	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg wwt)	0.00125	0.00174	0.00146	0.00143	0.00098	
	Tin (Sn)-Total (mg/kg wwt)	0.081	0.037	0.037	<0.020	0.040	
	Uranium (U)-Total (mg/kg wwt)	0.00054	<0.00040	0.00049	<0.00040	<0.00040	
	Vanadium (V)-Total (mg/kg wwt)	0.063	<0.020	0.040	<0.020	<0.020	
	Zinc (Zn)-Total (mg/kg wwt)	3.62	3.83	3.74	3.60	3.50	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1514793-56	L1514793-57	L1514793-58	L1514793-59	L1514793-60
		Description	FISH	FISH	FISH	FISH	FISH
		Sampled Date	02-SEP-14	02-SEP-14	04-SEP-14	04-SEP-14	04-SEP-14
		Sampled Time	11:30	11:30	11:45	11:45	11:45
		Client ID	SK-26 MUSCLE	SK-27 MUSCLE	SK-28 MUSCLE	SK-29 MUSCLE	SK-30 MUSCLE
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)	76.8	76.0	80.1	76.5	77.7	
Metals	Aluminum (Al)-Total (mg/kg wwt)	0.96	1.81	0.45	3.65	1.06	
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Arsenic (As)-Total (mg/kg wwt)	0.518	0.455	0.253	0.260	0.270	
	Barium (Ba)-Total (mg/kg wwt)	<0.010	0.022	<0.010	0.012	<0.010	
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Cadmium (Cd)-Total (mg/kg wwt)	0.0057	0.0088	0.0076	0.0047	0.0027	
	Calcium (Ca)-Total (mg/kg wwt)	33.9	33.9	30.1	35.7	30.2	
	Cesium (Cs)-Total (mg/kg wwt)	0.0177	0.0213	0.0235	0.0230	0.0233	
	Chromium (Cr)-Total (mg/kg wwt)	0.463	0.139	0.044	0.038	0.026	
	Cobalt (Co)-Total (mg/kg wwt)	0.0124	0.0090	0.0047	0.0047	0.0053	
	Copper (Cu)-Total (mg/kg wwt)	1.02	1.09	0.801	0.833	0.711	
	Iron (Fe)-Total (mg/kg wwt)	10.5	8.21	8.26	8.75	6.86	
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Magnesium (Mg)-Total (mg/kg wwt)	260	270	249	244	248	
	Manganese (Mn)-Total (mg/kg wwt)	0.122	0.121	0.069	0.102	0.074	
	Mercury (Hg)-Total (mg/kg wwt)	0.0453	0.0482	0.0864	0.0414	0.0344	
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0614	0.0207	0.0079	0.0084	0.0043	
	Nickel (Ni)-Total (mg/kg wwt)	0.293	0.086	<0.040	<0.040	<0.040	
	Phosphorus (P)-Total (mg/kg wwt)	2470	2560	2330	2440	2470	
	Potassium (K)-Total (mg/kg wwt)	3980	4020	3840	3750	4200	
	Rubidium (Rb)-Total (mg/kg wwt)	0.964	1.05	1.04	0.882	0.944	
	Selenium (Se)-Total (mg/kg wwt)	0.253	0.273	0.212	0.224	0.251	
	Sodium (Na)-Total (mg/kg wwt)	373	365	302	373	361	
	Strontium (Sr)-Total (mg/kg wwt)	0.051	0.074	0.038	0.048	0.039	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg wwt)	0.00082	0.00132	0.00081	0.00106	0.00072	
	Tin (Sn)-Total (mg/kg wwt)	0.032	0.020	0.087	0.032	0.030	
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Zinc (Zn)-Total (mg/kg wwt)	3.87	4.04	3.56	3.41	3.37	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Phosphorus (P)-Total	MB-LOR	L1514793-1, -10, -12, -13, -14, -15, -16, -19, -2, -20, -24, -27, -30, -34, -38, -39, -4, -5, -54, -55, -59, -6, -7, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-WET-CVAFS-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1991). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7. This digestion procedure was implemented on October 5, 2009.</p> <p>This analysis is not compliant with the requirements of the B.C. Lab Manual for digestion of tissue samples from British Columbia for metals analysis after January 1, 2015.</p>			
MET-WET-CCMS-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1991). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p> <p>This analysis is not compliant with the requirements of the B.C. Lab Manual for digestion of tissue samples from British Columbia for metals analysis after January 1, 2015.</p>			
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
<p>This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

Horsefly River

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1514793

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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0
 Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-WET-CVAFS-VA		Tissue						
Batch R2975431								
WG1966393-5 CRM		VA-NRC-TORT3						
Mercury (Hg)-Total			100.1		%		70-130	07-OCT-14
WG1966393-6 CRM		VA-NIST-1566B						
Mercury (Hg)-Total			93.5		%		70-130	07-OCT-14
WG1966393-3 DUP		L1514793-32						
Mercury (Hg)-Total		0.0509	0.0497		mg/kg wwt	2.4	40	07-OCT-14
WG1966393-4 DUP		L1514793-11						
Mercury (Hg)-Total		0.0728	0.0731		mg/kg wwt	0.3	40	07-OCT-14
WG1966393-1 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	07-OCT-14
WG1966393-2 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	07-OCT-14
Batch R2978163								
WG1965382-5 CRM		VA-NRC-TORT3						
Mercury (Hg)-Total			107.2		%		70-130	08-OCT-14
WG1965382-6 CRM		VA-NIST-1566B						
Mercury (Hg)-Total			97.7		%		70-130	08-OCT-14
WG1967865-4 CRM		VA-NRC-TORT3						
Mercury (Hg)-Total			104.8		%		70-130	08-OCT-14
WG1967865-5 CRM		VA-NIST-1566B						
Mercury (Hg)-Total			95.1		%		70-130	08-OCT-14
WG1965382-3 DUP		L1514793-24						
Mercury (Hg)-Total		0.0787	0.0746		mg/kg wwt	5.4	40	08-OCT-14
WG1965382-4 DUP		L1514793-14						
Mercury (Hg)-Total		0.0808	0.0840		mg/kg wwt	3.9	40	08-OCT-14
WG1967865-3 DUP		L1514793-52						
Mercury (Hg)-Total		0.0736	0.0854		mg/kg wwt	15	40	08-OCT-14
WG1965382-1 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	08-OCT-14
WG1965382-2 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	08-OCT-14
WG1967865-1 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	08-OCT-14
WG1967865-2 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	08-OCT-14

MET-WET-CCMS-VA **Tissue**



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA		Tissue						
Batch	R2989148							
WG1967865-5 CRM		VA-NIST-1566B						
Antimony (Sb)-Total			0.0076		mg/kg wwt		0.001-0.021	10-OCT-14
Arsenic (As)-Total			107.1		%		70-130	10-OCT-14
Barium (Ba)-Total			87.5		%		70-130	10-OCT-14
Boron (B)-Total			4.94		mg/kg wwt		3.5-5.5	10-OCT-14
Cadmium (Cd)-Total			109.9		%		70-130	10-OCT-14
Calcium (Ca)-Total			102.9		%		70-130	10-OCT-14
Cobalt (Co)-Total			102.4		%		70-130	10-OCT-14
Copper (Cu)-Total			104.0		%		70-130	10-OCT-14
Iron (Fe)-Total			98.5		%		70-130	10-OCT-14
Lead (Pb)-Total			99.9		%		70-130	10-OCT-14
Magnesium (Mg)-Total			102.2		%		70-130	10-OCT-14
Manganese (Mn)-Total			105.7		%		70-130	10-OCT-14
Nickel (Ni)-Total			102.9		%		70-130	10-OCT-14
Potassium (K)-Total			105.9		%		70-130	10-OCT-14
Rubidium (Rb)-Total			101.5		%		70-130	10-OCT-14
Selenium (Se)-Total			104.2		%		70-130	10-OCT-14
Sodium (Na)-Total			100.2		%		70-130	10-OCT-14
Strontium (Sr)-Total			101.8		%		70-130	10-OCT-14
Uranium (U)-Total			102.3		%		70-130	10-OCT-14
Vanadium (V)-Total			98.6		%		70-130	10-OCT-14
Zinc (Zn)-Total			103.7		%		70-130	10-OCT-14
WG1967865-3 DUP		L1514793-52						
Aluminum (Al)-Total		3.82	3.77		mg/kg wwt	1.3	40	10-OCT-14
Antimony (Sb)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Arsenic (As)-Total		0.197	0.201		mg/kg wwt	2.0	40	10-OCT-14
Barium (Ba)-Total		0.028	0.032		mg/kg wwt	12	40	10-OCT-14
Beryllium (Be)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Bismuth (Bi)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Boron (B)-Total		<0.20	<0.20	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Cadmium (Cd)-Total		0.0070	0.0074		mg/kg wwt	5.5	40	10-OCT-14
Calcium (Ca)-Total		39.4	38.1		mg/kg wwt	3.2	60	10-OCT-14
Cesium (Cs)-Total		0.0258	0.0255		mg/kg wwt	1.4	40	10-OCT-14
Chromium (Cr)-Total		0.102	0.084		mg/kg wwt	19	40	10-OCT-14
Cobalt (Co)-Total		0.0091	0.0079		mg/kg wwt	14	40	10-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R2989148							
WG1967865-3	DUP	L1514793-52						
Copper (Cu)-Total		0.985	1.00		mg/kg wwt	1.8	40	10-OCT-14
Iron (Fe)-Total		11.2	9.78		mg/kg wwt	14	40	10-OCT-14
Lead (Pb)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Lithium (Li)-Total		<0.10	<0.10	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Magnesium (Mg)-Total		266	264		mg/kg wwt	0.5	40	10-OCT-14
Manganese (Mn)-Total		0.146	0.116		mg/kg wwt	23	40	10-OCT-14
Molybdenum (Mo)-Total		0.0146	0.0137		mg/kg wwt	5.8	40	10-OCT-14
Nickel (Ni)-Total		0.067	0.058		mg/kg wwt	15	40	10-OCT-14
Phosphorus (P)-Total		2550	2570		mg/kg wwt	0.7	40	10-OCT-14
Potassium (K)-Total		4190	4120		mg/kg wwt	1.6	40	10-OCT-14
Rubidium (Rb)-Total		1.12	1.08		mg/kg wwt	3.1	40	10-OCT-14
Selenium (Se)-Total		0.254	0.251		mg/kg wwt	1.1	40	10-OCT-14
Sodium (Na)-Total		363	362		mg/kg wwt	0.3	40	10-OCT-14
Strontium (Sr)-Total		0.111	0.136		mg/kg wwt	20	60	10-OCT-14
Tellurium (Te)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Thallium (Tl)-Total		0.00174	0.00230		mg/kg wwt	28	40	10-OCT-14
Tin (Sn)-Total		0.037	0.041		mg/kg wwt	10	40	10-OCT-14
Uranium (U)-Total		<0.00040	<0.00040	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Vanadium (V)-Total		<0.020	<0.020	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Zinc (Zn)-Total		3.83	3.87		mg/kg wwt	1.2	40	10-OCT-14
Zirconium (Zr)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
WG1967865-1								
MB								
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	10-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	10-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	10-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	10-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	10-OCT-14
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	10-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	10-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	10-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R2989148							
WG1967865-1	MB							
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	10-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	10-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	10-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	10-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	10-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	10-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	10-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	10-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	10-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	10-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	10-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	10-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	10-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	10-OCT-14
Batch	R2991091							
WG1965382-5	CRM	VA-NRC-TORT3						
Arsenic (As)-Total			113.0		%		70-130	14-OCT-14
Cadmium (Cd)-Total			101.2		%		70-130	14-OCT-14
Chromium (Cr)-Total			96.6		%		70-130	14-OCT-14
Cobalt (Co)-Total			105.4		%		70-130	14-OCT-14
Copper (Cu)-Total			90.7		%		70-130	14-OCT-14
Iron (Fe)-Total			96.1		%		70-130	14-OCT-14
Lead (Pb)-Total			91.0		%		70-130	14-OCT-14
Manganese (Mn)-Total			97.1		%		70-130	14-OCT-14
Molybdenum (Mo)-Total			101.9		%		70-130	14-OCT-14
Nickel (Ni)-Total			98.0		%		70-130	14-OCT-14
Selenium (Se)-Total			101.0		%		70-130	14-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R2991091							
WG1965382-5	CRM	VA-NRC-TORT3						
Strontium (Sr)-Total			98.3		%		70-130	14-OCT-14
Vanadium (V)-Total			100.9		%		70-130	14-OCT-14
Zinc (Zn)-Total			94.1		%		70-130	14-OCT-14
WG1965382-6	CRM	VA-NIST-1566B						
Antimony (Sb)-Total			0.0087		mg/kg wwt		0.001-0.021	14-OCT-14
Arsenic (As)-Total			104.2		%		70-130	14-OCT-14
Barium (Ba)-Total			87.8		%		70-130	14-OCT-14
Boron (B)-Total			4.99		mg/kg wwt		3.5-5.5	14-OCT-14
Cadmium (Cd)-Total			106.0		%		70-130	14-OCT-14
Calcium (Ca)-Total			103.6		%		70-130	14-OCT-14
Cobalt (Co)-Total			101.3		%		70-130	14-OCT-14
Copper (Cu)-Total			99.3		%		70-130	14-OCT-14
Iron (Fe)-Total			99.1		%		70-130	14-OCT-14
Lead (Pb)-Total			97.1		%		70-130	14-OCT-14
Magnesium (Mg)-Total			102.0		%		70-130	14-OCT-14
Manganese (Mn)-Total			102.1		%		70-130	14-OCT-14
Nickel (Ni)-Total			97.3		%		70-130	14-OCT-14
Potassium (K)-Total			98.9		%		70-130	14-OCT-14
Rubidium (Rb)-Total			100.3		%		70-130	14-OCT-14
Selenium (Se)-Total			105.7		%		70-130	14-OCT-14
Sodium (Na)-Total			94.4		%		70-130	14-OCT-14
Strontium (Sr)-Total			98.8		%		70-130	14-OCT-14
Uranium (U)-Total			101.8		%		70-130	14-OCT-14
Vanadium (V)-Total			94.7		%		70-130	14-OCT-14
Zinc (Zn)-Total			98.6		%		70-130	14-OCT-14
WG1966393-5	CRM	VA-NRC-TORT3						
Arsenic (As)-Total			116.9		%		70-130	14-OCT-14
Cadmium (Cd)-Total			105.1		%		70-130	14-OCT-14
Chromium (Cr)-Total			103.9		%		70-130	14-OCT-14
Cobalt (Co)-Total			110.6		%		70-130	14-OCT-14
Copper (Cu)-Total			96.3		%		70-130	14-OCT-14
Iron (Fe)-Total			102.1		%		70-130	14-OCT-14
Lead (Pb)-Total			94.1		%		70-130	14-OCT-14
Manganese (Mn)-Total			103.1		%		70-130	14-OCT-14
Molybdenum (Mo)-Total			105.6		%		70-130	14-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA		Tissue						
Batch	R2991091							
WG1966393-5	CRM	VA-NRC-TORT3						
Nickel (Ni)-Total			102.5		%		70-130	14-OCT-14
Selenium (Se)-Total			103.7		%		70-130	14-OCT-14
Strontium (Sr)-Total			100.7		%		70-130	14-OCT-14
Vanadium (V)-Total			106.3		%		70-130	14-OCT-14
Zinc (Zn)-Total			97.6		%		70-130	14-OCT-14
WG1966393-6	CRM	VA-NIST-1566B						
Antimony (Sb)-Total			0.0067		mg/kg wwt		0.001-0.021	14-OCT-14
Arsenic (As)-Total			110.3		%		70-130	14-OCT-14
Barium (Ba)-Total			95.0		%		70-130	14-OCT-14
Boron (B)-Total			5.29		mg/kg wwt		3.5-5.5	14-OCT-14
Cadmium (Cd)-Total			112.6		%		70-130	14-OCT-14
Calcium (Ca)-Total			105.8		%		70-130	14-OCT-14
Cobalt (Co)-Total			108.5		%		70-130	14-OCT-14
Copper (Cu)-Total			106.8		%		70-130	14-OCT-14
Iron (Fe)-Total			106.7		%		70-130	14-OCT-14
Lead (Pb)-Total			105.9		%		70-130	14-OCT-14
Magnesium (Mg)-Total			109.6		%		70-130	14-OCT-14
Manganese (Mn)-Total			109.4		%		70-130	14-OCT-14
Nickel (Ni)-Total			105.5		%		70-130	14-OCT-14
Potassium (K)-Total			104.5		%		70-130	14-OCT-14
Rubidium (Rb)-Total			105.0		%		70-130	14-OCT-14
Selenium (Se)-Total			112.9		%		70-130	14-OCT-14
Sodium (Na)-Total			103.7		%		70-130	14-OCT-14
Strontium (Sr)-Total			103.8		%		70-130	14-OCT-14
Uranium (U)-Total			110.4		%		70-130	14-OCT-14
Vanadium (V)-Total			104.3		%		70-130	14-OCT-14
Zinc (Zn)-Total			105.3		%		70-130	14-OCT-14
WG1965382-3	DUP	L1514793-24						
Aluminum (Al)-Total		0.85	0.51	J	mg/kg wwt	0.34	0.8	14-OCT-14
Antimony (Sb)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Arsenic (As)-Total		0.279	0.269		mg/kg wwt	3.5	40	14-OCT-14
Barium (Ba)-Total		0.019	<0.010	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Beryllium (Be)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Bismuth (Bi)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Boron (B)-Total		<0.20	<0.20	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R2991091							
WG1965382-3	DUP	L1514793-24						
Cadmium (Cd)-Total		1.84	1.76		mg/kg wwt	4.0	40	14-OCT-14
Calcium (Ca)-Total		43.6	41.4		mg/kg wwt	5.1	60	14-OCT-14
Cesium (Cs)-Total		0.0049	0.0045		mg/kg wwt	8.4	40	14-OCT-14
Chromium (Cr)-Total		0.140	0.113		mg/kg wwt	21	40	14-OCT-14
Cobalt (Co)-Total		0.0182	0.0175		mg/kg wwt	4.2	40	14-OCT-14
Copper (Cu)-Total		261	251		mg/kg wwt	4.0	40	14-OCT-14
Iron (Fe)-Total		40.5	38.3		mg/kg wwt	5.6	40	14-OCT-14
Lead (Pb)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Lithium (Li)-Total		<0.10	<0.10	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Magnesium (Mg)-Total		179	173		mg/kg wwt	3.6	40	14-OCT-14
Manganese (Mn)-Total		1.38	1.32		mg/kg wwt	4.9	40	14-OCT-14
Molybdenum (Mo)-Total		0.197	0.188		mg/kg wwt	4.8	40	14-OCT-14
Nickel (Ni)-Total		0.102	0.082		mg/kg wwt	22	40	14-OCT-14
Phosphorus (P)-Total		3180	3080		mg/kg wwt	3.1	40	14-OCT-14
Potassium (K)-Total		3690	3520		mg/kg wwt	4.8	40	14-OCT-14
Rubidium (Rb)-Total		1.04	0.999		mg/kg wwt	4.1	40	14-OCT-14
Selenium (Se)-Total		16.7	16.2		mg/kg wwt	3.2	40	14-OCT-14
Sodium (Na)-Total		969	949		mg/kg wwt	2.0	40	14-OCT-14
Strontium (Sr)-Total		0.106	0.099		mg/kg wwt	7.0	60	14-OCT-14
Tellurium (Te)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Thallium (Tl)-Total		0.00286	0.00268		mg/kg wwt	6.6	40	14-OCT-14
Tin (Sn)-Total		0.021	0.022		mg/kg wwt	6.3	40	14-OCT-14
Uranium (U)-Total		0.00113	0.00100		mg/kg wwt	12	40	14-OCT-14
Vanadium (V)-Total		0.090	0.087		mg/kg wwt	3.4	40	14-OCT-14
Zinc (Zn)-Total		31.5	30.4		mg/kg wwt	3.6	40	14-OCT-14
Zirconium (Zr)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
WG1965382-4	DUP	L1514793-14						
Aluminum (Al)-Total		1.40	1.76		mg/kg wwt	22	40	14-OCT-14
Antimony (Sb)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Arsenic (As)-Total		0.258	0.249		mg/kg wwt	3.4	40	14-OCT-14
Barium (Ba)-Total		0.016	0.022		mg/kg wwt	33	40	14-OCT-14
Beryllium (Be)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Bismuth (Bi)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Boron (B)-Total		<0.20	<0.20	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA Tissue								
Batch	R2991091							
WG1965382-4 DUP		L1514793-14						
Cadmium (Cd)-Total		0.710	0.691		mg/kg wwt	2.7	40	14-OCT-14
Calcium (Ca)-Total		63.6	62.6		mg/kg wwt	1.5	60	14-OCT-14
Cesium (Cs)-Total		0.0062	0.0060		mg/kg wwt	3.2	40	14-OCT-14
Chromium (Cr)-Total		0.100	0.096		mg/kg wwt	3.6	40	14-OCT-14
Cobalt (Co)-Total		0.0166	0.0175		mg/kg wwt	5.4	40	14-OCT-14
Copper (Cu)-Total		74.1	71.4		mg/kg wwt	3.7	40	14-OCT-14
Iron (Fe)-Total		30.6	29.7		mg/kg wwt	3.0	40	14-OCT-14
Lead (Pb)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Lithium (Li)-Total		<0.10	<0.10	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Magnesium (Mg)-Total		233	225		mg/kg wwt	3.4	40	14-OCT-14
Manganese (Mn)-Total		1.18	1.13		mg/kg wwt	4.6	40	14-OCT-14
Molybdenum (Mo)-Total		0.135	0.133		mg/kg wwt	1.1	40	14-OCT-14
Nickel (Ni)-Total		0.071	0.068		mg/kg wwt	3.6	40	14-OCT-14
Phosphorus (P)-Total		4170	4020		mg/kg wwt	3.5	40	14-OCT-14
Potassium (K)-Total		4670	4520		mg/kg wwt	3.3	40	14-OCT-14
Rubidium (Rb)-Total		1.44	1.38		mg/kg wwt	4.5	40	14-OCT-14
Selenium (Se)-Total		7.31	7.17		mg/kg wwt	2.0	40	14-OCT-14
Sodium (Na)-Total		661	633		mg/kg wwt	4.3	40	14-OCT-14
Strontium (Sr)-Total		0.129	0.128		mg/kg wwt	0.8	60	14-OCT-14
Tellurium (Te)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Thallium (Tl)-Total		0.00669	0.00631		mg/kg wwt	5.9	40	14-OCT-14
Tin (Sn)-Total		0.027	0.026		mg/kg wwt	2.3	40	14-OCT-14
Uranium (U)-Total		0.00095	0.00087		mg/kg wwt	8.8	40	14-OCT-14
Vanadium (V)-Total		0.057	0.056		mg/kg wwt	0.9	40	14-OCT-14
Zinc (Zn)-Total		24.3	23.3		mg/kg wwt	4.3	40	14-OCT-14
Zirconium (Zr)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
WG1966393-3 DUP		L1514793-32						
Aluminum (Al)-Total		0.72	0.85		mg/kg wwt	16	40	14-OCT-14
Antimony (Sb)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Arsenic (As)-Total		0.230	0.219		mg/kg wwt	4.8	40	14-OCT-14
Barium (Ba)-Total		<0.010	<0.010	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Beryllium (Be)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Bismuth (Bi)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Boron (B)-Total		<0.20	<0.20	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R2991091							
WG1966393-3	DUP	L1514793-32						
Cadmium (Cd)-Total		0.0035	0.0032		mg/kg wwt	11	40	14-OCT-14
Calcium (Ca)-Total		32.4	30.6		mg/kg wwt	5.5	60	14-OCT-14
Cesium (Cs)-Total		0.0251	0.0236		mg/kg wwt	6.1	40	14-OCT-14
Chromium (Cr)-Total		0.065	0.059		mg/kg wwt	10	40	14-OCT-14
Cobalt (Co)-Total		0.0061	0.0053		mg/kg wwt	13	40	14-OCT-14
Copper (Cu)-Total		0.884	0.804		mg/kg wwt	9.4	40	14-OCT-14
Iron (Fe)-Total		6.93	6.55		mg/kg wwt	5.5	40	14-OCT-14
Lead (Pb)-Total		0.0046	0.0046		mg/kg wwt	0.2	40	14-OCT-14
Lithium (Li)-Total		<0.10	<0.10	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Magnesium (Mg)-Total		260	243		mg/kg wwt	6.5	40	14-OCT-14
Manganese (Mn)-Total		0.075	0.070		mg/kg wwt	7.5	40	14-OCT-14
Molybdenum (Mo)-Total		0.0107	0.0108		mg/kg wwt	0.4	40	14-OCT-14
Nickel (Ni)-Total		0.057	<0.040	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Phosphorus (P)-Total		2550	2390		mg/kg wwt	6.5	40	14-OCT-14
Potassium (K)-Total		3850	3600		mg/kg wwt	6.9	40	14-OCT-14
Rubidium (Rb)-Total		0.943	0.877		mg/kg wwt	7.3	40	14-OCT-14
Selenium (Se)-Total		0.266	0.247		mg/kg wwt	7.4	40	14-OCT-14
Sodium (Na)-Total		325	314		mg/kg wwt	3.4	40	14-OCT-14
Strontium (Sr)-Total		0.055	0.054		mg/kg wwt	2.0	60	14-OCT-14
Tellurium (Te)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Thallium (Tl)-Total		0.00151	0.00132		mg/kg wwt	13	40	14-OCT-14
Tin (Sn)-Total		0.060	0.058		mg/kg wwt	3.1	40	14-OCT-14
Uranium (U)-Total		<0.00040	<0.00040	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Vanadium (V)-Total		<0.020	<0.020	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Zinc (Zn)-Total		3.63	3.43		mg/kg wwt	5.4	40	14-OCT-14
Zirconium (Zr)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
WG1966393-4	DUP	L1514793-11						
Aluminum (Al)-Total		1.82	2.24		mg/kg wwt	20	40	14-OCT-14
Antimony (Sb)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Arsenic (As)-Total		0.252	0.245		mg/kg wwt	2.9	40	14-OCT-14
Barium (Ba)-Total		0.020	0.020		mg/kg wwt	2.8	40	14-OCT-14
Beryllium (Be)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Bismuth (Bi)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Boron (B)-Total		<0.20	<0.20	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R2991091							
WG1966393-4	DUP	L1514793-11						
Cadmium (Cd)-Total		1.11	1.10		mg/kg wwt	0.7	40	14-OCT-14
Calcium (Ca)-Total		59.2	58.6		mg/kg wwt	1.1	60	14-OCT-14
Cesium (Cs)-Total		0.0071	0.0068		mg/kg wwt	3.9	40	14-OCT-14
Chromium (Cr)-Total		0.094	0.112		mg/kg wwt	18	40	14-OCT-14
Cobalt (Co)-Total		0.0220	0.0231		mg/kg wwt	4.8	40	14-OCT-14
Copper (Cu)-Total		37.0	36.5		mg/kg wwt	1.2	40	14-OCT-14
Iron (Fe)-Total		30.6	31.5		mg/kg wwt	2.8	40	14-OCT-14
Lead (Pb)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Lithium (Li)-Total		<0.10	<0.10	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Magnesium (Mg)-Total		228	228		mg/kg wwt	0.1	40	14-OCT-14
Manganese (Mn)-Total		1.46	1.46		mg/kg wwt	0.2	40	14-OCT-14
Molybdenum (Mo)-Total		0.163	0.163		mg/kg wwt	0.4	40	14-OCT-14
Nickel (Ni)-Total		0.063	0.077		mg/kg wwt	20	40	14-OCT-14
Phosphorus (P)-Total		4190	4160		mg/kg wwt	0.7	40	14-OCT-14
Potassium (K)-Total		4660	4660		mg/kg wwt	0.0	40	14-OCT-14
Rubidium (Rb)-Total		1.38	1.40		mg/kg wwt	1.8	40	14-OCT-14
Selenium (Se)-Total		5.18	5.10		mg/kg wwt	1.7	40	14-OCT-14
Sodium (Na)-Total		684	686		mg/kg wwt	0.2	40	14-OCT-14
Strontium (Sr)-Total		0.125	0.125		mg/kg wwt	0.3	60	14-OCT-14
Tellurium (Te)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
Thallium (Tl)-Total		0.00749	0.00768		mg/kg wwt	2.6	40	14-OCT-14
Tin (Sn)-Total		0.031	0.027		mg/kg wwt	12	40	14-OCT-14
Uranium (U)-Total		0.00107	0.00102		mg/kg wwt	4.5	40	14-OCT-14
Vanadium (V)-Total		0.066	0.067		mg/kg wwt	1.4	40	14-OCT-14
Zinc (Zn)-Total		22.5	22.4		mg/kg wwt	0.4	40	14-OCT-14
Zirconium (Zr)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	14-OCT-14
WG1965382-1								
	MB							
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	14-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	14-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	14-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	14-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	14-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	14-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA		Tissue						
Batch	R2991091							
WG1965382-1 MB								
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	14-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	14-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	14-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	14-OCT-14
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	14-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	14-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	14-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	14-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	14-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	14-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	14-OCT-14
Phosphorus (P)-Total			2.0	MB-LOR	mg/kg wwt		2	14-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	14-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	14-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	14-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	14-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	14-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	14-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	14-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	14-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	14-OCT-14
WG1965382-2 MB								
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	14-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	14-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	14-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	14-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	14-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	14-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA		Tissue						
Batch	R2991091							
WG1965382-2 MB								
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	14-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	14-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	14-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	14-OCT-14
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	14-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	14-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	14-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	14-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	14-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	14-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	14-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	14-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	14-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	14-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	14-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	14-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	14-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	14-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	14-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	14-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	14-OCT-14
WG1966393-1 MB								
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	14-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	14-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	14-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	14-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	14-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	14-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA		Tissue						
Batch	R2991091							
WG1966393-1 MB								
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	14-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	14-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	14-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	14-OCT-14
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	14-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	14-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	14-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	14-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	14-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	14-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	14-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	14-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	14-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	14-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	14-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	14-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	14-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	14-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	14-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	14-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	14-OCT-14
WG1966393-2 MB								
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	14-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	14-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	14-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	14-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	14-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	14-OCT-14



Quality Control Report

Workorder: L1514793

Report Date: 14-SEP-15

Page 14 of 17

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R2991091							
WG1966393-2	MB							
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	14-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	14-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	14-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	14-OCT-14
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	14-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	14-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	14-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	14-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	14-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	14-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	14-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	14-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	14-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	14-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	14-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	14-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	14-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	14-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	14-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	14-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	14-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	14-OCT-14
Batch	R3002648							
WG1967865-4	CRM	VA-NRC-TORT3						
Arsenic (As)-Total			123.9		%		70-130	17-OCT-14
Cadmium (Cd)-Total			107.6		%		70-130	17-OCT-14
Chromium (Cr)-Total			106.9		%		70-130	17-OCT-14
Cobalt (Co)-Total			112.1		%		70-130	17-OCT-14
Copper (Cu)-Total			98.9		%		70-130	17-OCT-14
Iron (Fe)-Total			102.5		%		70-130	17-OCT-14



Quality Control Report

Workorder: L1514793

Report Date: 14-SEP-15

Page 15 of 17

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R3002648							
WG1967865-4	CRM	VA-NRC-TORT3						
Lead (Pb)-Total			102.5		%		70-130	17-OCT-14
Manganese (Mn)-Total			106.7		%		70-130	17-OCT-14
Molybdenum (Mo)-Total			106.1		%		70-130	17-OCT-14
Nickel (Ni)-Total			106.1		%		70-130	17-OCT-14
Selenium (Se)-Total			104.7		%		70-130	17-OCT-14
Strontium (Sr)-Total			101.7		%		70-130	17-OCT-14
Vanadium (V)-Total			111.4		%		70-130	17-OCT-14
Zinc (Zn)-Total			99.9		%		70-130	17-OCT-14
WG1967865-2	MB							
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	17-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	17-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	17-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	17-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	17-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	17-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	17-OCT-14
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	17-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	17-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	17-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	17-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	17-OCT-14
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	17-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	17-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	17-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	17-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	17-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	17-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	17-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	17-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	17-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	17-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	17-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	17-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	17-OCT-14



Quality Control Report

Workorder: L1514793

Report Date: 14-SEP-15

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R3002648							
WG1967865-2	MB							
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	17-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	17-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	17-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	17-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	17-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	17-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	17-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	17-OCT-14
MOISTURE-TISS-VA								
	Tissue							
Batch	R2971228							
WG1965404-1	DUP	L1514793-10						
% Moisture		76.0	76.2		%	0.2	20	02-OCT-14
WG1965404-2	DUP	L1514793-48						
% Moisture		76.1	76.6		%	0.7	20	02-OCT-14
WG1965404-5	DUP	L1514793-56						
% Moisture		76.8	76.6		%	0.2	20	02-OCT-14
Batch	R2972012							
WG1966422-2	DUP	L1514793-42						
% Moisture		74.8	74.8		%	0.1	20	03-OCT-14

Quality Control Report

Workorder: L1514793

Report Date: 14-SEP-15

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.


Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS LABORATORY GROUP ANALYTICAL REPORT

ALS Lab WO#: L1514793

Client ID	Liver - Total Weight (g)	Muscle- Total Weight (g)
SK-1	40.220	20.620
SK-2	69.284	23.515
SK-3	43.171	25.109
SK-4	51.629	26.250
SK-5	34.512	26.923
SK-6	45.234	36.194
SK-7	41.385	33.723
SK-8	67.154	32.003
SK-9	60.456	29.809
SK-10	47.631	29.220
SK-11	56.665	35.477
SK-12	47.768	30.052
SK-13	60.169	29.054
SK-14	65.323	36.545
SK-15	40.403	39.253
SK-16	48.202	44.150
SK-17	49.594	38.988
SK-18	59.403	37.684
SK-19	25.857	27.493
SK-20	60.998	33.123
SK-21	48.737	31.984
SK-22	41.875	34.505
SK-23	52.333	26.009
SK-24	56.757	40.482
SK-25	39.974	34.818
SK-26	48.081	41.670
SK-27	40.723	40.134
SK-28	27.889	14.629
SK-29	49.182	40.624
SK-30	37.929	35.520

Report To			Report Format / Distribution			Service Requested (Rush for routine analysis subject to availability)					
Company: Red Chris Development Company			<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)					
Contact: Jack Love/Heather Hawkins			<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT					
Address: 200-580 Hornby St. Vancouver, BC V6C 3B6			Email 1: jlove@redchrismine.ca			<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT					
Phone: 604-800-9200 329 Fax:			Email 2:			<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT					
Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			Client / Project Information			Analysis Request Please indicate below Filtered, Preserved or both (F, P, F/P)					
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No			Job #:								
Company:			PO / AFE:			Liver (metals) X Muscle (metals) X % moisture X					
Contact:			LSD:								
Address:			Quote #:								
Phone:			ALS Contact: Can Dang								
Lab (lab use only) L1514793-COFC											
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Liver (metals)	Muscle (metals)	% moisture	Number of Containers			
SK-1	Short Holding Time Rush Processing	Sep 2/14		FISH	X	X	X				
SK-2					X	X	X				
SK-3					X	X	X				
SK-4					X	X	X				
SK-5					X	X	X				
SK-6					X	X	X				
SK-7					X	X	X				
SK-8					X	X	X				
SK-9					X	X	X				
SK-10					X	X	X				
SK-11					X	X	X				
SK-12		Sep 2/14		FISH	X	X	X				
Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/IAB Tier 1 - Natural, etc) / Hazardous Details											
* Please include following addresses: kym.keogh@gov.bc.ca and have a COPY mailed to: Confidential lab results, Soda creek SK sampling, 2672 Indian Drive, Williams Lake, BC, V8K2G0											
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.											
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.											
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.											
SHIPMENT RELEASE (client use)				SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh:mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF	
C. Koenig	Sep 7/14		JW	Sep 9	8:30	1 °C					

Report To			Report Format / Distribution			Service Requested (Rush for routine analysis subject to availability)						
Company: Red Chris Development Company			<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)						
Contact: Jack Love/Heather Hawkins			<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT						
Address: 200-580 Hornby St. Vancouver, BC V6C 3B6			Email 1: love@redchrimine.ca			<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT						
Phone: 604-800-9200 329 Fax:			Email 2:			<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT						
Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			Email 3: ckoenig@redchrimine.ca			Analysis Request						
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No			Client / Project Information			Please indicate below Filtered, Preserved or both (F, P, F/P)						
Company:			Job #:									
Contact:			PO / AFE:									
Address:			LSD:									
Phone:			Quote #:									
Lab V (lab.  L1514793-COFC)			ALS Contact: Can Dang			Sampler: CK						Number of Containers
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Liver (metals)	Muscle (metals)	% moisture					
	SK-13	Sep 2/14		FISH	X	X	X					
	SK-14		X		X	X						
	SK-15		X		X	X						
	SK-16		X		X	X						
	SK-17		X		X	X						
	SK-18		X		X	X						
	SK-19		X		X	X						
	SK-20		X		X	X						
	SK-21		X		X	X						
	SK-22		X		X	X						
	SK-23	X	X	X								
	SK-24	Sep 2/14		FISH	X	X	X					

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

* Please include following addresses: kym.keogh@gov.bc.ca and have a COPY mailed to: Confidential lab results, Soda creek SK sampling, 2672 Indian Drive, Williams Lake, BC, V0K2G0

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

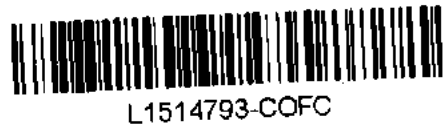
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: C. Koenig	Date (dd-mmm-yy): Sep 7/14	Time (hh-mm):	Received by: JK	Date: Sep 9	Time: 8:30	Temperature: 1 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

Report To	Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company: Red Chris Development Company	<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)
Contact: Jack Love/Heather Hawkins	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address: 200-580 Hornby St. Vancouver, BC V6C 3B6	Email 1: jlove@redchrismine.ca	<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
Phone: 604-800-9200 329 Fax:	Email 2:	<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
	Email 3: ckoenig@redchrismine.ca	Analysis Request

Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Client / Project Information	Please indicate below Filtered, Preserved or both (F, P, F/P)	
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No	Job #:		
Company:	PO / AFE:		
Contact:	LSD:		
Address:			
Phone:	Quote #:		
Lab \ (lal)	ALS Contact: Can Dang	Sampler: CK, [redacted]	



Sample #	(This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Liver (metals)	Miscle (metals)	Organistura	Number of Containers
SK-25		Sep 2/14		FISH	X	X	X	
SK-26		Sep 2/14		}	X	X	X	
SK-27		Sep 2/14			X	X	X	
SK-28		Sep 4/14		}	X	X	X	
SK-29		Sep 4/14			X	X	X	
SK-30		Sep 4/14		FISH	X	X	X	

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:
C. Koenig	Sep 7/14		[Signature]	Sep 9	8:30	°C				Yes / No ? If Yes add SIF



Sample Receipt Confirmation

60 Samples received at ALS in VANCOUVER

Job Reference #: N/A

Project PO #: N/A

Legal Site Description: N/A

Quote #: Q46666

Lab Work Order #: L1514793

Estimated Completion Date: 10/10/2014

Date Sampled: 9/2/2014

Date Received: 9/9/2014

Sampled By: CK

Chain of Custody: Horsefly River

Account Manager: Can Dang

Estimated Sample Disposal Date: See Sample Disposal Information section below.

Sample Integrity Observations: No observations were identified for this work order submission.

Report Distribution:

Company Name: MOUNT POLLEY MINING CORP.

Contact: Colleen Hughes

Address: PO Box 12

Likely, BC V0L 1N0

Phone: 250-790-2215

Fax: 250-790-2268

Email: chughes@mountpolley.com
dmcmillan@minnow.ca
JLove@imperialmetals.com
ckoenig@redchrismine.ca
Natalie.neufeld@snclavalin.com
trevor.mcconkey@snclavalin.com
kmcmahe@mountpolley.com
mia.sakelariou@snclavalin.com

EDD Email: chughes@mountpolley.com
dmcmillan@minnow.ca
JLove@imperialmetals.com
ckoenig@redchrismine.ca
Natalie.neufeld@snclavalin.com
trevor.mcconkey@snclavalin.com
mia.sakelariou@snclavalin.com
kmcmahe@mountpolley.com

Distribution: Hard Copy: N Email: Y Fax: N

EDD: Y

Invoice Distribution:

Acct Name: MOUNT POLLEY MINING CORP. ~LIKELY

Contact: Accounts Payable

Address: PO Box 12,

Likely, BC, V0L 1N0

Phone: 250-790-2215

Fax: --

Invoice Email: prosette@mountpolley.com
chughes@mountpolley.com

Project #: N/A

Account #: MPM100

Distribution: Hard Copy: Y Email: Y

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type
L1514793-1	SK-1 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-2	SK-2 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-3	SK-3 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-4	SK-4 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-5	SK-5 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700

ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company



Sample Receipt Confirmation

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type
L1514793-6	SK-6 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-7	SK-7 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-8	SK-8 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-9	SK-9 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-10	SK-10 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-11	SK-11 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-12	SK-12 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-13	SK-13 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-14	SK-14 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-15	SK-15 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-16	SK-16 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-17	SK-17 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-18	SK-18 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-19	SK-19 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-20	SK-20 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-21	SK-21 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-22	SK-22 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-23	SK-23 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-24	SK-24 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-25	SK-25 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-26	SK-26 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-27	SK-27 LIVER	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-28	SK-28 LIVER	9/4/2014 11:45 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-29	SK-29 LIVER	9/4/2014 11:45 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-30	SK-30 LIVER	9/4/2014 11:45 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-31	SK-1 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-32	SK-2 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-33	SK-3 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-34	SK-4 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH



Sample Receipt Confirmation

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type
L1514793-35	SK-5 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-36	SK-6 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-37	SK-7 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-38	SK-8 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-39	SK-9 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-40	SK-10 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-41	SK-11 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-42	SK-12 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-43	SK-13 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-44	SK-14 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-45	SK-15 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-46	SK-16 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-47	SK-17 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-48	SK-18 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-49	SK-19 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-50	SK-20 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-51	SK-21 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-52	SK-22 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-53	SK-23 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-54	SK-24 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-55	SK-25 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-56	SK-26 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-57	SK-27 MUSCLE	9/2/2014 11:30 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-58	SK-28 MUSCLE	9/4/2014 11:45 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-59	SK-29 MUSCLE	9/4/2014 11:45 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH
L1514793-60	SK-30 MUSCLE	9/4/2014 11:45 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH



Sample Receipt Confirmation

Analysis Requested:

	Sample Handling and Disposal Fee	Mercury in Tissue by CVAFS (WET)	Metals in Tissue by CRC ICPMS (WET)	% Moisture in Tissues	Tissue/Vegetation Sample Preparation
SK-1 LIVER	X	X	X	X	X
SK-2 LIVER	X	X	X	X	X
SK-3 LIVER	X	X	X	X	X
SK-4 LIVER	X	X	X	X	X
SK-5 LIVER	X	X	X	X	X
SK-6 LIVER	X	X	X	X	X
SK-7 LIVER	X	X	X	X	X
SK-8 LIVER	X	X	X	X	X
SK-9 LIVER	X	X	X	X	X
SK-10 LIVER	X	X	X	X	X
SK-11 LIVER	X	X	X	X	X
SK-12 LIVER	X	X	X	X	X
SK-13 LIVER	X	X	X	X	X
SK-14 LIVER	X	X	X	X	X
SK-15 LIVER	X	X	X	X	X
SK-16 LIVER	X	X	X	X	X
SK-17 LIVER	X	X	X	X	X
SK-18 LIVER	X	X	X	X	X
SK-19 LIVER	X	X	X	X	X



Sample Receipt Confirmation

Analysis Requested:

	Sample Handling and Disposal Fee	Mercury in Tissue by CVAFS (WET)	Metals in Tissue by CRC ICPMS (WET)	% Moisture in Tissues	Tissue/Vegetation Sample Preparation
SK-20 LIVER	X	X	X	X	X
SK-21 LIVER	X	X	X	X	X
SK-22 LIVER	X	X	X	X	X
SK-23 LIVER	X	X	X	X	X
SK-24 LIVER	X	X	X	X	X
SK-25 LIVER	X	X	X	X	X
SK-26 LIVER	X	X	X	X	X
SK-27 LIVER	X	X	X	X	X
SK-28 LIVER	X	X	X	X	X
SK-29 LIVER	X	X	X	X	X
SK-30 LIVER	X	X	X	X	X
SK-1 MUSCLE	X	X	X	X	X
SK-2 MUSCLE	X	X	X	X	X
SK-3 MUSCLE	X	X	X	X	X
SK-4 MUSCLE	X	X	X	X	X
SK-5 MUSCLE	X	X	X	X	X
SK-6 MUSCLE	X	X	X	X	X
SK-7 MUSCLE	X	X	X	X	X
SK-8 MUSCLE	X	X	X	X	X
SK-9 MUSCLE	X	X	X	X	X



Sample Receipt Confirmation

Analysis Requested:

	Sample Handling and Disposal Fee	Mercury in Tissue by CVAFS (WET)	Metals in Tissue by CRC ICPMS (WET)	% Moisture in Tissues	Tissue/Vegetation Sample Preparation
SK-10 MUSCLE	X	X	X	X	X
SK-11 MUSCLE	X	X	X	X	X
SK-12 MUSCLE	X	X	X	X	X
SK-13 MUSCLE	X	X	X	X	X
SK-14 MUSCLE	X	X	X	X	X
SK-15 MUSCLE	X	X	X	X	X
SK-16 MUSCLE	X	X	X	X	X
SK-17 MUSCLE	X	X	X	X	X
SK-18 MUSCLE	X	X	X	X	X
SK-19 MUSCLE	X	X	X	X	X
SK-20 MUSCLE	X	X	X	X	X
SK-21 MUSCLE	X	X	X	X	X
SK-22 MUSCLE	X	X	X	X	X
SK-23 MUSCLE	X	X	X	X	X
SK-24 MUSCLE	X	X	X	X	X
SK-25 MUSCLE	X	X	X	X	X
SK-26 MUSCLE	X	X	X	X	X
SK-27 MUSCLE	X	X	X	X	X
SK-28 MUSCLE	X	X	X	X	X
SK-29 MUSCLE	X	X	X	X	X



Sample Receipt Confirmation

**Analysis
Requested:**

	Sample Handling and Disposal Fee	Mercury in Tissue by CVAFS (WET)	Metals in Tissue by CRC ICPMS (WET)	% Moisture in Tissues	Tissue/Vegetation Sample Preparation
SK-30 MUSCLE	X	X	X	X	X



Sample Receipt Confirmation

Sample Disposal Information:


Where possible, ALS will store samples for 30 days from the date a final report is issued, or 30 days from the date samples are placed on hold without analytical requests, after which samples may be discarded. Air samples collected on re-usable media are an exception, and are stored for 7 days from the date a final report is issued. Longer storage times are available upon request.

For information about ALS accreditations and certifications please contact your Account Manager or visit our webpage at www.alsglobal.com (see Canada downloads).

ALS Group strives to deliver on-time results to our clients at all times. However, there are times when due to capacity issues or other unforeseen circumstances we are unable to meet our expected turnaround times. The information above is related to a recent workorder you have submitted to our laboratory. In the event that you have an inquiry, please refer to the Lab Work Order # L1514793 when calling your Account Manager.

ALS Group appreciates your business. Thank you for the opportunity to work with you.

Report To	Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company: Red Chris Development Company	<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)
Contact: Jack Love/Heather Hawkins	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address: 200-580 Hornby St. Vancouver, BC V6C 3B6	Email 1: jlove@redchrismine.ca	<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
Phone: 604-800-9200 329 Fax:	Email 2:	<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Email 3: ckoenig@redchrismine.ca	Analysis Request
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No	Client / Project Information	Please indicate below Filtered, Preserved or both (F, P, F/P)

Company: Contact: Address: Phone: Lab (lab use only)	 L1514793-COFC	Job #: PO / AFE: LSD: Quote #: ALS Contact: Can Dang Sampler: CK, MISSISS
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Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Analysis Request			Number of Containers
					Liver (metals)	Muscle (metals)	% moisture	
SK-1	<div style="border: 2px solid black; padding: 10px; transform: rotate(-15deg); display: inline-block;"> Short Holding Time Rush Processing </div>	Sep 2/14	FISH	X	X	X		
SK-2				X	X	X		
SK-3				X	X	X		
SK-4				X	X	X		
SK-5				X	X	X		
SK-6				X	X	X		
SK-7				X	X	X		
SK-8				X	X	X		
SK-9				X	X	X		
SK-10				X	X	X		
SK-11				X	X	X		
SK-12		Sep 2/14	FISH	X	X	X		

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/IAB Tier 1 - Natural, etc) / Hazardous Details

~~* Please include following addresses: kym.keogh@gov.bc.ca and have a COPY mailed to: Confidential lab results, Soda creek SK sampling, 2672 Indian Drive, Williams Lake, BC, V8K2G0~~

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
 By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
 Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: <i>C. Koenig</i>	Date (dd-mmm-yy): <i>Sep 7/14</i>	Time (hh:mm):	Received by: <i>JW</i>	Date: <i>Sep 9</i>	Time: <i>8:30</i>	Temperature: <i>1 °C</i>	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF



Report To	Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company: Red Chris Development Company	<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)
Contact: Jack Love/Heather Hawkins	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address: 200-580 Hornby St. Vancouver, BC V6C 3B6	Email 1: <u>love@redchrismine.ca</u>	<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
Phone: 604-800-9200 329 Fax:	Email 2:	<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Email 3: <u>ckoenig@redchrismine.ca</u>	Analysis Request
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No	Client / Project Information	Please indicate below Filtered, Preserved or both (F, P, F/P)

Company:	Job #:	Number of Containers
Contact:	PO / AFE:	
Address:	LSD:	
Phone:	Quote #:	
Lab V (lab.	ALS Contact: Can Dang	
	Sampler: CK	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	Liver (metals)	Muscle (metals)	% moisture												
	SK-13	Sep 2/14		FISH	X	X	X												
	SK-14				X	X	X												
	SK-15				X	X	X												
	SK-16				X	X	X												
	SK-17				X	X	X												
	SK-18				X	X	X												
	SK-19				X	X	X												
	SK-20				X	X	X												
	SK-21				X	X	X												
	SK-22				X	X	X												
	SK-23	X	X	X															
	SK-24	Sep 2/14		FISH	X	X	X												

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

* Please include following addresses: kym.keogh@gov.bc.ca and have a COPY mailed to: Confidential lab results, Soda creek SK sampling, 2672 Indian Drive, Williams Lake, BC, V0K2G0

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by	Date (dd-mm-yy)	Time (hh-mm)	Received by	Date	Time	Temperature:	Verified by:	Date:	Time:	Observations:
C. Koenig	Sep 7/14		Ju	Sept 9	8:30	1 °C				Yes / No ? If Yes add SIF

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)	
Company: Red Chris Development Company		<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other		<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)	
Contact: Jack Love/Heather Hawkins		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT	
Address: 200-580 Hornby St. Vancouver, BC V6C 3B6		Email 1: jlove@redchrismine.ca		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT	
Phone: 604-800-9200 329 Fax:		Email 2:		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT	
Email 3: ckoenig@redchrismine.ca		Analysis Request			

Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Client / Project Information		Please indicate below Filtered, Preserved or both (F, P, F/P)						Number of Containers		
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		Job #:										
Company:		PO / AFE:										
Contact:		LSD:										
Address:		Quote #:										
Phone:		ALS Contact: Can Dang		Sampler: CK, [redacted]								



Sample #	(This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Liver (metals)	Miscle (metals)	Organistura							
SK-25		Sep 2/14		FISH	X	X	X							
SK-26		Sep 2/14		}	X	X	X							
SK-27		Sep 2/14			X	X	X							
SK-28		Sep 4/14			X	X	X							
SK-29		Sep 4/14		}	X	X	X							
SK-30		Sep 4/14			FISH	X	X	X						

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

* Please include following addresses: kym.keogh@gov.bc.ca and have a COPY mailed to: Confidential lab results, Soda creek SK sampling, 2672 Indian Drive, Williams Lake, BC, V0K2G0

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: C.Koenig	Date (dd-mmm-yy): Sep 7/14	Time (hh-mm):	Received by: [Signature]	Date: Sept 9	Time: 8:30	Temperature: 1 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 09-SEP-14
Report Date: 04-SEP-15 18:01 (MT)
Version: FINAL REV. 2

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1514806
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: QL UNIMPACTED
Legal Site Desc:

Comments:

4-SEP-2015 Revision 2: The collection date for the sample ALS identify as L1514806-12 was modified.

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1514806-1 FISH - Unimpacted 05-SEP-14 NSC-1 HFGT-2	L1514806-2 FISH - Unimpacted 03-SEP-14 LNC-20 HFGT-1	L1514806-3 FISH - Unimpacted 03-SEP-14 NSC-9-10 HFGT-1	L1514806-4 FISH - Unimpacted 03-SEP-14 NSC-11-12-13 HFGT-1	L1514806-5 FISH - Unimpacted 03-SEP-14 PCC-2+5 HFGT-1
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)				
	75.7	77.5	71.7	76.0	73.8
Metals	Aluminum (Al)-Total (mg/kg wwt)				
	1.35	12.3	<0.40	1.36	0.53
	Antimony (Sb)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)				
	0.0183	0.0502	0.0120	0.0230	0.0645
	Barium (Ba)-Total (mg/kg wwt)				
	0.448	1.78	0.334	0.570	0.591
	Beryllium (Be)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)				
	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)				
	0.0117	0.0087	0.0111	0.0239	0.0311
	Calcium (Ca)-Total (mg/kg wwt)				
	9800	11400	8810	12700	11700
	Cesium (Cs)-Total (mg/kg wwt)				
	0.0064	0.0109	0.0082	0.0103	0.0164
	Chromium (Cr)-Total (mg/kg wwt)				
	0.017	0.052	0.011	<0.010	0.020
	Cobalt (Co)-Total (mg/kg wwt)				
	0.0095	0.0236	0.0146	0.0118	0.0140
	Copper (Cu)-Total (mg/kg wwt)				
	0.941	0.609	0.644	0.828	0.614
	Iron (Fe)-Total (mg/kg wwt)				
	12.3	30.5	12.3	12.7	11.3
	Lead (Pb)-Total (mg/kg wwt)				
	<0.0040	0.0082	0.0044	0.0057	0.0060
	Lithium (Li)-Total (mg/kg wwt)				
	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)				
	420	432	386	455	422
	Manganese (Mn)-Total (mg/kg wwt)				
	3.21	12.0	1.46	2.95	2.25
	Mercury (Hg)-Total (mg/kg wwt)				
	0.0488	0.0484	0.0412	0.0606	0.0629
	Molybdenum (Mo)-Total (mg/kg wwt)				
	0.0114	0.0218	0.0103	0.0121	0.0148
	Nickel (Ni)-Total (mg/kg wwt)				
	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg wwt)				
	7590	8070	6440	8960	8520
	Potassium (K)-Total (mg/kg wwt)				
	3620	3390	3420	3480	3430
	Rubidium (Rb)-Total (mg/kg wwt)				
	4.49	7.82	5.00	8.49	4.90
	Selenium (Se)-Total (mg/kg wwt)				
	0.548	0.532	0.621	0.591	0.619
	Sodium (Na)-Total (mg/kg wwt)				
	762	915	723	788	724
	Strontium (Sr)-Total (mg/kg wwt)				
	11.0	18.4	11.0	16.5	21.8
	Tellurium (Te)-Total (mg/kg wwt)				
	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)				
	0.00168	0.00345	0.00222	0.00232	0.00385
	Tin (Sn)-Total (mg/kg wwt)				
	<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg wwt)				
	<0.00040	0.00227	<0.00040	<0.00040	0.00061
	Vanadium (V)-Total (mg/kg wwt)				
	<0.020	0.044	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg wwt)				
	35.9	26.2	32.8	44.2	34.3
	Zirconium (Zr)-Total (mg/kg wwt)				
	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1514806-6 FISH - Unimpacted 03-SEP-14 NSC-18 HFGT-1	L1514806-7 FISH - Unimpacted 03-SEP-14 LND-19 HFGT-1	L1514806-8 FISH - Unimpacted 03-SEP-14 NSC-7-8 HFGT-1	L1514806-9 FISH - Unimpacted 05-SEP-14 NSC2+NSC3- HFGT-2	L1514806-10 FISH - Unimpacted 03-SEP-14 NSC-17 HFGT-1
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	75.1	77.2	76.3	70.6	75.9
Metals	Aluminum (Al)-Total (mg/kg wwt)	0.73	19.1	0.44	5.63	<0.40
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	0.0040 ^{RRU}	<0.0020
	Arsenic (As)-Total (mg/kg wwt)	0.0156	0.116	0.0246	0.0492	0.0180
	Barium (Ba)-Total (mg/kg wwt)	0.461	0.925	0.635	0.405	0.387
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)	0.0108	0.0183	0.0243	0.0083	0.0153
	Calcium (Ca)-Total (mg/kg wwt)	11800	12900	15700	9620	8290
	Cesium (Cs)-Total (mg/kg wwt)	0.0050	0.0109	0.0102	0.0123	0.0113
	Chromium (Cr)-Total (mg/kg wwt)	0.022	0.093	<0.010	0.269	0.086
	Cobalt (Co)-Total (mg/kg wwt)	0.0179	0.0304	0.0134	0.0213	0.0107
	Copper (Cu)-Total (mg/kg wwt)	0.598	0.945	0.778	0.714	0.655
	Iron (Fe)-Total (mg/kg wwt)	17.0	40.5	14.3	18.9	13.0
	Lead (Pb)-Total (mg/kg wwt)	0.0052	0.0243	<0.0040	0.0188	<0.0040
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)	431	422	544	409	361
	Manganese (Mn)-Total (mg/kg wwt)	2.79	8.12	4.34	3.93	2.39
	Mercury (Hg)-Total (mg/kg wwt)	0.0414	0.0477	0.0621	0.0387	0.0479
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0122	0.0407	0.0144	0.0173	0.0108
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	0.063	<0.040	0.303	0.042
	Phosphorus (P)-Total (mg/kg wwt)	8370	8950	10800	6930	6270
	Potassium (K)-Total (mg/kg wwt)	3570	3410	4070	3790	2980
	Rubidium (Rb)-Total (mg/kg wwt)	4.38	7.27	9.37	10.1	7.94
	Selenium (Se)-Total (mg/kg wwt)	0.984	0.464	0.752	0.461	0.532
	Sodium (Na)-Total (mg/kg wwt)	828	1060	937	900	769
	Strontium (Sr)-Total (mg/kg wwt)	14.3	19.4	18.9	10.3	9.90
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)	0.00066	0.00192	0.00177	0.00141	0.00111
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	0.066	<0.020
	Uranium (U)-Total (mg/kg wwt)	0.00057	0.00292	0.00064	0.00054	0.00070
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.078	<0.020	0.023	<0.020
	Zinc (Zn)-Total (mg/kg wwt)	32.8	32.4	46.4	27.7	24.2
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID Description Sampled Date Sampled Time Client ID	L1514806-11 FISH - Unimpacted 03-SEP-14 NSC-14-15-16 HFGT-1	L1514806-12 FISH - Impacted 05-SEP-14 NSC-1 HAZ-3	L1514806-13 FISH - Unimpacted 03-SEP-14 NSC1+6 HFGT	L1514806-14 FISH - Unimpacted 03-SEP-14 NSC-3-4 HFGT-1
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	77.6	76.6	78.9	76.1	
Metals	Aluminum (Al)-Total (mg/kg wwt)	<0.40	1.27	9.82	0.56	
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	0.0022 ^{RRU}	
	Arsenic (As)-Total (mg/kg wwt)	0.0270	0.0188	0.0320	0.0093	
	Barium (Ba)-Total (mg/kg wwt)	0.540	0.362	0.600	0.422	
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	0.0021	
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	
	Cadmium (Cd)-Total (mg/kg wwt)	0.0113	0.0086	0.0211	0.0140	
	Calcium (Ca)-Total (mg/kg wwt)	11900	10100	11500	14100	
	Cesium (Cs)-Total (mg/kg wwt)	0.0121	0.0096	0.0070	0.0315	
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	0.018	0.191	<0.010	
	Cobalt (Co)-Total (mg/kg wwt)	0.0106	0.0194	0.0151	0.0158	
	Copper (Cu)-Total (mg/kg wwt)	0.780	0.883	0.721	0.774	
	Iron (Fe)-Total (mg/kg wwt)	12.1	16.0	24.9	14.2	
	Lead (Pb)-Total (mg/kg wwt)	0.0042	<0.0040	0.0092	0.0137	
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	
	Magnesium (Mg)-Total (mg/kg wwt)	412	470	394	414	
	Manganese (Mn)-Total (mg/kg wwt)	2.52	2.65	3.36	3.52	
	Mercury (Hg)-Total (mg/kg wwt)	0.0641	0.0366	0.0641	0.0748	
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0098	0.0128	0.0113	0.0127	
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	
	Phosphorus (P)-Total (mg/kg wwt)	8410	7860	8210	9600	
	Potassium (K)-Total (mg/kg wwt)	3380	3820	3520	3490	
	Rubidium (Rb)-Total (mg/kg wwt)	6.08	7.35	5.35	7.20	
	Selenium (Se)-Total (mg/kg wwt)	0.599	0.570	1.06	0.474	
	Sodium (Na)-Total (mg/kg wwt)	744	969	933	791	
	Strontium (Sr)-Total (mg/kg wwt)	14.4	10.7	12.1	17.8	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg wwt)	0.00175	0.00118	0.00136	0.00217	
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	0.024	
	Uranium (U)-Total (mg/kg wwt)	0.00046	<0.00040	0.00110	0.00108	
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	0.054	<0.020	
	Zinc (Zn)-Total (mg/kg wwt)	37.3	33.2	37.1	37.1	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Chromium (Cr)-Total	DUP-H	L1514806-10
Duplicate	Chromium (Cr)-Total	DUP-H	L1514806-10

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
RRU	Reported Result is Uncertain due to proximity to the estimated Method Detection Limit.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-WET-CVAFS-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7

This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1991). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7. This digestion procedure was implemented on October 5, 2009.

This analysis is not compliant with the requirements of the B.C. Lab Manual for digestion of tissue samples from British Columbia for metals analysis after January 1, 2015.

MET-WET-CCMS-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
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This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1991). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

This analysis is not compliant with the requirements of the B.C. Lab Manual for digestion of tissue samples from British Columbia for metals analysis after January 1, 2015.

MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
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This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

QL UNIMPACTED

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1514806

Report Date: 04-SEP-15

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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0
 Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-WET-CVAFS-VA		Tissue						
Batch R3005130								
WG1977185-5 CRM		VA-NRC-TORT3						
Mercury (Hg)-Total			99.1		%		70-130	20-OCT-14
WG1977185-6 CRM		VA-NRC-TORT3						
Mercury (Hg)-Total			101.1		%		70-130	20-OCT-14
WG1977185-4 DUP		L1514806-10						
Mercury (Hg)-Total		0.0479	0.0501		mg/kg wwt	4.5	40	20-OCT-14
WG1977185-1 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	20-OCT-14
WG1977185-2 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	20-OCT-14
Batch R3014188								
WG1979839-3 CRM		VA-NRC-TORT3						
Mercury (Hg)-Total			95.6		%		70-130	22-OCT-14
WG1979839-4 CRM		VA-NIST-1566B						
Mercury (Hg)-Total			86.9		%		70-130	22-OCT-14
WG1979839-1 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	22-OCT-14
WG1979839-2 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	22-OCT-14
MET-WET-CCMS-VA		Tissue						
Batch R3002648								
WG1977185-5 CRM		VA-NRC-TORT3						
Arsenic (As)-Total			109.6		%		70-130	17-OCT-14
Cadmium (Cd)-Total			93.7		%		70-130	17-OCT-14
Chromium (Cr)-Total			87.5		%		70-130	17-OCT-14
Cobalt (Co)-Total			98.2		%		70-130	17-OCT-14
Copper (Cu)-Total			86.9		%		70-130	17-OCT-14
Iron (Fe)-Total			92.1		%		70-130	17-OCT-14
Lead (Pb)-Total			88.5		%		70-130	17-OCT-14
Manganese (Mn)-Total			92.0		%		70-130	17-OCT-14
Molybdenum (Mo)-Total			98.5		%		70-130	17-OCT-14
Nickel (Ni)-Total			90.4		%		70-130	17-OCT-14
Selenium (Se)-Total			94.8		%		70-130	17-OCT-14
Strontium (Sr)-Total			95.9		%		70-130	17-OCT-14
Vanadium (V)-Total			98.6		%		70-130	17-OCT-14
Zinc (Zn)-Total			88.0		%		70-130	17-OCT-14
WG1977185-6 CRM		VA-NRC-TORT3						



Quality Control Report

Workorder: L1514806

Report Date: 04-SEP-15

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA		Tissue						
Batch	R3002648							
WG1977185-6	CRM	VA-NRC-TORT3						
Arsenic (As)-Total			111.4		%		70-130	17-OCT-14
Cadmium (Cd)-Total			95.8		%		70-130	17-OCT-14
Chromium (Cr)-Total			92.3		%		70-130	17-OCT-14
Cobalt (Co)-Total			99.6		%		70-130	17-OCT-14
Copper (Cu)-Total			88.1		%		70-130	17-OCT-14
Iron (Fe)-Total			93.2		%		70-130	17-OCT-14
Lead (Pb)-Total			85.5		%		70-130	17-OCT-14
Manganese (Mn)-Total			93.2		%		70-130	17-OCT-14
Molybdenum (Mo)-Total			98.2		%		70-130	17-OCT-14
Nickel (Ni)-Total			92.2		%		70-130	17-OCT-14
Selenium (Se)-Total			97.9		%		70-130	17-OCT-14
Strontium (Sr)-Total			95.6		%		70-130	17-OCT-14
Vanadium (V)-Total			99.6		%		70-130	17-OCT-14
Zinc (Zn)-Total			89.0		%		70-130	17-OCT-14
WG1977185-4	DUP	L1514806-10						
Aluminum (Al)-Total		<0.40	<0.40	RPD-NA	mg/kg wwt	N/A	40	17-OCT-14
Antimony (Sb)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	17-OCT-14
Arsenic (As)-Total		0.0180	0.0145		mg/kg wwt	21	40	17-OCT-14
Barium (Ba)-Total		0.387	0.437		mg/kg wwt	12	40	17-OCT-14
Beryllium (Be)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	17-OCT-14
Bismuth (Bi)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	17-OCT-14
Boron (B)-Total		<0.20	<0.20	RPD-NA	mg/kg wwt	N/A	40	17-OCT-14
Cadmium (Cd)-Total		0.0153	0.0160		mg/kg wwt	4.5	40	17-OCT-14
Calcium (Ca)-Total		8290	9380		mg/kg wwt	12	60	17-OCT-14
Cesium (Cs)-Total		0.0113	0.0119		mg/kg wwt	4.7	40	17-OCT-14
Chromium (Cr)-Total		0.086	0.183	DUP-H	mg/kg wwt	72	40	17-OCT-14
Cobalt (Co)-Total		0.0107	0.0124		mg/kg wwt	15	40	17-OCT-14
Copper (Cu)-Total		0.655	0.667		mg/kg wwt	1.9	40	17-OCT-14
Iron (Fe)-Total		13.0	15.1		mg/kg wwt	15	40	17-OCT-14
Lead (Pb)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	17-OCT-14
Lithium (Li)-Total		<0.10	<0.10	RPD-NA	mg/kg wwt	N/A	40	17-OCT-14
Magnesium (Mg)-Total		361	392		mg/kg wwt	8.2	40	17-OCT-14
Manganese (Mn)-Total		2.39	2.61		mg/kg wwt	9.0	40	17-OCT-14
Molybdenum (Mo)-Total		0.0108	0.0106		mg/kg wwt	2.3	40	17-OCT-14



Quality Control Report

Workorder: L1514806

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R3002648							
WG1977185-4	DUP	L1514806-10						
Nickel (Ni)-Total		0.042	<0.040	RPD-NA	mg/kg wwt	N/A	40	17-OCT-14
Phosphorus (P)-Total		6270	6920		mg/kg wwt	10	40	17-OCT-14
Potassium (K)-Total		2980	3210		mg/kg wwt	7.3	40	17-OCT-14
Rubidium (Rb)-Total		7.94	8.46		mg/kg wwt	6.3	40	17-OCT-14
Selenium (Se)-Total		0.532	0.562		mg/kg wwt	5.5	40	17-OCT-14
Sodium (Na)-Total		769	832		mg/kg wwt	7.8	40	17-OCT-14
Strontium (Sr)-Total		9.90	11.2		mg/kg wwt	12	60	17-OCT-14
Tellurium (Te)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	17-OCT-14
Thallium (Tl)-Total		0.00111	0.00123		mg/kg wwt	10	40	17-OCT-14
Tin (Sn)-Total		<0.020	<0.020	RPD-NA	mg/kg wwt	N/A	40	17-OCT-14
Uranium (U)-Total		0.00070	0.00073		mg/kg wwt	3.6	40	17-OCT-14
Vanadium (V)-Total		<0.020	<0.020	RPD-NA	mg/kg wwt	N/A	40	17-OCT-14
Zinc (Zn)-Total		24.2	26.6		mg/kg wwt	9.7	40	17-OCT-14
Zirconium (Zr)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	17-OCT-14
WG1977185-1	MB							
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	17-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	17-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	17-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	17-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	17-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	17-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	17-OCT-14
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	17-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	17-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	17-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	17-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	17-OCT-14
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	17-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	17-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	17-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	17-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	17-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	17-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	17-OCT-14



Quality Control Report

Workorder: L1514806

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA		Tissue						
Batch	R3002648							
WG1977185-1 MB								
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	17-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	17-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	17-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	17-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	17-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	17-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	17-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	17-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	17-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	17-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	17-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	17-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	17-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	17-OCT-14
WG1977185-2 MB								
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	17-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	17-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	17-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	17-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	17-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	17-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	17-OCT-14
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	17-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	17-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	17-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	17-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	17-OCT-14
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	17-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	17-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	17-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	17-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	17-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	17-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	17-OCT-14



Quality Control Report

Workorder: L1514806

Report Date: 04-SEP-15

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA		Tissue						
Batch	R3002648							
WG1977185-2	MB							
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	17-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	17-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	17-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	17-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	17-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	17-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	17-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	17-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	17-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	17-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	17-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	17-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	17-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	17-OCT-14
Batch	R3020406							
WG1979839-3	CRM	VA-NRC-TORT3						
Arsenic (As)-Total			111.5		%		70-130	23-OCT-14
Cadmium (Cd)-Total			99.4		%		70-130	23-OCT-14
Chromium (Cr)-Total			95.5		%		70-130	23-OCT-14
Cobalt (Co)-Total			102.5		%		70-130	23-OCT-14
Copper (Cu)-Total			90.9		%		70-130	23-OCT-14
Iron (Fe)-Total			94.6		%		70-130	23-OCT-14
Lead (Pb)-Total			92.4		%		70-130	23-OCT-14
Manganese (Mn)-Total			96.7		%		70-130	23-OCT-14
Molybdenum (Mo)-Total			101.4		%		70-130	23-OCT-14
Nickel (Ni)-Total			95.0		%		70-130	23-OCT-14
Selenium (Se)-Total			97.2		%		70-130	23-OCT-14
Strontium (Sr)-Total			99.7		%		70-130	23-OCT-14
Vanadium (V)-Total			99.9		%		70-130	23-OCT-14
Zinc (Zn)-Total			92.2		%		70-130	23-OCT-14
WG1979839-4	CRM	VA-NIST-1566B						
Antimony (Sb)-Total			0.0102		mg/kg wwt		0.001-0.021	23-OCT-14
Arsenic (As)-Total			103.5		%		70-130	23-OCT-14
Barium (Ba)-Total			85.0		%		70-130	23-OCT-14
Boron (B)-Total			4.72		mg/kg wwt		3.5-5.5	23-OCT-14



Quality Control Report

Workorder: L1514806

Report Date: 04-SEP-15

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA		Tissue						
Batch	R3020406							
WG1979839-4 CRM	VA-NIST-1566B							
Cadmium (Cd)-Total			102.6		%		70-130	23-OCT-14
Calcium (Ca)-Total			100.1		%		70-130	23-OCT-14
Cobalt (Co)-Total			100.3		%		70-130	23-OCT-14
Copper (Cu)-Total			98.6		%		70-130	23-OCT-14
Iron (Fe)-Total			94.8		%		70-130	23-OCT-14
Lead (Pb)-Total			96.8		%		70-130	23-OCT-14
Magnesium (Mg)-Total			100.6		%		70-130	23-OCT-14
Manganese (Mn)-Total			101.3		%		70-130	23-OCT-14
Nickel (Ni)-Total			94.5		%		70-130	23-OCT-14
Potassium (K)-Total			100.7		%		70-130	23-OCT-14
Rubidium (Rb)-Total			97.2		%		70-130	23-OCT-14
Selenium (Se)-Total			102.5		%		70-130	23-OCT-14
Sodium (Na)-Total			96.8		%		70-130	23-OCT-14
Strontium (Sr)-Total			98.3		%		70-130	23-OCT-14
Uranium (U)-Total			101.6		%		70-130	23-OCT-14
Vanadium (V)-Total			92.4		%		70-130	23-OCT-14
Zinc (Zn)-Total			95.2		%		70-130	23-OCT-14
WG1979839-1 MB								
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	23-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	23-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	23-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	23-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	23-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	23-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	23-OCT-14
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	23-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	23-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	23-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	23-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	23-OCT-14
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	23-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	23-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	23-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	23-OCT-14



Quality Control Report

Workorder: L1514806

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA		Tissue						
Batch	R3020406							
WG1979839-1 MB								
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	23-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	23-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	23-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	23-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	23-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	23-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	23-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	23-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	23-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	23-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	23-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	23-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	23-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	23-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	23-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	23-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	23-OCT-14
WG1979839-2 MB								
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	23-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	23-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	23-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	23-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	23-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	23-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	23-OCT-14
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	23-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	23-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	23-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	23-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	23-OCT-14
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	23-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	23-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	23-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	23-OCT-14



Quality Control Report

Workorder: L1514806

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R3020406							
WG1979839-2	MB							
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	23-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	23-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	23-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	23-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	23-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	23-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	23-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	23-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	23-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	23-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	23-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	23-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	23-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	23-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	23-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	23-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	23-OCT-14
MOISTURE-TISS-VA								
	Tissue							
Batch	R2969433							
WG1964640-1	DUP	L1514806-12						
% Moisture		76.6	77.0		%	0.5	20	01-OCT-14

Quality Control Report

Workorder: L1514806

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Report To	Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company: Red Chris Development Company	<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)
Contact: Jack Love/Heather Hawkins	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address: 200-580 Hornby St. Vancouver, BC V6C 3B6	Email 1: jlove@redchrismine.ca Email 2:	<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
Phone: 604-800-9200 329 Fax:	Email 3: ckoenig@redchrismine.ca	<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT

Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No Company: Contact: Address: Phone:	Client / Project Information Job #: PO / AFE: LSD: Quote #: ALS Contact: Can Dang Sampler: CK	Analysis Request Please indicate below Filtered, Preserved or both (F, P, F/P)
---	--	--



Lab No L1514806-COFC
(lab u)

Sample #	Sample Description (This description is for the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	Number of Containers
	Short Holding Time <i>Rush Processing</i>			FISH	
NSC-1				X	X
NSC-2				X	X
NSC-3				X	X
NSC-4				X	X
NSC-5				X	X
NSC-6				X	X
NSC-7				X	X
NSC-8				X	X
NSC-9				X	X
NSC-10				X	X
NSC-11				FISH	

whole body (metals)
 70 moisture

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

* Please include following addresses: kym.koenig@gov.bc.ca and have a COPY mailed to: Confidential lab results, Soda creek SIK sampling, 2672 Indian Drive, Williams Lake, BC, V8K2G0

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: C. Koenig	Date (dd-mm-yy)	Time (hh:mm)	Received by: JH	Date: Sept 9	Time: 8:30	Temperature: 1 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

Report To			Report Format / Distribution			Service Requested (Rush for routine analysis subject to availability)					
Company: Red Chris Development Company			<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)					
Contact: Jack Love/Heather Hawkins			<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT					
Address: 200-580 Hornby St. Vancouver, BC V6C 3B6			Email 1: jlove@redchrismine.ca			<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT					
Phone: 604-800-9200 329 Fax:			Email 2:			<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT					
Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			Client / Project Information			Analysis Request					
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No			Job #:			Please indicate below Filtered, Preserved or both (F, P, F/P)					
Company:			PO / AFE:			<div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">Whole body (cont'd)</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">OR Residue</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">Number of Containers</div> </div>					
Contact:			LSD:								
Address:			Quote #:								
Phone:			ALS Contact: Can Dang Sampler: CK, ML, KK, GS								
Lab Work (lab us) L1514806-COFC			Date (dd-mm-yy)			Time (hh:mm)			Sample Type		
Sample #			(This description will appear on the report)								
PSC-1						FISH			X X		
XXXX						FISH					
LND-2						FISH			X X		
Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details											
Please include following addresses: kym.keogh@gov.bc.ca and have a COPY mailed to: Confidential Lab results, Soda creek SK sampling, 2672 Indian Drive, Williams Lake, BC, V0K2G8											
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.											
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.											
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.											
SHIPMENT RELEASE (client use)				SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:	
C. Koenig			JN	8/4/9	8:30	°C				Yes / No ? If Yes add SIF	



Sample Receipt Confirmation

14 Samples received at ALS in VANCOUVER

Job Reference #: N/A	Date Sampled: 9/3/2014
Project PO #: N/A	Date Received: 9/9/2014
Legal Site Description: N/A	Sampled By: CK
Quote #: Q47599	Chain of Custody: QL UNIMPACTED
Lab Work Order #: L1514806	Account Manager: Can Dang
Estimated Completion Date: 10/10/2014	Estimated Sample Disposal Date: See Sample Disposal Information section below.

Sample Integrity Observations: No observations were identified for this work order submission.

Report Distribution:

Company Name: MOUNT POLLEY MINING CORP.

Contact: Colleen Hughes

Address: PO Box 12

Likely, BC V0L 1N0

Phone: 250-790-2215

Fax: 250-790-2268

Email: chughes@mountpolley.com
Natalie.neufeld@snclavalin.com
kmcmaheh@mountpolley.com
mia.sakelariou@snclavalin.com
jlove@redchrismine.ca
ckoenig@redchrismine.ca

EDD Email: chughes@mountpolley.com
Natalie.neufeld@snclavalin.com
kmcmaheh@mountpolley.com
mia.sakelariou@snclavalin.com
jlove@redchrismine.ca
ckoenig@redchrismine.ca

Distribution: **Hard Copy:** N **Email:** Y **Fax:** N

EDD: Y

Invoice Distribution:

Acct Name: MOUNT POLLEY MINING CORP. ~LIKELY

Contact: Accounts Payable

Address: PO Box 12,

Likely, BC, V0L 1N0

Phone: 250-790-2215

Fax: --

Invoice Email: prosette@mountpolley.com
chughes@mountpolley.com

Project #: N/A

Account #: MPM100

Distribution: **Hard Copy:** Y **Email:** Y



Sample Receipt Confirmation

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type
L1514806-1	NSC-1 HFGT-2	9/5/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH - Unimpacted
L1514806-2	LNC-20 HFGT-1	9/3/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH - Unimpacted
L1514806-3	NSC-9-10 HFGT-1	9/3/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH - Unimpacted
L1514806-4	NSC-11-12-13 HFGT-1	9/3/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH - Unimpacted
L1514806-5	PCC-2+5 HFGT-1	9/3/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH - Unimpacted
L1514806-6	NSC-18 HFGT-1	9/3/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH - Unimpacted
L1514806-7	LND-19 HFGT-1	9/3/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH - Unimpacted
L1514806-8	NSC-7-8 HFGT-1	9/3/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH - Unimpacted
L1514806-9	NSC2+NSC3- HFGT-2	9/5/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH - Unimpacted
L1514806-10	NSC-17 HFGT-1	9/3/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH - Unimpacted
L1514806-11	NSC-14-15-16 HFGT-1	9/3/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH - Unimpacted
L1514806-12	NSC-1 HAZ-3	9/5/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH - Impacted
L1514806-13	NSC1+6 HFGT	9/3/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH - Unimpacted
L1514806-14	NSC-3-4 HFGT-1	9/3/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		FISH - Unimpacted



Sample Receipt Confirmation

Analysis Requested:

	Sample Handling and Disposal Fee	Mercury in Tissue by CVAFS (WET)	Metals in Tissue by CRC ICPMS (WET)	% Moisture in Tissues	Tissue/Vegetation Sample Preparation
NSC-1 HFGT-2	X	X	X	X	X
LNC-20 HFGT-1	X	X	X	X	X
NSC-9-10 HFGT-1	X	X	X	X	X
NSC-11-12-13 HFGT-1	X	X	X	X	X
PCC-2+5 HFGT-1	X	X	X	X	X
NSC-18 HFGT-1	X	X	X	X	X
LND-19 HFGT-1	X	X	X	X	X
NSC-7-8 HFGT-1	X	X	X	X	X
NSC2+NSC3- HFGT-2	X	X	X	X	X
NSC-17 HFGT-1	X	X	X	X	X
NSC-14-15-16 HFGT-1	X	X	X	X	X
NSC-1 HAZ-3	X	X	X	X	X
NSC1+6 HFGT	X	X	X	X	X
NSC-3-4 HFGT-1	X	X	X	X	X



Sample Receipt Confirmation

Sample Disposal Information:

Where possible, ALS will store samples for 30 days from the date a final report is issued, or 30 days from the date samples are placed on hold without analytical requests, after which samples may be discarded. Air samples collected on re-usable media are an exception, and are stored for 7 days from the date a final report is issued. Longer storage times are available upon request.

For information about ALS accreditations and certifications please contact your Account Manager or visit our webpage at www.alsglobal.com (see Canada downloads).

ALS Group strives to deliver on-time results to our clients at all times. However, there are times when due to capacity issues or other unforeseen circumstances we are unable to meet our expected turnaround times. The information above is related to a recent workorder you have submitted to our laboratory. In the event that you have an inquiry, please refer to the Lab Work Order # L1514806 when calling your Account Manager.

ALS Group appreciates your business. Thank you for the opportunity to work with you.

Report To	Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company: Red Chris Development Company	<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)
Contact: Jack Love/Heather Hawkins	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address: 200-580 Hornby St. Vancouver, BC V6C 3B6	Email 1: jlove@redchrismine.ca Email 2:	<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
Phone: 604-800-9200 329 Fax:	Email 3: ckoenig@redchrismine.ca	<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT

Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No Company: Contact: Address: Phone:	Client / Project Information Job #: PO / AFE: LSD: Quote #: ALS Contact: Can Dang Sampler: CK	Analysis Request Please indicate below Filtered, Preserved or both (F, P, F/P)
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Lab No L1514806-COFC
(lab u)

Sample #	Sample Description (This description is for the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	Number of Containers
	Short Holding Time <i>Rush Processing</i>				
NSC-1				FISH	
NSC-2					
NSC-3					
NSC-4					
NSC-5					
NSC-6					
NSC-7					
NSC-8					
NSC-9					
NSC-10					
NSC-11				FISH	

whole body (metals)
 70 moisture

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

* Please include following addresses: kym.koenig@gov.bc.ca and have a COPY mailed to: Confidential lab results, Soda creek SIK sampling, 2672 Indian Drive, Williams Lake, BC, V8K2G0

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: C. Koenig	Date (dd-mm-yy)	Time (hh:mm)	Received by: JH	Date: Sept 9	Time: 8:30	Temperature: 1 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

Report To			Report Format / Distribution			Service Requested (Rush for routine analysis subject to availability)					
Company: Red Chris Development Company			<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)					
Contact: Jack Love/Heather Hawkins			<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT					
Address: 200-580 Hornby St. Vancouver, BC V6C 3B6			Email 1: jlove@redchrismine.ca			<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT					
Phone: 604-800-9200 329 Fax:			Email 2:			<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT					
Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			Client / Project Information			Please indicate below Filtered, Preserved or both (F, P, F/P)					
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No			Job #:								
Company:			PO / AFE:			Whole body (cont'd) OR B. measure					
Contact:			LSD:								
Address:			Quote #:								
Phone:			ALS Contact: Can Dang Sampler: CK, ML, KK, GS								
Lab Work (lab us) L1514806-COFC			Date (dd-mm-yy)			Time (hh:mm)			Sample Type		
Sample #			(This description will appear on the report)								
PSC-1						FISH			X X		
XXXX						FISH					
LND-2						FISH			X X		
Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details											
Please include following addresses: kym.keogh@gov.bc.ca and have a COPY mailed to: Confidential Lab results, Soda creek SK sampling, 2672 Indian Drive, Williams Lake, BC, V0K2G8											
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab. Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.											
SHIPMENT RELEASE (client use)				SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: C.Koenig		Date (dd-mm-yy)		Received by: JN		Date: 8/4/9		Time: 8:30		Temperature: °C	
										Verified by:	
										Date:	
										Time:	
										Observations: Yes / No ? If Yes add SIF	



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 09-SEP-14
Report Date: 04-SEP-15 18:07 (MT)
Version: FINAL REV. 2

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1514817
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: QL IMPACTED
Legal Site Desc:

Comments:

4-SEP-2015 Revision 2: The Client ID for the samples ALS identify as L1514817-6 and L1514817-12 was modified.

Can Dang
Senior Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1514817-1 Fish - Impacted 22-AUG-14 NSC-1 QGTSK-1	L1514817-2 Fish - Impacted 01-SEP-14 NSC-2,3 HAZ-2	L1514817-3 Fish - Impacted 05-SEP-14 LNC HAZ-3	L1514817-4 Fish - Impacted 05-SEP-14 NSC 4,5,6 HAZ-3	L1514817-5 Fish - Impacted 05-SEP-14 NSC-2 NSC-3 HAZ-3
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	70.7	72.7	77.4	75.2	73.5
Metals	Aluminum (Al)-Total (mg/kg wwt)	4.01	<0.40	215	2.53	0.60
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	0.0035 ^{RRU}	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)	0.161	0.0293	0.109	0.0287	0.0144
	Barium (Ba)-Total (mg/kg wwt)	0.388	0.443	2.02	0.469	0.361
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	0.0050	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)	0.0186	0.0113	0.0586	0.0184	0.0138
	Calcium (Ca)-Total (mg/kg wwt)	7840	11500	9560	6490	9080
	Cesium (Cs)-Total (mg/kg wwt)	0.0067	0.0132	0.0341	0.0149	0.0115
	Chromium (Cr)-Total (mg/kg wwt)	0.017	<0.010	0.567	0.038	<0.010
	Cobalt (Co)-Total (mg/kg wwt)	0.0425	0.0139	0.170	0.0181	0.0094
	Copper (Cu)-Total (mg/kg wwt)	0.843	0.656	2.73	1.07	0.789
	Iron (Fe)-Total (mg/kg wwt)	15.9	10.4	419	12.1	10.2
	Lead (Pb)-Total (mg/kg wwt)	0.0044	<0.0040	0.0711	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	0.18	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)	438	434	488	395	412
	Manganese (Mn)-Total (mg/kg wwt)	1.44	2.41	15.0	1.99	1.60
	Mercury (Hg)-Total (mg/kg wwt)	0.0468	0.0714	0.0521	0.0445	0.0567
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0118	0.0096	0.0330	0.0134	0.0152
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	0.326	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg wwt)	6130	7800	6580	6240	6570
	Potassium (K)-Total (mg/kg wwt)	3620	3490	3450	3680	3440
	Rubidium (Rb)-Total (mg/kg wwt)	3.03	6.36	4.74	5.86	5.48
	Selenium (Se)-Total (mg/kg wwt)	0.848	0.607	0.473	0.647	0.597
	Sodium (Na)-Total (mg/kg wwt)	875	857	971	961	725
	Strontium (Sr)-Total (mg/kg wwt)	11.8	12.8	19.4	8.80	11.9
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)	0.00223	0.00166	0.00338	0.00101	0.00077
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg wwt)	0.00111	0.00045	0.0163	0.00068	0.00043
	Vanadium (V)-Total (mg/kg wwt)	0.028	<0.020	1.32	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg wwt)	29.6	37.9	23.7	34.1	34.8
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	0.136	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1514817-6 Fish - Impacted 01-SEP-14 NSC-1 HAZ-2	L1514817-7 Fish - Impacted 27-AUG-14 NSC-1 QGTCP-1	L1514817-8 Fish - Impacted 27-AUG-14 NSC-2 QGTCP-1	L1514817-9 Fish - Impacted 27-AUG-14 NSC-3 QGTCP-1	L1514817-10 Fish - Impacted 27-AUG-14 NSC-4 QGTCP-1
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	73.9	73.6	76.4	77.5	74.2
Metals	Aluminum (Al)-Total (mg/kg wwt)	<0.40	1.58	0.44	17.9	5.39
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)	0.0209	0.256	0.0628	0.183	0.0828
	Barium (Ba)-Total (mg/kg wwt)	0.518	0.287	0.181	0.366	0.283
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)	0.0196	0.0208	0.0067	0.0248	0.0225
	Calcium (Ca)-Total (mg/kg wwt)	14700	11400	7640	6000	6210
	Cesium (Cs)-Total (mg/kg wwt)	0.0169	0.0075	0.0165	0.0077	0.0165
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	0.067	0.018
	Cobalt (Co)-Total (mg/kg wwt)	0.0115	0.0739	0.0233	0.0838	0.0310
	Copper (Cu)-Total (mg/kg wwt)	0.959	0.835	0.575	0.978	0.783
	Iron (Fe)-Total (mg/kg wwt)	10.5	16.0	10.2	34.9	18.7
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	0.0068	<0.0040	0.0101	0.0045
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)	477	405	354	350	349
	Manganese (Mn)-Total (mg/kg wwt)	2.55	1.87	1.09	2.02	1.56
	Mercury (Hg)-Total (mg/kg wwt)	0.0389	0.0518	0.0524	0.0330	0.0399
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0167	0.0093	0.0103	0.0083	0.0115
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	0.045	0.041
	Phosphorus (P)-Total (mg/kg wwt)	9570	7540	5940	4930	5100
	Potassium (K)-Total (mg/kg wwt)	3560	3230	3370	3130	3290
	Rubidium (Rb)-Total (mg/kg wwt)	3.00	2.67	4.65	3.29	3.98
	Selenium (Se)-Total (mg/kg wwt)	0.705	0.851	0.405	0.554	0.782
	Sodium (Na)-Total (mg/kg wwt)	804	866	883	844	925
	Strontium (Sr)-Total (mg/kg wwt)	21.9	16.1	10.7	7.44	9.63
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)	0.00061	0.00246	0.00278	0.00260	0.00212
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg wwt)	0.00141	0.00070	0.00050	0.00126	0.00075
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	0.103	0.033
	Zinc (Zn)-Total (mg/kg wwt)	34.0	33.5	23.7	27.5	26.4
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1514817-11 Fish - Impacted 27-AUG-14 NSC-5 QGTCP-1	L1514817-12 Fish - Impacted 03-SEP-14 NSC-1,2,3 HGT-3	L1514817-13 Fish - Impacted 29-AUG-14 NSC-1 CPGT-1	L1514817-14 Fish - Impacted 29-AUG-14 NSC-2 CPGT-1	L1514817-15 Fish - Impacted 21-AUG-14 POLDF-1 MUSCLE TISSUE
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	76.4	76.5	68.7	71.9	79.7
Metals	Aluminum (Al)-Total (mg/kg wwt)	5.12	<0.40	54.7	1.55	<1.0
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	0.0066	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)	0.119	0.0214	0.208	0.151	0.0623
	Barium (Ba)-Total (mg/kg wwt)	0.423	0.508	1.37	0.231	0.116
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)	0.0194	0.0130	0.0335	0.0283	<0.0020
	Calcium (Ca)-Total (mg/kg wwt)	10300	9590	16000	7890	410
	Cesium (Cs)-Total (mg/kg wwt)	0.0089	0.0122	0.0199	0.0101	0.0016
	Chromium (Cr)-Total (mg/kg wwt)	0.023	<0.010	0.253	0.121	<0.040
	Cobalt (Co)-Total (mg/kg wwt)	0.0441	0.0144	0.103	0.0474	<0.0040
	Copper (Cu)-Total (mg/kg wwt)	0.792	0.815	1.33	0.774	0.238
	Iron (Fe)-Total (mg/kg wwt)	19.5	12.6	156	15.7	2.4
	Lead (Pb)-Total (mg/kg wwt)	0.0094	<0.0040	0.028	0.0052	<0.010
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)	447	391	495	388	275
	Manganese (Mn)-Total (mg/kg wwt)	1.99	1.85	10.7	1.68	0.328
	Mercury (Hg)-Total (mg/kg wwt)	0.0394	0.0468	0.0720	0.0376	0.0331
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0114	0.0102	0.0227	0.0086	<0.0080
	Nickel (Ni)-Total (mg/kg wwt)	0.044	<0.040	0.178	0.308	<0.040
	Phosphorus (P)-Total (mg/kg wwt)	7640	7440	8620	6300	1160
	Potassium (K)-Total (mg/kg wwt)	3610	3590	3480	3510	1210
	Rubidium (Rb)-Total (mg/kg wwt)	3.78	5.66	4.82	3.41	0.624
	Selenium (Se)-Total (mg/kg wwt)	0.878	0.623	0.847	0.821	1.01
	Sodium (Na)-Total (mg/kg wwt)	909	962	1010	886	178
	Strontium (Sr)-Total (mg/kg wwt)	13.3	12.4	29.7	10.9	1.30
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)	0.00430	0.00126	0.00312	0.00353	<0.00040
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg wwt)	0.00126	0.00057	0.0190	0.00042	<0.00040
	Vanadium (V)-Total (mg/kg wwt)	0.032	<0.020	0.389	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg wwt)	32.0	35.4	55.8	26.8	8.25
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1514817-16 Fish - Impacted 27-AUG-14 RB-1-LIVER ANGPQ-1	L1514817-17 Fish - Impacted 27-AUG-14 RB-1-TISSUE ANGPQ-1	L1514817-18 Fish - Impacted 29-AUG-14 BB-2 CPGT-1		
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	66.9	77.5	79.7		
Metals	Aluminum (Al)-Total (mg/kg wwt)	4.1	0.88	6.75		
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020		
	Arsenic (As)-Total (mg/kg wwt)	0.0466	0.0549	0.334		
	Barium (Ba)-Total (mg/kg wwt)	<0.010	0.084	1.18		
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020		
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020		
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20		
	Cadmium (Cd)-Total (mg/kg wwt)	0.496	0.0026	0.0336		
	Calcium (Ca)-Total (mg/kg wwt)	61.0	1530	14900		
	Cesium (Cs)-Total (mg/kg wwt)	0.0067	0.0162	0.0174		
	Chromium (Cr)-Total (mg/kg wwt)	0.077	0.038	0.048		
	Cobalt (Co)-Total (mg/kg wwt)	0.0382	0.0119	0.0392		
	Copper (Cu)-Total (mg/kg wwt)	38.9	0.323	1.51		
	Iron (Fe)-Total (mg/kg wwt)	169	10.2	20.8		
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.0040	0.0062		
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10		
	Magnesium (Mg)-Total (mg/kg wwt)	201	242	435		
	Manganese (Mn)-Total (mg/kg wwt)	2.91	0.332	3.54		
	Mercury (Hg)-Total (mg/kg wwt)	0.121	0.0888	0.0476		
	Molybdenum (Mo)-Total (mg/kg wwt)	0.799	<0.0040	0.0353		
	Nickel (Ni)-Total (mg/kg wwt)	0.049	<0.040	0.052		
	Phosphorus (P)-Total (mg/kg wwt)	4310	2840	9040		
	Potassium (K)-Total (mg/kg wwt)	3060	3630	3030		
	Rubidium (Rb)-Total (mg/kg wwt)	4.76	3.44	3.74		
	Selenium (Se)-Total (mg/kg wwt)	13.8	0.499	0.719		
	Sodium (Na)-Total (mg/kg wwt)	871	697	1250		
	Strontium (Sr)-Total (mg/kg wwt)	0.085	2.04	38.0		
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040		
	Thallium (Tl)-Total (mg/kg wwt)	0.0275	0.00360	0.00275		
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020		
	Uranium (U)-Total (mg/kg wwt)	0.00717	0.00061	0.00274		
	Vanadium (V)-Total (mg/kg wwt)	0.307	0.155	0.103		
	Zinc (Zn)-Total (mg/kg wwt)	37.6	15.1	25.0		
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Chromium (Cr)-Total	DUP-H	L1514817-1, -10, -11, -12, -14, -17, -18, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
RRU	Reported Result is Uncertain due to proximity to the estimated Method Detection Limit.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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HG-WET-CVAFS-VA Tissue Mercury in Tissue by CVAFS (WET) EPA 200.3, EPA 245.7

This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1991). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7. This digestion procedure was implemented on October 5, 2009.

This analysis is not compliant with the requirements of the B.C. Lab Manual for digestion of tissue samples from British Columbia for metals analysis after January 1, 2015.

HG-WET-MICR-CVAF-VA Tissue Mercury in Tissue by CVAFS Micro (WET) EPA 200.3, EPA 245.7

This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.

MET-WET-CCMS-VA Tissue Metals in Tissue by CRC ICPMS (WET) EPA 200.3/6020A

This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1991). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

This analysis is not compliant with the requirements of the B.C. Lab Manual for digestion of tissue samples from British Columbia for metals analysis after January 1, 2015.

MET-WET-MICR-HRMS-VA Tissue Metals in Tissue by HR-ICPMS Micro (WET) EPA 200.3/200.8

Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on wet weight basis.

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MOISTURE-TISS-VA Tissue % Moisture in Tissues ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

QL IMPACTED

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0
 Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-WET-CVAFS-VA		Tissue						
Batch	R2978163							
WG1966992-4 CRM		VA-NRC-TORT3						
Mercury (Hg)-Total			97.1		%		70-130	08-OCT-14
WG1966992-5 CRM		VA-NIST-1566B						
Mercury (Hg)-Total			95.9		%		70-130	08-OCT-14
WG1966992-3 DUP		L1514817-17						
Mercury (Hg)-Total		0.0888	0.104		mg/kg wwt	16	40	08-OCT-14
WG1966992-1 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	08-OCT-14
WG1966992-2 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	08-OCT-14
HG-WET-MICR-CVAF-VA		Tissue						
Batch	R2979415							
WG1965952-5 CRM		VA-NRC-TORT3						
Mercury (Hg)-Total			87.4		%		70-130	09-OCT-14
WG1965952-6 CRM		VA-NIST-1566B						
Mercury (Hg)-Total			103.0		%		70-130	09-OCT-14
WG1965952-4 DUP		L1514817-15						
Mercury (Hg)-Total		0.0331	0.0424		mg/kg wwt	25	30	09-OCT-14
WG1965952-1 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	09-OCT-14
WG1965952-2 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	09-OCT-14
WG1965952-3 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	09-OCT-14
MET-WET-CCMS-VA		Tissue						
Batch	R2989148							
WG1966992-4 CRM		VA-NRC-TORT3						
Arsenic (As)-Total			109.1		%		70-130	10-OCT-14
Cadmium (Cd)-Total			97.8		%		70-130	10-OCT-14
Chromium (Cr)-Total			94.5		%		70-130	10-OCT-14
Cobalt (Co)-Total			102.2		%		70-130	10-OCT-14
Copper (Cu)-Total			92.1		%		70-130	10-OCT-14
Iron (Fe)-Total			94.9		%		70-130	10-OCT-14
Lead (Pb)-Total			86.8		%		70-130	10-OCT-14
Manganese (Mn)-Total			96.6		%		70-130	10-OCT-14
Molybdenum (Mo)-Total			99.1		%		70-130	10-OCT-14
Nickel (Ni)-Total			95.0		%		70-130	10-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA		Tissue						
Batch	R2989148							
WG1966992-4	CRM	VA-NRC-TORT3						
Selenium (Se)-Total			97.5		%		70-130	10-OCT-14
Strontium (Sr)-Total			96.9		%		70-130	10-OCT-14
Vanadium (V)-Total			99.5		%		70-130	10-OCT-14
Zinc (Zn)-Total			88.5		%		70-130	10-OCT-14
WG1966992-5	CRM	VA-NIST-1566B						
Antimony (Sb)-Total			0.0083		mg/kg wwt		0.001-0.021	10-OCT-14
Arsenic (As)-Total			105.8		%		70-130	10-OCT-14
Barium (Ba)-Total			87.6		%		70-130	10-OCT-14
Boron (B)-Total			4.93		mg/kg wwt		3.5-5.5	10-OCT-14
Cadmium (Cd)-Total			107.0		%		70-130	10-OCT-14
Calcium (Ca)-Total			101.2		%		70-130	10-OCT-14
Cobalt (Co)-Total			102.6		%		70-130	10-OCT-14
Copper (Cu)-Total			102.5		%		70-130	10-OCT-14
Iron (Fe)-Total			99.3		%		70-130	10-OCT-14
Lead (Pb)-Total			97.3		%		70-130	10-OCT-14
Magnesium (Mg)-Total			101.8		%		70-130	10-OCT-14
Manganese (Mn)-Total			105.5		%		70-130	10-OCT-14
Nickel (Ni)-Total			102.4		%		70-130	10-OCT-14
Potassium (K)-Total			104.5		%		70-130	10-OCT-14
Rubidium (Rb)-Total			102.2		%		70-130	10-OCT-14
Selenium (Se)-Total			106.4		%		70-130	10-OCT-14
Sodium (Na)-Total			98.7		%		70-130	10-OCT-14
Strontium (Sr)-Total			98.9		%		70-130	10-OCT-14
Uranium (U)-Total			100.6		%		70-130	10-OCT-14
Vanadium (V)-Total			102.2		%		70-130	10-OCT-14
Zinc (Zn)-Total			99.1		%		70-130	10-OCT-14
WG1966992-3	DUP	L1514817-17						
Aluminum (Al)-Total		0.88	0.77		mg/kg wwt	14	40	10-OCT-14
Antimony (Sb)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Arsenic (As)-Total		0.0549	0.0613		mg/kg wwt	11	40	10-OCT-14
Barium (Ba)-Total		0.084	0.072		mg/kg wwt	15	40	10-OCT-14
Beryllium (Be)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Bismuth (Bi)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Boron (B)-Total		<0.20	<0.20	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Cadmium (Cd)-Total		0.0026	0.0025		mg/kg wwt	5.2	40	10-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA								
	Tissue							
Batch	R2989148							
WG1966992-3	DUP	L1514817-17						
Calcium (Ca)-Total		1530	1410		mg/kg wwt	8.2	60	10-OCT-14
Cesium (Cs)-Total		0.0162	0.0173		mg/kg wwt	6.4	40	10-OCT-14
Chromium (Cr)-Total		0.038	0.091	DUP-H	mg/kg wwt	83	40	10-OCT-14
Cobalt (Co)-Total		0.0119	0.0109		mg/kg wwt	8.5	40	10-OCT-14
Copper (Cu)-Total		0.323	0.338		mg/kg wwt	4.4	40	10-OCT-14
Iron (Fe)-Total		10.2	10.9		mg/kg wwt	6.6	40	10-OCT-14
Lead (Pb)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Lithium (Li)-Total		<0.10	<0.10	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Magnesium (Mg)-Total		242	246		mg/kg wwt	1.6	40	10-OCT-14
Manganese (Mn)-Total		0.332	0.292		mg/kg wwt	13	40	10-OCT-14
Molybdenum (Mo)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Nickel (Ni)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Phosphorus (P)-Total		2840	2800		mg/kg wwt	1.6	40	10-OCT-14
Potassium (K)-Total		3630	3800		mg/kg wwt	4.5	40	10-OCT-14
Rubidium (Rb)-Total		3.44	3.70		mg/kg wwt	7.2	40	10-OCT-14
Selenium (Se)-Total		0.499	0.477		mg/kg wwt	4.5	40	10-OCT-14
Sodium (Na)-Total		697	731		mg/kg wwt	4.7	40	10-OCT-14
Strontium (Sr)-Total		2.04	1.81		mg/kg wwt	12	60	10-OCT-14
Tellurium (Te)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Thallium (Tl)-Total		0.00360	0.00332		mg/kg wwt	7.8	40	10-OCT-14
Tin (Sn)-Total		<0.020	<0.020	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
Uranium (U)-Total		0.00061	0.00052		mg/kg wwt	16	40	10-OCT-14
Vanadium (V)-Total		0.155	0.140		mg/kg wwt	9.7	40	10-OCT-14
Zinc (Zn)-Total		15.1	13.8		mg/kg wwt	8.7	40	10-OCT-14
Zirconium (Zr)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	10-OCT-14
WG1966992-1	MB							
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	10-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	10-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	10-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	10-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	10-OCT-14
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	10-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA		Tissue						
Batch	R2989148							
WG1966992-1 MB								
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	10-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	10-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	10-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	10-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	10-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	10-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	10-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	10-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	10-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	10-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	10-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	10-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	10-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	10-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	10-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	10-OCT-14
WG1966992-2 MB								
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	10-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	10-OCT-14
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	10-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	10-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	10-OCT-14
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	10-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-VA		Tissue						
Batch	R2989148							
WG1966992-2	MB							
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	10-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	10-OCT-14
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	10-OCT-14
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	10-OCT-14
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	10-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	10-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	10-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	10-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	10-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	10-OCT-14
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	10-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	10-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	10-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	10-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	10-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	10-OCT-14
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	10-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	10-OCT-14
MET-WET-MICR-HRMS-VA		Tissue						
Batch	R3055491							
WG1965952-5	CRM							
		VA-NRC-TORT3						
Arsenic (As)-Total			122.8		%		70-130	30-OCT-14
Cadmium (Cd)-Total			115.0		%		70-130	30-OCT-14
Chromium (Cr)-Total			79.6		%		70-130	30-OCT-14
Cobalt (Co)-Total			84.8		%		70-130	30-OCT-14
Copper (Cu)-Total			96.3		%		70-130	30-OCT-14
Iron (Fe)-Total			99.6		%		70-130	30-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-MICR-HRMS-VA Tissue								
Batch	R3055491							
WG1965952-5 CRM		VA-NRC-TORT3						
Lead (Pb)-Total			74.9		%		70-130	30-OCT-14
Manganese (Mn)-Total			128.5		%		70-130	30-OCT-14
Molybdenum (Mo)-Total			123.7		%		70-130	30-OCT-14
Nickel (Ni)-Total			80.9		%		70-130	30-OCT-14
Selenium (Se)-Total			88.1		%		70-130	30-OCT-14
Strontium (Sr)-Total			119.9		%		70-130	30-OCT-14
Vanadium (V)-Total			121.9		%		70-130	30-OCT-14
Zinc (Zn)-Total			95.6		%		70-130	30-OCT-14
WG1965952-6 CRM		VA-NIST-1566B						
Antimony (Sb)-Total			0.0077		mg/kg wwt		0.001-0.021	30-OCT-14
Arsenic (As)-Total			97.7		%		70-130	30-OCT-14
Barium (Ba)-Total			89.8		%		70-130	30-OCT-14
Boron (B)-Total			121.2		%		70-130	30-OCT-14
Cadmium (Cd)-Total			126.9		%		70-130	30-OCT-14
Calcium (Ca)-Total			110.4		%		70-130	30-OCT-14
Cobalt (Co)-Total			84.5		%		70-130	30-OCT-14
Copper (Cu)-Total			109.2		%		70-130	30-OCT-14
Iron (Fe)-Total			104.0		%		70-130	30-OCT-14
Lead (Pb)-Total			94.5		%		70-130	30-OCT-14
Magnesium (Mg)-Total			100.3		%		70-130	30-OCT-14
Manganese (Mn)-Total			126.2		%		70-130	30-OCT-14
Nickel (Ni)-Total			85.7		%		70-130	30-OCT-14
Potassium (K)-Total			92.2		%		70-130	30-OCT-14
Rubidium (Rb)-Total			98.4		%		70-130	30-OCT-14
Selenium (Se)-Total			99.0		%		70-130	30-OCT-14
Sodium (Na)-Total			86.7		%		70-130	30-OCT-14
Strontium (Sr)-Total			119.9		%		70-130	30-OCT-14
Uranium (U)-Total			120.6		%		70-130	30-OCT-14
Vanadium (V)-Total			73.4		%		70-130	30-OCT-14
Zinc (Zn)-Total			97.6		%		70-130	30-OCT-14
WG1965952-1 MB								
Aluminum (Al)-Total			<1.0		mg/kg wwt		1	30-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	30-OCT-14
Arsenic (As)-Total			<0.0060		mg/kg wwt		0.006	30-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	30-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-MICR-HRMS-VA Tissue								
Batch	R3055491							
WG1965952-1 MB								
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	30-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	30-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	30-OCT-14
Cadmium (Cd)-Total			<0.0020		mg/kg wwt		0.002	30-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	30-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	30-OCT-14
Chromium (Cr)-Total			<0.040		mg/kg wwt		0.04	30-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	30-OCT-14
Copper (Cu)-Total			<0.040		mg/kg wwt		0.04	30-OCT-14
Iron (Fe)-Total			<1.0		mg/kg wwt		1	30-OCT-14
Lead (Pb)-Total			<0.010		mg/kg wwt		0.01	30-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	30-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	30-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	30-OCT-14
Molybdenum (Mo)-Total			<0.0080		mg/kg wwt		0.008	30-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	30-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	30-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	30-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	30-OCT-14
Selenium (Se)-Total			<0.020		mg/kg wwt		0.02	30-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	30-OCT-14
Strontium (Sr)-Total			<0.020		mg/kg wwt		0.02	30-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	30-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	30-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	30-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	30-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	30-OCT-14
Zinc (Zn)-Total			<0.20		mg/kg wwt		0.2	30-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	30-OCT-14
WG1965952-2 MB								
Aluminum (Al)-Total			<1.0		mg/kg wwt		1	30-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	30-OCT-14
Arsenic (As)-Total			<0.0060		mg/kg wwt		0.006	30-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	30-OCT-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-MICR-HRMS-VA Tissue								
Batch	R3055491							
WG1965952-2 MB								
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	30-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	30-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	30-OCT-14
Cadmium (Cd)-Total			<0.0020		mg/kg wwt		0.002	30-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	30-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	30-OCT-14
Chromium (Cr)-Total			<0.040		mg/kg wwt		0.04	30-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	30-OCT-14
Copper (Cu)-Total			<0.040		mg/kg wwt		0.04	30-OCT-14
Iron (Fe)-Total			<1.0		mg/kg wwt		1	30-OCT-14
Lead (Pb)-Total			<0.010		mg/kg wwt		0.01	30-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	30-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	30-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	30-OCT-14
Molybdenum (Mo)-Total			<0.0080		mg/kg wwt		0.008	30-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	30-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	30-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	30-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	30-OCT-14
Selenium (Se)-Total			<0.020		mg/kg wwt		0.02	30-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	30-OCT-14
Strontium (Sr)-Total			<0.020		mg/kg wwt		0.02	30-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	30-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	30-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	30-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	30-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	30-OCT-14
Zinc (Zn)-Total			<0.20		mg/kg wwt		0.2	30-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	30-OCT-14
WG1965952-3 MB								
Aluminum (Al)-Total			<1.0		mg/kg wwt		1	30-OCT-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	30-OCT-14
Arsenic (As)-Total			<0.0060		mg/kg wwt		0.006	30-OCT-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	30-OCT-14



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MET-WET-MICR-HRMS-VA Tissue								
Batch	R3055491							
WG1965952-3 MB								
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	30-OCT-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	30-OCT-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	30-OCT-14
Cadmium (Cd)-Total			<0.0020		mg/kg wwt		0.002	30-OCT-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	30-OCT-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	30-OCT-14
Chromium (Cr)-Total			<0.040		mg/kg wwt		0.04	30-OCT-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	30-OCT-14
Copper (Cu)-Total			<0.040		mg/kg wwt		0.04	30-OCT-14
Iron (Fe)-Total			<1.0		mg/kg wwt		1	30-OCT-14
Lead (Pb)-Total			<0.010		mg/kg wwt		0.01	30-OCT-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	30-OCT-14
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	30-OCT-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	30-OCT-14
Molybdenum (Mo)-Total			<0.0080		mg/kg wwt		0.008	30-OCT-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	30-OCT-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	30-OCT-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	30-OCT-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	30-OCT-14
Selenium (Se)-Total			<0.020		mg/kg wwt		0.02	30-OCT-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	30-OCT-14
Strontium (Sr)-Total			<0.020		mg/kg wwt		0.02	30-OCT-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	30-OCT-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	30-OCT-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	30-OCT-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	30-OCT-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	30-OCT-14
Zinc (Zn)-Total			<0.20		mg/kg wwt		0.2	30-OCT-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	30-OCT-14
Batch	R3073890							
WG1994284-5 CRM								
		VA-NRC-TORT3						
Cadmium (Cd)-Total			122.7		%		70-130	10-NOV-14
Chromium (Cr)-Total			75.3		%		70-130	10-NOV-14
Cobalt (Co)-Total			101.8		%		70-130	10-NOV-14



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MET-WET-MICR-HRMS-VA Tissue								
Batch	R3073890							
WG1994284-5 CRM		VA-NRC-TORT3						
Copper (Cu)-Total			113.9		%		70-130	10-NOV-14
Iron (Fe)-Total			112.8		%		70-130	10-NOV-14
Lead (Pb)-Total			82.8		%		70-130	10-NOV-14
Nickel (Ni)-Total			109.3		%		70-130	10-NOV-14
Selenium (Se)-Total			113.4		%		70-130	10-NOV-14
Strontium (Sr)-Total			116.9		%		70-130	10-NOV-14
Zinc (Zn)-Total			108.8		%		70-130	10-NOV-14
WG1994284-6 CRM		VA-NRC-TORT3						
Cadmium (Cd)-Total			124.7		%		70-130	10-NOV-14
Chromium (Cr)-Total			86.0		%		70-130	10-NOV-14
Cobalt (Co)-Total			101.4		%		70-130	10-NOV-14
Copper (Cu)-Total			113.2		%		70-130	10-NOV-14
Iron (Fe)-Total			112.0		%		70-130	10-NOV-14
Lead (Pb)-Total			83.9		%		70-130	10-NOV-14
Nickel (Ni)-Total			111.7		%		70-130	10-NOV-14
Selenium (Se)-Total			111.5		%		70-130	10-NOV-14
Strontium (Sr)-Total			118.7		%		70-130	10-NOV-14
Zinc (Zn)-Total			107.6		%		70-130	10-NOV-14
WG1994284-4 DUP		L1514817-15						
Aluminum (Al)-Total		<1.0	<1.0	RPD-NA	mg/kg wwt	N/A	40	10-NOV-14
Antimony (Sb)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	10-NOV-14
Arsenic (As)-Total		0.0623	0.0588		mg/kg wwt	5.7	40	10-NOV-14
Barium (Ba)-Total		0.116	0.103		mg/kg wwt	12	40	10-NOV-14
Beryllium (Be)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	10-NOV-14
Bismuth (Bi)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	10-NOV-14
Boron (B)-Total		<0.20	<0.20	RPD-NA	mg/kg wwt	N/A	40	10-NOV-14
Cadmium (Cd)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	10-NOV-14
Calcium (Ca)-Total		410	345		mg/kg wwt	17	60	10-NOV-14
Cesium (Cs)-Total		0.0016	0.0015		mg/kg wwt	8.4	40	10-NOV-14
Chromium (Cr)-Total		<0.040	0.050	RPD-NA	mg/kg wwt	N/A	40	10-NOV-14
Cobalt (Co)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	10-NOV-14
Copper (Cu)-Total		0.238	0.298		mg/kg wwt	23	40	10-NOV-14
Iron (Fe)-Total		2.4	3.4		mg/kg wwt	36	40	10-NOV-14
Lead (Pb)-Total		<0.010	0.010	RPD-NA	mg/kg wwt	N/A	40	10-NOV-14
Lithium (Li)-Total		<0.10	<0.10	RPD-NA	mg/kg wwt	N/A	40	10-NOV-14



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MET-WET-MICR-HRMS-VA Tissue								
Batch	R3073890							
WG1994284-4 DUP		L1514817-15						
Magnesium (Mg)-Total		275	270		mg/kg wwt	1.7	40	10-NOV-14
Manganese (Mn)-Total		0.328	0.248		mg/kg wwt	28	40	10-NOV-14
Molybdenum (Mo)-Total		<0.0080	<0.0080	RPD-NA	mg/kg wwt	N/A	40	10-NOV-14
Nickel (Ni)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	10-NOV-14
Phosphorus (P)-Total		1160	1080		mg/kg wwt	7.0	40	10-NOV-14
Potassium (K)-Total		1210	1160		mg/kg wwt	4.3	40	10-NOV-14
Rubidium (Rb)-Total		0.624	0.594		mg/kg wwt	5.0	40	10-NOV-14
Selenium (Se)-Total		1.01	0.992		mg/kg wwt	2.3	40	10-NOV-14
Sodium (Na)-Total		178	168		mg/kg wwt	5.4	40	10-NOV-14
Strontium (Sr)-Total		1.30	1.01		mg/kg wwt	26	60	10-NOV-14
Tellurium (Te)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	10-NOV-14
Thallium (Tl)-Total		<0.00040	<0.00040	RPD-NA	mg/kg wwt	N/A	40	10-NOV-14
Tin (Sn)-Total		<0.020	0.039	RPD-NA	mg/kg wwt	N/A	40	10-NOV-14
Uranium (U)-Total		<0.00040	<0.00040	RPD-NA	mg/kg wwt	N/A	40	10-NOV-14
Vanadium (V)-Total		<0.020	<0.020	RPD-NA	mg/kg wwt	N/A	40	10-NOV-14
Zinc (Zn)-Total		8.25	10.0		mg/kg wwt	19	40	10-NOV-14
Zirconium (Zr)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	10-NOV-14
WG1994284-1 MB								
Aluminum (Al)-Total			<1.0		mg/kg wwt		1	10-NOV-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	10-NOV-14
Arsenic (As)-Total			<0.0060		mg/kg wwt		0.006	10-NOV-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	10-NOV-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	10-NOV-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	10-NOV-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	10-NOV-14
Cadmium (Cd)-Total			<0.0020		mg/kg wwt		0.002	10-NOV-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	10-NOV-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	10-NOV-14
Chromium (Cr)-Total			<0.040		mg/kg wwt		0.04	10-NOV-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	10-NOV-14
Copper (Cu)-Total			<0.040		mg/kg wwt		0.04	10-NOV-14
Iron (Fe)-Total			<1.0		mg/kg wwt		1	10-NOV-14
Lead (Pb)-Total			<0.010		mg/kg wwt		0.01	10-NOV-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	10-NOV-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-MICR-HRMS-VA Tissue								
Batch	R3073890							
WG1994284-1 MB								
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	10-NOV-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	10-NOV-14
Molybdenum (Mo)-Total			<0.0080		mg/kg wwt		0.008	10-NOV-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	10-NOV-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	10-NOV-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	10-NOV-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	10-NOV-14
Selenium (Se)-Total			<0.020		mg/kg wwt		0.02	10-NOV-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	10-NOV-14
Strontium (Sr)-Total			<0.020		mg/kg wwt		0.02	10-NOV-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	10-NOV-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	10-NOV-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	10-NOV-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	10-NOV-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	10-NOV-14
Zinc (Zn)-Total			<0.20		mg/kg wwt		0.2	10-NOV-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	10-NOV-14
WG1994284-2 MB								
Aluminum (Al)-Total			<1.0		mg/kg wwt		1	10-NOV-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	10-NOV-14
Arsenic (As)-Total			<0.0060		mg/kg wwt		0.006	10-NOV-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	10-NOV-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	10-NOV-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	10-NOV-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	10-NOV-14
Cadmium (Cd)-Total			<0.0020		mg/kg wwt		0.002	10-NOV-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	10-NOV-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	10-NOV-14
Chromium (Cr)-Total			<0.040		mg/kg wwt		0.04	10-NOV-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	10-NOV-14
Copper (Cu)-Total			<0.040		mg/kg wwt		0.04	10-NOV-14
Iron (Fe)-Total			<1.0		mg/kg wwt		1	10-NOV-14
Lead (Pb)-Total			<0.010		mg/kg wwt		0.01	10-NOV-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	10-NOV-14



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-MICR-HRMS-VA Tissue								
Batch	R3073890							
WG1994284-2 MB								
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	10-NOV-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	10-NOV-14
Molybdenum (Mo)-Total			<0.0080		mg/kg wwt		0.008	10-NOV-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	10-NOV-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	10-NOV-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	10-NOV-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	10-NOV-14
Selenium (Se)-Total			<0.020		mg/kg wwt		0.02	10-NOV-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	10-NOV-14
Strontium (Sr)-Total			<0.020		mg/kg wwt		0.02	10-NOV-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	10-NOV-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	10-NOV-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	10-NOV-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	10-NOV-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	10-NOV-14
Zinc (Zn)-Total			<0.20		mg/kg wwt		0.2	10-NOV-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	10-NOV-14
WG1994284-3 MB								
Aluminum (Al)-Total			<1.0		mg/kg wwt		1	10-NOV-14
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	10-NOV-14
Arsenic (As)-Total			<0.0060		mg/kg wwt		0.006	10-NOV-14
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	10-NOV-14
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	10-NOV-14
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	10-NOV-14
Boron (B)-Total			<0.20		mg/kg wwt		0.2	10-NOV-14
Cadmium (Cd)-Total			<0.0020		mg/kg wwt		0.002	10-NOV-14
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	10-NOV-14
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	10-NOV-14
Chromium (Cr)-Total			<0.040		mg/kg wwt		0.04	10-NOV-14
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	10-NOV-14
Copper (Cu)-Total			<0.040		mg/kg wwt		0.04	10-NOV-14
Iron (Fe)-Total			<1.0		mg/kg wwt		1	10-NOV-14
Lead (Pb)-Total			<0.010		mg/kg wwt		0.01	10-NOV-14
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	10-NOV-14



Quality Control Report

Workorder: L1514817

Report Date: 04-SEP-15

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-MICR-HRMS-VA Tissue								
Batch R3073890								
WG1994284-3 MB								
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	10-NOV-14
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	10-NOV-14
Molybdenum (Mo)-Total			<0.0080		mg/kg wwt		0.008	10-NOV-14
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	10-NOV-14
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	10-NOV-14
Potassium (K)-Total			<4.0		mg/kg wwt		4	10-NOV-14
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	10-NOV-14
Selenium (Se)-Total			<0.020		mg/kg wwt		0.02	10-NOV-14
Sodium (Na)-Total			<4.0		mg/kg wwt		4	10-NOV-14
Strontium (Sr)-Total			<0.020		mg/kg wwt		0.02	10-NOV-14
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	10-NOV-14
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	10-NOV-14
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	10-NOV-14
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	10-NOV-14
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	10-NOV-14
Zinc (Zn)-Total			<0.20		mg/kg wwt		0.2	10-NOV-14
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	10-NOV-14
Batch R3074471								
WG1994284-5 CRM VA-NRC-TORT3								
Arsenic (As)-Total			121.9		%		70-130	12-NOV-14
Manganese (Mn)-Total			121.2		%		70-130	12-NOV-14
Molybdenum (Mo)-Total			119.9		%		70-130	12-NOV-14
Vanadium (V)-Total			122.8		%		70-130	12-NOV-14
WG1994284-6 CRM VA-NRC-TORT3								
Arsenic (As)-Total			122.8		%		70-130	12-NOV-14
Manganese (Mn)-Total			126.1		%		70-130	12-NOV-14
Molybdenum (Mo)-Total			124.1		%		70-130	12-NOV-14
Vanadium (V)-Total			126.2		%		70-130	12-NOV-14
MOISTURE-TISS-VA Tissue								
Batch R2969434								
WG1964641-1 DUP L1514817-17								
% Moisture			77.5	77.7	%	0.3	20	01-OCT-14



Quality Control Report

Workorder: L1514817

Report Date: 04-SEP-15

Page 15 of 16

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-TISS-VA	Tissue							
Batch	R2973170							
WG1965949-1	DUP	L1514817-15						
% Moisture		79.7	80.5		%	0.9	20	03-OCT-14

Quality Control Report

Workorder: L1514817

Report Date: 04-SEP-15

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Report To			Report Format / Distribution			Service Requested (Rush for routine analysis subject to availability)					
Company: Red Chris Development Company			<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)					
Contact: Jack Love/Heather Hawkins			<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT					
Address: 200-580 Hornby St. Vancouver, BC V6C 3B6			Email 1: jlove@redchrismine.ca			<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT					
Phone: 604-800-9200 329 Fax:			Email 2:			<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT					
Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			Client / Project Information			Please indicate below Filtered, Preserved or both (F, P, F/P)					
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No			Job #:								
Company:			PO / AFE:			Whole body of animals 0% moisture Number of Containers					
Contact:			LSD:								
Address:			Quote #:								
Phone:			ALS Contact: Can Dang								
Lab Work (lab use): L1514817-COFC			Sampler: CK,ML,KK,GS.								
Sample #	Sample Identification (This description will appear on the report)		Date (dd-mm-yy)	Time (hh:mm)	Sample Type						
	Short Holding Time Rush Processing				FISH						
Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details											
* Please include following addresses: kym.keogh@gov.bc.ca and have a COPY mailed to: Confidential lab results, Sooke creek CK sampling, 2672 Indian Drive, Williams Lake, BC, V8K2G0											
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.											
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.											
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.											
SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)				
Released by: C.Koenig	Date (dd-mm-yy)	Time (hh-mm)	Received by: Jm	Date: Sep 9	Time: 8:30	Temperature: 1 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF	

Report To		Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)					
Company: Red Chris Development Company		<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other				<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)					
Contact: Jack Love/Heather Hawkins		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax				<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT					
Address: 200-580 Hornby St. Vancouver, BC V6C 3B6		Email 1: jlove@redchrismine.ca				<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT					
Phone: 604-600-9200 329 Fax:		Email 2:				<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT					
Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Client / Project Information				Please indicate below Filtered, Preserved or both (F, P, F/P)					
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		Job #:									
Company:		PO / AFE:				Whole body (metals) No residue Liver (metals) Tissue (metals)					
Contact:		LSD:									
Address:		Quote #:				Number of Containers					
Phone:		ALS Contact: Can Dang Sampler: CK,ML,KK,GS,									
Lab W# (lab): L1514817-COFC		Date (dd-mmm-yy)		Time (hh:mm)		Sample Type					
Sample #		Sample Identification (This description will appear on the report)									
NSC-13						FISH		X X			
BB-1						?		X X			
POLDF-1						FISH		X X			
LND-1								X X			
BB-1								X X			
Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details											
* Please include following addresses: kym.keogh@gov.bc.ca and have a COPY mailed to: Confidential lab results, Soda creek SK sampling, 2672 Indian Drive, Williams Lake, BC, V0K2G0											
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.											
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.											
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.											
SHIPMENT RELEASE (client use)				SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: C. Koenig	Date (dd-mmm-yy)	Time (hh-mm)	Received by: JN	Date: Sept 9	Time: 8:30	Temperature: 1 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF	



Sample Receipt Confirmation

18 Samples received at ALS in VANCOUVER

Job Reference #: N/A	Date Sampled: 8/21/2014
Project PO #: N/A	Date Received: 9/9/2014
Legal Site Description: N/A	Sampled By: CK,ML,KK,GS
Quote #: Q47599	Chain of Custody: QL IMPACTED
Lab Work Order #: L1514817	Account Manager: Can Dang
Estimated Completion Date: 10/10/2014	Estimated Sample Disposal Date: See Sample Disposal Information section below.

Sample Integrity Observations: No observations were identified for this work order submission.

Report Distribution:

Company Name: MOUNT POLLEY MINING CORP.

Contact: Colleen Hughes

Address: PO Box 12
Likely, BC V0L 1N0

Phone: 250-790-2215

Fax: 250-790-2268

Email: chughes@mountpolley.com
Natalie.neufeld@snclavalin.com
kmcmahe@mountpolley.com
mia.sakelariou@snclavalin.com

EDD Email: chughes@mountpolley.com
Natalie.neufeld@snclavalin.com
mia.sakelariou@snclavalin.com
kmcmahe@mountpolley.com

Distribution: **Hard Copy:** N **Email:** Y **Fax:** N
EDD: Y

Invoice Distribution:

Acct Name: MOUNT POLLEY MINING CORP. ~LIKELY

Contact: Accounts Payable

Address: PO Box 12,
Likely, BC, V0L 1N0

Phone: 250-790-2215

Fax: --

Invoice Email: prosette@mountpolley.com
chughes@mountpolley.com

Project #: N/A

Account #: MPM100

Distribution: **Hard Copy:** Y **Email:** Y



Sample Receipt Confirmation

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type
L1514817-1	NSC-1 QGTSK-1	8/22/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		Fish - Impacted
L1514817-2	NSC-2,3 HAZ-2	9/1/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		Fish - Impacted
L1514817-3	LNC HAZ-3	9/5/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		Fish - Impacted
L1514817-4	NSC 4,5,6 HAZ-3	9/5/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		Fish - Impacted
L1514817-5	NSC-2 NSC-3 HAZ-3	9/5/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		Fish - Impacted
L1514817-6	NSC-1 HAZ-2	9/1/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		Fish - Impacted
L1514817-7	NSC-1 QGTCP-1	8/27/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		Fish - Impacted
L1514817-8	NSC-2 QGTCP-1	8/27/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		Fish - Impacted
L1514817-9	NSC-3 QGTCP-1	8/27/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		Fish - Impacted
L1514817-10	NSC-4 QGTCP-1	8/27/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		Fish - Impacted
L1514817-11	NSC-5 QGTCP-1	8/27/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		Fish - Impacted
L1514817-12	NSC-1,2,3 HGT-3	9/3/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		Fish - Impacted
L1514817-13	NSC-1 CPGT-1	8/29/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		Fish - Impacted
L1514817-14	NSC-2 CPGT-1	8/29/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		Fish - Impacted
L1514817-15	POLDF-1 MUSCLE TISSUE	8/21/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		Fish - Impacted
L1514817-16	RB-1-LIVER ANGPQ-1	8/27/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		Fish - Impacted
L1514817-17	RB-1-TISSUE ANGPQ-1	8/27/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		Fish - Impacted
L1514817-18	BB-2 CPGT-1	8/29/2014 12:00 AM	9/9/2014 8:30 AM	10/10/2014 5:00 PM		Fish - Impacted



Sample Receipt Confirmation

Analysis Requested:

	Sample Handling and Disposal Fee	Mercury in Tissue by CVAFS (WET)	Mercury in Tissue by CVAFS Micro (WET)	Metals in Tissue by CRC ICPMS (WET)	Metals in Tissue by HR-ICPMS Micro (WET)	% Moisture in Tissues	Tissue/Vegetation Micro Preparation	Tissue/Vegetation Sample Preparation
NSC-1 QGTSK-1	X	X		X		X		X
NSC-2,3 HAZ-2	X	X		X		X		X
LNC HAZ-3	X	X		X		X		X
NSC 4,5,6 HAZ-3	X	X		X		X		X
NSC-2 NSC-3 HAZ-3	X	X		X		X		X
NSC-1 HAZ-2	X	X		X		X		X
NSC-1 QGTCP-1	X	X		X		X		X
NSC-2 QGTCP-1	X	X		X		X		X
NSC-3 QGTCP-1	X	X		X		X		X
NSC-4 QGTCP-1	X	X		X		X		X
NSC-5 QGTCP-1	X	X		X		X		X
NSC-1,2,3 HGT-3	X	X		X		X		X
NSC-1 CPGT-1	X		X		X	X	X	X
NSC-2 CPGT-1	X	X		X		X		X
POLDF-1 MUSCLE TISSUE	X		X		X	X	X	X
RB-1-LIVER ANGPQ-1	X		X		X	X	X	X
RB-1-TISSUE ANGPQ-1	X	X		X		X		X
BB-2 CPGT-1	X	X		X		X		X



Sample Receipt Confirmation

Sample Disposal Information:

Where possible, ALS will store samples for 30 days from the date a final report is issued, or 30 days from the date samples are placed on hold without analytical requests, after which samples may be discarded. Air samples collected on re-usable media are an exception, and are stored for 7 days from the date a final report is issued. Longer storage times are available upon request.

For information about ALS accreditations and certifications please contact your Account Manager or visit our webpage at www.alsglobal.com (see Canada downloads).

ALS Group strives to deliver on-time results to our clients at all times. However, there are times when due to capacity issues or other unforeseen circumstances we are unable to meet our expected turnaround times. The information above is related to a recent workorder you have submitted to our laboratory. In the event that you have an inquiry, please refer to the Lab Work Order # L1514817 when calling your Account Manager.

ALS Group appreciates your business. Thank you for the opportunity to work with you.

Report To	Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company: Red Chris Development Company	<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)
Contact: Jack Love/Heather Hawkins	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address: 200-580 Hornby St. Vancouver, BC V6C 3B6	Email 1: jlove@redchrismine.ca	<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
Phone: 604-800-9200 329 Fax:	Email 2:	<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Email 3: ckoenig@redchrismine.ca	
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No	Client / Project Information	Analysis Request

Company: Contact: Address: Phone:	Job #: PO / AFE: LSD: Quote #: ALS Contact: Can Dang Sampler: CK,ML,KK,GS.	Please indicate below Filtered, Preserved or both (F, P, F/P)
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Whole body of animals
 0% moisture

Number of Containers

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	
	Short Holding Time Rush Processing			FISH	
NSC-1					
NSC-2					
NSC-3					
NSC-4					
NSC-5					
NSC-6					
NSC-7					
NSC-8					
NSC-9					
NSC-10					
NSC-11					
NSC-12				FISH	

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

* Please include following addresses: kym.keogh@gov.bc.ca and have a COPY mailed to: Confidential lab results, Sooke creek CK sampling, 2672 Indian Drive, Williams Lake, BC, V8K2G0

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: <i>C. Koenig</i>	Date (dd-mm-yy)	Time (hh-mm)	Received by: <i>JW</i>	Date: <i>Sept 9</i>	Time: <i>8:30</i>	Temperature: <i>1</i> °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

Report To		Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)																																																																																																																																																																																																																																																																																																																																																				
Company: Red Chris Development Company		<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax		<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)																																																																																																																																																																																																																																																																																																																																																				
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Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Client / Project Information				Analysis Request																																																																																																																																																																																																																																																																																																																																																				
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		Job #:				Please indicate below Filtered, Preserved or both (F, P, F/P)																																																																																																																																																																																																																																																																																																																																																				
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MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC V0L 1N0

Date Received: 01-OCT-14
Report Date: 18-NOV-14 17:48 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1526238
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: P0027
Legal Site Desc:

Can Dang
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	Description	L1526238-1	L1526238-2	L1526238-3	L1526238-4	L1526238-5
Sampled Date	Sampled Time	TISSUE 25-SEP-14 08:00 BOOTJACK LK RB-1	TISSUE 25-SEP-14 08:00 BOOTJACK LK RB-1(LIVER)	TISSUE 25-SEP-14 08:00 BOOTJACK LK RB-1X	TISSUE 25-SEP-14 08:00 BOOTJACK LK RB-1X(GONAD)	TISSUE 25-SEP-14 08:00 BOOTJACK LK RB-2
Client ID						
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	77.2	73.6	78.4	64.8	77.2
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<5.0	<2.0	<2.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<1.0	<0.40	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.048	0.038	0.023	0.023	<0.020
	Arsenic (As)-Total (mg/kg wwt)	0.0109	0.0100	0.0050	0.0079	<0.0040
	Barium (Ba)-Total (mg/kg)	<0.050	0.245	<0.050	0.253	0.087
	Barium (Ba)-Total (mg/kg wwt)	0.011	0.064	<0.010	0.089	0.020
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	0.020	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	0.0046	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	0.114	<0.0050	<0.0050	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	0.0300	<0.0010	<0.0010	<0.0010
	Calcium (Ca)-Total (mg/kg)	489	297	337	1200	1240
	Calcium (Ca)-Total (mg/kg wwt)	111	78.2	72.7	424	282
	Cesium (Cs)-Total (mg/kg)	0.0787	0.0229	0.0562	0.0130	0.0378
	Cesium (Cs)-Total (mg/kg wwt)	0.0179	0.0060	0.0122	0.0046	0.0086
	Chromium (Cr)-Total (mg/kg)	0.069	<0.20	<0.050	<0.050	0.066
	Chromium (Cr)-Total (mg/kg wwt)	0.016	<0.040	<0.010	<0.010	0.015
	Cobalt (Co)-Total (mg/kg)	<0.020	0.046	<0.020	0.130	<0.020
	Cobalt (Co)-Total (mg/kg wwt)	0.0043	0.0122	<0.0040	0.0459	<0.0040
	Copper (Cu)-Total (mg/kg)	1.99	77.9	1.11	18.1	0.84
	Copper (Cu)-Total (mg/kg wwt)	0.454	20.5	0.240	6.36	0.192
	Iron (Fe)-Total (mg/kg)	30.9	1480	19.3	103	17.9
	Iron (Fe)-Total (mg/kg wwt)	7.03	389	4.17	36.2	4.08
	Lead (Pb)-Total (mg/kg)	<0.020	<0.050	<0.020	<0.020	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.010	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1830	934	1300	1420	1390
	Magnesium (Mg)-Total (mg/kg wwt)	416	246	281	499	317
	Manganese (Mn)-Total (mg/kg)	0.437	15.3	0.275	7.97	0.544
	Manganese (Mn)-Total (mg/kg wwt)	0.100	4.04	0.059	2.81	0.124

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1526238-6 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 2(LIVER)	L1526238-7 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 3	L1526238-8 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 3(LIVER)	L1526238-9 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 4	L1526238-10 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 4(LIVER)	
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	74.6	77.0	76.9	77.2	75.5
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	<2.0	<5.0	<2.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	<0.40	<1.0	<0.40	<1.0
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.034	0.036	0.082	0.066	0.058
	Arsenic (As)-Total (mg/kg wwt)	0.0086	0.0083	0.0190	0.0150	0.0142
	Barium (Ba)-Total (mg/kg)	0.597	0.078	0.106	0.063	0.064
	Barium (Ba)-Total (mg/kg wwt)	0.151	0.018	0.025	0.014	0.016
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.277	<0.0050	0.230	<0.0050	0.094
	Cadmium (Cd)-Total (mg/kg wwt)	0.0702	<0.0010	0.0533	<0.0010	0.0231
	Calcium (Ca)-Total (mg/kg)	219	653	368	695	354
	Calcium (Ca)-Total (mg/kg wwt)	55.6	150	85.2	158	86.8
	Cesium (Cs)-Total (mg/kg)	0.0088	0.0663	0.0309	0.0598	0.0332
	Cesium (Cs)-Total (mg/kg wwt)	0.0022	0.0152	0.0072	0.0136	0.0081
	Chromium (Cr)-Total (mg/kg)	0.73	<0.050	0.42	<0.050	0.24
	Chromium (Cr)-Total (mg/kg wwt)	0.186	<0.010	0.096	0.011	0.059
	Cobalt (Co)-Total (mg/kg)	0.049	<0.020	0.046	<0.020	0.029
	Cobalt (Co)-Total (mg/kg wwt)	0.0125	<0.0040	0.0107	<0.0040	0.0072
	Copper (Cu)-Total (mg/kg)	586	1.21	57.6	0.98	126
	Copper (Cu)-Total (mg/kg wwt)	149	0.277	13.3	0.223	30.8
	Iron (Fe)-Total (mg/kg)	1890	16.3	720	13.5	490
	Iron (Fe)-Total (mg/kg wwt)	480	3.74	167	3.07	120
	Lead (Pb)-Total (mg/kg)	<0.050	<0.020	<0.050	<0.020	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.0040	<0.010	<0.0040	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	642	1260	762	1260	879
	Magnesium (Mg)-Total (mg/kg wwt)	163	290	176	288	216
	Manganese (Mn)-Total (mg/kg)	5.54	0.378	7.99	0.417	7.84
	Manganese (Mn)-Total (mg/kg wwt)	1.40	0.087	1.85	0.095	1.92

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID Description Sampled Date Sampled Time Client ID	L1526238-11 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 5	L1526238-12 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 5(LIVER)	L1526238-13 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 6	L1526238-14 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 6(LIVER)	L1526238-15 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 7
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)	77.3	75.0	74.5	76.8	76.9	
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<5.0	<2.0	<5.0	<2.0	
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<1.0	<0.40	<1.0	<0.40	
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010	
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Arsenic (As)-Total (mg/kg)	0.033	0.057	0.050	0.064	0.054	
	Arsenic (As)-Total (mg/kg wwt)	0.0075	0.0143	0.0129	0.0150	0.0124	
	Barium (Ba)-Total (mg/kg)	0.266	0.117	<0.050	<0.050	0.064	
	Barium (Ba)-Total (mg/kg wwt)	0.060	0.029	0.010	0.011	0.015	
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010	
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010	
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0	
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Cadmium (Cd)-Total (mg/kg)	<0.0050	0.097	<0.0050	0.090	<0.0050	
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	0.0242	<0.0010	0.0209	<0.0010	
	Calcium (Ca)-Total (mg/kg)	2880	301	504	239	755	
	Calcium (Ca)-Total (mg/kg wwt)	655	75.3	129	55.4	174	
	Cesium (Cs)-Total (mg/kg)	0.0431	0.0275	0.0480	0.0251	0.0420	
	Cesium (Cs)-Total (mg/kg wwt)	0.0098	0.0069	0.0123	0.0058	0.0097	
	Chromium (Cr)-Total (mg/kg)	<0.050	0.35	0.054	0.52	<0.050	
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	0.088	0.014	0.120	0.011	
	Cobalt (Co)-Total (mg/kg)	<0.020	0.050	<0.020	0.036	<0.020	
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040	0.0125	<0.0040	0.0083	<0.0040	
	Copper (Cu)-Total (mg/kg)	1.15	78.2	1.21	52.3	1.09	
	Copper (Cu)-Total (mg/kg wwt)	0.262	19.6	0.308	12.2	0.252	
	Iron (Fe)-Total (mg/kg)	12.2	861	16.7	810	14.2	
	Iron (Fe)-Total (mg/kg wwt)	2.78	215	4.27	188	3.27	
	Lead (Pb)-Total (mg/kg)	<0.020	<0.050	<0.020	<0.050	<0.020	
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.010	<0.0040	<0.010	<0.0040	
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50	
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Magnesium (Mg)-Total (mg/kg)	1160	754	1220	813	1270	
	Magnesium (Mg)-Total (mg/kg wwt)	263	188	312	189	293	
	Manganese (Mn)-Total (mg/kg)	0.806	6.84	0.322	6.08	0.326	
	Manganese (Mn)-Total (mg/kg wwt)	0.183	1.71	0.082	1.41	0.075	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1526238-16 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 7(LIVER)	L1526238-17 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 8	L1526238-18 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 8(LIVER)	L1526238-19 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 1(GONAD)
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)	74.2	78.0	71.9	65.0
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	<2.0	<5.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	<0.40	<1.0	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.069	0.040	0.075	0.023
	Arsenic (As)-Total (mg/kg wwt)	0.0177	0.0087	0.0210	0.0082
	Barium (Ba)-Total (mg/kg)	<0.050	0.077	<0.050	0.282
	Barium (Ba)-Total (mg/kg wwt)	<0.010	0.017	<0.010	0.099
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.133	<0.0050	0.168	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	0.0342	<0.0010	0.0472	<0.0010
	Calcium (Ca)-Total (mg/kg)	206	999	226	1290
	Calcium (Ca)-Total (mg/kg wwt)	53.1	220	63.5	453
	Cesium (Cs)-Total (mg/kg)	0.0189	0.0819	0.0307	0.0141
	Cesium (Cs)-Total (mg/kg wwt)	0.0049	0.0180	0.0086	0.0049
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.050	<0.20	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	0.044	<0.010	<0.040	0.010
	Cobalt (Co)-Total (mg/kg)	0.048	<0.020	0.051	0.144
	Cobalt (Co)-Total (mg/kg wwt)	0.0123	<0.0040	0.0143	0.0503
	Copper (Cu)-Total (mg/kg)	110	0.91	203	19.5
	Copper (Cu)-Total (mg/kg wwt)	28.3	0.201	56.9	6.85
	Iron (Fe)-Total (mg/kg)	486	15.6	447	114
	Iron (Fe)-Total (mg/kg wwt)	125	3.42	126	39.8
	Lead (Pb)-Total (mg/kg)	<0.050	<0.020	<0.050	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.0040	<0.010	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	720	1340	688	1550
	Magnesium (Mg)-Total (mg/kg wwt)	186	294	193	543
	Manganese (Mn)-Total (mg/kg)	5.58	0.452	7.70	8.77
	Manganese (Mn)-Total (mg/kg wwt)	1.44	0.100	2.16	3.07

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	Description	L1526238-1	L1526238-2	L1526238-3	L1526238-4	L1526238-5
Sampled Date	Sampled Time	TISSUE 25-SEP-14 08:00	TISSUE 25-SEP-14 08:00	TISSUE 25-SEP-14 08:00	TISSUE 25-SEP-14 08:00	TISSUE 25-SEP-14 08:00
Client ID	BOOTJACK LK RB-1	BOOTJACK LK RB-1(LIVER)	BOOTJACK LK RB-1X	BOOTJACK LK RB-1X(GONAD)	BOOTJACK LK RB-2	
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.418	0.263	0.321	0.0237	0.271
	Mercury (Hg)-Total (mg/kg wwt)	0.0952	0.0693	0.0694	0.0083	0.0617
	Molybdenum (Mo)-Total (mg/kg)	0.021	0.821	<0.020	0.037	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0048	0.216	<0.0040	0.0131	<0.0040
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	16800	17200	11700	10400	12100
	Phosphorus (P)-Total (mg/kg wwt)	3830	4530	2530	3670	2760
	Potassium (K)-Total (mg/kg)	28300	16000	20000	5240	20000
	Potassium (K)-Total (mg/kg wwt)	6450	4220	4320	1850	4550
	Rubidium (Rb)-Total (mg/kg)	14.8	12.1	10.5	3.53	7.90
	Rubidium (Rb)-Total (mg/kg wwt)	3.37	3.20	2.28	1.24	1.80
	Selenium (Se)-Total (mg/kg)	2.67	12.7	1.91	7.71	2.27
	Selenium (Se)-Total (mg/kg wwt)	0.607	3.34	0.414	2.72	0.517
	Sodium (Na)-Total (mg/kg)	1470	3600	1080	2050	1140
	Sodium (Na)-Total (mg/kg wwt)	335	948	234	721	260
	Strontium (Sr)-Total (mg/kg)	0.505	0.45	0.357	3.13	1.79
	Strontium (Sr)-Total (mg/kg wwt)	0.115	0.117	0.077	1.10	0.408
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0251	0.0722	0.0181	0.0039	0.0247
	Thallium (Tl)-Total (mg/kg wwt)	0.00572	0.0190	0.00391	0.00138	0.00562
	Tin (Sn)-Total (mg/kg)	0.10	0.15	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	0.024	0.040	<0.020	0.025	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	0.0025	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	0.00065	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	27.5	135	16.8	113	13.2
	Zinc (Zn)-Total (mg/kg wwt)	6.27	35.6	3.63	39.9	3.02
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID Description Sampled Date Sampled Time Client ID	L1526238-6 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 2(LIVER)	L1526238-7 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 3	L1526238-8 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 3(LIVER)	L1526238-9 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 4	L1526238-10 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 4(LIVER)
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)	0.203	0.311	0.159	0.264	0.133	
	Mercury (Hg)-Total (mg/kg wwt)	0.0515	0.0716	0.0368	0.0601	0.0327	
	Molybdenum (Mo)-Total (mg/kg)	0.679	<0.020	0.684	<0.020	0.692	
	Molybdenum (Mo)-Total (mg/kg wwt)	0.172	<0.0040	0.158	<0.0040	0.170	
	Nickel (Ni)-Total (mg/kg)	0.32	<0.20	<0.20	<0.20	0.32	
	Nickel (Ni)-Total (mg/kg wwt)	0.082	<0.040	0.044	<0.040	0.080	
	Phosphorus (P)-Total (mg/kg)	12300	11600	13900	11600	14900	
	Phosphorus (P)-Total (mg/kg wwt)	3120	2670	3220	2640	3670	
	Potassium (K)-Total (mg/kg)	12500	18800	12900	19100	16200	
	Potassium (K)-Total (mg/kg wwt)	3180	4310	2990	4360	3970	
	Rubidium (Rb)-Total (mg/kg)	7.21	10.1	13.0	10.5	14.6	
	Rubidium (Rb)-Total (mg/kg wwt)	1.83	2.32	3.00	2.39	3.59	
	Selenium (Se)-Total (mg/kg)	110	2.19	11.6	2.14	33.7	
	Selenium (Se)-Total (mg/kg wwt)	27.8	0.503	2.69	0.488	8.26	
	Sodium (Na)-Total (mg/kg)	3210	967	4750	797	3260	
	Sodium (Na)-Total (mg/kg wwt)	814	222	1100	181	801	
	Strontium (Sr)-Total (mg/kg)	0.31	0.972	0.87	1.09	0.77	
	Strontium (Sr)-Total (mg/kg wwt)	0.078	0.223	0.201	0.247	0.188	
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg)	0.0828	0.0091	0.0456	0.0108	0.0929	
	Thallium (Tl)-Total (mg/kg wwt)	0.0210	0.00210	0.0105	0.00245	0.0228	
	Tin (Sn)-Total (mg/kg)	0.21	<0.10	0.17	<0.10	0.40	
	Tin (Sn)-Total (mg/kg wwt)	0.054	<0.020	0.040	<0.020	0.099	
	Uranium (U)-Total (mg/kg)	0.0021	<0.0020	0.0040	<0.0020	<0.0020	
	Uranium (U)-Total (mg/kg wwt)	0.00054	<0.00040	0.00093	<0.00040	<0.00040	
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	0.14	<0.10	<0.10	
	Vanadium (V)-Total (mg/kg wwt)	0.023	<0.020	0.032	<0.020	<0.020	
	Zinc (Zn)-Total (mg/kg)	142	16.3	583	13.2	176	
	Zinc (Zn)-Total (mg/kg wwt)	36.1	3.75	135	3.01	43.3	
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID Description Sampled Date Sampled Time Client ID	L1526238-11 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB-5	L1526238-12 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB-5(LIVER)	L1526238-13 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB-6	L1526238-14 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB-6(LIVER)	L1526238-15 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB-7
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)	0.267	0.117	0.198	0.125	0.228	
	Mercury (Hg)-Total (mg/kg wwt)	0.0606	0.0293	0.0505	0.0289	0.0527	
	Molybdenum (Mo)-Total (mg/kg)	<0.020	0.724	<0.020	0.708	<0.020	
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.181	<0.0040	0.164	<0.0040	
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	0.23	<0.20	
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	0.054	<0.040	
	Phosphorus (P)-Total (mg/kg)	11400	13800	10700	13600	11300	
	Phosphorus (P)-Total (mg/kg wwt)	2580	3460	2730	3150	2610	
	Potassium (K)-Total (mg/kg)	17000	13800	16900	13200	18400	
	Potassium (K)-Total (mg/kg wwt)	3870	3450	4320	3060	4250	
	Rubidium (Rb)-Total (mg/kg)	9.26	12.5	8.79	10.7	8.74	
	Rubidium (Rb)-Total (mg/kg wwt)	2.10	3.12	2.24	2.48	2.02	
	Selenium (Se)-Total (mg/kg)	2.00	17.7	2.17	18.5	2.69	
	Selenium (Se)-Total (mg/kg wwt)	0.455	4.43	0.554	4.29	0.621	
	Sodium (Na)-Total (mg/kg)	1030	3660	847	4390	913	
	Sodium (Na)-Total (mg/kg wwt)	234	915	216	1020	211	
	Strontium (Sr)-Total (mg/kg)	5.20	0.50	0.673	0.53	1.02	
	Strontium (Sr)-Total (mg/kg wwt)	1.18	0.125	0.172	0.124	0.234	
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg)	0.0067	0.0454	0.0090	0.0858	0.0072	
	Thallium (Tl)-Total (mg/kg wwt)	0.00153	0.0114	0.00230	0.0199	0.00165	
	Tin (Sn)-Total (mg/kg)	<0.10	0.19	<0.10	0.31	0.10	
	Tin (Sn)-Total (mg/kg wwt)	<0.020	0.047	<0.020	0.073	0.024	
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.025	<0.020	<0.020	<0.020	
	Zinc (Zn)-Total (mg/kg)	16.3	127	12.7	164	14.1	
	Zinc (Zn)-Total (mg/kg wwt)	3.70	31.7	3.25	38.1	3.25	
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID Description Sampled Date Sampled Time Client ID	L1526238-16 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 7(LIVER)	L1526238-17 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 8	L1526238-18 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 8(LIVER)	L1526238-19 TISSUE 25-SEP-14 08:00 BOOTJACK LK RB- 1(GONAD)
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.0990	0.161	0.120	0.0242	
	Mercury (Hg)-Total (mg/kg wwt)	0.0255	0.0354	0.0337	0.0085	
	Molybdenum (Mo)-Total (mg/kg)	0.588	<0.020	0.791	0.044	
	Molybdenum (Mo)-Total (mg/kg wwt)	0.152	<0.0040	0.222	0.0155	
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	
	Phosphorus (P)-Total (mg/kg)	12800	12000	13200	11300	
	Phosphorus (P)-Total (mg/kg wwt)	3300	2630	3720	3960	
	Potassium (K)-Total (mg/kg)	12600	19100	12100	5800	
	Potassium (K)-Total (mg/kg wwt)	3250	4210	3390	2030	
	Rubidium (Rb)-Total (mg/kg)	9.37	14.7	12.8	3.91	
	Rubidium (Rb)-Total (mg/kg wwt)	2.42	3.23	3.60	1.37	
	Selenium (Se)-Total (mg/kg)	41.0	3.63	86.4	8.35	
	Selenium (Se)-Total (mg/kg wwt)	10.6	0.799	24.3	2.93	
	Sodium (Na)-Total (mg/kg)	2910	897	2320	2470	
	Sodium (Na)-Total (mg/kg wwt)	749	198	651	864	
	Strontium (Sr)-Total (mg/kg)	0.36	1.49	0.40	3.41	
	Strontium (Sr)-Total (mg/kg wwt)	0.093	0.329	0.113	1.19	
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg)	0.0434	0.0088	0.0655	0.0043	
	Thallium (Tl)-Total (mg/kg wwt)	0.0112	0.00193	0.0184	0.00152	
	Tin (Sn)-Total (mg/kg)	0.11	0.11	0.14	<0.10	
	Tin (Sn)-Total (mg/kg wwt)	0.030	0.024	0.040	0.031	
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	
	Zinc (Zn)-Total (mg/kg)	132	15.0	121	127	
	Zinc (Zn)-Total (mg/kg wwt)	34.1	3.29	34.1	44.6	
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Bismuth (Bi)-Total	DUP-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9
Duplicate	Calcium (Ca)-Total	DUP-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9
Duplicate	Magnesium (Mg)-Total	DUP-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9
Duplicate	Manganese (Mn)-Total	DUP-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9
Duplicate	Phosphorus (P)-Total	DUP-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9
Duplicate	Potassium (K)-Total	DUP-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9
Duplicate	Selenium (Se)-Total	DUP-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9
Duplicate	Strontium (Sr)-Total	DUP-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9
Duplicate	Zinc (Zn)-Total	DUP-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9
Duplicate	Bismuth (Bi)-Total	DUP-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9
Duplicate	Calcium (Ca)-Total	DUP-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9
Duplicate	Magnesium (Mg)-Total	DUP-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9
Duplicate	Manganese (Mn)-Total	DUP-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9
Duplicate	Phosphorus (P)-Total	DUP-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9
Duplicate	Potassium (K)-Total	DUP-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9
Duplicate	Selenium (Se)-Total	DUP-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9
Duplicate	Strontium (Sr)-Total	DUP-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9
Duplicate	Zinc (Zn)-Total	DUP-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9
Duplicate	Thallium (Tl)-Total	DUP-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9
Duplicate	Thallium (Tl)-Total	DUP-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9
Certified Reference Material	Antimony (Sb)-Total	RM-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9
Certified Reference Material	Antimony (Sb)-Total	RM-H	L1526238-1, -11, -13, -15, -17, -19, -3, -4, -5, -7, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
RM-H	Reference Material recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7
This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7. This digestion procedure was implemented on October 5, 2009.			
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.			
HG-WET-CVAFS-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7. This digestion procedure was implemented on October 5, 2009.			
HG-WET-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (WET)	EPA 200.3, EPA 245.7
This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.			
MET-DRY-CCMS-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A
This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).			

Reference Information

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MET-DRY-MICR-HRMS-VA Tissue Metals in Tissue by HR-ICPMS Micro (DRY) EPA 200.3/200.8

Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MET-WET-CCMS-VA Tissue Metals in Tissue by CRC ICPMS (WET) EPA 200.3/6020A

This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MET-WET-MICR-HRMS-VA Tissue Metals in Tissue by HR-ICPMS Micro (WET) EPA 200.3/200.8

Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on wet weight basis.

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MOISTURE-TISS-VA Tissue % Moisture in Tissues ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

P0027

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Colleen Hughes	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
	Email 2:	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact: ALS

Phone: 250-790-2215 Fax	Analysis Request	
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	Job #:	
Contact:	PO / AFE:	
Address:	Legal Site Description:	
Phone:	Quote #:	
Lab (lab use only):	ALS Contact: Can Dang	Sampler: Colleen Hughes



L1526238-COFC

Sample #	Sample Identification (This description will appear on report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Analysis Request			Number of Containers
					T-metals (HRICP-MS)(Wet&D)	Moisture	Liver Metals	
	Bootjack Lk RB-1	25-Sep-14	8:00-16:15	Tissue	X	X	X	2
	Bootjack Lk RB-1X	25-Sep-14	8:00-16:15	Tissue	X	X	X	2
	Bootjack Lk RB-2	25-Sep-14	8:00-16:15	Tissue	X	X	X	2
	Bootjack Lk RB-3	25-Sep-14	8:00-16:15	Tissue	X	X	X	2
	Bootjack Lk RB-4	25-Sep-14	8:00-16:15	Tissue	X	X	X	2
	Bootjack Lk RB-5	25-Sep-14	8:00-16:15	Tissue	X	X	X	2
	Bootjack Lk RB-6	25-Sep-14	8:00-16:15	Tissue	X	X	X	2
	Bootjack Lk RB-7	25-Sep-14	8:00-16:15	Tissue	X	X	X	2
	Bootjack Lk RB-8	25-Sep-14	8:00-16:15	Tissue	X	X	X	2

Rush Processing Short Holding Time

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)			
Released by: N.Zirnhelt	Date & Time: Sept. 29, 2014	Received by: JW	Date: Oct 1	Time: 8:30	Temperature: -1.5	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 01-OCT-14
Report Date: 03-DEC-14 15:31 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1526270
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: P0026
Legal Site Desc:

Can Dang
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1526270-1	L1526270-2	L1526270-3	L1526270-4	L1526270-5
		Description	OTHER	OTHER	OTHER	OTHER	OTHER
		Sampled Date	11-SEP-14	11-SEP-14	11-SEP-14	11-SEP-14	11-SEP-14
		Sampled Time	08:00	08:00	08:00	08:00	08:00
		Client ID	QUESNEL R RB-1 (LIVER)	QUESNEL R RB-1 (TISSUE)	QUESNEL R RB-1 (GONAD)	QUESNEL R RB-2 (LIVER)	QUESNEL R RB-2 (TISSUE)
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		75.4	76.4	72.0	72.3	77.0
Metals	Aluminum (Al)-Total (mg/kg)		16.9	<2.0	2.6	16.1	<2.0
	Aluminum (Al)-Total (mg/kg wwt)		4.1	<0.40	0.71	4.4	<0.40
	Antimony (Sb)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)		0.092	0.114	0.052	0.290	2.94
	Arsenic (As)-Total (mg/kg wwt)		0.0227	0.0269	0.0146	0.0802	0.674
	Barium (Ba)-Total (mg/kg)		0.099	<0.050	0.685	0.097	<0.050
	Barium (Ba)-Total (mg/kg wwt)		0.024	0.012	0.192	0.027	0.011
	Beryllium (Be)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)		<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)		0.729	<0.0050	0.0132	1.58	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)		0.179	<0.0010	0.0037	0.437	<0.0010
	Calcium (Ca)-Total (mg/kg)		177	903	921	465	605
	Calcium (Ca)-Total (mg/kg wwt)		43.6	213	258	129	139
	Cesium (Cs)-Total (mg/kg)		0.0236	0.0912	0.0307	0.0277	0.0607
	Cesium (Cs)-Total (mg/kg wwt)		0.0058	0.0215	0.0086	0.0077	0.0139
	Chromium (Cr)-Total (mg/kg)		<0.20	<0.050	<0.050	<0.20	<0.050
	Chromium (Cr)-Total (mg/kg wwt)		0.045	<0.010	0.013	<0.040	<0.010
	Cobalt (Co)-Total (mg/kg)		0.146	0.050	0.385	0.186	0.062
	Cobalt (Co)-Total (mg/kg wwt)		0.0360	0.0118	0.108	0.0514	0.0143
	Copper (Cu)-Total (mg/kg)		46.8	1.08	32.2	46.3	1.12
	Copper (Cu)-Total (mg/kg wwt)		11.5	0.255	9.00	12.8	0.257
	Iron (Fe)-Total (mg/kg)		1890	19.1	250	1550	14.4
	Iron (Fe)-Total (mg/kg wwt)		464	4.51	70.1	428	3.30
	Lead (Pb)-Total (mg/kg)		<0.050	<0.020	<0.020	<0.050	<0.020
	Lead (Pb)-Total (mg/kg wwt)		<0.010	<0.0040	<0.0040	<0.010	<0.0040
	Lithium (Li)-Total (mg/kg)		<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)		710	1290	1190	830	1280
	Magnesium (Mg)-Total (mg/kg wwt)		175	304	334	230	293
	Manganese (Mn)-Total (mg/kg)		9.99	0.458	11.4	12.8	0.383
	Manganese (Mn)-Total (mg/kg wwt)		2.46	0.108	3.19	3.55	0.088

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	Description	L1526270-6	L1526270-8	L1526270-9	L1526270-10	L1526270-11
		OTHER	OTHER	OTHER	OTHER	OTHER
	Sampled Date	11-SEP-14	11-SEP-14	11-SEP-14	11-SEP-14	11-SEP-14
	Sampled Time	08:00	08:00	08:00	08:00	08:00
	Client ID	QUESNEL R RB-2 (GONAD)	QUESNEL R RB-2X (TISSUE)	QUESNEL R RB-3 (LIVER)	QUESNEL R RB-3 (TISSUE)	QUESNEL R RB-4 (LIVER)
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	65.4	75.4	77.0	75.4	72.8
Metals	Aluminum (Al)-Total (mg/kg)	2.8	<2.0	10.4	<2.0	13.8
	Aluminum (Al)-Total (mg/kg wwt)	0.95	<0.40	2.38	<0.40	3.8
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.088	2.67	0.125	0.260	0.180
	Arsenic (As)-Total (mg/kg wwt)	0.0304	0.657	0.0286	0.0641	0.0491
	Barium (Ba)-Total (mg/kg)	0.621	0.156	<0.050	0.055	0.071
	Barium (Ba)-Total (mg/kg wwt)	0.215	0.038	<0.010	0.013	0.019
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.0090	<0.0050	1.17	<0.0050	0.986
	Cadmium (Cd)-Total (mg/kg wwt)	0.0031	<0.0010	0.269	<0.0010	0.268
	Calcium (Ca)-Total (mg/kg)	1340	1930	202	848	191
	Calcium (Ca)-Total (mg/kg wwt)	465	476	46.4	209	51.8
	Cesium (Cs)-Total (mg/kg)	0.0158	0.0539	0.0216	0.0530	0.0207
	Cesium (Cs)-Total (mg/kg wwt)	0.0055	0.0133	0.0050	0.0130	0.0056
	Chromium (Cr)-Total (mg/kg)	0.092	<0.050	0.161	<0.050	0.30
	Chromium (Cr)-Total (mg/kg wwt)	0.032	<0.010	0.037	<0.010	0.081
	Cobalt (Co)-Total (mg/kg)	0.529	0.058	0.174	0.030	0.171
	Cobalt (Co)-Total (mg/kg wwt)	0.183	0.0144	0.0399	0.0073	0.0464
	Copper (Cu)-Total (mg/kg)	36.7	0.92	152	1.29	47.5
	Copper (Cu)-Total (mg/kg wwt)	12.7	0.226	34.9	0.319	12.9
	Iron (Fe)-Total (mg/kg)	138	11.7	1030	18.1	2460
	Iron (Fe)-Total (mg/kg wwt)	47.7	2.88	238	4.46	670
	Lead (Pb)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1280	1210	642	1170	653
	Magnesium (Mg)-Total (mg/kg wwt)	445	297	147	288	178
	Manganese (Mn)-Total (mg/kg)	6.02	0.563	5.36	0.414	8.14
	Manganese (Mn)-Total (mg/kg wwt)	2.08	0.138	1.23	0.102	2.21

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1526270-12	L1526270-13	L1526270-14	L1526270-15	L1526270-16
		Description	OTHER	OTHER	OTHER	OTHER	OTHER
		Sampled Date	11-SEP-14	11-SEP-14	11-SEP-14	11-SEP-14	11-SEP-14
		Sampled Time	08:00	08:00	08:00	08:00	08:00
		Client ID	QUESNEL R RB-4 (TISSUE)	QUESNEL R RB-5 (LIVER)	QUESNEL R RB-5 (TISSUE)	QUESNEL R RB-6 (LIVER)	QUESNEL R RB-6 (TISSUE)
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		80.4	73.1	78.4	76.1	78.4
Metals	Aluminum (Al)-Total (mg/kg)		<2.0	24.3	<2.0	5.1	<2.0
	Aluminum (Al)-Total (mg/kg wwt)		<0.40	6.6	<0.40	1.2	<0.40
	Antimony (Sb)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)		0.433	0.331	3.01	0.158	0.865
	Arsenic (As)-Total (mg/kg wwt)		0.0850	0.0890	0.650	0.0376	0.187
	Barium (Ba)-Total (mg/kg)		0.097	0.053	0.101	0.063	0.107
	Barium (Ba)-Total (mg/kg wwt)		0.019	0.014	0.022	0.015	0.023
	Beryllium (Be)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)		<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)		<0.0050	3.04	<0.0050	1.29	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)		<0.0010	0.818	<0.0010	0.308	<0.0010
	Calcium (Ca)-Total (mg/kg)		1180	161	1430	174	1670
	Calcium (Ca)-Total (mg/kg wwt)		231	43.3	310	41.4	361
	Cesium (Cs)-Total (mg/kg)		0.0896	0.0233	0.0835	0.0233	0.0971
	Cesium (Cs)-Total (mg/kg wwt)		0.0176	0.0063	0.0181	0.0056	0.0210
	Chromium (Cr)-Total (mg/kg)		<0.050	<0.20	<0.050	0.24	<0.050
	Chromium (Cr)-Total (mg/kg wwt)		<0.010	0.053	<0.010	0.058	<0.010
	Cobalt (Co)-Total (mg/kg)		0.038	0.300	0.071	0.309	0.072
	Cobalt (Co)-Total (mg/kg wwt)		0.0075	0.0807	0.0154	0.0737	0.0156
	Copper (Cu)-Total (mg/kg)		0.81	379	0.81	70.4	0.92
	Copper (Cu)-Total (mg/kg wwt)		0.160	102	0.175	16.8	0.199
	Iron (Fe)-Total (mg/kg)		21.2	2800	16.2	2180	14.6
	Iron (Fe)-Total (mg/kg wwt)		4.16	753	3.51	521	3.17
	Lead (Pb)-Total (mg/kg)		<0.020	<0.050	<0.020	<0.050	<0.020
	Lead (Pb)-Total (mg/kg wwt)		<0.0040	<0.010	<0.0040	<0.010	<0.0040
	Lithium (Li)-Total (mg/kg)		<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)		1430	768	1360	683	1360
	Magnesium (Mg)-Total (mg/kg wwt)		281	207	294	163	293
	Manganese (Mn)-Total (mg/kg)		0.422	14.6	0.454	9.48	0.547
	Manganese (Mn)-Total (mg/kg wwt)		0.083	3.94	0.098	2.26	0.118

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		Sample ID	L1526270-17	L1526270-18	L1526270-19	L1526270-20	L1526270-21
		Description	OTHER	OTHER	OTHER	OTHER	OTHER
		Sampled Date	12-SEP-14	12-SEP-14	12-SEP-14	12-SEP-14	12-SEP-14
		Sampled Time	08:00	08:00	08:00	08:00	08:00
		Client ID	QUESNEL R RB-7 (LIVER)	QUESNEL R RB-7 (TISSUE)	QUESNEL R RB-8 (LIVER)	QUESNEL R RB-8 (TISSUE)	QUESNEL R RB-9 (LIVER)
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		74.1	77.3	74.1	80.6	74.5
Metals	Aluminum (Al)-Total (mg/kg)		<5.0	<2.0	14.7	<2.0	15.4
	Aluminum (Al)-Total (mg/kg wwt)		<1.0	<0.40	3.8	<0.40	3.93
	Antimony (Sb)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)		0.098	0.229	0.138	0.225	0.129
	Arsenic (As)-Total (mg/kg wwt)		0.0254	0.0520	0.0358	0.0438	0.0330
	Barium (Ba)-Total (mg/kg)		0.394	0.085	0.101	0.056	0.070
	Barium (Ba)-Total (mg/kg wwt)		0.102	0.019	0.026	0.011	0.018
	Beryllium (Be)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)		<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)		0.22	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)		0.466	<0.0050	0.999	<0.0050	0.752
	Cadmium (Cd)-Total (mg/kg wwt)		0.121	<0.0010	0.259	<0.0010	0.192
	Calcium (Ca)-Total (mg/kg)		242	979	196	965	372
	Calcium (Ca)-Total (mg/kg wwt)		62.8	222	50.9	188	95.1
	Cesium (Cs)-Total (mg/kg)		0.0288	0.0814	0.0273	0.0810	0.0361
	Cesium (Cs)-Total (mg/kg wwt)		0.0075	0.0185	0.0071	0.0157	0.0092
	Chromium (Cr)-Total (mg/kg)		<0.20	<0.050	<0.20	<0.050	0.103
	Chromium (Cr)-Total (mg/kg wwt)		<0.040	<0.010	0.051	<0.010	0.026
	Cobalt (Co)-Total (mg/kg)		0.177	0.050	0.279	0.037	0.188
	Cobalt (Co)-Total (mg/kg wwt)		0.0459	0.0113	0.0724	0.0072	0.0480
	Copper (Cu)-Total (mg/kg)		38.1	1.04	35.2	0.95	130
	Copper (Cu)-Total (mg/kg wwt)		9.87	0.235	9.14	0.185	33.1
	Iron (Fe)-Total (mg/kg)		1160	15.1	2200	29.1	751
	Iron (Fe)-Total (mg/kg wwt)		300	3.42	571	5.65	192
	Lead (Pb)-Total (mg/kg)		<0.050	<0.020	0.055	<0.020	0.472
	Lead (Pb)-Total (mg/kg wwt)		<0.010	<0.0040	0.014	<0.0040	0.120
	Lithium (Li)-Total (mg/kg)		<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)		648	1300	678	1280	774
	Magnesium (Mg)-Total (mg/kg wwt)		168	295	176	250	197
	Manganese (Mn)-Total (mg/kg)		7.47	0.530	8.11	0.333	10.8
	Manganese (Mn)-Total (mg/kg wwt)		1.94	0.120	2.10	0.065	2.75

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		Sample ID	L1526270-22	L1526270-23	L1526270-24	L1526270-25	L1526270-26
		Description	OTHER	OTHER	OTHER	OTHER	OTHER
		Sampled Date	12-SEP-14	12-SEP-14	12-SEP-14	12-SEP-14	12-SEP-14
		Sampled Time	08:00	08:00	08:00	08:00	08:00
		Client ID	QUESNEL R RB-9 (TISSUE)	QUESNEL R RB-9 (GONAD)	QUESNEL R RB-10 (LIVER)	QUESNEL R RB-10 (TISSUE)	QUESNEL R RB-11 (LIVER)
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		77.8	70.4	73.0	79.7	76.3
Metals	Aluminum (Al)-Total (mg/kg)		<2.0	2.4	9.1	<2.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)		<0.40	0.70	2.5	<0.40	<1.0
	Antimony (Sb)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)		0.248	0.056	0.071	0.067	0.118
	Arsenic (As)-Total (mg/kg wwt)		0.0551	0.0165	0.0191	0.0137	0.0280
	Barium (Ba)-Total (mg/kg)		0.083	0.619	0.210	0.072	<0.050
	Barium (Ba)-Total (mg/kg wwt)		0.018	0.183	0.057	0.015	<0.010
	Beryllium (Be)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)		<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)		<0.0050	0.0085	0.834	<0.0050	1.77
	Cadmium (Cd)-Total (mg/kg wwt)		<0.0010	0.0025	0.225	<0.0010	0.420
	Calcium (Ca)-Total (mg/kg)		1530	1180	189	1080	266
	Calcium (Ca)-Total (mg/kg wwt)		338	350	51.0	219	63.2
	Cesium (Cs)-Total (mg/kg)		0.0768	0.0268	0.0386	0.104	0.0131
	Cesium (Cs)-Total (mg/kg wwt)		0.0170	0.0079	0.0104	0.0211	0.0031
	Chromium (Cr)-Total (mg/kg)		<0.050	<0.050	0.27	<0.050	<0.20
	Chromium (Cr)-Total (mg/kg wwt)		<0.010	0.012	0.073	<0.010	<0.040
	Cobalt (Co)-Total (mg/kg)		0.045	0.368	0.112	0.046	0.181
	Cobalt (Co)-Total (mg/kg wwt)		0.0100	0.109	0.0304	0.0094	0.0428
	Copper (Cu)-Total (mg/kg)		0.90	29.5	104	1.19	23.3
	Copper (Cu)-Total (mg/kg wwt)		0.200	8.73	28.0	0.242	5.52
	Iron (Fe)-Total (mg/kg)		15.1	153	1810	22.6	898
	Iron (Fe)-Total (mg/kg wwt)		3.34	45.3	489	4.60	213
	Lead (Pb)-Total (mg/kg)		<0.020	0.022	<0.050	0.024	<0.050
	Lead (Pb)-Total (mg/kg wwt)		<0.0040	0.0066	<0.010	0.0048	<0.010
	Lithium (Li)-Total (mg/kg)		<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)		1230	1290	726	1390	696
	Magnesium (Mg)-Total (mg/kg wwt)		272	381	196	282	165
	Manganese (Mn)-Total (mg/kg)		0.490	9.01	14.9	0.468	6.59
	Manganese (Mn)-Total (mg/kg wwt)		0.109	2.66	4.01	0.095	1.56

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		Sample ID	L1526270-27	L1526270-28	L1526270-29		
		Description	OTHER	OTHER	OTHER		
		Sampled Date	12-SEP-14	12-SEP-14	12-SEP-14		
		Sampled Time	08:00	08:00	08:00		
		Client ID	QUESNEL R RB-11 (TISSUE)	QUESNEL R RB-12 (LIVER)	QUESNEL R RB-12 (TISSUE)		
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		75.6	76.6	71.2		
Metals	Aluminum (Al)-Total (mg/kg)		<2.0	<2.0	16.2		
	Aluminum (Al)-Total (mg/kg wwt)		<0.40	0.45	4.7		
	Antimony (Sb)-Total (mg/kg)		<0.010	<0.010	<0.010		
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020		
	Arsenic (As)-Total (mg/kg)		0.250	0.165	0.243		
	Arsenic (As)-Total (mg/kg wwt)		0.0610	0.0386	0.0700		
	Barium (Ba)-Total (mg/kg)		0.132	0.074	0.114		
	Barium (Ba)-Total (mg/kg wwt)		0.032	0.017	0.033		
	Beryllium (Be)-Total (mg/kg)		<0.010	<0.010	<0.010		
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020		
	Bismuth (Bi)-Total (mg/kg)		<0.010	<0.010	<0.010		
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020		
	Boron (B)-Total (mg/kg)		<1.0	<1.0	<1.0		
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	0.22		
	Cadmium (Cd)-Total (mg/kg)		<0.0050	<0.0050	1.30		
	Cadmium (Cd)-Total (mg/kg wwt)		<0.0010	<0.0010	0.375		
	Calcium (Ca)-Total (mg/kg)		1410	781	304		
	Calcium (Ca)-Total (mg/kg wwt)		342	182	87.4		
	Cesium (Cs)-Total (mg/kg)		0.0402	0.0831	0.0158		
	Cesium (Cs)-Total (mg/kg wwt)		0.0098	0.0194	0.0046		
	Chromium (Cr)-Total (mg/kg)		<0.050	<0.050	<0.20		
	Chromium (Cr)-Total (mg/kg wwt)		<0.010	<0.010	0.050		
	Cobalt (Co)-Total (mg/kg)		0.036	0.057	0.096		
	Cobalt (Co)-Total (mg/kg wwt)		0.0088	0.0132	0.0277		
	Copper (Cu)-Total (mg/kg)		1.17	0.69	32.5		
	Copper (Cu)-Total (mg/kg wwt)		0.286	0.161	9.35		
	Iron (Fe)-Total (mg/kg)		18.1	14.0	2220		
	Iron (Fe)-Total (mg/kg wwt)		4.41	3.27	639		
	Lead (Pb)-Total (mg/kg)		<0.020	<0.020	<0.050		
	Lead (Pb)-Total (mg/kg wwt)		<0.0040	<0.0040	0.011		
	Lithium (Li)-Total (mg/kg)		<0.50	<0.50	<0.50		
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10		
	Magnesium (Mg)-Total (mg/kg)		1230	1320	642		
	Magnesium (Mg)-Total (mg/kg wwt)		300	309	185		
	Manganese (Mn)-Total (mg/kg)		0.840	0.489	8.24		
	Manganese (Mn)-Total (mg/kg wwt)		0.205	0.114	2.37		

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Sample ID	Description	L1526270-1	L1526270-2	L1526270-3	L1526270-4	L1526270-5
Sampled Date	Sampled Time	11-SEP-14 08:00	11-SEP-14 08:00	11-SEP-14 08:00	11-SEP-14 08:00	11-SEP-14 08:00
Client ID		QUESNEL R RB-1 (LIVER)	QUESNEL R RB-1 (TISSUE)	QUESNEL R RB-1 (GONAD)	QUESNEL R RB-2 (LIVER)	QUESNEL R RB-2 (TISSUE)
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.462	0.565	0.0908	0.273	0.460
	Mercury (Hg)-Total (mg/kg wwt)	0.113	0.133	0.0254	0.0755	0.106
	Molybdenum (Mo)-Total (mg/kg)	0.963	<0.020	0.030	0.754	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	0.237	<0.0040	0.0084	0.209	<0.0040
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	12500	11700	9260	14600	11300
	Phosphorus (P)-Total (mg/kg wwt)	3080	2750	2590	4050	2600
	Potassium (K)-Total (mg/kg)	13500	19600	6380	12900	17900
	Potassium (K)-Total (mg/kg wwt)	3310	4610	1790	3560	4120
	Rubidium (Rb)-Total (mg/kg)	18.6	16.9	7.85	23.3	17.5
	Rubidium (Rb)-Total (mg/kg wwt)	4.58	3.98	2.20	6.45	4.03
	Selenium (Se)-Total (mg/kg)	7.12	2.45	15.0	17.0	2.77
	Selenium (Se)-Total (mg/kg wwt)	1.75	0.577	4.20	4.70	0.635
	Sodium (Na)-Total (mg/kg)	3050	1120	3910	2980	892
	Sodium (Na)-Total (mg/kg wwt)	750	265	1090	824	205
	Strontium (Sr)-Total (mg/kg)	0.21	0.971	1.94	0.66	0.727
	Strontium (Sr)-Total (mg/kg wwt)	0.052	0.229	0.543	0.182	0.167
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0786	0.0208	0.0080	0.0997	0.0265
	Thallium (Tl)-Total (mg/kg wwt)	0.0193	0.00490	0.00225	0.0276	0.00609
	Tin (Sn)-Total (mg/kg)	0.70	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	0.172	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	0.0178	<0.0020	0.0034	0.0240	<0.0020
	Uranium (U)-Total (mg/kg wwt)	0.00438	<0.00040	0.00095	0.00665	<0.00040
	Vanadium (V)-Total (mg/kg)	0.46	<0.10	<0.10	0.16	<0.10
	Vanadium (V)-Total (mg/kg wwt)	0.112	<0.020	<0.020	0.044	<0.020
	Zinc (Zn)-Total (mg/kg)	143	15.6	161	103	13.7
	Zinc (Zn)-Total (mg/kg wwt)	35.1	3.69	45.0	28.4	3.14
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	0.29	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	0.081	<0.040	<0.040

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		Sample ID	L1526270-6	L1526270-8	L1526270-9	L1526270-10	L1526270-11
		Description	OTHER	OTHER	OTHER	OTHER	OTHER
		Sampled Date	11-SEP-14	11-SEP-14	11-SEP-14	11-SEP-14	11-SEP-14
		Sampled Time	08:00	08:00	08:00	08:00	08:00
		Client ID	QUESNEL R RB-2 (GONAD)	QUESNEL R RB-2X (TISSUE)	QUESNEL R RB-3 (LIVER)	QUESNEL R RB-3 (TISSUE)	QUESNEL R RB-4 (LIVER)
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)	0.0390	0.433	0.475	0.501	0.827	
	Mercury (Hg)-Total (mg/kg wwt)	0.0135	0.107	0.109	0.123	0.225	
	Molybdenum (Mo)-Total (mg/kg)	0.027	<0.020	1.09	<0.020	1.25	
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0094	<0.0040	0.251	<0.0040	0.341	
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	
	Phosphorus (P)-Total (mg/kg)	9900	11000	12700	10700	13000	
	Phosphorus (P)-Total (mg/kg wwt)	3430	2710	2930	2640	3540	
	Potassium (K)-Total (mg/kg)	4540	16500	13600	17100	10600	
	Potassium (K)-Total (mg/kg wwt)	1570	4060	3120	4220	2870	
	Rubidium (Rb)-Total (mg/kg)	5.42	16.0	10.8	11.8	10.5	
	Rubidium (Rb)-Total (mg/kg wwt)	1.88	3.94	2.47	2.90	2.87	
	Selenium (Se)-Total (mg/kg)	18.1	2.51	38.5	2.24	17.0	
	Selenium (Se)-Total (mg/kg wwt)	6.27	0.618	8.84	0.551	4.63	
	Sodium (Na)-Total (mg/kg)	2190	883	4580	936	4340	
	Sodium (Na)-Total (mg/kg wwt)	756	217	1050	231	1180	
	Strontium (Sr)-Total (mg/kg)	3.51	2.66	0.299	0.891	0.33	
	Strontium (Sr)-Total (mg/kg wwt)	1.21	0.653	0.069	0.219	0.089	
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg)	0.0072	0.0241	0.0509	0.0149	0.112	
	Thallium (Tl)-Total (mg/kg wwt)	0.00251	0.00592	0.0117	0.00367	0.0304	
	Tin (Sn)-Total (mg/kg)	<0.10	0.11	0.40	<0.10	<0.10	
	Tin (Sn)-Total (mg/kg wwt)	0.023	0.028	0.092	<0.020	<0.020	
	Uranium (U)-Total (mg/kg)	0.0042	<0.0020	0.0046	<0.0020	0.0170	
	Uranium (U)-Total (mg/kg wwt)	0.00145	<0.00040	0.00105	<0.00040	0.00463	
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	1.08	<0.10	0.56	
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	0.248	<0.020	0.153	
	Zinc (Zn)-Total (mg/kg)	150	13.4	103	15.7	128	
	Zinc (Zn)-Total (mg/kg wwt)	51.9	3.30	23.7	3.86	34.9	
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1526270-12	L1526270-13	L1526270-14	L1526270-15	L1526270-16
		Description	OTHER	OTHER	OTHER	OTHER	OTHER
		Sampled Date	11-SEP-14	11-SEP-14	11-SEP-14	11-SEP-14	11-SEP-14
		Sampled Time	08:00	08:00	08:00	08:00	08:00
		Client ID	QUESNEL R RB-4 (TISSUE)	QUESNEL R RB-5 (LIVER)	QUESNEL R RB-5 (TISSUE)	QUESNEL R RB-6 (LIVER)	QUESNEL R RB-6 (TISSUE)
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)		1.28	0.793	0.769	0.370	0.664
	Mercury (Hg)-Total (mg/kg wwt)		0.252	0.214	0.166	0.0882	0.144
	Molybdenum (Mo)-Total (mg/kg)		<0.020	1.40	<0.020	1.00	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)		<0.0040	0.378	<0.0040	0.239	<0.0040
	Nickel (Ni)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)		13600	14700	12300	13400	12800
	Phosphorus (P)-Total (mg/kg wwt)		2670	3950	2660	3190	2760
	Potassium (K)-Total (mg/kg)		23500	12100	20700	12400	20700
	Potassium (K)-Total (mg/kg wwt)		4600	3240	4480	2960	4480
	Rubidium (Rb)-Total (mg/kg)		18.4	16.2	17.5	14.5	18.1
	Rubidium (Rb)-Total (mg/kg wwt)		3.61	4.36	3.78	3.47	3.92
	Selenium (Se)-Total (mg/kg)		2.47	81.2	3.32	18.3	2.23
	Selenium (Se)-Total (mg/kg wwt)		0.484	21.9	0.719	4.37	0.482
	Sodium (Na)-Total (mg/kg)		1590	3740	1150	4880	1270
	Sodium (Na)-Total (mg/kg wwt)		313	1010	248	1160	274
	Strontium (Sr)-Total (mg/kg)		1.47	0.27	1.90	0.26	1.97
	Strontium (Sr)-Total (mg/kg wwt)		0.288	0.074	0.412	0.062	0.427
	Tellurium (Te)-Total (mg/kg)		<0.020	0.057	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	0.0153	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)		0.0251	0.124	0.0343	0.0919	0.0346
	Thallium (Tl)-Total (mg/kg wwt)		0.00493	0.0334	0.00741	0.0219	0.00749
	Tin (Sn)-Total (mg/kg)		0.12	<0.10	<0.10	0.16	<0.10
	Tin (Sn)-Total (mg/kg wwt)		0.023	<0.020	<0.020	0.039	<0.020
	Uranium (U)-Total (mg/kg)		<0.0020	0.0404	<0.0020	0.0063	<0.0020
	Uranium (U)-Total (mg/kg wwt)		<0.00040	0.0109	<0.00040	0.00149	<0.00040
	Vanadium (V)-Total (mg/kg)		<0.10	0.29	<0.10	0.15	<0.10
	Vanadium (V)-Total (mg/kg wwt)		<0.020	0.077	<0.020	0.036	<0.020
	Zinc (Zn)-Total (mg/kg)		14.6	124	15.6	121	16.8
	Zinc (Zn)-Total (mg/kg wwt)		2.86	33.5	3.36	28.8	3.63
	Zirconium (Zr)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1526270-17 OTHER 12-SEP-14 08:00 QUESNEL R RB-7 (LIVER)	L1526270-18 OTHER 12-SEP-14 08:00 QUESNEL R RB-7 (TISSUE)	L1526270-19 OTHER 12-SEP-14 08:00 QUESNEL R RB-8 (LIVER)	L1526270-20 OTHER 12-SEP-14 08:00 QUESNEL R RB-8 (TISSUE)	L1526270-21 OTHER 12-SEP-14 08:00 QUESNEL R RB-9 (LIVER)
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.116	0.278	0.183	1.05	0.848
	Mercury (Hg)-Total (mg/kg wwt)	0.0302	0.0631	0.0475	0.204	0.216
	Molybdenum (Mo)-Total (mg/kg)	0.612	<0.020	0.698	<0.020	1.10
	Molybdenum (Mo)-Total (mg/kg wwt)	0.159	<0.0040	0.181	<0.0040	0.280
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	11900	11400	14500	11800	15900
	Phosphorus (P)-Total (mg/kg wwt)	3100	2590	3760	2280	4050
	Potassium (K)-Total (mg/kg)	11800	18700	10500	21000	15100
	Potassium (K)-Total (mg/kg wwt)	3050	4250	2730	4090	3850
	Rubidium (Rb)-Total (mg/kg)	19.2	21.1	15.8	17.2	22.7
	Rubidium (Rb)-Total (mg/kg wwt)	4.98	4.79	4.09	3.34	5.79
	Selenium (Se)-Total (mg/kg)	13.7	2.36	16.9	2.14	16.6
	Selenium (Se)-Total (mg/kg wwt)	3.54	0.536	4.38	0.417	4.23
	Sodium (Na)-Total (mg/kg)	3580	970	4550	1870	3130
	Sodium (Na)-Total (mg/kg wwt)	927	220	1180	364	799
	Strontium (Sr)-Total (mg/kg)	0.33	1.22	0.38	1.03	0.495
	Strontium (Sr)-Total (mg/kg wwt)	0.085	0.276	0.097	0.199	0.126
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.119	0.0333	0.117	0.0261	0.0620
	Thallium (Tl)-Total (mg/kg wwt)	0.0309	0.00756	0.0303	0.00508	0.0158
	Tin (Sn)-Total (mg/kg)	0.11	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	0.030	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	0.0037	<0.0020	0.0058	<0.0020	0.0226
	Uranium (U)-Total (mg/kg wwt)	0.00096	<0.00040	0.00150	<0.00040	0.00578
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	0.13	<0.10	0.70
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	0.033	<0.020	0.179
	Zinc (Zn)-Total (mg/kg)	94.3	14.1	115	15.7	131
	Zinc (Zn)-Total (mg/kg wwt)	24.5	3.19	29.8	3.05	33.4
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1526270-22	L1526270-23	L1526270-24	L1526270-25	L1526270-26
		Description	OTHER	OTHER	OTHER	OTHER	OTHER
		Sampled Date	12-SEP-14	12-SEP-14	12-SEP-14	12-SEP-14	12-SEP-14
		Sampled Time	08:00	08:00	08:00	08:00	08:00
		Client ID	QUESNEL R RB-9 (TISSUE)	QUESNEL R RB-9 (GONAD)	QUESNEL R RB-10 (LIVER)	QUESNEL R RB-10 (TISSUE)	QUESNEL R RB-11 (LIVER)
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)		0.996	0.0852	0.320	0.624	0.274
	Mercury (Hg)-Total (mg/kg wwt)		0.221	0.0252	0.0865	0.127	0.0649
	Molybdenum (Mo)-Total (mg/kg)		<0.020	0.025	1.01	<0.020	0.862
	Molybdenum (Mo)-Total (mg/kg wwt)		<0.0040	0.0075	0.274	<0.0040	0.204
	Nickel (Ni)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)		11100	10500	14300	12700	13100
	Phosphorus (P)-Total (mg/kg wwt)		2460	3100	3860	2580	3110
	Potassium (K)-Total (mg/kg)		17400	5580	11700	21400	12300
	Potassium (K)-Total (mg/kg wwt)		3860	1650	3170	4350	2920
	Rubidium (Rb)-Total (mg/kg)		16.3	6.99	21.5	25.0	8.18
	Rubidium (Rb)-Total (mg/kg wwt)		3.60	2.07	5.80	5.08	1.94
	Selenium (Se)-Total (mg/kg)		1.96	12.9	14.7	2.37	11.9
	Selenium (Se)-Total (mg/kg wwt)		0.434	3.82	3.98	0.483	2.83
	Sodium (Na)-Total (mg/kg)		1080	3970	2560	1160	6860
	Sodium (Na)-Total (mg/kg wwt)		240	1170	692	235	1630
	Strontium (Sr)-Total (mg/kg)		1.78	2.78	0.22	1.23	0.52
	Strontium (Sr)-Total (mg/kg wwt)		0.395	0.821	0.060	0.251	0.123
	Tellurium (Te)-Total (mg/kg)		<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)		0.0157	0.0058	0.152	0.0315	0.0466
	Thallium (Tl)-Total (mg/kg wwt)		0.00349	0.00172	0.0409	0.00641	0.0111
	Tin (Sn)-Total (mg/kg)		<0.10	<0.10	0.12	0.13	<0.10
	Tin (Sn)-Total (mg/kg wwt)		<0.020	<0.020	0.033	0.026	<0.020
	Uranium (U)-Total (mg/kg)		<0.0020	0.0040	0.0109	<0.0020	0.0078
	Uranium (U)-Total (mg/kg wwt)		<0.00040	0.00118	0.00295	<0.00040	0.00185
	Vanadium (V)-Total (mg/kg)		<0.10	<0.10	0.12	<0.10	0.72
	Vanadium (V)-Total (mg/kg wwt)		<0.020	<0.020	0.032	<0.020	0.171
	Zinc (Zn)-Total (mg/kg)		12.9	140	127	24.7	106
	Zinc (Zn)-Total (mg/kg wwt)		2.87	41.4	34.3	5.01	25.2
	Zirconium (Zr)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1526270-27	L1526270-28	L1526270-29		
		Description	OTHER	OTHER	OTHER		
		Sampled Date	12-SEP-14	12-SEP-14	12-SEP-14		
		Sampled Time	08:00	08:00	08:00		
		Client ID	QUESNEL R RB-11 (TISSUE)	QUESNEL R RB-12 (LIVER)	QUESNEL R RB-12 (TISSUE)		
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)		0.295	0.315	0.366		
	Mercury (Hg)-Total (mg/kg wwt)		0.0718	0.0736	0.105		
	Molybdenum (Mo)-Total (mg/kg)		<0.020	<0.020	1.66		
	Molybdenum (Mo)-Total (mg/kg wwt)		<0.0040	<0.0040	0.478		
	Nickel (Ni)-Total (mg/kg)		<0.20	<0.20	<0.20		
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	<0.040		
	Phosphorus (P)-Total (mg/kg)		11600	11300	12200		
	Phosphorus (P)-Total (mg/kg wwt)		2840	2640	3520		
	Potassium (K)-Total (mg/kg)		18900	18500	10500		
	Potassium (K)-Total (mg/kg wwt)		4610	4310	3010		
	Rubidium (Rb)-Total (mg/kg)		9.94	21.5	12.5		
	Rubidium (Rb)-Total (mg/kg wwt)		2.42	5.02	3.59		
	Selenium (Se)-Total (mg/kg)		1.99	2.26	18.2		
	Selenium (Se)-Total (mg/kg wwt)		0.485	0.529	5.24		
	Sodium (Na)-Total (mg/kg)		1260	1060	3380		
	Sodium (Na)-Total (mg/kg wwt)		307	247	972		
	Strontium (Sr)-Total (mg/kg)		2.08	0.933	0.39		
	Strontium (Sr)-Total (mg/kg wwt)		0.508	0.218	0.112		
	Tellurium (Te)-Total (mg/kg)		<0.020	<0.020	<0.020		
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040		
	Thallium (Tl)-Total (mg/kg)		0.0168	0.0342	0.146		
	Thallium (Tl)-Total (mg/kg wwt)		0.00410	0.00800	0.0419		
	Tin (Sn)-Total (mg/kg)		<0.10	<0.10	<0.10		
	Tin (Sn)-Total (mg/kg wwt)		<0.020	<0.020	<0.020		
	Uranium (U)-Total (mg/kg)		<0.0020	<0.0020	0.0132		
	Uranium (U)-Total (mg/kg wwt)		<0.00040	<0.00040	0.00380		
	Vanadium (V)-Total (mg/kg)		<0.10	<0.10	1.46		
	Vanadium (V)-Total (mg/kg wwt)		<0.020	<0.020	0.422		
	Zinc (Zn)-Total (mg/kg)		17.1	12.7	103		
	Zinc (Zn)-Total (mg/kg wwt)		4.16	2.96	29.6		
	Zirconium (Zr)-Total (mg/kg)		<0.20	<0.20	<0.20		
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040		

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7. This digestion procedure was implemented on October 5, 2009.</p>			
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-WET-CVAFS-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7. This digestion procedure was implemented on October 5, 2009.</p>			
HG-WET-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (WET)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
MET-DRY-CCMS-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-CCMS-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (WET)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on wet weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
<p>This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Reference Information

Chain of Custody Numbers:

P0026

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Report To	Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company: Mount Polley Mining Corp.	<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)
Contact: C. Bettles, Natalie Neufeld, Laura McOrmond, Norm Zirnhell,	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address: PO Box 12, Likely, BC V0L 1N0	Email 1: norm@environmentalquality.ca	<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
Vancouver, BC V6C 3B6	Email 2: Cory.Bettles@snclavalin.com	<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone: 2507902215x2560 Fax:	Email 3: dolighan@telus.net	Analysis Request

Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Client / Project Information	Please indicate below Filtered, Preserved or both (F, P, F/P)																		
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No	Job #:																			
Company:	PO / AFE:																			
Contact:	LSD:																			
Address:																				
Phone:	Quote #:																			
Lab Work (lab use)	ALS Contact: Can Dang																			
	Sampler: NZ																			



L1526270-COFC

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	Liver(METALS)	Tissue(METALS)	Gonad(METALS)	% Moisture content													Number of Containers
	Quesnel R RB-1 (Gonad Sampled)	11-Sep-14	08:00-16:15	Other	X	X	X	X													3
	Quesnel R RB-2 (Gonad Sampled)	11-Sep-14	08:00-16:15	Other	X	X	X	X													3
	Quesnel R RB 2X	11-Sep-14	08:00-16:15	Other	X	X		X													2
	Quesnel R RB-3	11-Sep-14	08:00-16:15	Other	X	X		X													2
	Quesnel R RB-4	11-Sep-14	08:00-16:15	Other	X	X		X													2
	Quesnel R RB-5	11-Sep-14	08:00-16:15	Other	X	X		X													2
	Quesnel R RB-6	11-Sep-14	08:00-16:15	Other	X	X		X													2
	Quesnel R RB-7	12-Sep-14	08:00-16:15	Other	X	X		X													2
	Quesnel R RB-8	12-Sep-14	08:00-16:15	Other	X	X		X													2
	Quesnel R RB-9 (GONAD sampled)	12-Sep-14	08:00-16:15	Other	X	X	X	X													3
	Quesnel R RB-10	12-Sep-14	08:00-16:15	Other	X	X		X													2
	Quesnel R RB-11	12-Sep-14	08:00-16:15	Other	X	X		X													2
	Quesnel R RB-12	12-Sep-14	08:00-16:15	Other	X	X		X													2

Short Holding Time
Rush Processing

Special instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT, RELEASE (client use)				SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: <i>Norm Zirnhell</i>	Date (dd-mm-yy): 30-Sep-14 29-Sep-14	Time (hh:mm): 2:30	Received by: <i>JH</i>	Date: 30-Sep-14	Time: 8:30	Temperature: -1.5°C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF	



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 02-OCT-14
Report Date: 14-SEP-15 16:40 (MT)
Version: FINAL REV. 2

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1527061
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

Comments: Please note we received an extra sample "RB-1 QUESNEL LAKE (IMPACTED) TISSUE R" not listed on the COC. We analyzed the extra sample as per other samples in the work order.

Please note we did not receive samples "BB-1 (HFSL-2) Right side liver tissue" and "RSC-11 (Polley Lake, Sinking net, P4)." Hence, requested analyses could not be completed.

14-SEP-2015 Revision 2: The sample collection date for the sample ASL identify as L1527061-12 was modified.

Can Dang
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
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ALS ENVIRONMENTAL ANALYTICAL REPORT

14-SEP-15 16:40 (MT)

Version: FINAL REV. 2

Sample ID Description Sampled Date Sampled Time Client ID	L1527061-1 OTHER 23-SEP-14 12:10 BB-1(HFSL-2) LEFT SIDE TISSUE	L1527061-2 OTHER 23-SEP-14 12:10 BB-1(HFSL-2) LEFT SIDE TISSUE(LIVER)	L1527061-3 OTHER 23-SEP-14 12:10 BB-1(HFSL-2) RIGHT SIDE TISSUE	L1527061-5 OTHER 23-SEP-14 11:45 RB-1 QUESNEL LAKE (IMPACTED) TISSUE	L1527061-6 OTHER 23-SEP-14 11:45 RB-1 QUESNEL LAKE (IMPACTED) TISSUE(LIVER)
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)				
Metals	81.2	43.5	80.5	89.8 ^{DLHM}	82.8
Aluminum (Al)-Total (mg/kg)	3.7	3.1	2.7	<4.0 ^{DLHM}	12.3
Aluminum (Al)-Total (mg/kg wwt)	0.69	1.77	0.53	<0.40 ^{DLHM}	2.12
Antimony (Sb)-Total (mg/kg)	<0.010	0.011	<0.010	<0.020 ^{DLHM}	<0.010
Antimony (Sb)-Total (mg/kg wwt)	<0.0020	0.0062	<0.0020	<0.0020	<0.0020
Arsenic (As)-Total (mg/kg)	0.677	3.39	0.996	0.146	0.243
Arsenic (As)-Total (mg/kg wwt)	0.128	1.91	0.194	0.0149 ^{DLHM}	0.0418
Barium (Ba)-Total (mg/kg)	0.054	<0.050	<0.050	<0.10 ^{DLHM}	0.070
Barium (Ba)-Total (mg/kg wwt)	0.010	<0.010	<0.010	<0.010 ^{DLHM}	0.012
Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.020 ^{DLHM}	<0.010
Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020 ^{DLHM}	<0.0020
Bismuth (Bi)-Total (mg/kg)	<0.010	0.011	<0.010	<0.020 ^{DLHM}	<0.010
Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	0.0063	<0.0020	<0.0020 ^{DLHM}	<0.0020
Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<2.0 ^{DLHM}	<1.0
Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20 ^{DLHM}	<0.20
Cadmium (Cd)-Total (mg/kg)	<0.0050	0.376	<0.0050	<0.010 ^{DLHM}	1.72
Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	0.212	<0.0010	<0.0010	0.296
Calcium (Ca)-Total (mg/kg)	447	53	364	508	1150
Calcium (Ca)-Total (mg/kg wwt)	84.2	29.8	70.8	51.7	198
Cesium (Cs)-Total (mg/kg)	0.606	0.0205	0.458	0.238	0.115
Cesium (Cs)-Total (mg/kg wwt)	0.114	0.0116	0.0890	0.0242	0.0198
Chromium (Cr)-Total (mg/kg)	<0.050	<0.050	<0.050	0.72	0.782
Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	0.073	0.135
Cobalt (Co)-Total (mg/kg)	<0.020	0.273	<0.020	0.069	0.111
Cobalt (Co)-Total (mg/kg wwt)	<0.0040	0.154	<0.0040	0.0070	0.0191
Copper (Cu)-Total (mg/kg)	1.10	17.8	1.50	2.83	813
Copper (Cu)-Total (mg/kg wwt)	0.208	10.0	0.291	0.288	140
Iron (Fe)-Total (mg/kg)	14.8	192	20.8	169	4760
Iron (Fe)-Total (mg/kg wwt)	2.78	109	4.05	17.2 ^{DLHM}	819
Lead (Pb)-Total (mg/kg)	0.040	<0.020	<0.020	<0.040 ^{DLHM}	0.031
Lead (Pb)-Total (mg/kg wwt)	0.0076	<0.0040	<0.0040	<0.0040 ^{DLHM}	0.0054
Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<1.0 ^{DLHM}	<0.50
Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
Magnesium (Mg)-Total (mg/kg)	1350	175	1230	1270	751
Magnesium (Mg)-Total (mg/kg wwt)	254	99.0	240	129	129
Manganese (Mn)-Total (mg/kg)	0.669	1.30	0.619	0.46	8.08
Manganese (Mn)-Total (mg/kg wwt)	0.126	0.733	0.120	0.047	1.39

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1527061-7 OTHER 23-SEP-14 12:30 PCC-1(HFGT-2)	L1527061-8 OTHER 23-SEP-14 12:30 PCC-2(HFGT-2)	L1527061-9 OTHER 23-SEP-14 12:30 PCC-3(HFGT-2)	L1527061-10 OTHER 23-SEP-14 12:30 PCC-4(HFGT-2)	L1527061-11 OTHER 23-SEP-14 12:30 PCC-5(HFGT-2)
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	75.0	76.8	77.6	77.1	74.2
Metals	Aluminum (Al)-Total (mg/kg)	4.0	2.9	7.8	3.5	2.3
	Aluminum (Al)-Total (mg/kg wwt)	1.00	0.68	1.74	0.81	0.59
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.275	0.177	0.150	0.177	0.165
	Arsenic (As)-Total (mg/kg wwt)	0.0687	0.0410	0.0336	0.0405	0.0428
	Barium (Ba)-Total (mg/kg)	2.89	3.85	3.64	2.72	2.33
	Barium (Ba)-Total (mg/kg wwt)	0.723	0.893	0.815	0.623	0.601
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	0.0021	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.102	0.0957	0.151	0.114	0.0967
	Cadmium (Cd)-Total (mg/kg wwt)	0.0256	0.0222	0.0339	0.0262	0.0250
	Calcium (Ca)-Total (mg/kg)	35300	43300	43500	47900	33200
	Calcium (Ca)-Total (mg/kg wwt)	8840	10000	9750	11000	8580
	Cesium (Cs)-Total (mg/kg)	0.0704	0.0420	0.0691	0.0893	0.0955
	Cesium (Cs)-Total (mg/kg wwt)	0.0176	0.0097	0.0155	0.0204	0.0247
	Chromium (Cr)-Total (mg/kg)	0.078	0.054	0.051	0.061	0.067
	Chromium (Cr)-Total (mg/kg wwt)	0.020	0.013	0.011	0.014	0.017
	Cobalt (Co)-Total (mg/kg)	0.084	0.109	0.099	0.144	0.112
	Cobalt (Co)-Total (mg/kg wwt)	0.0211	0.0253	0.0222	0.0330	0.0288
	Copper (Cu)-Total (mg/kg)	2.02	2.68	3.03	2.55	2.35
	Copper (Cu)-Total (mg/kg wwt)	0.504	0.621	0.679	0.584	0.609
	Iron (Fe)-Total (mg/kg)	60.2	60.6	63.1	59.1	50.7
	Iron (Fe)-Total (mg/kg wwt)	15.1	14.1	14.1	13.5	13.1
	Lead (Pb)-Total (mg/kg)	<0.020	0.023	0.022	<0.020	<0.020
	Lead (Pb)-Total (mg/kg wwt)	0.0044	0.0054	0.0049	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1510	1810	1820	1810	1460
	Magnesium (Mg)-Total (mg/kg wwt)	379	419	409	415	377
	Manganese (Mn)-Total (mg/kg)	11.0	14.2	14.8	12.1	7.31
	Manganese (Mn)-Total (mg/kg wwt)	2.74	3.29	3.31	2.78	1.89

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	Description	Sampled Date	Sampled Time	Client ID	L1527061-12	L1527061-14	L1527061-15	L1527061-16
					OTHER 29-AUG-14 12:00 MW-1(CPGT-1) FOUND DEAD	OTHER 23-SEP-14 12:00 RSC-2(Q.LAKE FOUND DEAD NEAR HAZ.CR.MOUTH)	OTHER 14-AUG-14 12:00 RSC-3(POLLEY LAKE, FOUND DEAD NEAR QUL- 45)	OTHER 23-SEP-14 11:45 RB-1 QUESNEL LAKE (IMPACTED) TISSUE R
Grouping	Analyte							
TISSUE								
Physical Tests	% Moisture (%)	75.4	75.2	79.9	86.9			
Metals	Aluminum (Al)-Total (mg/kg)	7.5	34.6	46.6	<4.0			DLHM
	Aluminum (Al)-Total (mg/kg wwt)	1.85	8.58	9.39	<0.40			DLHM
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	0.024	<0.020			DLHM
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	0.0049	<0.0020			DLHM
	Arsenic (As)-Total (mg/kg)	0.274	0.245	0.207	0.126			DLHM
	Arsenic (As)-Total (mg/kg wwt)	0.0674	0.0608	0.0417	0.0165			DLHM
	Barium (Ba)-Total (mg/kg)	0.626	2.33	4.18	<0.10			DLHM
	Barium (Ba)-Total (mg/kg wwt)	0.154	0.577	0.841	<0.010			DLHM
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.020			DLHM
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020			DLHM
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.020			DLHM
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020			DLHM
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<2.0			DLHM
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20			DLHM
	Cadmium (Cd)-Total (mg/kg)	0.0695	0.0596	0.0990	<0.010			DLHM
	Cadmium (Cd)-Total (mg/kg wwt)	0.0171	0.0148	0.0199	0.0011			DLHM
	Calcium (Ca)-Total (mg/kg)	16300	22500	49000	898			DLHM
	Calcium (Ca)-Total (mg/kg wwt)	4000	5580	9850	118			DLHM
	Cesium (Cs)-Total (mg/kg)	0.111	0.0697	0.0299	0.185			DLHM
	Cesium (Cs)-Total (mg/kg wwt)	0.0273	0.0173	0.0060	0.0243			DLHM
	Chromium (Cr)-Total (mg/kg)	0.057	<0.050	0.130	0.34			DLHM
	Chromium (Cr)-Total (mg/kg wwt)	0.014	0.011	0.026	0.044			DLHM
	Cobalt (Co)-Total (mg/kg)	0.254	0.084	0.069	0.063			DLHM
	Cobalt (Co)-Total (mg/kg wwt)	0.0623	0.0208	0.0140	0.0082			DLHM
	Copper (Cu)-Total (mg/kg)	4.88	21.7	3.82	2.83			DLHM
	Copper (Cu)-Total (mg/kg wwt)	1.20	5.39	0.769	0.371			DLHM
	Iron (Fe)-Total (mg/kg)	57.3	78.9	95.1	174			DLHM
	Iron (Fe)-Total (mg/kg wwt)	14.1	19.6	19.1	22.9			DLHM
	Lead (Pb)-Total (mg/kg)	<0.020	0.086	0.063	<0.040			DLHM
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	0.0214	0.0126	<0.0040			DLHM
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<1.0			DLHM
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10			DLHM
	Magnesium (Mg)-Total (mg/kg)	1200	1610	1870	982			DLHM
	Magnesium (Mg)-Total (mg/kg wwt)	294	399	377	129			DLHM
	Manganese (Mn)-Total (mg/kg)	4.09	8.46	13.1	0.46			DLHM
	Manganese (Mn)-Total (mg/kg wwt)	1.01	2.10	2.63	0.061			DLHM

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1527061-1 OTHER 23-SEP-14 12:10 BB-1(HFSL-2) LEFT SIDE TISSUE	L1527061-2 OTHER 23-SEP-14 12:10 BB-1(HFSL-2) LEFT SIDE TISSUE(LIVER)	L1527061-3 OTHER 23-SEP-14 12:10 BB-1(HFSL-2) RIGHT SIDE TISSUE	L1527061-5 OTHER 23-SEP-14 11:45 RB-1 QUESNEL LAKE (IMPACTED) TISSUE	L1527061-6 OTHER 23-SEP-14 11:45 RB-1 QUESNEL LAKE (IMPACTED) TISSUE(LIVER)
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	2.78	0.390	2.62	6.43	14.6
	Mercury (Hg)-Total (mg/kg wwt)	0.523	0.220	0.510	0.654	2.51
	Molybdenum (Mo)-Total (mg/kg)	<0.020	0.278	<0.020	<0.040 ^{DLHM}	4.96
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.157	<0.0040	<0.0040	0.854
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.40 ^{DLHM}	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	11300	3500	11200	12500	14600
	Phosphorus (P)-Total (mg/kg wwt)	2130	1980	2170	1270	2520
	Potassium (K)-Total (mg/kg)	21400	3350	20600	18800	11000
	Potassium (K)-Total (mg/kg wwt)	4030	1890	4000	1910	1890
	Rubidium (Rb)-Total (mg/kg)	35.7	4.75	32.3	20.7	12.6
	Rubidium (Rb)-Total (mg/kg wwt)	6.71	2.68	6.28	2.11	2.16
	Selenium (Se)-Total (mg/kg)	2.78	2.29	2.84	3.28	163
	Selenium (Se)-Total (mg/kg wwt)	0.523	1.29	0.552	0.334	28.0
	Sodium (Na)-Total (mg/kg)	2080	1100	2350	17800	11100
	Sodium (Na)-Total (mg/kg wwt)	392	620	458	1810	1920
	Strontium (Sr)-Total (mg/kg)	0.623	0.172	0.529	0.41	0.956
	Strontium (Sr)-Total (mg/kg wwt)	0.117	0.097	0.103	0.042	0.165
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.040 ^{DLHM}	0.362
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	0.0622
	Thallium (Tl)-Total (mg/kg)	0.0096	0.0053	0.0109	0.0310	0.110
	Thallium (Tl)-Total (mg/kg wwt)	0.00180	0.00300	0.00212	0.00315	0.0190
	Tin (Sn)-Total (mg/kg)	0.12	<0.10	0.14	0.24	0.13
	Tin (Sn)-Total (mg/kg wwt)	0.022	0.025	0.027	0.024	0.022
	Uranium (U)-Total (mg/kg)	<0.0020	0.0047	<0.0020	<0.0040 ^{DLHM}	0.0232
	Uranium (U)-Total (mg/kg wwt)	<0.00040	0.00265	<0.00040	<0.00040	0.00399
	Vanadium (V)-Total (mg/kg)	<0.10	0.19	<0.10	<0.20 ^{DLHM}	1.96
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.107	<0.020	<0.020	0.338
	Zinc (Zn)-Total (mg/kg)	22.6	39.8	30.0	63.6	481
	Zinc (Zn)-Total (mg/kg wwt)	4.26	22.5	5.85	6.47	82.8
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.40 ^{DLHM}	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1527061-7 OTHER 23-SEP-14 12:30 PCC-1(HFGT-2)	L1527061-8 OTHER 23-SEP-14 12:30 PCC-2(HFGT-2)	L1527061-9 OTHER 23-SEP-14 12:30 PCC-3(HFGT-2)	L1527061-10 OTHER 23-SEP-14 12:30 PCC-4(HFGT-2)	L1527061-11 OTHER 23-SEP-14 12:30 PCC-5(HFGT-2)
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.335	0.357	0.348	0.294	0.261
	Mercury (Hg)-Total (mg/kg wwt)	0.0837	0.0828	0.0780	0.0672	0.0673
	Molybdenum (Mo)-Total (mg/kg)	0.056	0.073	0.064	0.098	0.056
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0139	0.0170	0.0144	0.0224	0.0145
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	25000	30300	30300	29700	23800
	Phosphorus (P)-Total (mg/kg wwt)	6250	7030	6790	6810	6160
	Potassium (K)-Total (mg/kg)	14200	16000	16200	16200	13800
	Potassium (K)-Total (mg/kg wwt)	3560	3710	3620	3710	3570
	Rubidium (Rb)-Total (mg/kg)	18.1	18.4	21.1	21.4	16.8
	Rubidium (Rb)-Total (mg/kg wwt)	4.54	4.25	4.73	4.89	4.35
	Selenium (Se)-Total (mg/kg)	3.27	3.64	3.99	3.61	2.42
	Selenium (Se)-Total (mg/kg wwt)	0.817	0.843	0.896	0.826	0.626
	Sodium (Na)-Total (mg/kg)	3270	3740	3860	3820	3160
	Sodium (Na)-Total (mg/kg wwt)	816	866	866	875	816
	Strontium (Sr)-Total (mg/kg)	57.2	72.3	78.2	90.1	69.5
	Strontium (Sr)-Total (mg/kg wwt)	14.3	16.8	17.5	20.6	18.0
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0051	0.0106	0.0173	0.0157	0.0143
	Thallium (Tl)-Total (mg/kg wwt)	0.00128	0.00246	0.00389	0.00361	0.00370
	Tin (Sn)-Total (mg/kg)	<0.10	0.15	0.16	0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	0.035	0.036	0.024	0.025
	Uranium (U)-Total (mg/kg)	0.0083	0.0132	0.0117	0.0102	0.0079
	Uranium (U)-Total (mg/kg wwt)	0.00206	0.00307	0.00262	0.00234	0.00204
	Vanadium (V)-Total (mg/kg)	0.34	0.43	0.29	0.26	0.30
	Vanadium (V)-Total (mg/kg wwt)	0.086	0.101	0.066	0.059	0.077
	Zinc (Zn)-Total (mg/kg)	98.8	113	138	120	104
	Zinc (Zn)-Total (mg/kg wwt)	24.7	26.3	31.0	27.5	26.9
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1527061-12	L1527061-14	L1527061-15	L1527061-16
		Description	OTHER	OTHER	OTHER	OTHER
		Sampled Date	29-AUG-14	23-SEP-14	14-AUG-14	23-SEP-14
		Sampled Time	12:00	12:00	12:00	11:45
		Client ID	MW-1(CPGT-1) FOUND DEAD	RSC-2(Q.LAKE FOUND DEAD NEAR HAZ.CR.MOUTH)	RSC-3(POLLEY LAKE, FOUND DEAD NEAR QUL- 45)	RB-1 QUESNEL LAKE (IMPACTED) TISSUE R
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)		0.240	0.274	0.392	5.37
	Mercury (Hg)-Total (mg/kg wwt)		0.0590	0.0679	0.0789	0.704
	Molybdenum (Mo)-Total (mg/kg)		0.020	0.049	0.048	<0.040 ^{DLHM}
	Molybdenum (Mo)-Total (mg/kg wwt)		0.0049	0.0121	0.0097	0.0042
	Nickel (Ni)-Total (mg/kg)		<0.20	<0.20	0.22	<0.40 ^{DLHM}
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	0.044	<0.040
	Phosphorus (P)-Total (mg/kg)		16600	19200	28600	10800
	Phosphorus (P)-Total (mg/kg wwt)		4070	4770	5760	1420
	Potassium (K)-Total (mg/kg)		14800	13800	5480	15200
	Potassium (K)-Total (mg/kg wwt)		3630	3410	1100	2000
	Rubidium (Rb)-Total (mg/kg)		16.1	21.2	8.05	16.5
	Rubidium (Rb)-Total (mg/kg wwt)		3.94	5.26	1.62	2.16
	Selenium (Se)-Total (mg/kg)		2.85	2.23	1.96	3.06
	Selenium (Se)-Total (mg/kg wwt)		0.700	0.552	0.395	0.402
	Sodium (Na)-Total (mg/kg)		3380	4620	2600	13400
	Sodium (Na)-Total (mg/kg wwt)		829	1150	523	1770
	Strontium (Sr)-Total (mg/kg)		24.5	47.0	85.5	0.83
	Strontium (Sr)-Total (mg/kg wwt)		6.03	11.7	17.2	0.109
	Tellurium (Te)-Total (mg/kg)		<0.020	<0.020	<0.020	<0.040 ^{DLHM}
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)		0.0154	0.0105	0.0068	0.0271
	Thallium (Tl)-Total (mg/kg wwt)		0.00379	0.00260	0.00136	0.00355
	Tin (Sn)-Total (mg/kg)		<0.10	0.20	0.23	0.28
	Tin (Sn)-Total (mg/kg wwt)		<0.020	0.050	0.047	0.037
	Uranium (U)-Total (mg/kg)		0.0112	0.0029	0.0139	<0.0040 ^{DLHM}
	Uranium (U)-Total (mg/kg wwt)		0.00276	0.00072	0.00280	<0.00040 ^{DLHM}
	Vanadium (V)-Total (mg/kg)		0.35	0.22	0.21	<0.20 ^{DLHM}
	Vanadium (V)-Total (mg/kg wwt)		0.085	0.056	0.043	<0.020
	Zinc (Zn)-Total (mg/kg)		87.6	110	99.2	59.4
	Zinc (Zn)-Total (mg/kg wwt)		21.5	27.3	20.0	7.79
	Zirconium (Zr)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.40 ^{DLHM}
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHM	Detection Limit Adjusted: Sample has High Moisture Content

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1991). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7. This digestion procedure was implemented on October 5, 2009.</p> <p>This analysis is not compliant with the requirements of the B.C. Lab Manual for digestion of tissue samples from British Columbia for metals analysis after January 1, 2015.</p>			
HG-WET-CVAFS-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1991). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7. This digestion procedure was implemented on October 5, 2009.</p> <p>This analysis is not compliant with the requirements of the B.C. Lab Manual for digestion of tissue samples from British Columbia for metals analysis after January 1, 2015.</p>			
MET-DRY-CCMS-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1991). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p> <p>This analysis is not compliant with the requirements of the B.C. Lab Manual for digestion of tissue samples from British Columbia for metals analysis after January 1, 2015.</p>			
MET-WET-CCMS-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1991). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p> <p>This analysis is not compliant with the requirements of the B.C. Lab Manual for digestion of tissue samples from British Columbia for metals analysis after January 1, 2015.</p>			
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
<p>This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
Chain of Custody Numbers:	

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



L1527061-COFC

Chain of Custody / Analytical Request Form
 Canada Toll Free: 1 800 668 9878
 www.alsglobal.com

COC # Ques Lk HFSL-2/HFGT-2

+ DEAD FISH

Page 1 of 1

Report To	Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company: Mount Polley Mining Corp.	<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)
Contact: C.Bettles, Natalie Neufeld, Laura McOrmond, Lee Nikl	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address: PO Box 12, Likely, BC V0L 1N0	Email 1: Natalie.Neufeld@snclayalin.com	<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
Vancouver, BC V6C 3B6	Email 2: Cory.Bettles@snclayalin.com	<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone: 2507902215x2560 Fax:	Email 3: ckoenig@redchrimine.ca	

Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Client / Project Information	Analysis Request				
Hardcopy of Report? <input type="checkbox"/> Yes <input type="checkbox"/> No	Job #:	Please indicate below Filtered, Preserved or both (F, P, F/P)				
Company:	PO / AFE:	Whole body metals	Tissue(METALS)			
Contact:	LSD:			% Moisture content	Liver(METALS)	
Address:	Quote #:					Number of Containers
Phone:	ALS Contact: Can Dang					
Lab (lab use only)	Sampler: C. Koenig					

Short Holding Time
Rush Processing

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	Whole body metals	Tissue(METALS)	% Moisture content	Liver(METALS)	Number of Containers
BB-1	(site name HFSL-2) Left side tissue	23-09-14	12:10	Other		X		X	
BB-1	(site name HFSL-2) Right side tissue	23-09-14	12:10	Other		X		X	
RB-1	(floating dead kelt rainbow trout) Quesnel Lake(impacted)	23-09-14	11:45	Other		X		X	
PCC-1	(site name HFGT-2)	23-09-14	12:30	Other	X		X		
PCC-2	(site name HFGT-2)	23-09-14	12:30	Other	X		X		
PCC-3	(site name HFGT-2)	23-09-14	12:30	Other	X		X		
PCC-4	(site name HFGT-2)	23-09-14	12:30	Other	X		X		
PCC-5	(site name HFGT-2)	23-09-14	12:30	Other	X		X		
MW-1	(COFT-1) found dead	29-08-14	12:00	Other	X		X		
RSC-1	(POLEY LAKE, Sinking Net, P4)	25-09-14	16:00	Other	X		X		
RSC-2	(Q Lake found dead near HA2 w. mouth)	23-08-14	12:00	Other	X		X		
RSC-3	(Polley Lake found dead near PUL-45)	14-08-14	12:00	Other	X		X		

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

*Please add site names abbreviations (Horsefly Set Line-2((HFSL-2)), as un-impacted), and (Horsefly Gee Trap-2((HFGT-2)) as un-impacted)
 Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
 By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
 Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:
C. Koenig	Sep 30/14	17:00	JN	Oct 2	16:50	1 °C				Yes / No ? If Yes add SIF



Sample Receipt Confirmation

14 Samples received at ALS in VANCOUVER

Job Reference #: N/A

Project PO #: N/A

Legal Site Description: N/A

Quote #: N/A

Lab Work Order #: L1527061

Estimated Completion Date: 11/17/2014

Date Sampled: 8/14/2014

Date Received: 10/2/2014

Sampled By: C KOENIG

Chain of Custody: N/A

Account Manager: Can Dang

Estimated Sample Disposal Date: See Sample Disposal Information section below.

Sample Integrity Observations:

Observation	Details
Samples listed on COC but not received	SAMPLE #4 AND 13 WERE NOT RECEIVED.
Extra samples/bottles received but not listed on COC	RECEIVED A SAMPLE LABELED "RB-1 QUESNEL LAKE (IMPACTED) TISSUE R" ADDED AS SAMPLE #16

Report Distribution:

Company Name: MOUNT POLLEY MINING CORP.

Contact: Colleen Hughes

Address: PO Box 12

Likely, BC V0L 1N0

Phone: 250-790-2215

Fax: 250-790-2268

Email: chughes@mountpolley.com
natalie.neufeld@snclavalin.com
ckoenig@redchrismine.ca
mia.sakelariou@snclavalin.com
kmcmahe@mountpolley.com

EDD Email: chughes@mountpolley.com
natalie.neufeld@snclavalin.com
ckoenig@redchrismine.ca
mia.sakelariou@snclavalin.com
kmcmahe@mountpolley.com

Distribution: Hard Copy: N Email: Y Fax: N

EDD: Y

Invoice Distribution:

Acct Name: MOUNT POLLEY MINING CORP. ~LIKELY

Contact: Accounts Payable

Address: PO Box 12,

Likely, BC, V0L 1N0

Phone: 250-790-2215

Fax: --

Invoice Email: prosette@mountpolley.com
chughes@mountpolley.com

Project #: N/A

Account #: MPM100

Distribution: Hard Copy: Y Email: Y



Sample Receipt Confirmation

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type
L1527061-1	BB-1(HFSL-2) LEFT SIDE TISSUE	9/23/2014 12:10 PM	10/2/2014 10:50 AM	11/17/2014 5:00 PM		OTHER
L1527061-2	BB-1(HFSL-2) LEFT SIDE TISSUE(LIVER)	9/23/2014 12:10 PM	10/2/2014 10:50 AM	11/17/2014 5:00 PM		OTHER
L1527061-3	BB-1(HFSL-2) RIGHT SIDE TISSUE	9/23/2014 12:10 PM	10/2/2014 10:50 AM	11/17/2014 5:00 PM		OTHER
L1527061-5	RB-1 QUESNEL LAKE (IMPACTED) TISSUE	9/23/2014 11:45 AM	10/2/2014 10:50 AM	11/17/2014 5:00 PM		OTHER
L1527061-6	RB-1 QUESNEL LAKE (IMPACTED) TISSUE(LIVER)	9/23/2014 11:45 AM	10/2/2014 10:50 AM	11/17/2014 5:00 PM		OTHER
L1527061-7	PCC-1(HFGT-2)	9/23/2014 12:30 PM	10/2/2014 10:50 AM	11/17/2014 5:00 PM		OTHER
L1527061-8	PCC-2(HFGT-2)	9/23/2014 12:30 PM	10/2/2014 10:50 AM	11/17/2014 5:00 PM		OTHER
L1527061-9	PCC-3(HFGT-2)	9/23/2014 12:30 PM	10/2/2014 10:50 AM	11/17/2014 5:00 PM		OTHER
L1527061-10	PCC-4(HFGT-2)	9/23/2014 12:30 PM	10/2/2014 10:50 AM	11/17/2014 5:00 PM		OTHER
L1527061-11	PCC-5(HFGT-2)	9/23/2014 12:30 PM	10/2/2014 10:50 AM	11/17/2014 5:00 PM		OTHER
L1527061-12	MW-1(CPGT-1) FOUND DEAD	8/29/2014 12:00 PM	10/2/2014 10:50 AM	11/17/2014 5:00 PM		OTHER
L1527061-14	RSC-2(Q.LAKE FOUND DEAD NEAR HAZ.CR.MOUTH)	9/23/2014 12:00 PM	10/2/2014 10:50 AM	11/17/2014 5:00 PM		OTHER
L1527061-15	RSC-3(POLLEY LAKE, FOUND DEAD NEAR QUL-45)	8/14/2014 12:00 PM	10/2/2014 10:50 AM	11/17/2014 5:00 PM		OTHER
L1527061-16	RB-1 QUESNEL LAKE (IMPACTED) TISSUE R	9/23/2014 11:45 AM	10/2/2014 10:50 AM	11/17/2014 5:00 PM		OTHER



Sample Receipt Confirmation

Analysis Requested:

	Sample Handling and Disposal Fee	Mercury in Tissue by CVAFS (DRY)	Mercury in Tissue by CVAFS (WET)	Metals in Tissue by CRC ICPMS (DRY)	Metals in Tissue by CRC ICPMS (WET)	% Moisture in Tissues	Tissue/Vegetation Sample Preparation
BB-1(HFSL-2) LEFT SIDE TISSUE	X	X	X	X	X	X	X
BB-1(HFSL-2) LEFT SIDE TISSUE(LIVER)	X	X	X	X	X	X	X
BB-1(HFSL-2) RIGHT SIDE TISSUE	X	X	X	X	X	X	X
RB-1 QUESNEL LAKE (IMPACTED) TISSUE	X	X	X	X	X	X	X
RB-1 QUESNEL LAKE (IMPACTED) TISSUE (LIVER)	X	X	X	X	X	X	X
PCC-1(HFGT-2)	X	X	X	X	X	X	X
PCC-2(HFGT-2)	X	X	X	X	X	X	X
PCC-3(HFGT-2)	X	X	X	X	X	X	X
PCC-4(HFGT-2)	X	X	X	X	X	X	X
PCC-5(HFGT-2)	X	X	X	X	X	X	X
MW-1(CPGT-1) FOUND DEAD	X	X	X	X	X	X	X
RSC-2(Q.LAKE FOUND DEAD NEAR HAZ.CR.MOUTH)	X	X	X	X	X	X	X
RSC-3(POLLEY LAKE, FOUND DEAD NEAR QUL-45)	X	X	X	X	X	X	X
RB-1 QUESNEL LAKE (IMPACTED) TISSUE R	X	X	X	X	X	X	X



Sample Receipt Confirmation

Sample Disposal Information:

Where possible, ALS will store samples for 30 days from the date a final report is issued, or 30 days from the date samples are placed on hold without analytical requests, after which samples may be discarded. Air samples collected on re-usable media are an exception, and are stored for 7 days from the date a final report is issued. Longer storage times are available upon request.

For information about ALS accreditations and certifications please contact your Account Manager or visit our webpage at www.alsglobal.com (see Canada downloads).

ALS Group strives to deliver on-time results to our clients at all times. However, there are times when due to capacity issues or other unforeseen circumstances we are unable to meet our expected turnaround times. The information above is related to a recent workorder you have submitted to our laboratory. In the event that you have an inquiry, please refer to the Lab Work Order # L1527061 when calling your Account Manager.

ALS Group appreciates your business. Thank you for the opportunity to work with you.



L1527061-COFC

Chain of Custody / Analytical Request Form
 Canada Toll Free: 1 800 668 9878
 www.alsglobal.com

COC # Ques Lk HFSL-2/HFGT-2

+DEAD FISH

Page 1 of 1

Report To	Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company: Mount Polley Mining Corp.	<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)
Contact: C.Bettles, Natalie Neufeld, Laura McOrmond, Lee Nikl	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address: PO Box 12, Likely, BC V0L 1N0	Email 1: Natalie.Neufeld@snclayalin.com	<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
Vancouver, BC V6C 3B6	Email 2: Cory.Bettles@snclayalin.com	<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone: 2507902215x2560 Fax:	Email 3: ckoenig@redchrimine.ca	

Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Client / Project Information	Analysis Request				
Hardcopy of Report? <input type="checkbox"/> Yes <input type="checkbox"/> No	Job #:	Please indicate below Filtered, Preserved or both (F, P, F/P)				
Company:	PO / AFE:	Whole body metals	Tissue(METALS)			
Contact:	LSD:			% Moisture content	Liver(METALS)	
Address:	Quote #:					Number of Containers
Phone:	ALS Contact: Can Dang					
Lab (lab use only)	Sampler: C. Koenig					

Short Holding Time
Rush Processing

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	Whole body metals	Tissue(METALS)	% Moisture content	Liver(METALS)	Number of Containers
BB-1	(site name HFSL-2) Left side tissue	23-09-14	12:10	Other		X		X	
BB-1	(site name HFSL-2) Right side tissue	23-09-14	12:10	Other		X		X	
RB-1	(floating dead kelt rainbow trout) Quesnel Lake(impacted)	23-09-14	11:45	Other		X		X	
PCC-1	(site name HFGT-2)	23-09-14	12:30	Other	X		X		
PCC-2	(site name HFGT-2)	23-09-14	12:30	Other	X		X		
PCC-3	(site name HFGT-2)	23-09-14	12:30	Other	X		X		
PCC-4	(site name HFGT-2)	23-09-14	12:30	Other	X		X		
PCC-5	(site name HFGT-2)	23-09-14	12:30	Other	X		X		
MW-1	(COFT-1) found dead	29-08-14	12:00	Other	X		X		
RSC-1	(POLEY LAKE, Sinking Net, P4)	25-09-14	16:00	Other	X		X		
RSC-2	(Q. Lake found dead near HA2 w. mouth)	23-08-14	12:00	Other	X		X		
RSC-3	(Polley Lake found dead near PUL-45)	14-08-14	12:00	Other	X		X		

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

*Please add site names abbreviations (Horsefly Set Line-2((HFSL-2)), as un-impacted), and (Horsefly Gee Trap-2((HFGT-2)) as un-impacted)
 Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
 By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
 Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:
C. Koenig	Sep 30/14	17:00	JN	Oct 2	16:50	1 °C				Yes / No ? If Yes add SIF



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC V0L 1N0

Date Received: 02-OCT-14
Report Date: 17-NOV-14 12:57 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1527078
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: Q LK CPGN-1 PCC-1-12
Legal Site Desc:

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1527078-1 Other 23-SEP-14 12:30 PCC-1 (CPGN-1)	L1527078-2 Other 23-SEP-14 12:30 PCC-2 (CPGN-1)	L1527078-3 Other 23-SEP-14 12:30 PCC-3 (CPGN-1)	L1527078-4 Other 23-SEP-14 12:30 PCC-4 (CPGN-1)	L1527078-5 Other 23-SEP-14 12:30 PCC-5 (CPGN-1)
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	77.1	73.7	75.6	74.4	77.9
Metals	Aluminum (Al)-Total (mg/kg)	141	92.7	17.1	68.2	81.1
	Aluminum (Al)-Total (mg/kg wwt)	32.2	24.4	4.16	17.5	17.9
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.296	0.276	0.269	0.232	0.276
	Arsenic (As)-Total (mg/kg wwt)	0.0679	0.0726	0.0657	0.0595	0.0609
	Barium (Ba)-Total (mg/kg)	3.45	1.95	1.47	2.23	3.08
	Barium (Ba)-Total (mg/kg wwt)	0.790	0.514	0.358	0.571	0.681
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.153	0.139	0.145	0.137	0.135
	Cadmium (Cd)-Total (mg/kg wwt)	0.0350	0.0365	0.0354	0.0351	0.0299
	Calcium (Ca)-Total (mg/kg)	37700	17000	19900	28100	45200
	Calcium (Ca)-Total (mg/kg wwt)	8640	4480	4850	7190	9980
	Cesium (Cs)-Total (mg/kg)	0.0933	0.0824	0.0759	0.0966	0.0741
	Cesium (Cs)-Total (mg/kg wwt)	0.0214	0.0217	0.0185	0.0248	0.0164
	Chromium (Cr)-Total (mg/kg)	1.57	0.848	0.466	0.892	1.19
	Chromium (Cr)-Total (mg/kg wwt)	0.360	0.223	0.114	0.229	0.263
	Cobalt (Co)-Total (mg/kg)	0.235	0.176	0.089	0.149	0.154
	Cobalt (Co)-Total (mg/kg wwt)	0.0539	0.0463	0.0217	0.0383	0.0340
	Copper (Cu)-Total (mg/kg)	3.54	2.55	2.68	2.99	3.02
	Copper (Cu)-Total (mg/kg wwt)	0.810	0.671	0.655	0.766	0.668
	Iron (Fe)-Total (mg/kg)	327	219	79.0	141	176
	Iron (Fe)-Total (mg/kg wwt)	75.0	57.6	19.3	36.1	38.9
	Lead (Pb)-Total (mg/kg)	0.049	0.037	<0.020	0.127	0.036
	Lead (Pb)-Total (mg/kg wwt)	0.0112	0.0098	<0.0040	0.0325	0.0079
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1700	1130	1320	1310	1700
	Magnesium (Mg)-Total (mg/kg wwt)	390	297	323	336	376
	Manganese (Mn)-Total (mg/kg)	12.9	8.29	4.39	8.69	10.1
	Manganese (Mn)-Total (mg/kg wwt)	2.96	2.18	1.07	2.23	2.23

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Sample ID Description Sampled Date Sampled Time Client ID		L1527078-6 Other 23-SEP-14 12:30 PCC-6 (CPGN-1)	L1527078-7 Other 23-SEP-14 12:30 PCC-7 (CPGN-1)	L1527078-8 Other 23-SEP-14 12:30 PCC-8 (CPGN-1)	L1527078-9 Other 23-SEP-14 12:30 PCC-9 (CPGN-1)	L1527078-10 Other 23-SEP-14 12:30 PCC-10 (CPGN-1)
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	75.6	76.3	75.6	75.6	76.3
Metals	Aluminum (Al)-Total (mg/kg)	20.4	46.0	17.8	204	160
	Aluminum (Al)-Total (mg/kg wwt)	4.99	10.9	4.34	49.8	38.0
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.195	0.270	0.348	0.293	0.285
	Arsenic (As)-Total (mg/kg wwt)	0.0476	0.0640	0.0850	0.0716	0.0675
	Barium (Ba)-Total (mg/kg)	1.48	2.27	1.56	4.07	2.76
	Barium (Ba)-Total (mg/kg wwt)	0.362	0.538	0.381	0.993	0.654
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.0775	0.105	0.108	0.124	0.104
	Cadmium (Cd)-Total (mg/kg wwt)	0.0189	0.0249	0.0263	0.0303	0.0246
	Calcium (Ca)-Total (mg/kg)	21500	33800	19100	44400	22600
	Calcium (Ca)-Total (mg/kg wwt)	5250	8000	4670	10800	5350
	Cesium (Cs)-Total (mg/kg)	0.0846	0.101	0.0767	0.0647	0.0917
	Cesium (Cs)-Total (mg/kg wwt)	0.0207	0.0238	0.0187	0.0158	0.0217
	Chromium (Cr)-Total (mg/kg)	0.443	0.544	0.674	1.93	1.66
	Chromium (Cr)-Total (mg/kg wwt)	0.108	0.129	0.165	0.472	0.392
	Cobalt (Co)-Total (mg/kg)	0.071	0.120	0.134	0.282	0.230
	Cobalt (Co)-Total (mg/kg wwt)	0.0174	0.0285	0.0328	0.0688	0.0545
	Copper (Cu)-Total (mg/kg)	2.06	2.47	2.40	3.24	2.73
	Copper (Cu)-Total (mg/kg wwt)	0.504	0.585	0.587	0.792	0.646
	Iron (Fe)-Total (mg/kg)	68.9	95.6	75.1	374	264
	Iron (Fe)-Total (mg/kg wwt)	16.9	22.7	18.4	91.2	62.5
	Lead (Pb)-Total (mg/kg)	<0.020	0.026	<0.020	0.064	0.068
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	0.0062	<0.0040	0.0157	0.0162
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1270	1540	1250	1740	1310
	Magnesium (Mg)-Total (mg/kg wwt)	311	366	307	426	310
	Manganese (Mn)-Total (mg/kg)	5.63	9.10	6.06	18.8	10.8
	Manganese (Mn)-Total (mg/kg wwt)	1.38	2.16	1.48	4.59	2.57

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Sample ID Description Sampled Date Sampled Time Client ID	L1527078-11 Other 23-SEP-14 12:30 PCC-11 (CPGN-1)	L1527078-12 Other 23-SEP-14 12:30 PCC-12 (CPGN-1)			
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)	76.4	75.5		
Metals	Aluminum (Al)-Total (mg/kg)	64.1	10.3		
	Aluminum (Al)-Total (mg/kg wwt)	15.1	2.54		
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010		
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020		
	Arsenic (As)-Total (mg/kg)	0.217	0.295		
	Arsenic (As)-Total (mg/kg wwt)	0.0512	0.0723		
	Barium (Ba)-Total (mg/kg)	2.02	1.28		
	Barium (Ba)-Total (mg/kg wwt)	0.478	0.314		
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010		
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020		
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010		
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020		
	Boron (B)-Total (mg/kg)	<1.0	<1.0		
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20		
	Cadmium (Cd)-Total (mg/kg)	0.113	0.143		
	Cadmium (Cd)-Total (mg/kg wwt)	0.0266	0.0352		
	Calcium (Ca)-Total (mg/kg)	35900	23100		
	Calcium (Ca)-Total (mg/kg wwt)	8490	5660		
	Cesium (Cs)-Total (mg/kg)	0.0844	0.0782		
	Cesium (Cs)-Total (mg/kg wwt)	0.0199	0.0192		
	Chromium (Cr)-Total (mg/kg)	0.647	0.217		
	Chromium (Cr)-Total (mg/kg wwt)	0.153	0.053		
	Cobalt (Co)-Total (mg/kg)	0.121	0.080		
	Cobalt (Co)-Total (mg/kg wwt)	0.0285	0.0196		
	Copper (Cu)-Total (mg/kg)	3.25	1.82		
	Copper (Cu)-Total (mg/kg wwt)	0.767	0.446		
	Iron (Fe)-Total (mg/kg)	143	65.9		
	Iron (Fe)-Total (mg/kg wwt)	33.7	16.1		
	Lead (Pb)-Total (mg/kg)	0.035	<0.020		
	Lead (Pb)-Total (mg/kg wwt)	0.0084	0.0042		
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50		
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10		
	Magnesium (Mg)-Total (mg/kg)	1440	1080		
	Magnesium (Mg)-Total (mg/kg wwt)	340	264		
	Manganese (Mn)-Total (mg/kg)	8.00	4.18		
	Manganese (Mn)-Total (mg/kg wwt)	1.89	1.02		

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		Sample ID Description Sampled Date Sampled Time Client ID	L1527078-1 Other 23-SEP-14 12:30 PCC-1 (CPGN-1)	L1527078-2 Other 23-SEP-14 12:30 PCC-2 (CPGN-1)	L1527078-3 Other 23-SEP-14 12:30 PCC-3 (CPGN-1)	L1527078-4 Other 23-SEP-14 12:30 PCC-4 (CPGN-1)	L1527078-5 Other 23-SEP-14 12:30 PCC-5 (CPGN-1)
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)	0.468	0.431	0.433	0.528	0.373	
	Mercury (Hg)-Total (mg/kg wwt)	0.107	0.113	0.106	0.135	0.0824	
	Molybdenum (Mo)-Total (mg/kg)	0.214	0.124	0.091	0.126	0.158	
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0490	0.0327	0.0223	0.0322	0.0348	
	Nickel (Ni)-Total (mg/kg)	1.02	0.56	0.29	0.55	0.68	
	Nickel (Ni)-Total (mg/kg wwt)	0.234	0.148	0.071	0.140	0.151	
	Phosphorus (P)-Total (mg/kg)	26800	15100	19400	19800	29800	
	Phosphorus (P)-Total (mg/kg wwt)	6130	3980	4730	5070	6590	
	Potassium (K)-Total (mg/kg)	14900	11500	13400	12500	13600	
	Potassium (K)-Total (mg/kg wwt)	3410	3020	3270	3200	2990	
	Rubidium (Rb)-Total (mg/kg)	16.4	14.6	17.2	14.6	15.9	
	Rubidium (Rb)-Total (mg/kg wwt)	3.75	3.85	4.19	3.73	3.52	
	Selenium (Se)-Total (mg/kg)	3.70	1.90	3.12	1.97	3.50	
	Selenium (Se)-Total (mg/kg wwt)	0.847	0.499	0.762	0.504	0.772	
	Sodium (Na)-Total (mg/kg)	3460	2470	2700	2780	3130	
	Sodium (Na)-Total (mg/kg wwt)	793	648	658	714	692	
	Strontium (Sr)-Total (mg/kg)	71.4	35.6	35.8	60.6	89.0	
	Strontium (Sr)-Total (mg/kg wwt)	16.4	9.36	8.75	15.5	19.7	
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg)	0.0084	0.0075	0.0075	0.0078	0.0079	
	Thallium (Tl)-Total (mg/kg wwt)	0.00193	0.00197	0.00182	0.00199	0.00175	
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Uranium (U)-Total (mg/kg)	0.0274	0.0124	0.0057	0.0185	0.0191	
	Uranium (U)-Total (mg/kg wwt)	0.00628	0.00326	0.00138	0.00474	0.00422	
	Vanadium (V)-Total (mg/kg)	0.80	0.46	<0.10	0.26	0.40	
	Vanadium (V)-Total (mg/kg wwt)	0.184	0.120	<0.020	0.068	0.088	
	Zinc (Zn)-Total (mg/kg)	107	88.7	105	98.4	88.5	
	Zinc (Zn)-Total (mg/kg wwt)	24.6	23.3	25.6	25.2	19.6	
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	

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		Sample ID Description Sampled Date Sampled Time Client ID	L1527078-6 Other 23-SEP-14 12:30 PCC-6 (CPGN-1)	L1527078-7 Other 23-SEP-14 12:30 PCC-7 (CPGN-1)	L1527078-8 Other 23-SEP-14 12:30 PCC-8 (CPGN-1)	L1527078-9 Other 23-SEP-14 12:30 PCC-9 (CPGN-1)	L1527078-10 Other 23-SEP-14 12:30 PCC-10 (CPGN-1)
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)	0.445	0.437	0.434	0.287	0.394	
	Mercury (Hg)-Total (mg/kg wwt)	0.109	0.104	0.106	0.0702	0.0933	
	Molybdenum (Mo)-Total (mg/kg)	0.090	0.098	0.118	0.210	0.208	
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0221	0.0233	0.0290	0.0513	0.0494	
	Nickel (Ni)-Total (mg/kg)	0.26	0.31	0.44	1.09	1.11	
	Nickel (Ni)-Total (mg/kg wwt)	0.064	0.073	0.107	0.266	0.263	
	Phosphorus (P)-Total (mg/kg)	18700	25200	16900	31900	18900	
	Phosphorus (P)-Total (mg/kg wwt)	4560	5960	4140	7780	4480	
	Potassium (K)-Total (mg/kg)	12400	13500	13000	13000	13200	
	Potassium (K)-Total (mg/kg wwt)	3040	3210	3180	3170	3130	
	Rubidium (Rb)-Total (mg/kg)	15.1	16.2	17.3	12.7	14.6	
	Rubidium (Rb)-Total (mg/kg wwt)	3.69	3.84	4.23	3.10	3.47	
	Selenium (Se)-Total (mg/kg)	1.62	2.01	2.62	3.30	2.53	
	Selenium (Se)-Total (mg/kg wwt)	0.395	0.476	0.641	0.806	0.599	
	Sodium (Na)-Total (mg/kg)	2330	2690	2410	2500	2760	
	Sodium (Na)-Total (mg/kg wwt)	570	637	590	611	653	
	Strontium (Sr)-Total (mg/kg)	48.4	73.0	37.0	78.2	44.3	
	Strontium (Sr)-Total (mg/kg wwt)	11.8	17.3	9.03	19.1	10.5	
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg)	0.0073	0.0091	0.0093	0.0115	0.0084	
	Thallium (Tl)-Total (mg/kg wwt)	0.00179	0.00216	0.00228	0.00281	0.00199	
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	0.022	
	Uranium (U)-Total (mg/kg)	0.0068	0.0155	0.0055	0.0273	0.0155	
	Uranium (U)-Total (mg/kg wwt)	0.00166	0.00368	0.00134	0.00668	0.00368	
	Vanadium (V)-Total (mg/kg)	<0.10	0.26	<0.10	1.03	0.62	
	Vanadium (V)-Total (mg/kg wwt)	0.021	0.060	0.020	0.252	0.146	
	Zinc (Zn)-Total (mg/kg)	81.9	105	81.5	92.1	86.6	
	Zinc (Zn)-Total (mg/kg wwt)	20.0	24.9	19.9	22.5	20.5	
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	

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	Sample ID Description Sampled Date Sampled Time Client ID	L1527078-11 Other 23-SEP-14 12:30 PCC-11 (CPGN-1)	L1527078-12 Other 23-SEP-14 12:30 PCC-12 (CPGN-1)		
Grouping	Analyte				
TISSUE					
Metals	Mercury (Hg)-Total (mg/kg)	0.427	0.376		
	Mercury (Hg)-Total (mg/kg wwt)	0.101	0.0922		
	Molybdenum (Mo)-Total (mg/kg)	0.109	0.061		
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0257	0.0148		
	Nickel (Ni)-Total (mg/kg)	0.42	<0.20		
	Nickel (Ni)-Total (mg/kg wwt)	0.100	<0.040		
	Phosphorus (P)-Total (mg/kg)	24900	17500		
	Phosphorus (P)-Total (mg/kg wwt)	5880	4280		
	Potassium (K)-Total (mg/kg)	12100	10200		
	Potassium (K)-Total (mg/kg wwt)	2870	2500		
	Rubidium (Rb)-Total (mg/kg)	15.1	14.8		
	Rubidium (Rb)-Total (mg/kg wwt)	3.56	3.62		
	Selenium (Se)-Total (mg/kg)	2.20	2.61		
	Selenium (Se)-Total (mg/kg wwt)	0.519	0.640		
	Sodium (Na)-Total (mg/kg)	2660	2020		
	Sodium (Na)-Total (mg/kg wwt)	627	495		
	Strontium (Sr)-Total (mg/kg)	76.8	42.9		
	Strontium (Sr)-Total (mg/kg wwt)	18.1	10.5		
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020		
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040		
	Thallium (Tl)-Total (mg/kg)	0.0062	0.0075		
	Thallium (Tl)-Total (mg/kg wwt)	0.00147	0.00185		
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10		
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020		
	Uranium (U)-Total (mg/kg)	0.0142	0.0064		
	Uranium (U)-Total (mg/kg wwt)	0.00336	0.00157		
	Vanadium (V)-Total (mg/kg)	0.38	<0.10		
	Vanadium (V)-Total (mg/kg wwt)	0.089	0.023		
	Zinc (Zn)-Total (mg/kg)	93.5	76.4		
	Zinc (Zn)-Total (mg/kg wwt)	22.1	18.7		
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20		
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040		

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7. This digestion procedure was implemented on October 5, 2009.</p>			
HG-WET-CVAFS-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7. This digestion procedure was implemented on October 5, 2009.</p>			
MET-DRY-CCMS-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p>			
<p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-CCMS-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p>			
<p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
<p>This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Q LK CPGN-1 PCC-1-12

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.


D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Report To			Report Format / Distribution			Service Requested (Rush for routine analysis subject to availability)							
Company: Mount Polley Mining Corp.			<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)							
Contact: C.Bettles, Natalie Neufeld, Laura McOrmond, Lee Niki			<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT							
Address: PO Box 12, Likely, BC V0L 1N0			Email 1: Natalie.Neufeld@snclavalin.com			<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT							
Vancouver, BC V6C 3B6			Email 2: Cory.Bettles@snclavalin.com			<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT							
Phone: 2507902216x2560 Fax:			Email 3: ckoenig@redchrysmine.ca			Analysis Request							
Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			Client / Project Information			Please indicate below Filtered, Preserved or both (F, P, F/P)							
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No			Job #:										
Company:			PO / AFE:			Whole body metals Tissue(METALS) % Moisture content Number of Containers							
Contact:			LSD:										
Address:			Quote #:										
Phone:			ALS Contact: Can Dang Sampler: C. Koenig										
 Lab Work (lab use) L1527078-COFC													
Sample #			Sample Identification (This description will appear on the report)			Date (dd-mmm-yy)		Time (hh:mm)		Sample Type			
PCC-1			[Redacted]			23-09-14		12:30		Other		X X	
PCC-2			[Redacted]			23-09-14		12:30		Other		X X	
PCC-3			[Redacted]			23-09-14		12:30		Other		X X	
PCC-4			[Redacted]			23-09-14		12:30		Other		X X	
PCC-5			[Redacted]			23-09-14		12:30		Other		X X	
PCC-6			[Redacted]			23-09-14		12:30		Other		X X	
PCC-7			[Redacted]			23-09-14		12:30		Other		X X	
PCC-8			[Redacted]			23-09-14		12:30		Other		X X	
PCC-9			[Redacted]			23-09-14		12:30		Other		X X	
PCC-10			[Redacted]			23-09-14		12:30		Other		X X	
PCC-11			[Redacted]			23-09-14		12:30		Other		X X	
PCC-12			[Redacted]			23-09-14		12:30		Other		X X	

 Short Holding Time
 Rush Processing

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

*Please add site name CPGN-1(Cedar Point Gill Net-1, as potentially impacted)

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT, RELEASE (client use)			SHIPMENT, RECEPTION (lab use only)			SHIPMENT, VERIFICATION (lab use only)				
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
C. Koenig	Sep 30 / 14	17:00	JH	Oct 2	10:50	°C				



Sample Receipt Confirmation

Report Distribution:

Company Name: MOUNT POLLEY MINING CORP.
Contact: Colleen Hughes
Address: PO Box 12,
Likely, BC, V0L 1N0
Phone: 250-790-2215
Fax: 250-790-2268
Email: chughes@mountpolley.com
kcmahen@mountpolley.com
afrye@mountpolley.com
CORY.BETTLES@SNCLAVALIN.COM
CKOENIG@RECHRISMINE.CA
NATALIE.NEUFELD@SNCLAVALIN.COM

Report Name: CROSSTAB_ALS
Digital Type: EHS_MOUNTP
Digital Email: chughes@mountpolley.com
kcmahen@mountpolley.com
CORY.BETTLES@SNCLAVALIN.COM
CKOENIG@RECHRISMINE.CA
NATALIE.NEUFELD@SNCLAVALIN.COM

Distribution: Hard Copy: N Email: Y Fax: N

Invoice Distribution:

Acct Name: MOUNT POLLEY MINING CORP.
Contact: Accounts Payable
Address: PO Box 12,
Likely, BC, V0L 1N0
Phone: 250-790-2215
Fax: --
Invoice Email: prosette@mountpolley.com
chughes@mountpolley.com
Project #: N/A
Account #: MPM100

Client Information:

Job Reference #: _____
Project PO #: _____
Legal Site Description: N/A
Quote #: N/A

Date Sampled: 23-SEP-14
Date Received: 02-OCT-14
Sampled By: C KOENIG
Chain Of Custody: Q LK CPGN-1 PCC-1-12

Workorder Summary:

Lab Work Order #: L1527078
Estimated completion date: 17-NOV-14
12 Samples received at ALS in: VANCOUVER

Account Manager: Can Dang
Estimated sample disposal date: 17-DEC-14

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type	Client Job#
L1527078-1	PCC-1	23-SEP-14 12:30	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527078-2	PCC-2	23-SEP-14 12:30	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527078-3	PCC-3	23-SEP-14 12:30	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527078-4	PCC-4	23-SEP-14 12:30	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527078-5	PCC-5	23-SEP-14 12:30	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527078-6	PCC-6	23-SEP-14 12:30	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527078-7	PCC-7	23-SEP-14 12:30	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527078-8	PCC-8	23-SEP-14 12:30	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527078-9	PCC-9	23-SEP-14 12:30	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527078-10	PCC-10	23-SEP-14 12:30	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527078-11	PCC-11	23-SEP-14 12:30	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527078-12	PCC-12	23-SEP-14 12:30	02-OCT-14 10:50	17-NOV-14		OTHER	



Analysis Requested :

	Sample Handling and Disposal Fee	Mercury in Tissue by CVAFS [DRY]	Mercury in Tissue by CVAFS [WET]	Metals in Tissue by CRC ICPMS [DRY]	Metals in Tissue by CRC ICPMS [WET]	% Moisture in Tissues	Tissue/Vegetation Sample Preparation
PCC-1	✓	✓	✓	✓	✓	✓	✓
PCC-2	✓	✓	✓	✓	✓	✓	✓
PCC-3	✓	✓	✓	✓	✓	✓	✓
PCC-4	✓	✓	✓	✓	✓	✓	✓
PCC-5	✓	✓	✓	✓	✓	✓	✓
PCC-6	✓	✓	✓	✓	✓	✓	✓
PCC-7	✓	✓	✓	✓	✓	✓	✓
PCC-8	✓	✓	✓	✓	✓	✓	✓
PCC-9	✓	✓	✓	✓	✓	✓	✓
PCC-10	✓	✓	✓	✓	✓	✓	✓
PCC-11	✓	✓	✓	✓	✓	✓	✓
PCC-12	✓	✓	✓	✓	✓	✓	✓

Sample Integrity Observations: No observations were identified for this work order submission.

ALS Group strives to deliver on-time results to our clients at all times. However, there are times when due to capacity issues or other unforeseen circumstances we are unable to meet our expected turnaround times. The information above is related to a recent workorder you have submitted to our laboratory. In the event that you have an inquiry, please refer to the Lab Work Order # when calling your Account Manager.



Report To	Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company: Mount Polley Mining Corp.	<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)
Contact: C.Bettles, Natalie Neufeld, Laura McOrmond, Lee Niki	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address: PO Box 12, Likely, BC V0L 1N0	Email 1: Natalie.Neufeld@snclavalin.com	<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
Vancouver, BC V6C 3B6	Email 2: Cory.Bettles@snclavalin.com	<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone: 2507902216x2560 Fax:	Email 3: ckoenig@redchrysmine.ca	

Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Client / Project Information	Analysis Request			
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No	Job #:	Please indicate below Filtered, Preserved or both (F, P, F/P)			
Company:	PO / AFE:	Whole body metals	Tissue(METALS)		
Contact:	LSD:			% Moisture content	Number of Containers
Address:	Quote #:				
Phone:	ALS Contact: Can Dang				



L1527078-COFC

Lab Work (lab use)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Whole body metals	Tissue(METALS)	% Moisture content	Number of Containers												
PCC-1		23-09-14	12:30	Other	X	X														
PCC-2		23-09-14	12:30	Other	X	X														
PCC-3		23-09-14	12:30	Other	X	X														
PCC-4		23-09-14	12:30	Other	X	X														
PCC-5		23-09-14	12:30	Other	X	X														
PCC-6		23-09-14	12:30	Other	X	X														
PCC-7		23-09-14	12:30	Other	X	X														
PCC-8		23-09-14	12:30	Other	X	X														
PCC-9		23-09-14	12:30	Other	X	X														
PCC-10		23-09-14	12:30	Other	X	X														
PCC-11		23-09-14	12:30	Other	X	X														
PCC-12		23-09-14	12:30	Other	X	X														

Short Holding Time
Rush Processing

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

*Please add site name CPGN-1(Cedar Point Gill Net-1, as potentially impacted)

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT, RELEASE (client use)			SHIPMENT, RECEPTION (lab use only)			SHIPMENT, VERIFICATION (lab use only)			Observations:	
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Yes / No ? If Yes add SIF
C. Koenig	Sep 30 / 14	17:00	JH	Oct 2	10:50	°C				



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC V0L 1N0

Date Received: 02-OCT-14
Report Date: 24-NOV-14 16:42 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1527082
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: RB-1-8 POL LK GN FL, RB-9-16 POL LK GN SK
Legal Site Desc:

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1527082-1 Other 25-SEP-14 17:00 RB-1(TISSUE)	L1527082-2 Other 25-SEP-14 17:00 RB-1(LIVER)	L1527082-3 Other 25-SEP-14 17:00 RB-2(TISSUE)	L1527082-4 Other 25-SEP-14 17:00 RB-2(LIVER)	L1527082-5 Other 25-SEP-14 17:00 RB-3(TISSUE)
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	77.9	74.5	80.4	74.0	77.2
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<5.0	<5.0	<5.0	3.9
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<1.0	<1.0	<1.0	0.89
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.037	0.094	0.031	0.074	0.106
	Arsenic (As)-Total (mg/kg wwt)	0.0081	0.0240	0.0061	0.0193	0.0243
	Barium (Ba)-Total (mg/kg)	<0.050	0.073	0.051	<0.050	<0.050
	Barium (Ba)-Total (mg/kg wwt)	<0.010	0.019	0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	0.062	0.036	0.107	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	0.0157	0.0071	0.0278	<0.0010
	Calcium (Ca)-Total (mg/kg)	253	464	1160	432	204
	Calcium (Ca)-Total (mg/kg wwt)	55.9	118	228	112	46.5
	Cesium (Cs)-Total (mg/kg)	0.0320	0.0240	0.0288	0.0193	0.0593
	Cesium (Cs)-Total (mg/kg wwt)	0.0071	0.0061	0.0056	0.0050	0.0135
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.20	<0.20	<0.20	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.040	<0.040	<0.040	0.010
	Cobalt (Co)-Total (mg/kg)	<0.020	0.091	<0.020	0.053	<0.020
	Cobalt (Co)-Total (mg/kg wwt)	0.0043	0.0232	<0.0040	0.0137	<0.0040
	Copper (Cu)-Total (mg/kg)	1.89	79.2	1.77	113	1.85
	Copper (Cu)-Total (mg/kg wwt)	0.417	20.2	0.346	29.4	0.423
	Iron (Fe)-Total (mg/kg)	23.6	1670	41.2	1670	12.1
	Iron (Fe)-Total (mg/kg wwt)	5.20	425	8.1	435	2.76
	Lead (Pb)-Total (mg/kg)	<0.020	<0.050	<0.050	<0.050	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.010	<0.010	<0.010	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1280	655	1090	651	1760
	Magnesium (Mg)-Total (mg/kg wwt)	282	167	213	169	402
	Manganese (Mn)-Total (mg/kg)	0.277	5.24	0.324	4.99	0.359
	Manganese (Mn)-Total (mg/kg wwt)	0.061	1.33	0.063	1.30	0.082

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID Description Sampled Date Sampled Time Client ID	L1527082-6 Other 25-SEP-14 17:00 RB-3(LIVER)	L1527082-7 Other 25-SEP-14 17:00 RB-4(TISSUE)	L1527082-8 Other 25-SEP-14 17:00 RB-4(LIVER)	L1527082-9 Other 25-SEP-14 17:00 RB-5(TISSUE)	L1527082-10 Other 25-SEP-14 17:00 RB-5(LIVER)
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)	71.1	79.0	71.9	77.3	73.8	
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	<2.0	<5.0	<2.0	<5.0	
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	<0.40	1.1	<0.40	<1.0	
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010	
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Arsenic (As)-Total (mg/kg)	0.161	0.021	0.090	0.050	0.129	
	Arsenic (As)-Total (mg/kg wwt)	0.0466	0.0044	0.0254	0.0114	0.0337	
	Barium (Ba)-Total (mg/kg)	<0.050	<0.050	0.089	<0.050	0.260	
	Barium (Ba)-Total (mg/kg wwt)	<0.010	<0.010	0.025	<0.010	0.068	
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010	
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010	
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0	
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Cadmium (Cd)-Total (mg/kg)	0.051	<0.0050	0.135	<0.0050	0.034	
	Cadmium (Cd)-Total (mg/kg wwt)	0.0148	<0.0010	0.0378	<0.0010	0.0088	
	Calcium (Ca)-Total (mg/kg)	481	378	1410	264	348	
	Calcium (Ca)-Total (mg/kg wwt)	139	79.3	397	59.7	91.2	
	Cesium (Cs)-Total (mg/kg)	0.0306	0.0293	0.0172	0.0292	0.0273	
	Cesium (Cs)-Total (mg/kg wwt)	0.0088	0.0062	0.0048	0.0066	0.0071	
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.050	<0.20	<0.050	<0.20	
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	<0.010	<0.040	<0.010	<0.040	
	Cobalt (Co)-Total (mg/kg)	0.064	<0.020	0.067	<0.020	0.078	
	Cobalt (Co)-Total (mg/kg wwt)	0.0184	<0.0040	0.0188	<0.0040	0.0204	
	Copper (Cu)-Total (mg/kg)	42.4	1.26	677	1.35	12.9	
	Copper (Cu)-Total (mg/kg wwt)	12.3	0.265	190	0.307	3.37	
	Iron (Fe)-Total (mg/kg)	612	18.6	2240	18.3	897	
	Iron (Fe)-Total (mg/kg wwt)	177	3.91	631	4.14	235	
	Lead (Pb)-Total (mg/kg)	<0.050	<0.020	<0.050	<0.020	<0.050	
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.0040	<0.010	<0.0040	<0.010	
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50	
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Magnesium (Mg)-Total (mg/kg)	675	1380	637	1350	641	
	Magnesium (Mg)-Total (mg/kg wwt)	195	289	179	307	168	
	Manganese (Mn)-Total (mg/kg)	5.15	0.201	7.67	0.208	10.1	
	Manganese (Mn)-Total (mg/kg wwt)	1.49	0.042	2.16	0.047	2.65	

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1527082-11 Other 25-SEP-14 17:00 RB-6(WHOLE BODY FISH)	L1527082-12 Other 25-SEP-14 17:00 RB-7(TISSUE)	L1527082-13 Other 25-SEP-14 17:00 RB-7(LIVER)	L1527082-14 Other 25-SEP-14 17:00 RB-8(TISSUE)	L1527082-15 Other 25-SEP-14 17:00 RB-8(LIVER)
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	74.8	77.9	71.7	77.3	72.8
Metals	Aluminum (Al)-Total (mg/kg)	6.1	<2.0	<5.0	<2.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	1.54	<0.40	<1.0	0.40	<1.0
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.214	0.091	0.096	0.079	0.144
	Arsenic (As)-Total (mg/kg wwt)	0.0539	0.0200	0.0271	0.0179	0.0392
	Barium (Ba)-Total (mg/kg)	0.480	<0.050	<0.050	0.052	<0.050
	Barium (Ba)-Total (mg/kg wwt)	0.121	<0.010	<0.010	0.012	<0.010
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.0389	<0.0050	0.138	<0.0050	0.077
	Cadmium (Cd)-Total (mg/kg wwt)	0.0098	<0.0010	0.0391	<0.0010	0.0210
	Calcium (Ca)-Total (mg/kg)	10800	433	234	1460	299
	Calcium (Ca)-Total (mg/kg wwt)	2730	95.6	66.2	331	81.4
	Cesium (Cs)-Total (mg/kg)	0.0547	0.0444	0.0224	0.0323	0.0270
	Cesium (Cs)-Total (mg/kg wwt)	0.0137	0.0098	0.0063	0.0073	0.0073
	Chromium (Cr)-Total (mg/kg)	0.113	<0.050	<0.20	<0.050	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	0.028	<0.010	<0.040	<0.010	<0.040
	Cobalt (Co)-Total (mg/kg)	0.061	<0.020	0.050	<0.020	0.044
	Cobalt (Co)-Total (mg/kg wwt)	0.0154	<0.0040	0.0142	<0.0040	0.0121
	Copper (Cu)-Total (mg/kg)	2.39	1.57	162	1.05	37.1
	Copper (Cu)-Total (mg/kg wwt)	0.600	0.347	45.9	0.240	10.1
	Iron (Fe)-Total (mg/kg)	60.8	19.7	1650	14.4	1140
	Iron (Fe)-Total (mg/kg wwt)	15.3	4.34	468	3.28	311
	Lead (Pb)-Total (mg/kg)	<0.020	<0.020	<0.050	<0.020	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.010	<0.0040	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1140	1390	590	1310	796
	Magnesium (Mg)-Total (mg/kg wwt)	286	308	167	298	216
	Manganese (Mn)-Total (mg/kg)	6.01	0.224	6.46	0.508	11.4
	Manganese (Mn)-Total (mg/kg wwt)	1.51	0.050	1.83	0.116	3.10

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		Sample ID Description Sampled Date Sampled Time Client ID	L1527082-16 Other 25-SEP-14 17:00 RB-9(TISSUE)	L1527082-17 Other 25-SEP-14 17:00 RB-9(LIVER)	L1527082-18 Other 25-SEP-14 17:00 RB-10(TISSUE)	L1527082-19 Other 25-SEP-14 17:00 RB-10(LIVER)	L1527082-20 Other 25-SEP-14 17:00 RB-11(WHOLE BODY FISH)
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)	75.4	72.9	78.4	72.3	73.7	
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<5.0	<2.0	<5.0	5.8	
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<1.0	<0.40	<1.0	1.53	
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010	
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Arsenic (As)-Total (mg/kg)	0.053	0.119	0.048	0.112	0.181	
	Arsenic (As)-Total (mg/kg wwt)	0.0131	0.0324	0.0103	0.0310	0.0477	
	Barium (Ba)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.050	0.501	
	Barium (Ba)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	0.132	
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010	
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010	
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0	
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Cadmium (Cd)-Total (mg/kg)	<0.0050	0.039	<0.0050	0.096	0.0219	
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	0.0107	<0.0010	0.0265	0.0058	
	Calcium (Ca)-Total (mg/kg)	513	300	613	392	21500	
	Calcium (Ca)-Total (mg/kg wwt)	126	81.4	132	109	5650	
	Cesium (Cs)-Total (mg/kg)	0.0279	0.0181	0.0404	0.0274	0.0540	
	Cesium (Cs)-Total (mg/kg wwt)	0.0069	0.0049	0.0087	0.0076	0.0142	
	Chromium (Cr)-Total (mg/kg)	0.080	<0.20	<0.050	<0.20	0.150	
	Chromium (Cr)-Total (mg/kg wwt)	0.020	<0.040	<0.010	<0.040	0.039	
	Cobalt (Co)-Total (mg/kg)	<0.020	0.069	<0.020	0.063	0.057	
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040	0.0187	<0.0040	0.0175	0.0149	
	Copper (Cu)-Total (mg/kg)	1.44	114	1.42	62.3	2.32	
	Copper (Cu)-Total (mg/kg wwt)	0.354	31.1	0.307	17.2	0.609	
	Iron (Fe)-Total (mg/kg)	17.3	742	17.2	1080	55.4	
	Iron (Fe)-Total (mg/kg wwt)	4.25	201	3.70	300	14.6	
	Lead (Pb)-Total (mg/kg)	<0.020	<0.050	<0.020	<0.050	<0.020	
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.010	<0.0040	<0.010	<0.0040	
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50	
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Magnesium (Mg)-Total (mg/kg)	1390	628	1370	756	1300	
	Magnesium (Mg)-Total (mg/kg wwt)	343	170	295	209	341	
	Manganese (Mn)-Total (mg/kg)	0.235	6.16	0.317	11.6	6.12	
	Manganese (Mn)-Total (mg/kg wwt)	0.058	1.67	0.068	3.21	1.61	

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Sample ID Description Sampled Date Sampled Time Client ID		L1527082-21 Other 25-SEP-14 17:00 RB-12(TISSUE)	L1527082-22 Other 25-SEP-14 17:00 RB-12(LIVER)	L1527082-23 Other 25-SEP-14 17:00 RB-13(TISSUE)	L1527082-24 Other 25-SEP-14 17:00 RB-13(LIVER)	L1527082-25 Other 25-SEP-14 17:00 RB-14(TISSUE)
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	76.4	73.0	76.9	73.9	79.9
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<5.0	<5.0	<5.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<1.0	<1.0	<1.0	<1.0
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.044	0.077	<0.030	0.098	0.051
	Arsenic (As)-Total (mg/kg wwt)	0.0105	0.0209	0.0066	0.0256	0.0103
	Barium (Ba)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Barium (Ba)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	0.077	<0.010	0.120	<0.010
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	0.0208	<0.0020	0.0312	<0.0020
	Calcium (Ca)-Total (mg/kg)	275	244	1090	405	314
	Calcium (Ca)-Total (mg/kg wwt)	65.1	65.8	252	106	63.2
	Cesium (Cs)-Total (mg/kg)	0.0307	0.0235	0.0274	0.0181	0.0407
	Cesium (Cs)-Total (mg/kg wwt)	0.0073	0.0064	0.0063	0.0047	0.0082
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.20	<0.20	<0.20	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.040	<0.040	<0.040	<0.040
	Cobalt (Co)-Total (mg/kg)	<0.020	0.047	<0.020	0.079	<0.020
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040	0.0128	<0.0040	0.0207	<0.0040
	Copper (Cu)-Total (mg/kg)	1.23	151	0.75	108	0.94
	Copper (Cu)-Total (mg/kg wwt)	0.291	40.8	0.173	28.1	0.190
	Iron (Fe)-Total (mg/kg)	17.2	1450	13.2	1500	26.8
	Iron (Fe)-Total (mg/kg wwt)	4.07	393	3.1	392	5.4
	Lead (Pb)-Total (mg/kg)	<0.020	<0.050	<0.050	<0.050	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.010	<0.010	<0.010	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1250	735	1100	568	1070
	Magnesium (Mg)-Total (mg/kg wwt)	297	198	255	148	215
	Manganese (Mn)-Total (mg/kg)	0.126	11.2	0.261	7.53	0.188
	Manganese (Mn)-Total (mg/kg wwt)	0.030	3.03	0.060	1.96	0.038

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Sample ID Description Sampled Date Sampled Time Client ID		L1527082-26 Other 25-SEP-14 17:00 RB-14(LIVER)	L1527082-27 Other 25-SEP-14 17:00 RB-15(TISSUE)	L1527082-28 Other 25-SEP-14 17:00 RB-15(LIVER)	L1527082-29 Other 25-SEP-14 17:00 RB-16(WHOLE BODY FISH)	L1527082-30 Other 25-SEP-14 17:00 RSC-1(WHOLE BODY FISH),(PANEL 4 SK NET))
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	75.4	77.9	73.4	74.1	75.9
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	2.0	<5.0	6.4	11.3
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	0.45	<1.0	1.65	2.72
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.108	0.034	0.085	0.129	0.077
	Arsenic (As)-Total (mg/kg wwt)	0.0265	0.0075	0.0227	0.0334	0.0186
	Barium (Ba)-Total (mg/kg)	0.073	0.064	<0.050	0.397	1.94
	Barium (Ba)-Total (mg/kg wwt)	0.018	0.014	<0.010	0.103	0.468
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.191	<0.0050	0.022	0.0253	0.0315
	Cadmium (Cd)-Total (mg/kg wwt)	0.0471	<0.0010	0.0058	0.0066	0.0076
	Calcium (Ca)-Total (mg/kg)	868	1160	305	10400	46300
	Calcium (Ca)-Total (mg/kg wwt)	213	256	81.3	2700	11100
	Cesium (Cs)-Total (mg/kg)	0.0302	0.0278	0.0236	0.0489	0.0261
	Cesium (Cs)-Total (mg/kg wwt)	0.0074	0.0061	0.0063	0.0127	0.0063
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.050	<0.20	0.109	0.211
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	<0.010	<0.040	0.028	0.051
	Cobalt (Co)-Total (mg/kg)	0.063	<0.020	0.055	0.039	0.144
	Cobalt (Co)-Total (mg/kg wwt)	0.0155	<0.0040	0.0147	0.0101	0.0346
	Copper (Cu)-Total (mg/kg)	312	1.14	118	2.35	2.21
	Copper (Cu)-Total (mg/kg wwt)	76.7	0.252	31.3	0.608	0.532
	Iron (Fe)-Total (mg/kg)	2410	16.3	672	41.6	68.2
	Iron (Fe)-Total (mg/kg wwt)	592	3.61	179	10.8	16.4
	Lead (Pb)-Total (mg/kg)	<0.050	<0.020	<0.050	0.036	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.0040	<0.010	0.0094	0.0043
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	809	1190	685	979	1500
	Magnesium (Mg)-Total (mg/kg wwt)	199	262	182	254	361
	Manganese (Mn)-Total (mg/kg)	12.0	0.427	4.40	5.61	9.48
	Manganese (Mn)-Total (mg/kg wwt)	2.94	0.094	1.17	1.45	2.28

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		Sample ID Description Sampled Date Sampled Time Client ID	L1527082-1 Other 25-SEP-14 17:00 RB-1(TISSUE)	L1527082-2 Other 25-SEP-14 17:00 RB-1(LIVER)	L1527082-3 Other 25-SEP-14 17:00 RB-2(TISSUE)	L1527082-4 Other 25-SEP-14 17:00 RB-2(LIVER)	L1527082-5 Other 25-SEP-14 17:00 RB-3(TISSUE)
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)	0.301	0.174	0.524	0.236	0.211	
	Mercury (Hg)-Total (mg/kg wwt)	0.0665	0.0442	0.103	0.0613	0.0481	
	Molybdenum (Mo)-Total (mg/kg)	<0.020	2.01	<0.040	2.41	<0.020	
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.512	<0.0080	0.629	<0.0040	
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	
	Phosphorus (P)-Total (mg/kg)	11000	10800	9740	12000	14200	
	Phosphorus (P)-Total (mg/kg wwt)	2430	2750	1910	3120	3250	
	Potassium (K)-Total (mg/kg)	18900	10200	20000	10300	25900	
	Potassium (K)-Total (mg/kg wwt)	4170	2590	3920	2690	5910	
	Rubidium (Rb)-Total (mg/kg)	7.22	5.68	6.78	4.74	10.9	
	Rubidium (Rb)-Total (mg/kg wwt)	1.59	1.45	1.33	1.23	2.48	
	Selenium (Se)-Total (mg/kg)	3.09	37.0	3.72	40.6	3.38	
	Selenium (Se)-Total (mg/kg wwt)	0.681	9.41	0.729	10.6	0.773	
	Sodium (Na)-Total (mg/kg)	930	3970	4100	4360	1100	
	Sodium (Na)-Total (mg/kg wwt)	205	1010	802	1140	251	
	Strontium (Sr)-Total (mg/kg)	0.283	0.94	1.47	1.07	0.231	
	Strontium (Sr)-Total (mg/kg wwt)	0.062	0.240	0.289	0.279	0.053	
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg)	0.0046	0.0172	0.0041	0.0224	0.0031	
	Thallium (Tl)-Total (mg/kg wwt)	0.00101	0.00438	0.00080	0.00583	0.00071	
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Uranium (U)-Total (mg/kg wwt)	<0.00040	0.00050	<0.00040	0.00049	<0.00040	
	Vanadium (V)-Total (mg/kg)	<0.10	0.26	<0.10	0.53	<0.10	
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.067	<0.020	0.138	<0.020	
	Zinc (Zn)-Total (mg/kg)	14.3	171	21.3	281	17.8	
	Zinc (Zn)-Total (mg/kg wwt)	3.15	43.5	4.17	73.1	4.07	
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	

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		Sample ID Description Sampled Date Sampled Time Client ID	L1527082-6 Other 25-SEP-14 17:00 RB-3(LIVER)	L1527082-7 Other 25-SEP-14 17:00 RB-4(TISSUE)	L1527082-8 Other 25-SEP-14 17:00 RB-4(LIVER)	L1527082-9 Other 25-SEP-14 17:00 RB-5(TISSUE)	L1527082-10 Other 25-SEP-14 17:00 RB-5(LIVER)
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)	0.159	0.353	0.201	0.396	0.207	
	Mercury (Hg)-Total (mg/kg wwt)	0.0460	0.0741	0.0565	0.0897	0.0542	
	Molybdenum (Mo)-Total (mg/kg)	0.858	<0.020	2.58	<0.020	1.32	
	Molybdenum (Mo)-Total (mg/kg wwt)	0.248	<0.0040	0.724	<0.0040	0.345	
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	
	Phosphorus (P)-Total (mg/kg)	11700	11300	12000	11700	11300	
	Phosphorus (P)-Total (mg/kg wwt)	3390	2370	3370	2650	2970	
	Potassium (K)-Total (mg/kg)	9080	19000	11400	19200	12400	
	Potassium (K)-Total (mg/kg wwt)	2630	3990	3190	4340	3260	
	Rubidium (Rb)-Total (mg/kg)	5.64	5.65	4.66	6.83	5.50	
	Rubidium (Rb)-Total (mg/kg wwt)	1.63	1.19	1.31	1.55	1.44	
	Selenium (Se)-Total (mg/kg)	24.1	3.58	254	3.71	3.89	
	Selenium (Se)-Total (mg/kg wwt)	6.98	0.752	71.3	0.840	1.02	
	Sodium (Na)-Total (mg/kg)	3720	1890	4000	1460	4710	
	Sodium (Na)-Total (mg/kg wwt)	1080	396	1120	331	1230	
	Strontium (Sr)-Total (mg/kg)	1.20	0.444	3.11	0.217	0.87	
	Strontium (Sr)-Total (mg/kg wwt)	0.346	0.093	0.875	0.049	0.228	
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg)	0.0182	0.0030	0.0163	0.0020	0.0082	
	Thallium (Tl)-Total (mg/kg wwt)	0.00528	0.00063	0.00458	0.00046	0.00214	
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	0.0032	<0.0020	0.0044	
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	0.00090	<0.00040	0.00116	
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	0.65	<0.10	0.26	
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	0.182	<0.020	0.069	
	Zinc (Zn)-Total (mg/kg)	175	14.3	182	14.4	166	
	Zinc (Zn)-Total (mg/kg wwt)	50.7	3.00	51.2	3.27	43.5	
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1527082-11	L1527082-12	L1527082-13	L1527082-14	L1527082-15
		Description	Other	Other	Other	Other	Other
		Sampled Date	25-SEP-14	25-SEP-14	25-SEP-14	25-SEP-14	25-SEP-14
		Sampled Time	17:00	17:00	17:00	17:00	17:00
		Client ID	RB-6(WHOLE BODY FISH)	RB-7(TISSUE)	RB-7(LIVER)	RB-8(TISSUE)	RB-8(LIVER)
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)		0.146	0.356	0.147	0.340	0.148
	Mercury (Hg)-Total (mg/kg wwt)		0.0366	0.0786	0.0415	0.0772	0.0403
	Molybdenum (Mo)-Total (mg/kg)		0.065	<0.020	1.79	<0.020	1.04
	Molybdenum (Mo)-Total (mg/kg wwt)		0.0163	<0.0040	0.505	<0.0040	0.282
	Nickel (Ni)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)		14100	11800	12100	11100	13600
	Phosphorus (P)-Total (mg/kg wwt)		3550	2610	3430	2520	3690
	Potassium (K)-Total (mg/kg)		14500	19900	11200	17900	11900
	Potassium (K)-Total (mg/kg wwt)		3650	4400	3170	4080	3240
	Rubidium (Rb)-Total (mg/kg)		7.29	8.59	6.34	6.16	6.30
	Rubidium (Rb)-Total (mg/kg wwt)		1.83	1.90	1.79	1.40	1.71
	Selenium (Se)-Total (mg/kg)		3.65	2.91	80.5	3.24	19.0
	Selenium (Se)-Total (mg/kg wwt)		0.919	0.642	22.8	0.736	5.18
	Sodium (Na)-Total (mg/kg)		2900	1250	3090	1810	3790
	Sodium (Na)-Total (mg/kg wwt)		729	277	874	413	1030
	Strontium (Sr)-Total (mg/kg)		18.1	0.512	0.42	1.92	0.77
	Strontium (Sr)-Total (mg/kg wwt)		4.56	0.113	0.119	0.436	0.209
	Tellurium (Te)-Total (mg/kg)		<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)		0.0044	0.0056	0.0240	0.0035	0.0144
	Thallium (Tl)-Total (mg/kg wwt)		0.00111	0.00124	0.00680	0.00079	0.00391
	Tin (Sn)-Total (mg/kg)		<0.10	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)		<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)		<0.10	<0.10	0.18	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)		<0.020	<0.020	0.051	<0.020	0.025
	Zinc (Zn)-Total (mg/kg)		143	14.3	95.7	19.4	186
	Zinc (Zn)-Total (mg/kg wwt)		36.0	3.15	27.1	4.41	50.5
	Zirconium (Zr)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1527082-16	L1527082-17	L1527082-18	L1527082-19	L1527082-20
		Description	Other	Other	Other	Other	Other
		Sampled Date	25-SEP-14	25-SEP-14	25-SEP-14	25-SEP-14	25-SEP-14
		Sampled Time	17:00	17:00	17:00	17:00	17:00
		Client ID	RB-9(TISSUE)	RB-9(LIVER)	RB-10(TISSUE)	RB-10(LIVER)	RB-11(WHOLE BODY FISH)
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)		0.420	0.255	0.271	0.144	0.132
	Mercury (Hg)-Total (mg/kg wwt)		0.103	0.0692	0.0584	0.0400	0.0348
	Molybdenum (Mo)-Total (mg/kg)		<0.020	1.13	<0.020	1.49	0.063
	Molybdenum (Mo)-Total (mg/kg wwt)		<0.0040	0.308	<0.0040	0.413	0.0166
	Nickel (Ni)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)		11500	11800	11000	13700	19900
	Phosphorus (P)-Total (mg/kg wwt)		2840	3210	2380	3790	5240
	Potassium (K)-Total (mg/kg)		19100	11700	18200	11700	14600
	Potassium (K)-Total (mg/kg wwt)		4700	3180	3920	3250	3840
	Rubidium (Rb)-Total (mg/kg)		6.07	5.06	7.12	6.08	7.00
	Rubidium (Rb)-Total (mg/kg wwt)		1.49	1.37	1.53	1.68	1.84
	Selenium (Se)-Total (mg/kg)		2.77	55.6	4.34	30.7	4.35
	Selenium (Se)-Total (mg/kg wwt)		0.681	15.1	0.935	8.50	1.14
	Sodium (Na)-Total (mg/kg)		1350	3960	2000	3080	2760
	Sodium (Na)-Total (mg/kg wwt)		332	1070	432	852	724
	Strontium (Sr)-Total (mg/kg)		0.551	0.60	0.664	0.80	29.4
	Strontium (Sr)-Total (mg/kg wwt)		0.136	0.164	0.143	0.221	7.73
	Tellurium (Te)-Total (mg/kg)		<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)		0.0035	0.0129	0.0033	0.0085	0.0040
	Thallium (Tl)-Total (mg/kg wwt)		0.00086	0.00349	0.00070	0.00236	0.00106
	Tin (Sn)-Total (mg/kg)		<0.10	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	<0.020	0.021
	Uranium (U)-Total (mg/kg)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)		<0.00040	<0.00040	<0.00040	0.00051	<0.00040
	Vanadium (V)-Total (mg/kg)		<0.10	0.12	<0.10	0.14	<0.10
	Vanadium (V)-Total (mg/kg wwt)		<0.020	0.033	<0.020	0.038	<0.020
	Zinc (Zn)-Total (mg/kg)		14.4	146	13.8	119	153
	Zinc (Zn)-Total (mg/kg wwt)		3.53	39.6	2.98	32.8	40.2
	Zirconium (Zr)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1527082-21	L1527082-22	L1527082-23	L1527082-24	L1527082-25
		Description	Other	Other	Other	Other	Other
		Sampled Date	25-SEP-14	25-SEP-14	25-SEP-14	25-SEP-14	25-SEP-14
		Sampled Time	17:00	17:00	17:00	17:00	17:00
		Client ID	RB-12(TISSUE)	RB-12(LIVER)	RB-13(TISSUE)	RB-13(LIVER)	RB-14(TISSUE)
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)		0.330	0.156	0.244	0.203	0.406
	Mercury (Hg)-Total (mg/kg wwt)		0.0781	0.0421	0.0564	0.0529	0.0817
	Molybdenum (Mo)-Total (mg/kg)		<0.020	2.02	<0.040	2.46	<0.040
	Molybdenum (Mo)-Total (mg/kg wwt)		<0.0040	0.546	<0.0080	0.642	<0.0080
	Nickel (Ni)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)		10200	14100	9550	11500	8710
	Phosphorus (P)-Total (mg/kg wwt)		2410	3800	2210	2990	1750
	Potassium (K)-Total (mg/kg)		17000	12800	18100	10300	18900
	Potassium (K)-Total (mg/kg wwt)		4030	3460	4190	2690	3800
	Rubidium (Rb)-Total (mg/kg)		7.56	9.67	6.11	4.51	7.12
	Rubidium (Rb)-Total (mg/kg wwt)		1.79	2.61	1.41	1.18	1.43
	Selenium (Se)-Total (mg/kg)		3.25	57.1	3.43	52.6	3.45
	Selenium (Se)-Total (mg/kg wwt)		0.769	15.4	0.793	13.7	0.694
	Sodium (Na)-Total (mg/kg)		1770	4200	1200	4100	2170
	Sodium (Na)-Total (mg/kg wwt)		418	1130	277	1070	436
	Strontium (Sr)-Total (mg/kg)		0.210	0.37	1.44	0.90	0.34
	Strontium (Sr)-Total (mg/kg wwt)		0.050	0.100	0.333	0.235	0.069
	Tellurium (Te)-Total (mg/kg)		<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)		0.0041	0.0185	0.0036	0.0185	0.0054
	Thallium (Tl)-Total (mg/kg wwt)		0.00097	0.00501	0.00084	0.00483	0.00108
	Tin (Sn)-Total (mg/kg)		<0.10	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg)		<0.0020	<0.0020	<0.0020	0.0035	<0.0020
	Uranium (U)-Total (mg/kg wwt)		<0.00040	<0.00040	<0.00040	0.00091	<0.00040
	Vanadium (V)-Total (mg/kg)		<0.10	0.22	<0.10	0.42	<0.10
	Vanadium (V)-Total (mg/kg wwt)		<0.020	0.060	<0.020	0.109	<0.020
	Zinc (Zn)-Total (mg/kg)		12.0	114	11.5	184	11.3
	Zinc (Zn)-Total (mg/kg wwt)		2.84	30.8	2.66	48.1	2.27
	Zirconium (Zr)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1527082-26	L1527082-27	L1527082-28	L1527082-29	L1527082-30
		Description	Other	Other	Other	Other	Other
		Sampled Date	25-SEP-14	25-SEP-14	25-SEP-14	25-SEP-14	25-SEP-14
		Sampled Time	17:00	17:00	17:00	17:00	17:00
		Client ID	RB-14(LIVER)	RB-15(TISSUE)	RB-15(LIVER)	RB-16(WHOLE BODY FISH)	RSC-1(WHOLE BODY FISH),(PANEL 4 SK NET))
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)		0.240	0.386	0.194	0.140	0.290
	Mercury (Hg)-Total (mg/kg wwt)		0.0589	0.0854	0.0516	0.0364	0.0698
	Molybdenum (Mo)-Total (mg/kg)		3.01	<0.020	1.72	0.055	0.100
	Molybdenum (Mo)-Total (mg/kg wwt)		0.740	<0.0040	0.458	0.0143	0.0240
	Nickel (Ni)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)		0.043	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)		13500	10500	12200	12900	29300
	Phosphorus (P)-Total (mg/kg wwt)		3330	2320	3240	3350	7060
	Potassium (K)-Total (mg/kg)		11700	16400	12100	12500	10500
	Potassium (K)-Total (mg/kg wwt)		2880	3630	3220	3230	2520
	Rubidium (Rb)-Total (mg/kg)		5.81	6.64	6.01	6.40	6.78
	Rubidium (Rb)-Total (mg/kg wwt)		1.43	1.47	1.60	1.66	1.63
	Selenium (Se)-Total (mg/kg)		89.4	3.35	37.3	3.42	3.58
	Selenium (Se)-Total (mg/kg wwt)		22.0	0.740	9.94	0.886	0.863
	Sodium (Na)-Total (mg/kg)		3920	1390	4030	1820	2460
	Sodium (Na)-Total (mg/kg wwt)		964	306	1070	471	592
	Strontium (Sr)-Total (mg/kg)		2.14	1.58	0.54	15.6	91.4
	Strontium (Sr)-Total (mg/kg wwt)		0.526	0.348	0.143	4.05	22.0
	Tellurium (Te)-Total (mg/kg)		<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)		0.0399	0.0030	0.0115	0.0041	<0.0020
	Thallium (Tl)-Total (mg/kg wwt)		0.00980	0.00066	0.00306	0.00106	<0.00040
	Tin (Sn)-Total (mg/kg)		<0.10	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	<0.020	0.022
	Uranium (U)-Total (mg/kg)		0.0038	<0.0020	<0.0020	<0.0020	0.0030
	Uranium (U)-Total (mg/kg wwt)		0.00094	<0.00040	<0.00040	<0.00040	0.00073
	Vanadium (V)-Total (mg/kg)		0.60	<0.10	0.12	<0.10	0.12
	Vanadium (V)-Total (mg/kg wwt)		0.148	<0.020	0.033	<0.020	0.029
	Zinc (Zn)-Total (mg/kg)		114	17.0	206	131	119
	Zinc (Zn)-Total (mg/kg wwt)		28.1	3.75	54.8	34.0	28.7
	Zirconium (Zr)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7. This digestion procedure was implemented on October 5, 2009.</p>			
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-WET-CVAFS-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7. This digestion procedure was implemented on October 5, 2009.</p>			
HG-WET-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (WET)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
MET-DRY-CCMS-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p>			
<p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.</p>			
<p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-CCMS-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p>			
<p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (WET)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on wet weight basis.</p>			
<p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
<p>This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Reference Information

Chain of Custody Numbers:

RB-1-8 POL LK GN FL RB-9-16 POL LK GN SK

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.


D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Report To			Report Format / Distribution			Service Requested (Rush for routine analysis subject to availability)																																																																														
Company: Mount Polley Mining Corp.			<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)																																																																														
Contact: C.Bettles, Natalie Neufeld, Laura McOrmond, Lee Nikl			<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT																																																																														
Address: PO Box 12, Likely, BC V0L 1N0 Vancouver, BC V6C 3B6			Email 1: Natalie.Neufeld@snclavalin.com			<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT																																																																														
Phone: 2507902215x2560 Fax:			Email 2: Cory.Bettles@snclavalin.com			<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT																																																																														
Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			Client / Project Information			<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td colspan="12">Please indicate below Filtered, Preserved or both (F, P, F/P)</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> <td rowspan="5" style="writing-mode: vertical-rl; text-orientation: mixed;">Number of Containers</td> </tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>						Please indicate below Filtered, Preserved or both (F, P, F/P)																								Number of Containers																																																
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Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No			Job #:																																																																																	
Company:			PO / AFE:																																																																																	
Contact:			LSD:																																																																																	
Address:			Quote #:																																																																																	
Phone:			ALS Contact: Can Dang			Sampler: C. Koenig																																																																														
 L1527082-COFC (lab use only)																																																																																				
Sample #	Sample Identification (This description will appear on label)		Date (dd-mm-yy)	Time (hh:mm)	Sample Type	Whole body metals	Tissue(METALS)	% Moisture content	Liver(METALS)																																																																											
RB-1			25-09-14	17:00	Other	X		X																																																																												
RB-2			25-09-14	17:00	Other	X		X																																																																												
RB-3			25-09-14	17:00	Other	X		X																																																																												
RB-4			25-09-14	17:00	Other	X		X																																																																												
RB-5			25-09-14	17:00	Other	X		X																																																																												
RB-6(Whole body fish)			25-09-14	17:00	Other	X	X	X																																																																												
RB-7			25-09-14	17:00	Other	X		X																																																																												
RB-8			25-09-14	17:00	Other	X		X																																																																												
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SHIPMENT, RELEASE (client use)				SHIPMENT, RECEPTION (lab use only)				SHIPMENT, VERIFICATION (lab use only)																																																																												
Released by: C. Koenig	Date (dd-mm-yy): Sep 30/14	Time (hh-mm): 17:00	Received by: J. Koenig	Date: 30/09/14	Time: 17:50	Temperature: 1 °C	Verified by:	Date:	Time:	Observations: Yes / No ?	If Yes add SIF																																																																									

Short Holding Time
Rush Processing

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)			
Company: Mount Polley Mining Corp.		<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other		<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)			
Contact: C.Bettles, Natalie Neufeld, Laura McOrmond, Lee Nikl		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT			
Address: PO Box 12, Likely, BC V0L 1N0 Vancouver, BC V6C 3B6		Email 1: Natalie.Neufeld@snclavalin.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT			
Phone: 2507902215x2560 Fax:		Email 2: Cory.Bettles@snclavalin.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT			
Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Email 3: ckoenig@redchrismine.ca		Analysis Request			
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		Client / Project Information					

Company:		Job #:		Please indicate below Filtered, Preserved or both (F, P, F/P)				Number of Containers
Contact:		PO / AFE:						
Address:		LSD:						
Phone:		Quote #:						
ALS Contact: Can Dang		Sampler: C. Koenig						
Lab Work (lab use)								



L1527082-COFC

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	Whole body metals	Tissue(METALS)	% Moisture content	Liver(METALS)						Number of Containers	
RB-9		25-09-14	17:00	Other		X		X							
RB-10		25-09-14	17:00	Other		X		X							
RB-11	(whole body fish)	25-09-14	17:00	Other	X		X								
RB-12		25-09-14	17:00	Other		X		X							
RB-13		25-09-14	17:00	Other		X		X							
RB-14		25-09-14	17:00	Other		X		X							
RB-15		25-09-14	17:00	Other		X		X							
RB-16	(whole body fish)	25-09-14	17:00	Other	X		X								
RSC-1	(Whole body fish), ((Panel 4 SK net))	25-09-14	17:00	Other	X		X								

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

*One RSC included

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)				
Released by: C. Koenig	Date (dd-mm-yy): Sep 30/14	Time (hh:mm): 17:00	Received by: JK	Date: 09/22	Time: 10:50	Temperature: 1 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF



Sample Receipt Confirmation

Report Distribution:

Company Name: MOUNT POLLEY MINING CORP.
Contact: Colleen Hughes
Address: PO Box 12,
Likely, BC, V0L 1N0
Phone: 250-790-2215
Fax: 250-790-2268
Email: chughes@mountpolley.com
kmcmahe@mountpolley.com
afrye@mountpolley.com
CORY.BETTLES@SNCLAVALIN.COM
CKOENIG@RECHRISMINE.CA
NATALIE.NEUFELD@SNCLAVALIN.COM

Report Name: CROSSTAB_ALS
Digital Type: EHS_MOUNTP
Digital Email: chughes@mountpolley.com
kmcmahe@mountpolley.com
CORY.BETTLES@SNCLAVALIN.COM
CKOENIG@RECHRISMINE.CA
NATALIE.NEUFELD@SNCLAVALIN.COM

Distribution: Hard Copy: N Email: Y Fax: N

Invoice Distribution:

Acct Name: MOUNT POLLEY MINING CORP.
Contact: Accounts Payable
Address: PO Box 12,
Likely, BC, V0L 1N0
Phone: 250-790-2215
Fax: --
Invoice Email: prosette@mountpolley.com
chughes@mountpolley.com
Project #: N/A
Account #: MPM100

Client Information:

Job Reference #:
Project PO #:
Legal Site Description: N/A
Quote #: N/A

Date Sampled: 25-SEP-14
Date Received: 02-OCT-14
Sampled By: C KOENIG
Chain Of Custody: RB-1-8 POL LK GN FL, RB-9-16 POL LK GN SK

Workorder Summary:

Lab Work Order #: L1527082
Estimated completion date: 17-NOV-14
30 Samples received at ALS in: VANCOUVER

Account Manager: Can Dang
Estimated sample disposal date: 17-DEC-14

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type	Client Job#
L1527082-1	RB-1(TISSUE)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-2	RB-1(LIVER)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-3	RB-2(TISSUE)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-4	RB-2(LIVER)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-5	RB-3(TISSUE)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-6	RB-3(LIVER)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-7	RB-4(TISSUE)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-8	RB-4(LIVER)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-9	RB-5(TISSUE)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-10	RB-5(LIVER)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-11	RB-6(WHOLE BODY FISH)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-12	RB-7(TISSUE)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-13	RB-7(LIVER)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-14	RB-8(TISSUE)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-15	RB-8(LIVER)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-16	RB-9(TISSUE)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-17	RB-9(LIVER)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-18	RB-10(TISSUE)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-19	RB-10(LIVER)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-20	RB-11(WHOLE BODY FISH)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-21	RB-12(TISSUE)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	



Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type	Client Job#
L1527082-22	RB-12(LIVER)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-23	RB-13(TISSUE)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-24	RB-13(LIVER)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-25	RB-14(TISSUE)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-26	RB-14(LIVER)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-27	RB-15(TISSUE)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-28	RB-15(LIVER)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-29	RB-16(WHOLE BODY FISH)	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527082-30	RSC-1(WHOLE BODY FISH),((PANEL 4 SK NET))	25-SEP-14 17:00	02-OCT-14 10:50	17-NOV-14		OTHER	



**Analysis
Requested :**

	Sample Handling and Disposal Fee	Mercury in Tissue by CVAFS [DRY]	Mercury in Tissue by CVAFS [WET]	Metals in Tissue by CRC ICPMS [DRY]	Metals in Tissue by CRC ICPMS [WET]	% Moisture in Tissues	Tissue/Vegetation Sample Preparation
RB-1(TISSUE)	✓	✓	✓	✓	✓	✓	✓
RB-1(LIVER)	✓	✓	✓	✓	✓	✓	✓
RB-2(TISSUE)	✓	✓	✓	✓	✓	✓	✓
RB-2(LIVER)	✓	✓	✓	✓	✓	✓	✓
RB-3(TISSUE)	✓	✓	✓	✓	✓	✓	✓
RB-3(LIVER)	✓	✓	✓	✓	✓	✓	✓
RB-4(TISSUE)	✓	✓	✓	✓	✓	✓	✓
RB-4(LIVER)	✓	✓	✓	✓	✓	✓	✓
RB-5(TISSUE)	✓	✓	✓	✓	✓	✓	✓
RB-5(LIVER)	✓	✓	✓	✓	✓	✓	✓
RB-6(WHOLE BODY FISH)	✓	✓	✓	✓	✓	✓	✓
RB-7(TISSUE)	✓	✓	✓	✓	✓	✓	✓
RB-7(LIVER)	✓	✓	✓	✓	✓	✓	✓
RB-8(TISSUE)	✓	✓	✓	✓	✓	✓	✓
RB-8(LIVER)	✓	✓	✓	✓	✓	✓	✓
RB-9(TISSUE)	✓	✓	✓	✓	✓	✓	✓
RB-9(LIVER)	✓	✓	✓	✓	✓	✓	✓
RB-10(TISSUE)	✓	✓	✓	✓	✓	✓	✓
RB-10(LIVER)	✓	✓	✓	✓	✓	✓	✓
RB-11(WHOLE BODY FISH)	✓	✓	✓	✓	✓	✓	✓
RB-12(TISSUE)	✓	✓	✓	✓	✓	✓	✓
RB-12(LIVER)	✓	✓	✓	✓	✓	✓	✓
RB-13(TISSUE)	✓	✓	✓	✓	✓	✓	✓
RB-13(LIVER)	✓	✓	✓	✓	✓	✓	✓
RB-14(TISSUE)	✓	✓	✓	✓	✓	✓	✓
RB-14(LIVER)	✓	✓	✓	✓	✓	✓	✓
RB-15(TISSUE)	✓	✓	✓	✓	✓	✓	✓
RB-15(LIVER)	✓	✓	✓	✓	✓	✓	✓



Analysis Requested :

	Sample Handling and Disposal Fee	Mercury in Tissue by CVAFS [DRY]	Mercury in Tissue by CVAFS [WET]	Metals in Tissue by CRC ICPMS [DRY]	Metals in Tissue by CRC ICPMS [WET]	% Moisture in Tissues	Tissue/Vegetation Sample Preparation
RB-16(WHOLE BODY FISH)	✓	✓	✓	✓	✓	✓	✓
RSC-1(WHOLE BODY FISH),(PANEL 4 SK NET))	✓	✓	✓	✓	✓	✓	✓

Sample Integrity Observations: No observations were identified for this work order submission.

ALS Group strives to deliver on-time results to our clients at all times. However, there are times when due to capacity issues or other unforeseen circumstances we are unable to meet our expected turnaround times. The information above is related to a recent workorder you have submitted to our laboratory. In the event that you have an inquiry, please refer to the Lab Work Order # when calling your Account Manager.

Report To	Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company: Mount Polley Mining Corp.	<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)
Contact: C.Bettles, Natalie Neufeld, Laura McOrmond, Lee Nikl	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address: PO Box 12, Likely, BC V0L 1N0	Email 1: Natalie.Neufeld@snclavalin.com	<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
Vancouver, BC V6C 3B6	Email 2: Cory.Bettles@snclavalin.com	<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone: 2507902215x2560 Fax:	Email 3: ckoenig@redchrismine.ca	

Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Client / Project Information	Please indicate below Filtered, Preserved or both (F, P, F/P)				
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No	Job #:					
Company:	PO / AFE:	Whole body metals	Tissue(METALS)	% Moisture content	Liver(METALS)	Number of Containers
Contact:	LSD:					
Address:	Quote #:					
Phone:	ALS Contact: Can Dang					
Phone: L1527082-COFC	Sampler: C. Koenig					

Sample #	Sample Identification (This description will appear on label)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Whole body metals	Tissue(METALS)	% Moisture content	Liver(METALS)										
RB-1		25-09-14	17:00	Other		X		X										
RB-2		25-09-14	17:00	Other		X		X										
RB-3		25-09-14	17:00	Other		X		X										
RB-4		25-09-14	17:00	Other		X		X										
RB-5		25-09-14	17:00	Other		X		X										
RB-6(Whole body fish)		25-09-14	17:00	Other	X		X											
RB-7		25-09-14	17:00	Other		X		X										
RB-8		25-09-14	17:00	Other		X		X										

Short Holding Time
Rush Processing

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)				
Released by: C. Koenig	Date (dd-mmm-yy): Sep 30/14	Time (hh-mm): 17:00	Received by: J. Koenig	Date: Sep 30/14	Time: 17:50	Temperature: 1 °C	Verified by:	Date:	Time:	Observations: Yes / No? If Yes add SIF



Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # RB-9-16 POL Lk GN SK

Page 2 of 2

Report To	Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)				
Company: Mount Polley Mining Corp.	<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)				
Contact: C. Bettles, Natalie Neufeld, Laura McOrmond, Lee Nikl	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT				
Address: PO Box 12, Likely, BC V0L 1N0 Vancouver, BC V6C 3B6	Email 1: Natalie.Neufeld@snclavalin.com Email 2: Cory.Bettles@snclavalin.com Email 3: ckoenig@redchrismine.ca	<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT <input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT				
Phone: 2507902215x2560 Fax:	Client / Project Information	Analysis Request				
Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Job #:	Please indicate below Filtered, Preserved or both (F, P, F/P)				
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No	PO / AFE:					
Company:	LSD:					
Contact:	Quote #:					
Address:	ALS Contact: Can Dang Sampler: C. Koenig					
Phone:		Whole body metals	Tissue(METALS)	% Moisture content	Liver(METALS)	Number of Containers



L1527082-COFC

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	Whole body metals	Tissue(METALS)	% Moisture content	Liver(METALS)									
	RB-9	25-09-14	17:00	Other		X		X									
	RB-10	25-09-14	17:00	Other		X		X									
	RB-11(whole body fish)	25-09-14	17:00	Other	X		X										
	RB-12	25-09-14	17:00	Other		X		X									
	RB-13	25-09-14	17:00	Other		X		X									
	RB-14	25-09-14	17:00	Other		X		X									
	RB-15	25-09-14	17:00	Other		X		X									
	RB-16(whole body fish)	25-09-14	17:00	Other	X		X										
	RSC-1(Whole body fish), ((Panel 4 SK net))	25-09-14	17:00	Other	X		X										

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

*One RSC included

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
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Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)				SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mm-yy):	Time (hh:mm):	Temperature:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No? If Yes add SIF
C. Koenig	25/09/14	17:00	1 °C	JH	02/09	10:50	1 °C				



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC V0L 1N0

Date Received: 02-OCT-14
Report Date: 21-NOV-14 17:18 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1527095
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: LNS-1-8 POL LK GN, LNS-9-16 POL LK GN
Legal Site Desc:

Can Dang
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
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ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1527095-1	L1527095-2	L1527095-3	L1527095-4	L1527095-5
		Description	Other	Other	Other	Other	Other
		Sampled Date	25-SEP-14	25-SEP-14	25-SEP-14	25-SEP-14	25-SEP-14
		Sampled Time	14:00	14:00	14:00	14:00	14:00
		Client ID	LNS-1	LNS-2	LNS-3	LNS-4	LNS-5
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		79.4	79.4	77.9	79.1	78.4
Metals	Aluminum (Al)-Total (mg/kg)		<5.0	<5.0	<5.0	<5.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)		<1.0	<1.0	<1.0	<1.0	<1.0
	Antimony (Sb)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)		0.287	0.311	0.252	0.131	0.352
	Arsenic (As)-Total (mg/kg wwt)		0.0591	0.0641	0.0557	0.0274	0.0760
	Barium (Ba)-Total (mg/kg)		0.073	0.773	0.213	<0.050	0.133
	Barium (Ba)-Total (mg/kg wwt)		0.015	0.159	0.047	<0.010	0.029
	Beryllium (Be)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)		<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Calcium (Ca)-Total (mg/kg)		407	4030	1320	400	1900
	Calcium (Ca)-Total (mg/kg wwt)		83.6	830	293	83.3	412
	Cesium (Cs)-Total (mg/kg)		0.0478	0.0562	0.0640	0.0533	0.0571
	Cesium (Cs)-Total (mg/kg wwt)		0.0098	0.0116	0.0142	0.0111	0.0123
	Chromium (Cr)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Chromium (Cr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040
	Cobalt (Co)-Total (mg/kg)		<0.020	<0.020	<0.020	<0.020	<0.020
	Cobalt (Co)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Copper (Cu)-Total (mg/kg)		0.71	1.14	0.92	1.21	0.75
	Copper (Cu)-Total (mg/kg wwt)		0.145	0.236	0.203	0.252	0.162
	Iron (Fe)-Total (mg/kg)		15.8	12.5	8.3	14.9	7.7
	Iron (Fe)-Total (mg/kg wwt)		3.3	2.6	1.8	3.1	1.7
	Lead (Pb)-Total (mg/kg)		<0.050	<0.050	<0.050	<0.050	<0.050
	Lead (Pb)-Total (mg/kg wwt)		<0.010	<0.010	<0.010	<0.010	<0.010
	Lithium (Li)-Total (mg/kg)		<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)		1170	1450	1540	1210	1450
	Magnesium (Mg)-Total (mg/kg wwt)		241	299	341	252	314
	Manganese (Mn)-Total (mg/kg)		0.479	3.61	1.76	0.415	1.70
	Manganese (Mn)-Total (mg/kg wwt)		0.099	0.744	0.389	0.086	0.367

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1527095-6 Other 25-SEP-14 14:00 LNS-6	L1527095-7 Other 25-SEP-14 14:00 LNS-7	L1527095-8 Other 25-SEP-14 14:00 LNS-8	L1527095-9 Other 25-SEP-14 14:00 LNS-9	L1527095-10 Other 25-SEP-14 14:00 LNS-10
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	80.0	77.9	78.5	80.4	78.4
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	<1.0	<1.0	<1.0	<1.0
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.336	0.118	0.327	0.132	0.330
	Arsenic (As)-Total (mg/kg wwt)	0.0673	0.0260	0.0703	0.0259	0.0713
	Barium (Ba)-Total (mg/kg)	0.216	0.094	0.067	0.168	0.076
	Barium (Ba)-Total (mg/kg wwt)	0.043	0.021	0.015	0.033	0.016
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Calcium (Ca)-Total (mg/kg)	1880	696	897	1540	1320
	Calcium (Ca)-Total (mg/kg wwt)	376	154	193	302	286
	Cesium (Cs)-Total (mg/kg)	0.0663	0.0447	0.0611	0.102	0.0493
	Cesium (Cs)-Total (mg/kg wwt)	0.0133	0.0099	0.0132	0.0200	0.0106
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Cobalt (Co)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Copper (Cu)-Total (mg/kg)	0.75	1.71	1.74	0.57	0.78
	Copper (Cu)-Total (mg/kg wwt)	0.151	0.378	0.374	0.113	0.168
	Iron (Fe)-Total (mg/kg)	5.0	20.6	21.2	6.4	6.3
	Iron (Fe)-Total (mg/kg wwt)	1.0	4.5	4.6	1.3	1.4
	Lead (Pb)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1470	1190	1250	1380	1380
	Magnesium (Mg)-Total (mg/kg wwt)	293	263	269	271	298
	Manganese (Mn)-Total (mg/kg)	2.20	0.768	0.870	2.83	1.14
	Manganese (Mn)-Total (mg/kg wwt)	0.440	0.170	0.187	0.556	0.247

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1527095-11	L1527095-12	L1527095-13	L1527095-14	L1527095-15
		Description	Other	Other	Other	Other	Other
		Sampled Date	25-SEP-14	25-SEP-14	25-SEP-14	25-SEP-14	25-SEP-14
		Sampled Time	14:00	14:00	14:00	14:00	14:00
		Client ID	LNS-11	LNS-12	LNS-13	LNS-14	LNS-15
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		79.3	79.6	77.2	77.6	78.8
Metals	Aluminum (Al)-Total (mg/kg)		<5.0	<5.0	<5.0	<5.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)		<1.0	<1.0	<1.0	<1.0	<1.0
	Antimony (Sb)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)		0.477	0.154	0.245	0.367	0.264
	Arsenic (As)-Total (mg/kg wwt)		0.0989	0.0316	0.0559	0.0824	0.0559
	Barium (Ba)-Total (mg/kg)		0.308	0.135	0.239	0.168	0.127
	Barium (Ba)-Total (mg/kg wwt)		0.064	0.028	0.055	0.038	0.027
	Beryllium (Be)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)		<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Calcium (Ca)-Total (mg/kg)		2940	1040	2050	2480	599
	Calcium (Ca)-Total (mg/kg wwt)		610	212	469	556	127
	Cesium (Cs)-Total (mg/kg)		0.0601	0.0683	0.0419	0.0615	0.0516
	Cesium (Cs)-Total (mg/kg wwt)		0.0125	0.0139	0.0096	0.0138	0.0109
	Chromium (Cr)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Chromium (Cr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040
	Cobalt (Co)-Total (mg/kg)		<0.020	<0.020	<0.020	<0.020	<0.020
	Cobalt (Co)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Copper (Cu)-Total (mg/kg)		0.85	0.73	1.57	1.62	0.83
	Copper (Cu)-Total (mg/kg wwt)		0.176	0.149	0.358	0.364	0.177
	Iron (Fe)-Total (mg/kg)		10.8	9.6	15.8	17.2	10.0
	Iron (Fe)-Total (mg/kg wwt)		2.2	2.0	3.6	3.8	2.1
	Lead (Pb)-Total (mg/kg)		<0.050	<0.050	<0.050	<0.050	<0.050
	Lead (Pb)-Total (mg/kg wwt)		<0.010	<0.010	<0.010	<0.010	<0.010
	Lithium (Li)-Total (mg/kg)		<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)		1410	1320	1210	1370	1280
	Magnesium (Mg)-Total (mg/kg wwt)		293	270	277	307	271
	Manganese (Mn)-Total (mg/kg)		3.65	2.90	2.65	1.81	0.560
	Manganese (Mn)-Total (mg/kg wwt)		0.757	0.593	0.606	0.406	0.119

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID				
	L1527095-16 Other 25-SEP-14 14:00 LNS-16				
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)	79.1			
Metals	Aluminum (Al)-Total (mg/kg)	<5.0			
	Aluminum (Al)-Total (mg/kg wwt)	<1.0			
	Antimony (Sb)-Total (mg/kg)	<0.010			
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020			
	Arsenic (As)-Total (mg/kg)	0.123			
	Arsenic (As)-Total (mg/kg wwt)	0.0257			
	Barium (Ba)-Total (mg/kg)	0.485			
	Barium (Ba)-Total (mg/kg wwt)	0.101			
	Beryllium (Be)-Total (mg/kg)	<0.010			
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020			
	Bismuth (Bi)-Total (mg/kg)	<0.010			
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020			
	Boron (B)-Total (mg/kg)	<1.0			
	Boron (B)-Total (mg/kg wwt)	<0.20			
	Cadmium (Cd)-Total (mg/kg)	<0.010			
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0020			
	Calcium (Ca)-Total (mg/kg)	2400			
	Calcium (Ca)-Total (mg/kg wwt)	501			
	Cesium (Cs)-Total (mg/kg)	0.0563			
	Cesium (Cs)-Total (mg/kg wwt)	0.0118			
	Chromium (Cr)-Total (mg/kg)	<0.20			
	Chromium (Cr)-Total (mg/kg wwt)	<0.040			
	Cobalt (Co)-Total (mg/kg)	<0.020			
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040			
	Copper (Cu)-Total (mg/kg)	2.30			
	Copper (Cu)-Total (mg/kg wwt)	0.481			
	Iron (Fe)-Total (mg/kg)	13.4			
	Iron (Fe)-Total (mg/kg wwt)	2.8			
	Lead (Pb)-Total (mg/kg)	<0.050			
	Lead (Pb)-Total (mg/kg wwt)	<0.010			
	Lithium (Li)-Total (mg/kg)	<0.50			
	Lithium (Li)-Total (mg/kg wwt)	<0.10			
	Magnesium (Mg)-Total (mg/kg)	1370			
	Magnesium (Mg)-Total (mg/kg wwt)	287			
	Manganese (Mn)-Total (mg/kg)	3.67			
	Manganese (Mn)-Total (mg/kg wwt)	0.766			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID Description Sampled Date Sampled Time Client ID	L1527095-1 Other 25-SEP-14 14:00 LNS-1	L1527095-2 Other 25-SEP-14 14:00 LNS-2	L1527095-3 Other 25-SEP-14 14:00 LNS-3	L1527095-4 Other 25-SEP-14 14:00 LNS-4	L1527095-5 Other 25-SEP-14 14:00 LNS-5
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)	0.375	0.302	0.188	0.370	0.391	
	Mercury (Hg)-Total (mg/kg wwt)	0.0771	0.0622	0.0415	0.0772	0.0845	
	Molybdenum (Mo)-Total (mg/kg)	<0.040	<0.040	<0.040	<0.040	<0.040	
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	
	Phosphorus (P)-Total (mg/kg)	8880	12500	9500	9700	10500	
	Phosphorus (P)-Total (mg/kg wwt)	1830	2580	2100	2020	2280	
	Potassium (K)-Total (mg/kg)	20900	24600	20000	21500	21900	
	Potassium (K)-Total (mg/kg wwt)	4290	5070	4430	4480	4740	
	Rubidium (Rb)-Total (mg/kg)	7.58	10.9	13.8	8.37	8.17	
	Rubidium (Rb)-Total (mg/kg wwt)	1.56	2.24	3.05	1.75	1.77	
	Selenium (Se)-Total (mg/kg)	5.23	5.36	5.14	7.81	4.64	
	Selenium (Se)-Total (mg/kg wwt)	1.08	1.11	1.14	1.63	1.00	
	Sodium (Na)-Total (mg/kg)	1230	1750	2170	1480	1910	
	Sodium (Na)-Total (mg/kg wwt)	252	361	479	309	414	
	Strontium (Sr)-Total (mg/kg)	0.27	10.2	2.26	0.21	3.52	
	Strontium (Sr)-Total (mg/kg wwt)	0.055	2.10	0.501	0.044	0.762	
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Thallium (Tl)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Zinc (Zn)-Total (mg/kg)	10.5	63.7	17.4	14.6	18.1	
	Zinc (Zn)-Total (mg/kg wwt)	2.16	13.1	3.85	3.05	3.92	
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	

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ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID Description Sampled Date Sampled Time Client ID	L1527095-6 Other 25-SEP-14 14:00 LNS-6	L1527095-7 Other 25-SEP-14 14:00 LNS-7	L1527095-8 Other 25-SEP-14 14:00 LNS-8	L1527095-9 Other 25-SEP-14 14:00 LNS-9	L1527095-10 Other 25-SEP-14 14:00 LNS-10
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)	0.318	0.339	0.493	0.286	0.409	
	Mercury (Hg)-Total (mg/kg wwt)	0.0636	0.0748	0.106	0.0562	0.0884	
	Molybdenum (Mo)-Total (mg/kg)	<0.040	<0.040	<0.040	<0.040	<0.040	
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	
	Phosphorus (P)-Total (mg/kg)	9820	9260	9960	9790	10100	
	Phosphorus (P)-Total (mg/kg wwt)	1960	2050	2140	1920	2190	
	Potassium (K)-Total (mg/kg)	20900	19600	21800	21700	22000	
	Potassium (K)-Total (mg/kg wwt)	4170	4340	4700	4260	4750	
	Rubidium (Rb)-Total (mg/kg)	9.03	7.29	9.44	12.3	10.3	
	Rubidium (Rb)-Total (mg/kg wwt)	1.81	1.61	2.03	2.41	2.22	
	Selenium (Se)-Total (mg/kg)	4.89	6.37	4.40	7.34	4.33	
	Selenium (Se)-Total (mg/kg wwt)	0.977	1.41	0.946	1.44	0.937	
	Sodium (Na)-Total (mg/kg)	1850	1190	1640	1640	1710	
	Sodium (Na)-Total (mg/kg wwt)	369	263	353	321	370	
	Strontium (Sr)-Total (mg/kg)	3.51	0.67	0.80	3.15	1.97	
	Strontium (Sr)-Total (mg/kg wwt)	0.703	0.148	0.173	0.618	0.426	
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Thallium (Tl)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	
	Tin (Sn)-Total (mg/kg)	0.12	<0.10	0.11	0.14	<0.10	
	Tin (Sn)-Total (mg/kg wwt)	0.024	<0.020	0.023	0.028	<0.020	
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Zinc (Zn)-Total (mg/kg)	15.4	17.6	13.9	13.0	17.4	
	Zinc (Zn)-Total (mg/kg wwt)	3.07	3.89	2.99	2.54	3.75	
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1527095-11	L1527095-12	L1527095-13	L1527095-14	L1527095-15
		Description	Other	Other	Other	Other	Other
		Sampled Date	25-SEP-14	25-SEP-14	25-SEP-14	25-SEP-14	25-SEP-14
		Sampled Time	14:00	14:00	14:00	14:00	14:00
		Client ID	LNS-11	LNS-12	LNS-13	LNS-14	LNS-15
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)		0.325	0.269	0.452	0.408	0.337
	Mercury (Hg)-Total (mg/kg wwt)		0.0674	0.0550	0.103	0.0914	0.0713
	Molybdenum (Mo)-Total (mg/kg)		<0.040	<0.040	<0.040	<0.040	<0.040
	Molybdenum (Mo)-Total (mg/kg wwt)		<0.0080	<0.0080	<0.0080	<0.0080	<0.0080
	Nickel (Ni)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)		10800	9220	9990	10300	8830
	Phosphorus (P)-Total (mg/kg wwt)		2230	1880	2280	2300	1870
	Potassium (K)-Total (mg/kg)		20900	19500	19700	21000	19300
	Potassium (K)-Total (mg/kg wwt)		4330	3980	4490	4710	4090
	Rubidium (Rb)-Total (mg/kg)		8.93	13.7	7.25	9.01	9.19
	Rubidium (Rb)-Total (mg/kg wwt)		1.85	2.79	1.66	2.02	1.95
	Selenium (Se)-Total (mg/kg)		4.63	8.49	4.93	4.36	5.70
	Selenium (Se)-Total (mg/kg wwt)		0.959	1.73	1.13	0.979	1.21
	Sodium (Na)-Total (mg/kg)		2170	2150	1980	1950	2170
	Sodium (Na)-Total (mg/kg wwt)		449	439	451	438	459
	Strontium (Sr)-Total (mg/kg)		7.20	1.62	4.21	5.04	0.71
	Strontium (Sr)-Total (mg/kg wwt)		1.49	0.331	0.961	1.13	0.151
	Tellurium (Te)-Total (mg/kg)		<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Thallium (Tl)-Total (mg/kg wwt)		<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Tin (Sn)-Total (mg/kg)		<0.10	<0.10	0.19	0.15	0.20
	Tin (Sn)-Total (mg/kg wwt)		<0.020	<0.020	0.042	0.033	0.043
	Uranium (U)-Total (mg/kg)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)		<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)		<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)		19.8	12.3	30.9	18.2	17.2
	Zinc (Zn)-Total (mg/kg wwt)		4.11	2.52	7.06	4.08	3.64
	Zirconium (Zr)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID				
	L1527095-16 Other 25-SEP-14 14:00 LNS-16				
Grouping	Analyte				
TISSUE					
Metals	Mercury (Hg)-Total (mg/kg)	0.259			
	Mercury (Hg)-Total (mg/kg wwt)	0.0541			
	Molybdenum (Mo)-Total (mg/kg)	<0.040			
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0080			
	Nickel (Ni)-Total (mg/kg)	<0.20			
	Nickel (Ni)-Total (mg/kg wwt)	<0.040			
	Phosphorus (P)-Total (mg/kg)	10400			
	Phosphorus (P)-Total (mg/kg wwt)	2160			
	Potassium (K)-Total (mg/kg)	20300			
	Potassium (K)-Total (mg/kg wwt)	4230			
	Rubidium (Rb)-Total (mg/kg)	13.7			
	Rubidium (Rb)-Total (mg/kg wwt)	2.86			
	Selenium (Se)-Total (mg/kg)	4.87			
	Selenium (Se)-Total (mg/kg wwt)	1.02			
	Sodium (Na)-Total (mg/kg)	1750			
	Sodium (Na)-Total (mg/kg wwt)	366			
	Strontium (Sr)-Total (mg/kg)	5.55			
	Strontium (Sr)-Total (mg/kg wwt)	1.16			
	Tellurium (Te)-Total (mg/kg)	<0.020			
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040			
	Thallium (Tl)-Total (mg/kg)	<0.0020			
	Thallium (Tl)-Total (mg/kg wwt)	<0.00040			
	Tin (Sn)-Total (mg/kg)	0.13			
	Tin (Sn)-Total (mg/kg wwt)	0.028			
	Uranium (U)-Total (mg/kg)	<0.0020			
	Uranium (U)-Total (mg/kg wwt)	<0.00040			
	Vanadium (V)-Total (mg/kg)	<0.10			
	Vanadium (V)-Total (mg/kg wwt)	<0.020			
	Zinc (Zn)-Total (mg/kg)	37.9			
	Zinc (Zn)-Total (mg/kg wwt)	7.91			
	Zirconium (Zr)-Total (mg/kg)	<0.20			
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Copper (Cu)-Total	DUP-H	L1527095-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Copper (Cu)-Total	DUP-H	L1527095-1, -10, -11, -12, -13, -14, -15, -16, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-WET-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (WET)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (WET)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on wet weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
<p>This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

LNS-1-8 POL LK GN LNS-9-16 POL LK GN

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Report To	Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company: Mount Polley Mining Corp.	<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)
Contact: C.Bettles, Natalie Neufeld, Laura McOrmond, Lee Nikl	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address: PO Box 12, Likely, BC V0L 1N0 Vancouver, BC V6C 3B6	Email 1: Natalie.Neufeld@sncjavalin.com Email 2: Cory.Bettles@sncjavalin.com	<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
Phone: 2507902215x2560 Fax:	Email 3: ckoenig@redchrimjine.ca	<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT

Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No	Client / Project Information	Analysis Request
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Company: Contact: Address: Phone:	Job #: PO / AFE: LSD: Quote #:	Please indicate below Filtered, Preserved or both (F, P, F/P)
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ALS Contact: Can Dang	Sampler: C. Koenig
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Sample #	Sample Description (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Whole body metals	Tissue(METALS)	% Moisture content	Liver(METALS)	Number of Containers
█	LNS-9	25-09-14	14:00	Other	X				
█	LNS-10	25-09-14	14:00	Other	X				
█	LNS-11	25-09-14	14:00	Other	X				
█	LNS-12	25-09-14	14:00	Other	X				
█	LNS-13	25-09-14	14:00	Other	X				
█	LNS-14	25-09-14	14:00	Other	X				
█	LNS-15	25-09-14	14:00	Other	X				
█	LNS-16	25-09-14	14:00	Other	X				
█									
█									
█									
█									

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

LNS=Long nose sucker, no livers taken as they were connected to the anal tracts throughout body cavity attempted Liver separation resulted in a mess and contamination of Liver samples*

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT, RELEASE (client use)			SHIPMENT, RECEPTION (lab use only)			SHIPMENT, VERIFICATION (lab use only)				
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:
C. Koenig	Sep 30/14	17:00	Ju	over	07:50	1 °C				Yes / No ? If Yes add SIF

Report To	Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company: <u>Mount Polley Mining Corp.</u>	<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)
Contact: <u>C.Bettes, Natalie Neufeld, Laura McOrmond, Lee Niki</u>	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address: <u>PO Box 12, Likely, BC V0L 1N0</u>	Email 1: <u>Natalie.Neufeld@snclavalin.com</u>	<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
<u>Vancouver, BC V6C 3B6</u>	Email 2: <u>Cory.Bettes@snclavalin.com</u>	<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone: <u>2507902215x2560</u> Fax:	Email 3: <u>ckoenig@redchrismine.ca</u>	

Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Client / Project Information	Analysis Request				
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No	Job #:	Please indicate below Filtered, Preserved or both (F, P, F/P)				
Company:	PO / AFE:	Whole body metals	Tissue(METALS)	% Moisture content	Liver(METALS)	Number of Containers
Contact:	LSD:					
Address:	Quote #:					
Phone:	ALS Contact: <u>Can Dang</u>					
	Sampler: <u>C. Koenig</u>					



L1527095-COFC

Sample #	Sample Identification (This description will appear in the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	Whole body metals	Tissue(METALS)	% Moisture content	Liver(METALS)	Number of Containers						
███	LNS-1	25-09-14	14:00	Other	X										
███	LNS-2	25-09-14	14:00	Other	X										
███	LNS-3	25-09-14	14:00	Other	X										
███	LNS-4	25-09-14	14:00	Other	X										
███	LNS-5	25-09-14	14:00	Other	X										
███	LNS-6	25-09-14	14:00	Other	X										
███	LNS-7	25-09-14	14:00	Other	X										
███	LNS-8	25-09-14	14:00	Other	X										

Short Holding Time

Rush Processing

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

LNS-Long nose sucker, no livers taken as they were connected to the anal tracts throughout body cavity attempted Liver separation resulted in a mess and contamination of Liver samples*

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT, RELEASE (client use)			SHIPMENT, RECEPTION (lab use only)			SHIPMENT, VERIFICATION (lab use only)				
Released by: <u>C. Koenig</u>	Date (dd-mm-yy): <u>Sep 30/14</u>	Time (hh-mm): <u>17:00</u>	Received by: <u>JK</u>	Date: <u>09/2</u>	Time: <u>17:50</u>	Temperature: <u>1 °C</u>	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF



Sample Receipt Confirmation

Report Distribution:

Company Name: MOUNT POLLEY MINING CORP.
Contact: Colleen Hughes
Address: PO Box 12,
Likely, BC, V0L 1N0
Phone: 250-790-2215
Fax: 250-790-2268
Email: chughes@mountpolley.com
kmcmaheh@mountpolley.com
afrye@mountpolley.com
NATALIE.NEUFELD@SNCLAVALIN.COM
CKOENIG@RECHRISMINE.CA
CORY.BETTLES@SNCLAVALIN.COM

Report Name: CROSSTAB_ALS
Digital Type: EHS_MOUNTP
Digital Email: chughes@mountpolley.com
kmcmaheh@mountpolley.com
NATALIE.NEUFELD@SNCLAVALIN.COM
CKOENIG@RECHRISMINE.CA
CORY.BETTLES@SNCLAVALIN.COM

Distribution: Hard Copy: N Email: Y Fax: N

Invoice Distribution:

Acct Name: MOUNT POLLEY MINING CORP.
Contact: Accounts Payable
Address: PO Box 12,
Likely, BC, V0L 1N0
Phone: 250-790-2215
Fax: --
Invoice Email: prosette@mountpolley.com
chughes@mountpolley.com
Project #: N/A
Account #: MPM100

Client Information:

Job Reference #: _____
Project PO #: _____
Legal Site Description: N/A
Quote #: N/A

Date Sampled: 25-SEP-14
Date Received: 02-OCT-14
Sampled By: C KOENIG
Chain Of Custody: LNS-1-8 POL LK GN, LNS-9-16 POL LK GN

Workorder Summary:

Lab Work Order #: L1527095
Estimated completion date: 17-NOV-14
16 Samples received at ALS in: VANCOUVER

Account Manager: Can Dang
Estimated sample disposal date: 17-DEC-14

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type	Client Job#
L1527095-1	LNS-1	25-SEP-14 14:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527095-2	LNS-2	25-SEP-14 14:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527095-3	LNS-3	25-SEP-14 14:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527095-4	LNS-4	25-SEP-14 14:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527095-5	LNS-5	25-SEP-14 14:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527095-6	LNS-6	25-SEP-14 14:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527095-7	LNS-7	25-SEP-14 14:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527095-8	LNS-8	25-SEP-14 14:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527095-9	LNS-9	25-SEP-14 14:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527095-10	LNS-10	25-SEP-14 14:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527095-11	LNS-11	25-SEP-14 14:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527095-12	LNS-12	25-SEP-14 14:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527095-13	LNS-13	25-SEP-14 14:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527095-14	LNS-14	25-SEP-14 14:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527095-15	LNS-15	25-SEP-14 14:00	02-OCT-14 10:50	17-NOV-14		OTHER	
L1527095-16	LNS-16	25-SEP-14 14:00	02-OCT-14 10:50	17-NOV-14		OTHER	



Analysis Requested :

	Sample Handling and Disposal Fee	Mercury in Tissue by CVAFS [DRY]	Mercury in Tissue by CVAFS [WET]	Metals in Tissue by CRC ICPMS [DRY]	Metals in Tissue by CRC ICPMS [WET]	% Moisture in Tissues	Tissue/Vegetation Sample Preparation
LNS-1	✓	✓	✓	✓	✓	✓	✓
LNS-2	✓	✓	✓	✓	✓	✓	✓
LNS-3	✓	✓	✓	✓	✓	✓	✓
LNS-4	✓	✓	✓	✓	✓	✓	✓
LNS-5	✓	✓	✓	✓	✓	✓	✓
LNS-6	✓	✓	✓	✓	✓	✓	✓
LNS-7	✓	✓	✓	✓	✓	✓	✓
LNS-8	✓	✓	✓	✓	✓	✓	✓
LNS-9	✓	✓	✓	✓	✓	✓	✓
LNS-10	✓	✓	✓	✓	✓	✓	✓
LNS-11	✓	✓	✓	✓	✓	✓	✓
LNS-12	✓	✓	✓	✓	✓	✓	✓
LNS-13	✓	✓	✓	✓	✓	✓	✓
LNS-14	✓	✓	✓	✓	✓	✓	✓
LNS-15	✓	✓	✓	✓	✓	✓	✓
LNS-16	✓	✓	✓	✓	✓	✓	✓

Sample Integrity Observations: No observations were identified for this work order submission.

ALS Group strives to deliver on-time results to our clients at all times. However, there are times when due to capacity issues or other unforeseen circumstances we are unable to meet our expected turnaround times. The information above is related to a recent workorder you have submitted to our laboratory. In the event that you have an inquiry, please refer to the Lab Work Order # when calling your Account Manager.

Report To	Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company: Mount Polley Mining Corp.	<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)
Contact: C.Bettles, Natalie Neufeld, Laura McOrmond, Lee Nikl	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address: PO Box 12, Likely, BC V0L 1N0 Vancouver, BC V6C 3B6	Email 1: Natalie.Neufeld@sncjavalin.com Email 2: Cory.Bettles@sncjavalin.com	<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
Phone: 2507902215x2560 Fax:	Email 3: ckoenig@redchrimjine.ca	<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT

Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No	Client / Project Information	Analysis Request
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Company: Contact: Address: Phone:	Job #: PO / AFE: LSD: Quote #:	Please indicate below Filtered, Preserved or both (F, P, F/P)
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Lab Work (lab use) L1527095-COFC	ALS Contact: Can Dang	Sampler: C. Koenig
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Sample #	Sample Description (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Whole body metals	Tissue(METALS)	% Moisture content	Liver(METALS)	Number of Containers
█	LNS-9	25-09-14	14:00	Other	X				
█	LNS-10	25-09-14	14:00	Other	X				
█	LNS-11	25-09-14	14:00	Other	X				
█	LNS-12	25-09-14	14:00	Other	X				
█	LNS-13	25-09-14	14:00	Other	X				
█	LNS-14	25-09-14	14:00	Other	X				
█	LNS-15	25-09-14	14:00	Other	X				
█	LNS-16	25-09-14	14:00	Other	X				
█									
█									
█									
█									

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

LNS=Long nose sucker, no livers taken as they were connected to the anal tracts throughout body cavity attempted Liver separation resulted in a mess and contamination of Liver samples*
 Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
 Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT, RELEASE (client use)			SHIPMENT, RECEPTION (lab use only)			SHIPMENT, VERIFICATION (lab use only)				
Released by: C. Koenig	Date (dd-mmm-yy): Sep 30/14	Time (hh-mm): 17:00	Received by: JK	Date: over	Time: 07:50	Temperature: 1 °C	Verified by:	Date:	Time:	Observations: Yes / No? If Yes add SIF

Report To		Report Format / Distribution			Service Requested (Rush for routine analysis subject to availability)					
Company: Mount Polley Mining Corp.		<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)					
Contact: C.Bettes, Natalie Neufeld, Laura McOrmond, Lee Niki		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT					
Address: PO Box 12, Likely, BC V0L 1N0		Email 1: Natalie.Neufeld@snclavalin.com			<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT					
Vancouver, BC V6C 3B6		Email 2: Cory.Bettes@snclavalin.com			<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT					
Phone: 2507902215x2560 Fax:		Email 3: ckoenig@redchrismine.ca			Analysis Request					
Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Client / Project Information			Please indicate below Filtered, Preserved or both (F, P, F/P)					
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		Job #:			Whole body metals	Tissue(METALS)	% Moisture content	Liver(METALS)	Number of Containers	
Company:		PO / AFE:								
Contact:		LSD:								
Address:		Quote #:								
Phone:		ALS Contact: Can Dang Sampler: C. Koenig								
 Lab Work (lab use) L1527095-COFC										
Sample #	Sample Identification (This description will appear in the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type						
	LNS-1	25-09-14	14:00	Other	X					
	LNS-2	25-09-14	14:00	Other	X					
	LNS-3	25-09-14	14:00	Other	X					
	LNS-4	25-09-14	14:00	Other	X					
	LNS-5	25-09-14	14:00	Other	X					
	LNS-6	25-09-14	14:00	Other	X					
	LNS-7	25-09-14	14:00	Other	X					
	LNS-8	25-09-14	14:00	Other	X					
<div style="border: 2px solid black; padding: 10px; transform: rotate(-15deg); display: inline-block;"> Short Holding Time Rush Processing </div>										
Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details										
<p>*LNS-Long nose sucker, no livers taken as they were connected to the anal tracts throughout body cavity* attempted Liver separation resulted in a mess and contamination of Liver samples*</p> <p>Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.</p> <p>By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.</p> <p>Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.</p>										
SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)				
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
C. Koenig	Sep 30/14	17:00	JK	Oct 2	17:50	1 °C				



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC V0L 1N0

Date Received: 24-OCT-14
Report Date: 05-JAN-15 12:08 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1538008
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

Comments: Please see the attached document for total weight and fork length measurements.

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1538008-1 TISSUE 23-OCT-14 19:37 QUESNEL NORTH 1	L1538008-2 TISSUE 23-OCT-14 19:37 QUESNEL NORTH 2	L1538008-3 TISSUE 23-OCT-14 19:37 QUESNEL NORTH 3	L1538008-4 TISSUE 23-OCT-14 19:37 QUESNEL NORTH 4	L1538008-5 TISSUE 23-OCT-14 19:37 QUESNEL NORTH 5
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)				
	73.5	72.1	74.2	78.9	71.1
Metals	Aluminum (Al)-Total (mg/kg wwt)				
	4.61	9.9	4.3	3.34	6.26
	Antimony (Sb)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	0.0029 ^{RRU}
	Arsenic (As)-Total (mg/kg wwt)				
	0.124	0.111	0.0865	0.125	0.132
	Barium (Ba)-Total (mg/kg wwt)				
	0.621	0.786	0.337	0.404	0.583
	Beryllium (Be)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)				
	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)				
	0.0184	0.0489	0.0309	0.0189	0.0228
	Calcium (Ca)-Total (mg/kg wwt)				
	5250	7790	5550	5520	6610
	Cesium (Cs)-Total (mg/kg wwt)				
	0.0358	0.0461	0.0416	0.0397	0.0385
	Chromium (Cr)-Total (mg/kg wwt)				
	0.024	0.044	<0.040	0.013	0.025
	Cobalt (Co)-Total (mg/kg wwt)				
	0.0294	0.0336	0.0270	0.0289	0.0283
	Copper (Cu)-Total (mg/kg wwt)				
	1.20	0.715	0.918	1.31	1.41
	Iron (Fe)-Total (mg/kg wwt)				
	17.3	33.2	16.4	17.0	20.0
	Lead (Pb)-Total (mg/kg wwt)				
	0.0123	0.044	0.019	0.0134	0.0150
	Lithium (Li)-Total (mg/kg wwt)				
	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)				
	325	278	287	333	341
	Manganese (Mn)-Total (mg/kg wwt)				
	1.52	2.52	1.43	1.46	1.59
	Mercury (Hg)-Total (mg/kg wwt)				
	0.0390	0.0295	0.0274	0.0399	0.0409
	Molybdenum (Mo)-Total (mg/kg wwt)				
	0.0122	0.0165	0.0153	0.0137	0.0180
	Nickel (Ni)-Total (mg/kg wwt)				
	0.044	0.079	0.060	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg wwt)				
	5140	5200	4340	5170	5840
	Potassium (K)-Total (mg/kg wwt)				
	3080	2690	2740	3270	3200
	Rubidium (Rb)-Total (mg/kg wwt)				
	4.96	5.11	5.13	5.36	5.21
	Selenium (Se)-Total (mg/kg wwt)				
	0.415	0.404	0.372	0.430	0.465
	Sodium (Na)-Total (mg/kg wwt)				
	632	599	616	681	681
	Strontium (Sr)-Total (mg/kg wwt)				
	9.41	18.2	11.7	9.44	11.7
	Tellurium (Te)-Total (mg/kg wwt)				
	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)				
	0.0104	0.0111	0.0101	0.0108	0.0123
	Tin (Sn)-Total (mg/kg wwt)				
	<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg wwt)				
	0.00070	0.00147	0.00078	0.00067	0.00074
	Vanadium (V)-Total (mg/kg wwt)				
	<0.020	0.026	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg wwt)				
	44.0	40.3	31.1	44.9	52.0
	Zirconium (Zr)-Total (mg/kg wwt)				
	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID Description Sampled Date Sampled Time Client ID	L1538008-6 TISSUE 23-OCT-14 19:37 QUESNEL NORTH 6	L1538008-7 TISSUE 23-OCT-14 19:37 QUESNEL NORTH 7	L1538008-8 TISSUE 23-OCT-14 19:37 QUESNEL NORTH 8	L1538008-9 TISSUE 23-OCT-14 19:37 QUESNEL NORTH 9	L1538008-10 TISSUE 23-OCT-14 19:37 QUESNEL NORTH 10
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		74.6	71.9	74.5	71.8	72.5
Metals	Aluminum (Al)-Total (mg/kg wwt)		10.9	10.0	9.7	13.5	7.0
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)		0.104	0.115	0.117	0.143	0.110
	Barium (Ba)-Total (mg/kg wwt)		0.484	0.504	0.495	0.835	0.639
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)		0.0324	0.0263	0.0290	0.0502	0.0372
	Calcium (Ca)-Total (mg/kg wwt)		6610	5010	4670	8580	7330
	Cesium (Cs)-Total (mg/kg wwt)		0.0450	0.0363	0.0440	0.0465	0.0451
	Chromium (Cr)-Total (mg/kg wwt)		<0.040	0.033	<0.040	0.052	<0.040
	Cobalt (Co)-Total (mg/kg wwt)		0.0268	0.0365	0.0277	0.0317	0.0287
	Copper (Cu)-Total (mg/kg wwt)		0.917	1.79	1.08	1.19	1.04
	Iron (Fe)-Total (mg/kg wwt)		29.1	24.2	28.5	40.0	24.2
	Lead (Pb)-Total (mg/kg wwt)		0.021	0.0163	0.028	0.047	0.014
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)		322	290	269	363	334
	Manganese (Mn)-Total (mg/kg wwt)		2.76	1.68	2.44	3.42	2.28
	Mercury (Hg)-Total (mg/kg wwt)		0.0296	0.0410	0.0251	0.0281	0.0350
	Molybdenum (Mo)-Total (mg/kg wwt)		0.0136	0.0143	0.0141	0.0182	0.0181
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	0.051	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg wwt)		4830	4850	3970	5650	5250
	Potassium (K)-Total (mg/kg wwt)		2810	3030	2790	3060	2880
	Rubidium (Rb)-Total (mg/kg wwt)		5.20	4.98	5.17	5.63	5.53
	Selenium (Se)-Total (mg/kg wwt)		0.341	0.473	0.344	0.399	0.376
	Sodium (Na)-Total (mg/kg wwt)		610	673	598	638	646
	Strontium (Sr)-Total (mg/kg wwt)		14.1	9.39	11.3	19.5	15.8
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)		0.0104	0.0105	0.00970	0.0134	0.0121
	Tin (Sn)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg wwt)		0.00157	0.00099	0.00137	0.00218	0.00110
	Vanadium (V)-Total (mg/kg wwt)		0.025	0.022	0.020	0.028	<0.020
	Zinc (Zn)-Total (mg/kg wwt)		37.5	42.5	36.6	58.8	42.6
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1538008-11 TISSUE 23-OCT-14 00:14 QUESNEL MIDDLE 1	L1538008-12 TISSUE 23-OCT-14 00:14 QUESNEL MIDDLE 2	L1538008-13 TISSUE 23-OCT-14 00:14 QUESNEL MIDDLE 3	L1538008-14 TISSUE 23-OCT-14 00:14 QUESNEL MIDDLE 4	L1538008-15 TISSUE 23-OCT-14 00:14 QUESNEL MIDDLE 5
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	73.5	74.9	71.5	70.9	69.6
Metals	Aluminum (Al)-Total (mg/kg wwt)	<1.0	10.3	2.5	<1.0	6.1
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)	0.101	0.0952	0.0826	0.0749	0.0847
	Barium (Ba)-Total (mg/kg wwt)	0.626	0.554	0.397	0.435	0.605
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)	0.0224	0.0536	0.0376	0.0212	0.0437
	Calcium (Ca)-Total (mg/kg wwt)	8530	5790	6260	9730	5120
	Cesium (Cs)-Total (mg/kg wwt)	0.0346	0.0339	0.0367	0.0311	0.0351
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Cobalt (Co)-Total (mg/kg wwt)	0.0232	0.0278	0.0288	0.0188	0.0231
	Copper (Cu)-Total (mg/kg wwt)	1.13	0.916	0.899	0.809	1.27
	Iron (Fe)-Total (mg/kg wwt)	22.4	30.1	14.2	16.1	18.1
	Lead (Pb)-Total (mg/kg wwt)	0.015	0.014	0.012	<0.010	0.012
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)	336	270	356	342	318
	Manganese (Mn)-Total (mg/kg wwt)	1.81	2.77	1.37	3.03	2.02
	Mercury (Hg)-Total (mg/kg wwt)	0.0331	0.0341	0.0306	0.0342	0.0381
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0166	0.0162	0.0184	0.0132	0.0150
	Nickel (Ni)-Total (mg/kg wwt)	0.042	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg wwt)	5650	4600	4980	6310	4370
	Potassium (K)-Total (mg/kg wwt)	3070	2970	3010	2780	2920
	Rubidium (Rb)-Total (mg/kg wwt)	4.57	4.28	4.58	4.03	4.39
	Selenium (Se)-Total (mg/kg wwt)	0.511	0.447	0.527	0.509	0.475
	Sodium (Na)-Total (mg/kg wwt)	642	646	645	611	596
	Strontium (Sr)-Total (mg/kg wwt)	17.1	13.0	13.3	18.6	10.5
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)	0.0126	0.0103	0.0122	0.0122	0.0114
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg wwt)	0.00059	0.00125	0.00051	0.00042	0.00066
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.035	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg wwt)	48.6	46.4	38.0	50.5	34.5
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1538008-16 TISSUE 23-OCT-14 00:14 QUESNEL MIDDLE 6	L1538008-17 TISSUE 23-OCT-14 00:14 QUESNEL MIDDLE 7	L1538008-18 TISSUE 23-OCT-14 00:14 QUESNEL MIDDLE 8	L1538008-19 TISSUE 23-OCT-14 00:14 QUESNEL MIDDLE 9	L1538008-20 TISSUE 23-OCT-14 00:14 QUESNEL MIDDLE 10
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	74.8	72.7	69.9	71.8	71.8
Metals	Aluminum (Al)-Total (mg/kg wwt)	4.16	1.2	<1.0	1.3	2.9
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)	0.122	0.0765	0.130	0.0811	0.0945
	Barium (Ba)-Total (mg/kg wwt)	0.411	0.208	0.389	0.563	0.530
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)	0.0268	0.0309	0.0216	0.0280	0.0301
	Calcium (Ca)-Total (mg/kg wwt)	4820	4210	3660	7700	6200
	Cesium (Cs)-Total (mg/kg wwt)	0.0310	0.0315	0.0342	0.0337	0.0324
	Chromium (Cr)-Total (mg/kg wwt)	0.012	<0.040	<0.040	<0.040	<0.040
	Cobalt (Co)-Total (mg/kg wwt)	0.0300	0.0298	0.0244	0.0237	0.0238
	Copper (Cu)-Total (mg/kg wwt)	1.04	0.834	0.808	1.12	1.17
	Iron (Fe)-Total (mg/kg wwt)	14.4	12.9	10.7	18.6	17.6
	Lead (Pb)-Total (mg/kg wwt)	0.0069	<0.010	<0.010	<0.010	<0.010
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)	321	387	256	315	255
	Manganese (Mn)-Total (mg/kg wwt)	1.22	0.937	0.814	1.71	1.83
	Mercury (Hg)-Total (mg/kg wwt)	0.0341	0.0339	0.0375	0.0309	0.0310
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0137	0.0150	0.0160	0.0135	0.0133
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg wwt)	4930	3780	3510	5630	4580
	Potassium (K)-Total (mg/kg wwt)	3160	3070	2860	3000	2850
	Rubidium (Rb)-Total (mg/kg wwt)	4.21	4.42	4.34	4.41	4.14
	Selenium (Se)-Total (mg/kg wwt)	0.502	0.438	0.435	0.445	0.427
	Sodium (Na)-Total (mg/kg wwt)	674	673	618	638	605
	Strontium (Sr)-Total (mg/kg wwt)	8.32	9.00	7.40	16.0	13.0
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)	0.0101	0.00959	0.00988	0.0116	0.00972
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg wwt)	0.00046	<0.00040	<0.00040	0.00050	0.00044
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg wwt)	42.7	36.5	27.6	41.2	41.5
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID Description Sampled Date Sampled Time Client ID	L1538008-21 TISSUE 23-OCT-14 19:15 QUESNEL WEST 1	L1538008-22 TISSUE 23-OCT-14 19:15 QUESNEL WEST 2	L1538008-23 TISSUE 23-OCT-14 19:15 QUESNEL WEST 3	L1538008-24 TISSUE 23-OCT-14 19:15 QUESNEL WEST 4	L1538008-25 TISSUE 23-OCT-14 19:15 QUESNEL WEST 5
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)	68.9	73.4	71.4	73.9	71.9	
Metals	Aluminum (Al)-Total (mg/kg wwt)	5.60	6.60	3.43	8.31	3.92	
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	0.117	
	Arsenic (As)-Total (mg/kg wwt)	0.199	0.160	0.149	0.137	0.205	
	Barium (Ba)-Total (mg/kg wwt)	0.240	0.224	0.216	0.266	0.211	
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Cadmium (Cd)-Total (mg/kg wwt)	0.0370	0.0399	0.0460	0.0361	0.0351	
	Calcium (Ca)-Total (mg/kg wwt)	5000	3920	4640	4340	4800	
	Cesium (Cs)-Total (mg/kg wwt)	0.0205	0.0228	0.0216	0.0247	0.0203	
	Chromium (Cr)-Total (mg/kg wwt)	0.017	<0.010	0.011	0.018	0.015	
	Cobalt (Co)-Total (mg/kg wwt)	0.0136	0.0142	0.0116	0.0159	0.0141	
	Copper (Cu)-Total (mg/kg wwt)	1.82	1.50	1.65	1.20	1.60	
	Iron (Fe)-Total (mg/kg wwt)	16.0	14.9	12.8	17.4	14.9	
	Lead (Pb)-Total (mg/kg wwt)	0.0080	0.0070	0.0103	0.0106	0.0107	
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Magnesium (Mg)-Total (mg/kg wwt)	314	322	333	346	359	
	Manganese (Mn)-Total (mg/kg wwt)	1.08	0.853	0.747	1.13	1.05	
	Mercury (Hg)-Total (mg/kg wwt)	0.0339	0.0296	0.0348	0.0353	0.0277	
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0135	0.0171	0.0162	0.0120	0.0182	
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	
	Phosphorus (P)-Total (mg/kg wwt)	5090	4460	4830	4940	5100	
	Potassium (K)-Total (mg/kg wwt)	3270	3440	3230	3750	3300	
	Rubidium (Rb)-Total (mg/kg wwt)	5.31	5.69	5.37	6.16	5.39	
	Selenium (Se)-Total (mg/kg wwt)	0.610	0.620	0.532	0.687	0.566	
	Sodium (Na)-Total (mg/kg wwt)	689	672	603	686	681	
	Strontium (Sr)-Total (mg/kg wwt)	8.23	6.75	6.96	6.86	7.86	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg wwt)	0.00658	0.00683	0.00755	0.00706	0.00668	
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	0.101	
	Uranium (U)-Total (mg/kg wwt)	0.00057	0.00052	0.00055	0.00072	0.00045	
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.021	<0.020	0.027	<0.020	
	Zinc (Zn)-Total (mg/kg wwt)	40.2	32.4	35.1	32.2	39.3	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1538008-26 TISSUE 23-OCT-14 19:15 QUESNEL WEST 6	L1538008-27 TISSUE 23-OCT-14 19:15 QUESNEL WEST 7	L1538008-28 TISSUE 23-OCT-14 19:15 QUESNEL WEST 8	L1538008-29 TISSUE 23-OCT-14 19:15 QUESNEL WEST 9	L1538008-30 TISSUE 23-OCT-14 19:15 QUESNEL WEST 10
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	72.0	68.9	69.7	72.3	73.5
Metals	Aluminum (Al)-Total (mg/kg wwt)	7.31	4.63	12.5	2.83	6.51
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	0.0025 ^{RRU}	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)	0.188	0.175	0.139	0.177	0.177
	Barium (Ba)-Total (mg/kg wwt)	0.386	0.132	0.282	0.215	0.291
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)	0.0404	0.0248	0.0394	0.0568	0.0376
	Calcium (Ca)-Total (mg/kg wwt)	6110	2130	3360	4740	4800
	Cesium (Cs)-Total (mg/kg wwt)	0.0210	0.0212	0.0212	0.0209	0.0214
	Chromium (Cr)-Total (mg/kg wwt)	0.012	0.019	0.020	0.028	0.015
	Cobalt (Co)-Total (mg/kg wwt)	0.0174	0.0102	0.0171	0.0139	0.0134
	Copper (Cu)-Total (mg/kg wwt)	2.46	1.45	1.52	1.60	2.13
	Iron (Fe)-Total (mg/kg wwt)	23.2	15.0	22.2	15.2	13.9
	Lead (Pb)-Total (mg/kg wwt)	0.0147	0.0069	0.0100	0.0078	0.0073
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)	318	248	278	347	335
	Manganese (Mn)-Total (mg/kg wwt)	1.41	0.535	0.956	0.875	1.06
	Mercury (Hg)-Total (mg/kg wwt)	0.0293	0.0313	0.0435	0.0313	0.0238
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0157	0.0235	0.0156	0.0193	0.0143
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	0.043	<0.040
	Phosphorus (P)-Total (mg/kg wwt)	5770	3320	4110	5080	5120
	Potassium (K)-Total (mg/kg wwt)	3430	3150	3280	3430	3520
	Rubidium (Rb)-Total (mg/kg wwt)	5.64	5.36	5.40	5.60	5.72
	Selenium (Se)-Total (mg/kg wwt)	0.627	0.632	0.592	0.630	0.591
	Sodium (Na)-Total (mg/kg wwt)	696	619	623	708	679
	Strontium (Sr)-Total (mg/kg wwt)	9.87	3.26	5.00	7.66	7.91
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)	0.00710	0.00680	0.00683	0.00700	0.00652
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg wwt)	0.00066	<0.00040	0.00066	0.00056	0.00079
	Vanadium (V)-Total (mg/kg wwt)	0.024	<0.020	0.036	<0.020	0.023
	Zinc (Zn)-Total (mg/kg wwt)	51.6	31.7	31.6	43.3	31.5
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1538008-31	L1538008-32	L1538008-33	L1538008-34	L1538008-35
		Description	TISSUE	TISSUE	TISSUE	TISSUE	TISSUE
		Sampled Date	23-OCT-14	23-OCT-14	23-OCT-14	23-OCT-14	23-OCT-14
		Sampled Time	19:12	19:12	19:12	19:12	19:12
		Client ID	QUESNEL EAST 1	QUESNEL EAST 2	QUESNEL EAST 3	QUESNEL EAST 4	QUESNEL EAST 5
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		70.6	69.9	69.4	72.4	74.3
Metals	Aluminum (Al)-Total (mg/kg wwt)		4.9	<1.0	1.4	3.94	4.07
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	0.0026 ^{RRU}
	Arsenic (As)-Total (mg/kg wwt)		0.0980	0.117	0.101	0.0928	0.0893
	Barium (Ba)-Total (mg/kg wwt)		1.04	0.313	0.255	0.414	0.420
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)		0.0535	0.0182	0.0270	0.0278	0.0172
	Calcium (Ca)-Total (mg/kg wwt)		9630	3510	4870	6030	5490
	Cesium (Cs)-Total (mg/kg wwt)		0.0352	0.0257	0.0323	0.0324	0.0344
	Chromium (Cr)-Total (mg/kg wwt)		<0.040	0.054	<0.040	0.012	0.013
	Cobalt (Co)-Total (mg/kg wwt)		0.0272	0.0222	0.0273	0.0345	0.0343
	Copper (Cu)-Total (mg/kg wwt)		0.830	1.07	1.11	1.08	1.08
	Iron (Fe)-Total (mg/kg wwt)		24.1	14.4	15.6	17.4	18.3
	Lead (Pb)-Total (mg/kg wwt)		0.059	0.034	0.031	0.0356	0.0403
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)		353	190	305	361	332
	Manganese (Mn)-Total (mg/kg wwt)		3.00	0.895	0.982	1.17	0.959
	Mercury (Hg)-Total (mg/kg wwt)		0.0338	0.0319	0.0337	0.0430	0.0449
	Molybdenum (Mo)-Total (mg/kg wwt)		0.0164	0.0182	0.0238	0.0140	0.0147
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg wwt)		6670	3100	4100	5670	5450
	Potassium (K)-Total (mg/kg wwt)		3190	2590	2830	3390	3590
	Rubidium (Rb)-Total (mg/kg wwt)		4.58	3.64	4.17	4.49	4.66
	Selenium (Se)-Total (mg/kg wwt)		0.436	0.407	0.494	0.557	0.557
	Sodium (Na)-Total (mg/kg wwt)		578	633	630	721	684
	Strontium (Sr)-Total (mg/kg wwt)		20.6	7.11	8.77	9.93	9.36
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)		0.0123	0.00804	0.0110	0.0115	0.0119
	Tin (Sn)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg wwt)		0.00097	<0.00040	0.00098	0.00041	0.00095
	Vanadium (V)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg wwt)		56.0	41.1	39.8	52.3	48.6
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1538008-36 TISSUE 23-OCT-14 19:12 QUESNEL EAST 6	L1538008-37 TISSUE 23-OCT-14 19:12 QUESNEL EAST 7	L1538008-38 TISSUE 23-OCT-14 19:12 QUESNEL EAST 8	L1538008-39 TISSUE 23-OCT-14 19:12 QUESNEL EAST 9	L1538008-40 TISSUE 23-OCT-14 19:12 QUESNEL EAST 10
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	72.5	70.6	72.8	73.2	70.5
Metals	Aluminum (Al)-Total (mg/kg wwt)	2.8	1.8	2.9	2.2	1.1
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)	0.0850	0.0797	0.0915	0.0841	0.0820
	Barium (Ba)-Total (mg/kg wwt)	0.317	0.294	0.833	0.438	0.407
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)	0.0343	0.0328	0.0389	0.0201	0.0250
	Calcium (Ca)-Total (mg/kg wwt)	4640	5910	8510	3630	6250
	Cesium (Cs)-Total (mg/kg wwt)	0.0370	0.0357	0.0322	0.0359	0.0399
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Cobalt (Co)-Total (mg/kg wwt)	0.0199	0.0226	0.0249	0.0186	0.0233
	Copper (Cu)-Total (mg/kg wwt)	0.997	0.844	1.02	0.967	1.05
	Iron (Fe)-Total (mg/kg wwt)	15.5	16.8	22.8	12.5	13.2
	Lead (Pb)-Total (mg/kg wwt)	0.038	0.037	0.064	0.024	0.039
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg wwt)	295	297	320	275	323
	Manganese (Mn)-Total (mg/kg wwt)	1.26	1.04	1.76	1.21	1.25
	Mercury (Hg)-Total (mg/kg wwt)	0.0382	0.0421	0.0332	0.0346	0.0341
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0113	0.0147	0.0149	0.0156	0.0119
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg wwt)	4020	4600	5790	3540	5070
	Potassium (K)-Total (mg/kg wwt)	3320	3060	2960	2930	3020
	Rubidium (Rb)-Total (mg/kg wwt)	4.69	4.41	4.23	4.36	4.51
	Selenium (Se)-Total (mg/kg wwt)	0.421	0.498	0.459	0.395	0.446
	Sodium (Na)-Total (mg/kg wwt)	605	622	678	588	640
	Strontium (Sr)-Total (mg/kg wwt)	8.92	11.0	17.6	7.44	11.9
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)	0.0107	0.0113	0.0121	0.00868	0.0106
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	0.043
	Uranium (U)-Total (mg/kg wwt)	0.00063	0.00047	0.00089	0.00044	0.00046
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg wwt)	37.7	37.5	48.4	31.1	33.3
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Aluminum (Al)-Total	DUP-H	L1538008-10, -11, -12, -13, -14, -15, -17, -18, -19, -2, -3, -31, -33, -37, -38, -39, -40, -6, -8, -9
Duplicate	Iron (Fe)-Total	DUP-H	L1538008-10, -11, -12, -13, -14, -15, -17, -18, -19, -2, -3, -31, -33, -37, -38, -39, -40, -6, -8, -9
Duplicate	Manganese (Mn)-Total	DUP-H	L1538008-10, -11, -12, -13, -14, -15, -17, -18, -19, -2, -3, -31, -33, -37, -38, -39, -40, -6, -8, -9
Duplicate	Zinc (Zn)-Total	DUP-H	L1538008-10, -11, -12, -13, -14, -15, -17, -18, -19, -2, -3, -31, -33, -37, -38, -39, -40, -6, -8, -9
Duplicate	Aluminum (Al)-Total	DUP-H	L1538008-14, -20, -32, -36
Duplicate	Barium (Ba)-Total	DUP-H	L1538008-14, -20, -32, -36
Duplicate	Magnesium (Mg)-Total	DUP-H	L1538008-14, -20, -32, -36
Duplicate	Manganese (Mn)-Total	DUP-H	L1538008-14, -20, -32, -36
Duplicate	Uranium (U)-Total	DUP-H	L1538008-14, -20, -32, -36
Duplicate	Antimony (Sb)-Total	RRU	L1538008-27

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
RRU	Reported Result is Uncertain due to proximity to the estimated Method Detection Limit.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-WET-CVAFS-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1991). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7. This digestion procedure was implemented on October 5, 2009.</p> <p>This analysis is not compliant with the requirements of the B.C. Lab Manual for digestion of tissue samples from British Columbia for metals analysis after January 1, 2015.</p>			
HG-WET-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (WET)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
MET-WET-CCMS-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1991). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p> <p>This analysis is not compliant with the requirements of the B.C. Lab Manual for digestion of tissue samples from British Columbia for metals analysis after January 1, 2015.</p>			
MET-WET-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (WET)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on wet weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
<p>This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Reference Information

Laboratory Definition Code **Laboratory Location**

VA ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS LABORATORY GROUP ANALYTICAL REPORT

ALS Lab Work Order #: L1538008

Client ID	Total Weight (g)	Fork Length (cm)
QUESNEL NORTH 1	3.399	7.90
QUESNEL NORTH 2	2.168	7.00
QUESNEL NORTH 3	1.612	7.30
QUESNEL NORTH 4	3.132	7.80
QUESNEL NORTH 5	3.829	8.70
QUESNEL NORTH 6	1.967	7.00
QUESNEL NORTH 7	3.213	8.00
QUESNEL NORTH 8	2.225	7.50
QUESNEL NORTH 9	1.672	6.90
QUESNEL NORTH 10	2.079	6.90
QUESNEL MIDDLE 1	1.827	6.70
QUESNEL MIDDLE 2	1.801	7.00
QUESNEL MIDDLE 3	1.615	7.00
QUESNEL MIDDLE 4	2.738	7.70
QUESNEL MIDDLE 5	2.502	7.50
QUESNEL MIDDLE 6	2.988	7.80
QUESNEL MIDDLE 7	1.316	6.50
QUESNEL MIDDLE 8	2.427	6.60
QUESNEL MIDDLE 9	1.808	6.90
QUESNEL MIDDLE 10	2.593	7.00
QUESNEL WEST 1	5.131	8.90
QUESNEL WEST 2	4.161	9.00
QUESNEL WEST 3	5.263	9.20
QUESNEL WEST 4	3.978	9.50
QUESNEL WEST 5	5.51	9.00
QUESNEL WEST 6	5.484	9.00
QUESNEL WEST 7	9.054	10.30
QUESNEL WEST 8	6.675	9.50
QUESNEL WEST 9	4.139	8.80
QUESNEL WEST 10	4.269	8.50
QUESNEL EAST 1	2.432	7.90
QUESNEL EAST 2	2.755	7.50
QUESNEL EAST 3	2.485	8.00
QUESNEL EAST 4	3.537	8.60
QUESNEL EAST 5	4.356	8.80
QUESNEL EAST 6	3.021	7.80
QUESNEL EAST 7	2.435	7.80
QUESNEL EAST 8	1.953	6.90
QUESNEL EAST 9	2.268	7.40
QUESNEL EAST 10	2.788	7.70



Report to:		Report Format / Distribution			Service Requested: (rush - subject to availability)																			
Company: MOUNT POLLEY MINING CORP.		<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Default)																			
Contact: Colleen Hughes		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge																			
Address: PO BOX 12, Likely, BC, V0L 1N0		Email 1: <u>chughes@mountpolley.com</u>			<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge																			
Phone: 250-790-2215 Fax: 250-790-2268		Email 2: <u>Daniel.Selbie@dfo-mpo.gc.ca</u>			<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS																			
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No		Client / Project Information:			Analysis Request																			
Company:		Job #:			Please indicate below Filtered, Preserved or both (F, P, F/P)																			
Contact:		PO / AFE:			P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Address:		Legal Site Description:																						
Phone: Fax:		Quote #:																						
Lab Work Order # (lab use only)		ALS Contact: Can Dang			Sampler: Garrett Lidin																			
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type																				
	North Arm, Tow 1, 10 Nerka samples (Number 1)	23-Oct-14	19:37 PST	Tissue																				1
	Middle Arm (Lower West Arm), Tow 5, 10 Nerka samples (Number 2)	25-Oct-14	00:14 PST	Tissue																				1
	West Arm, Tow 6, 10 Nerka Samples (Number 3)	26-Oct-14	19:15 PST	Tissue																				1
	East Arm, Tow 9, 10 Nerka Samples (Number 4)	27-Oct-14	19:12 PST	Tissue																				1



L1538008-COFC

Special Instructions / Regulations / Hazardous Details

Please also record fork length, weight, and % moisture. Perform the full suite of metals analyses

Failure to complete all portions of this form may delay analysis. Please fill in this form **LEGIBLY**

By the use of this form the user acknowledges and agrees with the following conditions as specified on the back page of the white report copy.

Released by: <i>[Signature]</i>	Date & Time: Oct 24/14 11:00 hrs	Received by: <i>[Signature]</i>	Date: Oct 24/14	Time: 11:00	Temperature: -3 C	Verified by:	Date & Time:	Observed? Yes / No?
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REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY



Sample Receipt Confirmation

40 Samples received at ALS in VANCOUVER

Job Reference #: N/A
Project PO #: N/A
Legal Site Description: N/A
Quote #: N/A
Lab Work Order #: L1538008
Estimated Completion Date: 12/19/2014

Date Sampled: 10/23/2014
Date Received: 10/24/2014
Sampled By: Garrett Lidin
Chain of Custody: N/A
Account Manager: Can Dang
Estimated Sample Disposal Date: 1/18/2015

Sample Integrity Observations:

Observation	Details
CofC incomplete or unclear	Sampling date > receiving date

Report Distribution:

Company Name: MOUNT POLLEY MINING CORP.
Contact: Colleen Hughes
Address: PO Box 12
Likely, BC V0L 1N0
Phone: 250-790-2215
Fax: 250-790-2268
Email: chughes@mountpolley.com
kmcmaheh@mountpolley.com
Report Name: CROSSTAB_ALS
Digital Type: EHS_MOUNTP
Digital Email: chughes@mountpolley.com
kmcmaheh@mountpolley.com
Distribution: **Hard Copy:** N **Email:** Y **Fax:** N

Invoice Distribution:

Acct Name: MOUNT POLLEY MINING CORP. ~LIKELY
Contact: Accounts Payable
Address: PO Box 12,
Likely, BC, V0L 1N0
Phone: 250-790-2215
Fax: --
Invoice Email: prosette@mountpolley.com
chughes@mountpolley.com
Project #: N/A
Account #: MPM100
Distribution: **Hard Copy:** Y **Email:** Y

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type
L1538008-1	QUESNEL NORTH 1	10/23/2014 7:37 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-2	QUESNEL NORTH 2	10/23/2014 7:37 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-3	QUESNEL NORTH 3	10/23/2014 7:37 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-4	QUESNEL NORTH 4	10/23/2014 7:37 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-5	QUESNEL NORTH 5	10/23/2014 7:37 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-6	QUESNEL NORTH 6	10/23/2014 7:37 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-7	QUESNEL NORTH 7	10/23/2014 7:37 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-8	QUESNEL NORTH 8	10/23/2014 7:37 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700

ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company



Sample Receipt Confirmation

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type
L1538008-9	QUESNEL NORTH 9	10/23/2014 7:37 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-10	QUESNEL NORTH 10	10/23/2014 7:37 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-11	QUESNEL MIDDLE 1	10/23/2014 12:14 AM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-12	QUESNEL MIDDLE 2	10/23/2014 12:14 AM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-13	QUESNEL MIDDLE 3	10/23/2014 12:14 AM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-14	QUESNEL MIDDLE 4	10/23/2014 12:14 AM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-15	QUESNEL MIDDLE 5	10/23/2014 12:14 AM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-16	QUESNEL MIDDLE 6	10/23/2014 12:14 AM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-17	QUESNEL MIDDLE 7	10/23/2014 12:14 AM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-18	QUESNEL MIDDLE 8	10/23/2014 12:14 AM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-19	QUESNEL MIDDLE 9	10/23/2014 12:14 AM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-20	QUESNEL MIDDLE 10	10/23/2014 12:14 AM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-21	QUESNEL WEST 1	10/23/2014 7:15 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-22	QUESNEL WEST 2	10/23/2014 7:15 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-23	QUESNEL WEST 3	10/23/2014 7:15 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-24	QUESNEL WEST 4	10/23/2014 7:15 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-25	QUESNEL WEST 5	10/23/2014 7:15 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-26	QUESNEL WEST 6	10/23/2014 7:15 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-27	QUESNEL WEST 7	10/23/2014 7:15 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-28	QUESNEL WEST 8	10/23/2014 7:15 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-29	QUESNEL WEST 9	10/23/2014 7:15 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-30	QUESNEL WEST 10	10/23/2014 7:15 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-31	QUESNEL EAST 1	10/23/2014 7:12 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-32	QUESNEL EAST 2	10/23/2014 7:12 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-33	QUESNEL EAST 3	10/23/2014 7:12 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-34	QUESNEL EAST 4	10/23/2014 7:12 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-35	QUESNEL EAST 5	10/23/2014 7:12 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-36	QUESNEL EAST 6	10/23/2014 7:12 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-37	QUESNEL EAST 7	10/23/2014 7:12 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-38	QUESNEL EAST 8	10/23/2014 7:12 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE



Sample Receipt Confirmation

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type
L1538008-39	QUESNEL EAST 9	10/23/2014 7:12 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE
L1538008-40	QUESNEL EAST 10	10/23/2014 7:12 PM	10/24/2014 11:00 AM	12/19/2014 5:00 PM		TISSUE



Sample Receipt Confirmation

Analysis Requested:

	Sample Handling and Disposal Fee	Special Request	Mercury in Tissue by CVAFS (WET)	Mercury in Tissue by CVAFS Micro (WET)	Metals in Tissue by CRC ICPMS (WET)	Metals in Tissue by HR-ICPMS Micro (WET)	% Moisture in Tissues	Tissue/Vegetation Micro Preparation	Tissue/Vegetation Sample Preparation
QUESNEL NORTH 1	X	X	X		X		X		X
QUESNEL NORTH 2	X	X		X		X	X	X	X
QUESNEL NORTH 3	X	X		X		X	X	X	X
QUESNEL NORTH 4	X	X	X		X		X		X
QUESNEL NORTH 5	X	X	X		X		X		X
QUESNEL NORTH 6	X	X		X		X	X	X	X
QUESNEL NORTH 7	X	X	X		X		X		X
QUESNEL NORTH 8	X	X		X		X	X	X	X
QUESNEL NORTH 9	X	X		X		X	X	X	X
QUESNEL NORTH 10	X	X		X		X	X	X	X
QUESNEL MIDDLE 1	X	X		X		X	X	X	X
QUESNEL MIDDLE 2	X	X		X		X	X	X	X
QUESNEL MIDDLE 3	X	X		X		X	X	X	X
QUESNEL MIDDLE 4	X	X		X		X	X	X	X
QUESNEL MIDDLE 5	X	X		X		X	X	X	X
QUESNEL MIDDLE 6	X	X	X		X		X		X
QUESNEL MIDDLE 7	X	X		X		X	X	X	X
QUESNEL MIDDLE 8	X	X		X		X	X	X	X
QUESNEL MIDDLE 9	X	X		X		X	X	X	X



Sample Receipt Confirmation

Analysis Requested:

	Sample Handling and Disposal Fee	Special Request	Mercury in Tissue by CVAFS (WET)	Mercury in Tissue by CVAFS Micro (WET)	Metals in Tissue by CRC ICPMS (WET)	Metals in Tissue by HR-ICPMS Micro (WET)	% Moisture in Tissues	Tissue/Vegetation Micro Preparation	Tissue/Vegetation Sample Preparation
QUESNEL MIDDLE 10	X	X		X		X	X	X	X
QUESNEL WEST 1	X	X	X		X		X		X
QUESNEL WEST 2	X	X	X		X		X		X
QUESNEL WEST 3	X	X	X		X		X		X
QUESNEL WEST 4	X	X	X		X		X		X
QUESNEL WEST 5	X	X	X		X		X		X
QUESNEL WEST 6	X	X	X		X		X		X
QUESNEL WEST 7	X	X	X		X		X		X
QUESNEL WEST 8	X	X	X		X		X		X
QUESNEL WEST 9	X	X	X		X		X		X
QUESNEL WEST 10	X	X	X		X		X		X
QUESNEL EAST 1	X	X		X		X	X	X	X
QUESNEL EAST 2	X	X		X		X	X	X	X
QUESNEL EAST 3	X	X		X		X	X	X	X
QUESNEL EAST 4	X	X	X		X		X		X
QUESNEL EAST 5	X	X	X		X		X		X
QUESNEL EAST 6	X	X		X		X	X	X	X
QUESNEL EAST 7	X	X		X		X	X	X	X
QUESNEL EAST 8	X	X		X		X	X	X	X
QUESNEL EAST 9	X	X		X		X	X	X	X



Sample Receipt Confirmation

Analysis Requested:

	Sample Handling and Disposal Fee	Special Request	Mercury in Tissue by CVAFS (WET)	Mercury in Tissue by CVAFS Micro (WET)	Metals in Tissue by CRC ICPMS (WET)	Metals in Tissue by HR-ICPMS Micro (WET)	% Moisture in Tissues	Tissue/Vegetation Micro Preparation	Tissue/Vegetation Sample Preparation
QUESNEL EAST 10	X	X		X		X	X	X	X



Sample Receipt Confirmation

ALS Group strives to deliver on-time results to our clients at all times. However, there are times when due to capacity issues or other unforeseen circumstances we are unable to meet our expected turnaround times. The information above is related to a recent workorder you have submitted to our laboratory. In the event that you have an inquiry, please refer to the Lab Work Order # L1538008 when calling your Account Manager.

ALS Group appreciates your business. Thank you for the opportunity to work with you.



Report to:		Report Format / Distribution			Service Requested: (rush - subject to availability)											
Company: MOUNT POLLEY MINING CORP.		<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Default)											
Contact: Colleen Hughes		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge											
Address: PO BOX 12, Likely, BC, V0L 1N0		Email 1: chughes@mountpolley.com			<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge											
Phone: 250-790-2215 Fax: 250-790-2268		Email 2: Daniel.Selbie@dfo-mpo.gc.ca			<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS											
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No		Client / Project Information:			Analysis Request											
Company:		Job #:			Please indicate below Filtered, Preserved or both (F, P, F/P)											
Contact:		PO / AFE:			P P P P P P P P P P P P P											
Address:		Legal Site Description:														
Phone: Fax:		Quote #:														
Lab Work Order # (lab use only)		ALS Contact: Can Dang			Sampler: Garrett Lidin										Number of Containers	
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type												
	North Arm, Tow 1, 10 Nerka samples (Number 1)	23-Oct-14	19:37 PST	Tissue												1
	Middle Arm (Lower West Arm), Tow 5, 10 Nerka samples (Number 2)	25-Oct-14	00:14 PST	Tissue												1
	West Arm, Tow 6, 10 Nerka Samples (Number 3)	26-Oct-14	19:15 PST	Tissue												1
	East Arm, Tow 9, 10 Nerka Samples (Number 4)	27-Oct-14	19:12 PST	Tissue											1	



L1538008-COFC

Special Instructions / Regulations / Hazardous Details

Please also record fork length, weight, and % moisture. Perform the full suite of metals analyses

Failure to complete all portions of this form may delay analysis. Please fill in this form **LEGIBLY**

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white report copy.

Released by: <i>[Signature]</i>	Date & Time: Oct 24/14 11:00 hrs	Received by: <i>[Signature]</i>	Date: Oct 24/14	Time: 11:00	Temperature: -3 C	Verified by:	Date & Time:	Observed? Yes / No?
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REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 03-JUN-15
Report Date: 06-JUL-15 15:26 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1621080
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: FT-1
Legal Site Desc:

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1621080-1 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-1 - MUSCLE	L1621080-2 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-1 - LIVER	L1621080-3 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-1 - KIDNEY	L1621080-4 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-1 - GONAD	L1621080-5 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-1 - MUSCLE
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)				
	81.0	77.2	83.0	62.2	80.2
Metals	Aluminum (Al)-Total (mg/kg)				
	<2.0	<5.0	<5.0	<2.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)				
	<0.40	<1.0	<1.0	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	0.0033	<0.0020
	Arsenic (As)-Total (mg/kg)				
	<0.020	0.037	0.343	<0.020	0.028
	Arsenic (As)-Total (mg/kg wwt)				
	<0.0040	0.0084	0.0584	0.0042	0.0056
	Barium (Ba)-Total (mg/kg)				
	0.058	0.052	0.221	0.150	0.149
	Barium (Ba)-Total (mg/kg wwt)				
	0.011	0.012	0.038	0.057	0.030
	Beryllium (Be)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)				
	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)				
	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)				
	<0.0050	0.131	0.914	<0.0050	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)				
	<0.0010	0.0299	0.156	<0.0010	<0.0010
	Calcium (Ca)-Total (mg/kg)				
	1060	316	1440	1120	1010
	Calcium (Ca)-Total (mg/kg wwt)				
	202	72.0	245	425	200
	Cesium (Cs)-Total (mg/kg)				
	0.0605	0.0386	0.0608	0.0148	0.0684
	Cesium (Cs)-Total (mg/kg wwt)				
	0.0115	0.0088	0.0104	0.0056	0.0136
	Chromium (Cr)-Total (mg/kg)				
	<0.050	<0.20	0.21	<0.050	<0.050
	Chromium (Cr)-Total (mg/kg wwt)				
	<0.010	<0.040	<0.040	0.013	<0.010
	Cobalt (Co)-Total (mg/kg)				
	<0.020	0.095	0.840	0.070	<0.020
	Cobalt (Co)-Total (mg/kg wwt)				
	<0.0040	0.0217	0.143	0.0266	<0.0040
	Copper (Cu)-Total (mg/kg)				
	2.28	30.8	7.10	6.55	2.34
	Copper (Cu)-Total (mg/kg wwt)				
	0.433	7.01	1.21	2.48	0.464
	Iron (Fe)-Total (mg/kg)				
	34.4	2110	709	40.0	30.8
	Iron (Fe)-Total (mg/kg wwt)				
	6.53	481	121	15.1	6.10
	Lead (Pb)-Total (mg/kg)				
	<0.020	<0.050	<0.050	<0.020	<0.020
	Lead (Pb)-Total (mg/kg wwt)				
	<0.0040	<0.010	<0.010	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg)				
	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)				
	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)				
	1210	691	1060	1500	1210
	Magnesium (Mg)-Total (mg/kg wwt)				
	231	157	181	566	239
	Manganese (Mn)-Total (mg/kg)				
	0.684	7.79	1.95	2.67	0.656
	Manganese (Mn)-Total (mg/kg wwt)				
	0.130	1.77	0.333	1.01	0.130

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1621080-6 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-1X - GONAD	L1621080-7 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-2 - MUSCLE	L1621080-8 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-2 - LIVER	L1621080-9 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-2 - KIDNEY	L1621080-10 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-2 - GONAD
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)				
	61.3	80.8	78.3	80.5	61.0
Metals	Aluminum (Al)-Total (mg/kg)				
	<2.0	<2.0	<5.0	<5.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)				
	<0.40	<0.40	<1.0	<1.0	<0.40
	Antimony (Sb)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)				
	<0.020	0.045	0.045	0.358	0.024
	Arsenic (As)-Total (mg/kg wwt)				
	0.0065	0.0086	0.0098	0.0697	0.0095
	Barium (Ba)-Total (mg/kg)				
	0.145	<0.050	<0.050	0.160	0.092
	Barium (Ba)-Total (mg/kg wwt)				
	0.056	<0.010	<0.010	0.031	0.036
	Beryllium (Be)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)				
	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)				
	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)				
	<0.0050	0.0087	0.058	1.31	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)				
	<0.0010	0.0017	0.0127	0.256	0.0011
	Calcium (Ca)-Total (mg/kg)				
	1160	1240	366	884	1290
	Calcium (Ca)-Total (mg/kg wwt)				
	449	237	79.5	172	505
	Cesium (Cs)-Total (mg/kg)				
	0.0148	0.0551	0.0406	0.0441	0.0159
	Cesium (Cs)-Total (mg/kg wwt)				
	0.0057	0.0106	0.0088	0.0086	0.0062
	Chromium (Cr)-Total (mg/kg)				
	<0.050	<0.050	<0.20	<0.20	<0.050
	Chromium (Cr)-Total (mg/kg wwt)				
	0.015	<0.010	<0.040	<0.040	<0.010
	Cobalt (Co)-Total (mg/kg)				
	0.072	<0.020	0.087	0.434	0.068
	Cobalt (Co)-Total (mg/kg wwt)				
	0.0277	<0.0040	0.0189	0.0846	0.0267
	Copper (Cu)-Total (mg/kg)				
	6.81	2.45	12.7	6.41	8.14
	Copper (Cu)-Total (mg/kg wwt)				
	2.64	0.469	2.76	1.25	3.18
	Iron (Fe)-Total (mg/kg)				
	40.1	35.3	832	562	35.0
	Iron (Fe)-Total (mg/kg wwt)				
	15.5	6.78	181	110	13.6
	Lead (Pb)-Total (mg/kg)				
	<0.020	<0.020	<0.050	<0.050	<0.020
	Lead (Pb)-Total (mg/kg wwt)				
	<0.0040	<0.0040	<0.010	<0.010	<0.0040
	Lithium (Li)-Total (mg/kg)				
	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)				
	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)				
	1540	1290	697	940	1470
	Magnesium (Mg)-Total (mg/kg wwt)				
	596	247	151	183	573
	Manganese (Mn)-Total (mg/kg)				
	2.77	0.642	6.71	2.44	3.34
	Manganese (Mn)-Total (mg/kg wwt)				
	1.07	0.123	1.46	0.476	1.30

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1621080-11 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-3 - MUSCLE	L1621080-12 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-3 - LIVER	L1621080-13 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-3 - KIDNEY	L1621080-14 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-3 - GONAD	L1621080-15 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-4 - MUSCLE
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	82.4	80.9	85.4	64.1	78.9
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<5.0	6.1	<2.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<1.0	<1.0	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.060	0.054	0.336	0.036	0.037
	Arsenic (As)-Total (mg/kg wwt)	0.0105	0.0103	0.0490	0.0129	0.0078
	Barium (Ba)-Total (mg/kg)	<0.050	<0.050	0.228	0.164	0.088
	Barium (Ba)-Total (mg/kg wwt)	<0.010	<0.010	0.033	0.059	0.018
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	0.259	1.08	<0.0050	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	0.0496	0.157	<0.0010	<0.0010
	Calcium (Ca)-Total (mg/kg)	998	362	925	1240	1070
	Calcium (Ca)-Total (mg/kg wwt)	175	69.2	135	444	226
	Cesium (Cs)-Total (mg/kg)	0.0802	0.0516	0.0814	0.0201	0.0747
	Cesium (Cs)-Total (mg/kg wwt)	0.0141	0.0099	0.0119	0.0072	0.0158
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.20	0.22	0.070	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.040	<0.040	0.025	<0.010
	Cobalt (Co)-Total (mg/kg)	<0.020	0.116	1.62	0.116	<0.020
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040	0.0221	0.236	0.0416	0.0042
	Copper (Cu)-Total (mg/kg)	2.44	126	5.95	11.2	2.76
	Copper (Cu)-Total (mg/kg wwt)	0.428	24.2	0.868	4.02	0.583
	Iron (Fe)-Total (mg/kg)	39.6	2970	1020	50.2	37.3
	Iron (Fe)-Total (mg/kg wwt)	6.97	569	148	18.0	7.87
	Lead (Pb)-Total (mg/kg)	<0.020	<0.050	<0.050	<0.020	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.010	<0.010	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1410	693	1130	1310	1240
	Magnesium (Mg)-Total (mg/kg wwt)	248	133	165	469	262
	Manganese (Mn)-Total (mg/kg)	0.490	7.97	2.13	6.81	0.692
	Manganese (Mn)-Total (mg/kg wwt)	0.086	1.53	0.310	2.44	0.146

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Sample ID Description Sampled Date Sampled Time Client ID		L1621080-16 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-4 - LIVER	L1621080-17 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-4 - KIDNEY	L1621080-18 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-4 - GONAD	L1621080-19 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-5 - MUSCLE	L1621080-20 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-5 - LIVER
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	77.8	81.8	61.2	80.1	76.6
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	<5.0	<5.0	<2.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	<1.0	<1.0	<0.40	<1.0
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.056	0.121	<0.030	0.044	0.055
	Arsenic (As)-Total (mg/kg wwt)	0.0123	0.0220	0.0085	0.0087	0.0128
	Barium (Ba)-Total (mg/kg)	<0.050	0.198	0.106	<0.050	<0.050
	Barium (Ba)-Total (mg/kg wwt)	<0.010	0.036	0.041	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.079	0.645	<0.010	<0.0050	0.109
	Cadmium (Cd)-Total (mg/kg wwt)	0.0175	0.117	<0.0020	<0.0010	0.0257
	Calcium (Ca)-Total (mg/kg)	354	663	1100	789	271
	Calcium (Ca)-Total (mg/kg wwt)	78.6	121	427	157	63.6
	Cesium (Cs)-Total (mg/kg)	0.0473	0.0753	0.0187	0.0746	0.0544
	Cesium (Cs)-Total (mg/kg wwt)	0.0105	0.0137	0.0072	0.0148	0.0127
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.050	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.010	<0.040
	Cobalt (Co)-Total (mg/kg)	0.094	0.778	0.062	<0.020	0.085
	Cobalt (Co)-Total (mg/kg wwt)	0.0209	0.141	0.0240	<0.0040	0.0200
	Copper (Cu)-Total (mg/kg)	31.0	6.12	7.17	2.67	201
	Copper (Cu)-Total (mg/kg wwt)	6.89	1.11	2.78	0.529	47.2
	Iron (Fe)-Total (mg/kg)	1190	442	37.1	38.6	1360
	Iron (Fe)-Total (mg/kg wwt)	265	80.3	14.4	7.66	320
	Lead (Pb)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.020	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.0040	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	745	955	1410	1300	594
	Magnesium (Mg)-Total (mg/kg wwt)	166	174	548	258	139
	Manganese (Mn)-Total (mg/kg)	7.81	1.98	6.14	0.571	7.27
	Manganese (Mn)-Total (mg/kg wwt)	1.73	0.359	2.38	0.113	1.71

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1621080-21 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-5 - KIDNEY	L1621080-22 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-5 - GONAD	L1621080-23 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-6 - MUSCLE	L1621080-24 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-6 - LIVER	L1621080-25 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-6 - KIDNEY
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	79.6	62.5	80.8	75.2	80.5
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	<2.0	<2.0	<5.0	7.5
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	<0.40	<0.40	<1.0	1.5
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	0.013
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	0.0026
	Arsenic (As)-Total (mg/kg)	0.120	0.021	0.022	0.079	0.400
	Arsenic (As)-Total (mg/kg wwt)	0.0244	0.0079	0.0043	0.0195	0.0781
	Barium (Ba)-Total (mg/kg)	0.177	0.170	<0.050	<0.050	0.209
	Barium (Ba)-Total (mg/kg wwt)	0.036	0.064	<0.010	<0.010	0.041
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.487	<0.0050	<0.0050	0.179	1.04
	Cadmium (Cd)-Total (mg/kg wwt)	0.0992	0.0011	<0.0010	0.0445	0.203
	Calcium (Ca)-Total (mg/kg)	3820	1010	312	257	1140
	Calcium (Ca)-Total (mg/kg wwt)	779	378	59.9	63.8	222
	Cesium (Cs)-Total (mg/kg)	0.0623	0.0266	0.0466	0.0530	0.0932
	Cesium (Cs)-Total (mg/kg wwt)	0.0127	0.0100	0.0090	0.0131	0.0182
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.050	<0.050	<0.20	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	0.017	<0.010	<0.040	<0.040
	Cobalt (Co)-Total (mg/kg)	0.644	0.052	<0.020	0.068	1.13
	Cobalt (Co)-Total (mg/kg wwt)	0.131	0.0194	<0.0040	0.0168	0.221
	Copper (Cu)-Total (mg/kg)	6.44	7.92	1.15	62.1	7.96
	Copper (Cu)-Total (mg/kg wwt)	1.31	2.97	0.220	15.4	1.56
	Iron (Fe)-Total (mg/kg)	623	45.8	23.4	1950	556
	Iron (Fe)-Total (mg/kg wwt)	127	17.1	4.49	485	109
	Lead (Pb)-Total (mg/kg)	<0.050	<0.020	<0.020	<0.050	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.0040	<0.0040	<0.010	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	920	1560	640	645	1270
	Magnesium (Mg)-Total (mg/kg wwt)	187	583	123	160	249
	Manganese (Mn)-Total (mg/kg)	2.30	4.92	0.190	6.42	2.07
	Manganese (Mn)-Total (mg/kg wwt)	0.469	1.84	0.036	1.59	0.405

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1621080-26 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-6 - GONAD	L1621080-27 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-7 - MUSCLE	L1621080-28 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-7 - LIVER	L1621080-29 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-7 - KIDNEY	L1621080-30 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-7 - GONAD
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	70.9	85.0	75.2	85.0	64.5
Metals	Aluminum (Al)-Total (mg/kg)	2.0	<2.0	<5.0	6.5	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	0.59	<0.40	<1.0	<1.0	0.43
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	0.011	0.022
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	0.0078
	Arsenic (As)-Total (mg/kg)	0.031	0.033	0.050	0.329	0.021
	Arsenic (As)-Total (mg/kg wwt)	0.0089	0.0050	0.0124	0.0492	0.0076
	Barium (Ba)-Total (mg/kg)	0.197	<0.050	<0.050	0.175	0.250
	Barium (Ba)-Total (mg/kg wwt)	0.057	<0.010	<0.010	0.026	0.089
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	<0.0050	0.164	0.759	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	<0.0010	0.0408	0.114	<0.0010
	Calcium (Ca)-Total (mg/kg)	1870	1210	219	808	1480
	Calcium (Ca)-Total (mg/kg wwt)	543	182	54.5	121	528
	Cesium (Cs)-Total (mg/kg)	0.0056	0.0958	0.0260	0.0956	0.0239
	Cesium (Cs)-Total (mg/kg wwt)	0.0016	0.0144	0.0065	0.0143	0.0085
	Chromium (Cr)-Total (mg/kg)	0.088	<0.050	<0.20	<0.20	0.104
	Chromium (Cr)-Total (mg/kg wwt)	0.026	<0.010	<0.040	<0.040	0.037
	Cobalt (Co)-Total (mg/kg)	0.124	0.023	0.069	0.743	0.084
	Cobalt (Co)-Total (mg/kg wwt)	0.0360	<0.0040	0.0170	0.111	0.0298
	Copper (Cu)-Total (mg/kg)	8.95	2.45	188	6.91	9.99
	Copper (Cu)-Total (mg/kg wwt)	2.61	0.367	46.7	1.03	3.55
	Iron (Fe)-Total (mg/kg)	46.0	40.7	1710	686	46.0
	Iron (Fe)-Total (mg/kg wwt)	13.4	6.10	425	103	16.4
	Lead (Pb)-Total (mg/kg)	<0.020	<0.020	<0.050	<0.050	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.010	<0.010	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1030	1370	702	1140	1590
	Magnesium (Mg)-Total (mg/kg wwt)	299	206	174	170	567
	Manganese (Mn)-Total (mg/kg)	6.25	0.637	7.20	2.06	8.80
	Manganese (Mn)-Total (mg/kg wwt)	1.82	0.096	1.79	0.308	3.13

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Sample ID Description Sampled Date Sampled Time Client ID		L1621080-31 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-8 - MUSCLE	L1621080-32 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-8 - LIVER	L1621080-33 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-8 - KIDNEY	L1621080-34 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-8 - GONAD
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)	81.4	75.8	79.9	66.6
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<5.0	6.8	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<1.0	1.4	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	0.0021	<0.0020
	Arsenic (As)-Total (mg/kg)	0.021	0.087	0.298	<0.020
	Arsenic (As)-Total (mg/kg wwt)	<0.0040	0.0209	0.0600	0.0052
	Barium (Ba)-Total (mg/kg)	<0.050	<0.050	0.218	0.171
	Barium (Ba)-Total (mg/kg wwt)	<0.010	<0.010	0.044	0.057
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	0.278	0.843	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	0.0671	0.170	<0.0010
	Calcium (Ca)-Total (mg/kg)	945	399	851	1330
	Calcium (Ca)-Total (mg/kg wwt)	176	96.4	171	444
	Cesium (Cs)-Total (mg/kg)	0.0608	0.0687	0.0752	0.0203
	Cesium (Cs)-Total (mg/kg wwt)	0.0113	0.0166	0.0151	0.0068
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.20	0.38	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.040	0.077	0.014
	Cobalt (Co)-Total (mg/kg)	0.023	0.071	1.37	0.109
	Cobalt (Co)-Total (mg/kg wwt)	0.0042	0.0172	0.276	0.0364
	Copper (Cu)-Total (mg/kg)	2.14	103	6.41	8.95
	Copper (Cu)-Total (mg/kg wwt)	0.398	24.8	1.29	2.99
	Iron (Fe)-Total (mg/kg)	60.4	3190	667	58.6
	Iron (Fe)-Total (mg/kg wwt)	11.2	771	134	19.6
	Lead (Pb)-Total (mg/kg)	<0.020	<0.050	<0.050	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.010	<0.010	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1260	830	1080	1400
	Magnesium (Mg)-Total (mg/kg wwt)	234	201	218	469
	Manganese (Mn)-Total (mg/kg)	0.625	6.08	1.84	7.99
	Manganese (Mn)-Total (mg/kg wwt)	0.116	1.47	0.371	2.67

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	Sample ID Description Sampled Date Sampled Time Client ID	L1621080-1 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-1 - MUSCLE	L1621080-2 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-1 - LIVER	L1621080-3 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-1 - KIDNEY	L1621080-4 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-1 - GONAD	L1621080-5 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-1X - MUSCLE
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.462	0.345	0.414	0.0100	0.447
	Mercury (Hg)-Total (mg/kg wwt)	0.0878	0.0785	0.0705	0.0038	0.0887
	Molybdenum (Mo)-Total (mg/kg)	<0.020	2.35	0.890	0.041	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.536	0.152	0.0154	<0.0040
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	0.37	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	0.063	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	13000	12300	13800	11600	12900
	Phosphorus (P)-Total (mg/kg wwt)	2470	2810	2350	4380	2550
	Potassium (K)-Total (mg/kg)	21700	10500	17300	6850	21500
	Potassium (K)-Total (mg/kg wwt)	4120	2400	2950	2590	4250
	Rubidium (Rb)-Total (mg/kg)	8.51	5.40	7.86	3.19	8.54
	Rubidium (Rb)-Total (mg/kg wwt)	1.62	1.23	1.34	1.20	1.69
	Selenium (Se)-Total (mg/kg)	3.56	30.6	21.7	28.0	3.77
	Selenium (Se)-Total (mg/kg wwt)	0.678	6.97	3.69	10.6	0.747
	Sodium (Na)-Total (mg/kg)	2000	6380	6370	1710	1970
	Sodium (Na)-Total (mg/kg wwt)	381	1450	1080	646	390
	Strontium (Sr)-Total (mg/kg)	1.53	0.45	2.90	3.39	1.41
	Strontium (Sr)-Total (mg/kg wwt)	0.290	0.103	0.494	1.28	0.279
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0044	0.0342	0.0951	<0.0020	0.0038
	Thallium (Tl)-Total (mg/kg wwt)	0.00084	0.00780	0.0162	<0.00040	0.00075
	Tin (Sn)-Total (mg/kg)	<0.10	0.10	0.46	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	0.024	0.078	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	0.0031	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	0.00054	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	0.32	0.39	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.072	0.066	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	20.0	116	147	57.6	18.5
	Zinc (Zn)-Total (mg/kg wwt)	3.81	26.3	25.1	21.8	3.67
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

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Sample ID Description Sampled Date Sampled Time Client ID		L1621080-6 Tissue 14-MAY-15 16:15 FRYPAN CR. RB- 1X - GONAD	L1621080-7 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-2 - MUSCLE	L1621080-8 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-2 - LIVER	L1621080-9 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-2 - KIDNEY	L1621080-10 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-2 - GONAD
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.0091	0.504	0.302	0.355	0.0089
	Mercury (Hg)-Total (mg/kg wwt)	0.0035	0.0967	0.0655	0.0691	0.0035
	Molybdenum (Mo)-Total (mg/kg)	0.041	<0.020	1.26	0.778	0.033
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0160	<0.0040	0.273	0.152	0.0131
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	0.24	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	0.047	<0.040
	Phosphorus (P)-Total (mg/kg)	12100	13700	12800	12800	11500
	Phosphorus (P)-Total (mg/kg wwt)	4680	2620	2770	2490	4490
	Potassium (K)-Total (mg/kg)	7020	22300	10400	15300	6660
	Potassium (K)-Total (mg/kg wwt)	2720	4270	2270	2990	2600
	Rubidium (Rb)-Total (mg/kg)	3.21	8.95	5.80	7.08	3.47
	Rubidium (Rb)-Total (mg/kg wwt)	1.24	1.72	1.26	1.38	1.36
	Selenium (Se)-Total (mg/kg)	28.0	3.19	19.1	14.6	19.3
	Selenium (Se)-Total (mg/kg wwt)	10.8	0.612	4.15	2.84	7.54
	Sodium (Na)-Total (mg/kg)	1800	2100	6290	4420	1500
	Sodium (Na)-Total (mg/kg wwt)	697	404	1360	862	586
	Strontium (Sr)-Total (mg/kg)	3.37	1.30	0.36	1.58	2.70
	Strontium (Sr)-Total (mg/kg wwt)	1.30	0.250	0.078	0.309	1.05
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	<0.0020	0.0032	0.0369	0.0417	<0.0020
	Thallium (Tl)-Total (mg/kg wwt)	<0.00040	0.00061	0.00801	0.00813	<0.00040
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	0.0029	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	0.00056	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	0.23	0.34	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	0.049	0.067	<0.020
	Zinc (Zn)-Total (mg/kg)	59.3	21.0	127	262	64.0
	Zinc (Zn)-Total (mg/kg wwt)	23.0	4.03	27.6	51.2	25.0
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

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Sample ID Description Sampled Date Sampled Time Client ID		L1621080-11 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-3 - MUSCLE	L1621080-12 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-3 - LIVER	L1621080-13 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-3 - KIDNEY	L1621080-14 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-3 - GONAD	L1621080-15 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-4 - MUSCLE
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.438	0.261	0.266	0.0102	0.315
	Mercury (Hg)-Total (mg/kg wwt)	0.0769	0.0500	0.0388	0.0037	0.0664
	Molybdenum (Mo)-Total (mg/kg)	<0.020	2.75	0.642	0.069	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.525	0.0937	0.0246	<0.0040
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	0.30	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	0.044	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	14100	12300	15400	10900	12400
	Phosphorus (P)-Total (mg/kg wwt)	2480	2360	2240	3910	2620
	Potassium (K)-Total (mg/kg)	23000	11200	20600	6090	19700
	Potassium (K)-Total (mg/kg wwt)	4050	2140	3000	2180	4150
	Rubidium (Rb)-Total (mg/kg)	9.04	6.34	8.60	2.88	8.38
	Rubidium (Rb)-Total (mg/kg wwt)	1.59	1.21	1.25	1.03	1.77
	Selenium (Se)-Total (mg/kg)	5.78	82.1	28.9	50.5	5.74
	Selenium (Se)-Total (mg/kg wwt)	1.02	15.7	4.21	18.1	1.21
	Sodium (Na)-Total (mg/kg)	1630	7120	5800	2560	1390
	Sodium (Na)-Total (mg/kg wwt)	286	1360	846	920	294
	Strontium (Sr)-Total (mg/kg)	1.24	0.49	2.29	3.28	1.18
	Strontium (Sr)-Total (mg/kg wwt)	0.218	0.093	0.335	1.18	0.248
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0058	0.0387	0.0830	<0.0020	0.0035
	Thallium (Tl)-Total (mg/kg wwt)	0.00102	0.00740	0.0121	<0.00040	0.00073
	Tin (Sn)-Total (mg/kg)	<0.10	0.16	0.48	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	0.031	0.070	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	0.0035	0.0049	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	0.00068	0.00072	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	0.71	0.66	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.136	0.096	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	30.0	158	164	63.2	23.1
	Zinc (Zn)-Total (mg/kg wwt)	5.27	30.2	23.9	22.7	4.88
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

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Sample ID Description Sampled Date Sampled Time Client ID		L1621080-16 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-4 - LIVER	L1621080-17 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-4 - KIDNEY	L1621080-18 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-4 - GONAD	L1621080-19 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-5 - MUSCLE	L1621080-20 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-5 - LIVER
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.167	0.182	0.0064	0.364	0.199
	Mercury (Hg)-Total (mg/kg wwt)	0.0372	0.0330	0.0025	0.0723	0.0467
	Molybdenum (Mo)-Total (mg/kg)	1.48	0.403	0.055	<0.020	1.84
	Molybdenum (Mo)-Total (mg/kg wwt)	0.329	0.0732	0.0212	<0.0040	0.432
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	13700	13700	9850	13500	12500
	Phosphorus (P)-Total (mg/kg wwt)	3050	2480	3820	2680	2930
	Potassium (K)-Total (mg/kg)	9970	15400	6120	22800	9890
	Potassium (K)-Total (mg/kg wwt)	2220	2800	2370	4520	2320
	Rubidium (Rb)-Total (mg/kg)	6.85	7.85	3.10	9.10	5.84
	Rubidium (Rb)-Total (mg/kg wwt)	1.52	1.43	1.20	1.81	1.37
	Selenium (Se)-Total (mg/kg)	44.1	18.1	35.3	6.00	97.7
	Selenium (Se)-Total (mg/kg wwt)	9.79	3.28	13.7	1.19	22.9
	Sodium (Na)-Total (mg/kg)	5460	3890	1220	1440	4730
	Sodium (Na)-Total (mg/kg wwt)	1210	706	473	285	1110
	Strontium (Sr)-Total (mg/kg)	0.32	0.91	3.20	1.06	0.35
	Strontium (Sr)-Total (mg/kg wwt)	0.072	0.165	1.24	0.211	0.081
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0311	0.107	<0.0020	0.0042	0.0266
	Thallium (Tl)-Total (mg/kg wwt)	0.00690	0.0195	<0.00040	0.00083	0.00624
	Tin (Sn)-Total (mg/kg)	0.11	0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	0.023	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	0.0020	<0.0020	<0.0020	0.0021
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	0.00048
	Vanadium (V)-Total (mg/kg)	0.42	0.37	<0.10	<0.10	0.41
	Vanadium (V)-Total (mg/kg wwt)	0.094	0.067	<0.020	<0.020	0.095
	Zinc (Zn)-Total (mg/kg)	105	153	49.2	18.8	121
	Zinc (Zn)-Total (mg/kg wwt)	23.3	27.8	19.1	3.73	28.3
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

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		Sample ID	L1621080-21	L1621080-22	L1621080-23	L1621080-24	L1621080-25
		Description	Tissue	Tissue	Tissue	Tissue	Tissue
		Sampled Date	14-MAY-15	14-MAY-15	14-MAY-15	14-MAY-15	14-MAY-15
		Sampled Time	16:15	16:15	16:15	16:15	16:15
		Client ID	FRYPAN CR. RB-5 - KIDNEY	FRYPAN CR. RB-5 - GONAD	FRYPAN CR. RB-6 - MUSCLE	FRYPAN CR. RB-6 - LIVER	FRYPAN CR. RB-6 - KIDNEY
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)		0.209	0.0090	0.694	0.318	0.461
	Mercury (Hg)-Total (mg/kg wwt)		0.0426	0.0034	0.133	0.0790	0.0901
	Molybdenum (Mo)-Total (mg/kg)		0.435	0.084	<0.020	2.12	0.818
	Molybdenum (Mo)-Total (mg/kg wwt)		0.0887	0.0316	<0.0040	0.526	0.160
	Nickel (Ni)-Total (mg/kg)		0.29	<0.20	<0.20	<0.20	0.45
	Nickel (Ni)-Total (mg/kg wwt)		0.059	<0.040	<0.040	<0.040	0.088
	Phosphorus (P)-Total (mg/kg)		13200	11300	6440	13100	13200
	Phosphorus (P)-Total (mg/kg wwt)		2700	4250	1240	3260	2580
	Potassium (K)-Total (mg/kg)		16600	6710	10800	9600	17000
	Potassium (K)-Total (mg/kg wwt)		3380	2520	2070	2380	3330
	Rubidium (Rb)-Total (mg/kg)		7.04	3.39	5.29	5.97	9.56
	Rubidium (Rb)-Total (mg/kg wwt)		1.43	1.27	1.02	1.48	1.87
	Selenium (Se)-Total (mg/kg)		18.2	34.8	2.47	57.4	36.8
	Selenium (Se)-Total (mg/kg wwt)		3.72	13.0	0.475	14.2	7.19
	Sodium (Na)-Total (mg/kg)		4190	1850	828	4300	4410
	Sodium (Na)-Total (mg/kg wwt)		854	693	159	1070	861
	Strontium (Sr)-Total (mg/kg)		6.91	3.84	0.373	0.29	3.02
	Strontium (Sr)-Total (mg/kg wwt)		1.41	1.44	0.072	0.072	0.591
	Tellurium (Te)-Total (mg/kg)		<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)		0.0666	<0.0020	0.0048	0.0291	0.136
	Thallium (Tl)-Total (mg/kg wwt)		0.0136	<0.00040	0.00093	0.00722	0.0265
	Tin (Sn)-Total (mg/kg)		<0.10	<0.10	<0.10	<0.10	0.22
	Tin (Sn)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	0.021	0.043
	Uranium (U)-Total (mg/kg)		0.0026	<0.0020	<0.0020	0.0052	0.0080
	Uranium (U)-Total (mg/kg wwt)		0.00053	<0.00040	<0.00040	0.00129	0.00156
	Vanadium (V)-Total (mg/kg)		0.26	<0.10	<0.10	0.68	0.65
	Vanadium (V)-Total (mg/kg wwt)		0.053	<0.020	<0.020	0.169	0.128
	Zinc (Zn)-Total (mg/kg)		173	69.0	11.4	151	218
	Zinc (Zn)-Total (mg/kg wwt)		35.3	25.8	2.19	37.4	42.6
	Zirconium (Zr)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1621080-26 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-6 - GONAD	L1621080-27 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-7 - MUSCLE	L1621080-28 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-7 - LIVER	L1621080-29 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-7 - KIDNEY	L1621080-30 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-7 - GONAD
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.0345	0.459	0.367	0.373	0.0111
	Mercury (Hg)-Total (mg/kg wwt)	0.0100	0.0688	0.0913	0.0559	0.0039
	Molybdenum (Mo)-Total (mg/kg)	<0.020	<0.020	2.40	0.535	0.101
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0055	<0.0040	0.595	0.0801	0.0360
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	0.41	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	0.062	<0.040
	Phosphorus (P)-Total (mg/kg)	9670	14600	12800	15400	11700
	Phosphorus (P)-Total (mg/kg wwt)	2820	2190	3170	2310	4150
	Potassium (K)-Total (mg/kg)	1110	22300	8470	19400	6500
	Potassium (K)-Total (mg/kg wwt)	324	3350	2100	2910	2310
	Rubidium (Rb)-Total (mg/kg)	0.593	11.3	5.72	10.8	3.45
	Rubidium (Rb)-Total (mg/kg wwt)	0.173	1.69	1.42	1.62	1.23
	Selenium (Se)-Total (mg/kg)	55.6	5.71	98.0	24.6	44.8
	Selenium (Se)-Total (mg/kg wwt)	16.2	0.856	24.3	3.69	15.9
	Sodium (Na)-Total (mg/kg)	7920	916	2320	3380	1320
	Sodium (Na)-Total (mg/kg wwt)	2310	137	578	507	470
	Strontium (Sr)-Total (mg/kg)	4.50	1.39	0.24	1.60	3.46
	Strontium (Sr)-Total (mg/kg wwt)	1.31	0.208	0.059	0.240	1.23
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	<0.0020	0.0054	0.0274	0.0550	<0.0020
	Thallium (Tl)-Total (mg/kg wwt)	<0.00040	0.00081	0.00682	0.00824	<0.00040
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	0.15	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	0.022	0.024
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	0.0154	0.0155	0.0050
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	0.00383	0.00233	0.00179
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	1.06	0.69	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	0.264	0.103	<0.020
	Zinc (Zn)-Total (mg/kg)	37.7	30.2	210	225	59.1
	Zinc (Zn)-Total (mg/kg wwt)	11.0	4.52	52.1	33.7	21.0
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1621080-31 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-8 - MUSCLE	L1621080-32 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-8 - LIVER	L1621080-33 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-8 - KIDNEY	L1621080-34 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-8 - GONAD
Grouping	Analyte				
TISSUE					
Metals	Mercury (Hg)-Total (mg/kg)	0.469	0.207	0.248	0.0132
	Mercury (Hg)-Total (mg/kg wwt)	0.0872	0.0501	0.0499	0.0044
	Molybdenum (Mo)-Total (mg/kg)	<0.020	2.71	0.727	0.054
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.655	0.146	0.0180
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	0.44	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	0.043	0.089	<0.040
	Phosphorus (P)-Total (mg/kg)	14300	13400	13800	11400
	Phosphorus (P)-Total (mg/kg wwt)	2660	3230	2780	3820
	Potassium (K)-Total (mg/kg)	22900	12300	17500	5980
	Potassium (K)-Total (mg/kg wwt)	4260	2980	3510	2000
	Rubidium (Rb)-Total (mg/kg)	10.2	8.70	8.75	3.14
	Rubidium (Rb)-Total (mg/kg wwt)	1.89	2.10	1.76	1.05
	Selenium (Se)-Total (mg/kg)	6.90	72.2	34.7	55.0
	Selenium (Se)-Total (mg/kg wwt)	1.28	17.4	6.99	18.4
	Sodium (Na)-Total (mg/kg)	1980	3410	5240	2440
	Sodium (Na)-Total (mg/kg wwt)	368	824	1060	815
	Strontium (Sr)-Total (mg/kg)	1.16	0.45	1.98	3.30
	Strontium (Sr)-Total (mg/kg wwt)	0.216	0.108	0.399	1.10
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0036	0.0301	0.0936	<0.0020
	Thallium (Tl)-Total (mg/kg wwt)	0.00066	0.00728	0.0188	<0.00040
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	0.37	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	0.075	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	0.0057	0.0070	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	0.00137	0.00140	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	1.11	0.74	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.267	0.149	<0.020
	Zinc (Zn)-Total (mg/kg)	24.8	236	193	61.0
	Zinc (Zn)-Total (mg/kg wwt)	4.61	57.1	38.9	20.4
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-WET-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-WET-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (WET)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (WET)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on wet weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
<p>This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Reference Information

Chain of Custody Numbers:

FT-1

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Colleen Hughes	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
Phone: 250-790-2215 Fax:	Email 2:	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Analysis Request		

Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	Job #:	
Contact:	PO / AFE:	
Address:	Legal Site Description:	
Phone: Fax:	Quote #:	

Lab Work Order # (lab use only)	L1621080	ALS Contact: Can Dang	Sampler: Norm Zirnhelt 25
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Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	T-metals (HR/CP-MS) (Met&D)	Moisture	Liver Metals	Kidney Metals	Gonad Metals	Number of Containers
	Frypan Cr. RB-1	14-May-15	8:00-16:15	Tissue	X	X	X	X	X	4
	Frypan Cr. RB-1X	14-May-15	8:00-16:15	Tissue	X	X			X	2
	Frypan Cr. RB-2	14-May-15	8:00-16:15	Tissue	X	X	X	X	X	4
	Frypan Cr. RB-3	14-May-15	8:00-16:15	Tissue	X	X	X	X	X	4
	Frypan Cr. RB-4	14-May-15	8:00-16:15	Tissue	X	X	X	X	X	4
	Frypan Cr. RB-5	14-May-15	8:00-16:15	Tissue	X	X	X	X	X	4
	Frypan Cr. RB-6	14-May-15	8:00-16:15	Tissue	X	X	X	X	X	4
	Frypan Cr. RB-7	14-May-15	8:00-16:15	Tissue	X	X	X	X	X	4
	Frypan Cr. RB-8	14-May-15	8:00-16:15	Tissue	X	X	X	X	X	4



Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)			
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations:
N.Zirnhelt	June 2, 2015 1600hr	lady	06/03	9AM	2.2°C			Yes / No ? If Yes attach SIF



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 03-JUN-15
Report Date: 10-FEB-16 15:11 (MT)
Version: FINAL REV. 2

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1621082
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: FT-2
Legal Site Desc:

Comments:

10-FEB-2016 Revision 2: This revision replaces and supersedes previous revision of this report. The metals data for the sample ALS identify as L1621082-10 have been modified.

Can Dang
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
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ALS ENVIRONMENTAL ANALYTICAL REPORT

10-FEB-16 15:11 (MT)

Version: FINAL REV. 2

Sample ID Description Sampled Date Sampled Time Client ID		L1621082-1 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-1 - MUSCLE	L1621082-2 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-1 - LIVER	L1621082-3 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-1 - GONAD	L1621082-4 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-2 - MUSCLE	L1621082-5 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-2 - LIVER
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	81.5	78.1	64.0	80.8	76.1
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<5.0	<2.0	<2.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<1.0	<0.40	<0.40	<1.0
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	<0.020	<0.030	0.031	0.025	<0.030
	Arsenic (As)-Total (mg/kg wwt)	<0.0040	0.0060	0.0111	0.0049	0.0068
	Barium (Ba)-Total (mg/kg)	0.074	0.082	0.544	0.122	0.060
	Barium (Ba)-Total (mg/kg wwt)	0.014	0.018	0.196	0.024	0.014
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	0.074	<0.0050	<0.0050	0.108
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	0.0163	<0.0010	<0.0010	0.0259
	Calcium (Ca)-Total (mg/kg)	685	645	1410	855	228
	Calcium (Ca)-Total (mg/kg wwt)	127	142	507	164	54.5
	Cesium (Cs)-Total (mg/kg)	0.0684	0.0322	0.0137	0.0660	0.0294
	Cesium (Cs)-Total (mg/kg wwt)	0.0126	0.0071	0.0049	0.0127	0.0070
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.20	<0.050	<0.050	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.040	<0.010	<0.010	<0.040
	Cobalt (Co)-Total (mg/kg)	<0.020	0.054	0.078	<0.020	0.046
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040	0.0118	0.0280	<0.0040	0.0111
	Copper (Cu)-Total (mg/kg)	1.73	28.6	10.0	2.03	36.3
	Copper (Cu)-Total (mg/kg wwt)	0.320	6.27	3.62	0.391	8.69
	Iron (Fe)-Total (mg/kg)	29.1	739	34.4	28.7	781
	Iron (Fe)-Total (mg/kg wwt)	5.39	162	12.4	5.51	187
	Lead (Pb)-Total (mg/kg)	<0.020	<0.050	<0.020	<0.020	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.010	<0.0040	<0.0040	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1250	887	1750	1260	804
	Magnesium (Mg)-Total (mg/kg wwt)	231	194	628	242	192
	Manganese (Mn)-Total (mg/kg)	0.484	6.29	4.68	0.599	7.68
	Manganese (Mn)-Total (mg/kg wwt)	0.089	1.38	1.68	0.115	1.84

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1621082-6 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-2 - GONAD	L1621082-7 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-3 - MUSCLE	L1621082-8 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-3 - LIVER	L1621082-9 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-3 - GONAD	L1621082-10 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-3X - MUSCLE
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)				
	61.7	84.4	78.8	63.1	84.1
Metals	Aluminum (Al)-Total (mg/kg)				
	<2.0	<2.0	<5.0	<5.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)				
	<0.40	<0.40	<1.0	<1.0	<0.40
	Antimony (Sb)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)				
	<0.020	0.034	0.053	<0.030	0.030
	Arsenic (As)-Total (mg/kg wwt)				
	0.0069	0.0053	0.0112	0.0078	0.0048
	Barium (Ba)-Total (mg/kg)				
	0.563	0.090	<0.050	0.408	0.187
	Barium (Ba)-Total (mg/kg wwt)				
	0.215	0.014	0.011	0.151	0.030
	Beryllium (Be)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)				
	<0.010	<0.010	0.012	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)				
	<0.0020	<0.0020	0.0025	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)				
	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)				
	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)				
	<0.0050	<0.0050	0.139	<0.010	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)				
	<0.0010	<0.0010	0.0294	<0.0020	<0.0010
	Calcium (Ca)-Total (mg/kg)				
	1460	830	216	1290	2100
	Calcium (Ca)-Total (mg/kg wwt)				
	558	130	45.9	478	334
	Cesium (Cs)-Total (mg/kg)				
	0.0146	0.0841	0.0359	0.0136	0.0884
	Cesium (Cs)-Total (mg/kg wwt)				
	0.0056	0.0131	0.0076	0.0050	0.0140
	Chromium (Cr)-Total (mg/kg)				
	<0.050	<0.050	<0.20	<0.20	<0.050
	Chromium (Cr)-Total (mg/kg wwt)				
	<0.010	<0.010	<0.040	<0.040	<0.010
	Cobalt (Co)-Total (mg/kg)				
	0.076	<0.020	0.060	0.043	<0.020
	Cobalt (Co)-Total (mg/kg wwt)				
	0.0289	<0.0040	0.0127	0.0158	<0.0040
	Copper (Cu)-Total (mg/kg)				
	11.2	3.64	39.2	7.88	2.91
	Copper (Cu)-Total (mg/kg wwt)				
	4.29	0.569	8.31	2.91	0.461
	Iron (Fe)-Total (mg/kg)				
	40.3	53.0	1820	39.5	55.8
	Iron (Fe)-Total (mg/kg wwt)				
	15.4	8.29	385	14.6	8.85
	Lead (Pb)-Total (mg/kg)				
	<0.020	<0.020	<0.050	<0.050	<0.020
	Lead (Pb)-Total (mg/kg wwt)				
	<0.0040	<0.0040	<0.010	<0.010	<0.0040
	Lithium (Li)-Total (mg/kg)				
	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)				
	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)				
	1460	1460	772	1360	1500
	Magnesium (Mg)-Total (mg/kg wwt)				
	559	229	164	504	238
	Manganese (Mn)-Total (mg/kg)				
	3.11	0.699	9.30	3.42	1.00
	Manganese (Mn)-Total (mg/kg wwt)				
	1.19	0.109	1.97	1.26	0.159

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

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Sample ID Description Sampled Date Sampled Time Client ID		L1621082-11 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-3X - GONAD	L1621082-12 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 4 - MUSCLE	L1621082-13 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 4 - LIVER	L1621082-14 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 4 - GONAD	L1621082-15 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 5 - MUSCLE
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	62.0	81.3	78.9	62.1	79.3
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	<2.0	<5.0	<5.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	<0.40	<1.0	<1.0	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	<0.030	<0.020	<0.030	<0.030	0.041
	Arsenic (As)-Total (mg/kg wwt)	0.0088	<0.0040	<0.0060	0.0082	0.0085
	Barium (Ba)-Total (mg/kg)	0.421	0.111	<0.050	0.465	0.060
	Barium (Ba)-Total (mg/kg wwt)	0.160	0.021	<0.010	0.176	0.012
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	0.012	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	0.0023	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.010	<0.0050	0.095	<0.010	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0020	<0.0010	0.0200	<0.0020	<0.0010
	Calcium (Ca)-Total (mg/kg)	1350	876	262	1440	882
	Calcium (Ca)-Total (mg/kg wwt)	512	164	55.3	547	183
	Cesium (Cs)-Total (mg/kg)	0.0135	0.0762	0.0296	0.0112	0.0685
	Cesium (Cs)-Total (mg/kg wwt)	0.0051	0.0143	0.0063	0.0043	0.0142
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.050	<0.20	<0.20	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	<0.010	<0.040	<0.040	<0.010
	Cobalt (Co)-Total (mg/kg)	0.044	<0.020	0.039	0.055	<0.020
	Cobalt (Co)-Total (mg/kg wwt)	0.0167	<0.0040	0.0082	0.0207	<0.0040
	Copper (Cu)-Total (mg/kg)	7.87	2.43	21.0	10.0	2.59
	Copper (Cu)-Total (mg/kg wwt)	3.00	0.455	4.42	3.80	0.538
	Iron (Fe)-Total (mg/kg)	40.7	41.2	644	35.9	26.3
	Iron (Fe)-Total (mg/kg wwt)	15.5	7.73	136	13.6	5.46
	Lead (Pb)-Total (mg/kg)	<0.050	<0.020	<0.050	<0.050	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.0040	<0.010	<0.010	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1380	1300	925	1300	1380
	Magnesium (Mg)-Total (mg/kg wwt)	525	244	195	492	286
	Manganese (Mn)-Total (mg/kg)	3.62	0.566	9.92	2.55	0.629
	Manganese (Mn)-Total (mg/kg wwt)	1.38	0.106	2.09	0.966	0.130

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Sample ID Description Sampled Date Sampled Time Client ID		L1621082-16 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 5 - LIVER	L1621082-17 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 5 - GONAD	L1621082-18 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 6 - MUSCLE	L1621082-19 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 6 - LIVER	L1621082-20 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 6 - GONAD
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	76.2	61.3	81.1	76.3	63.5
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	<2.0	<2.0	<5.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	<0.40	<0.40	<1.0	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.041	0.033	<0.020	0.030	0.026
	Arsenic (As)-Total (mg/kg wwt)	0.0098	0.0130	<0.0040	0.0072	0.0096
	Barium (Ba)-Total (mg/kg)	0.100	0.476	0.069	<0.050	0.486
	Barium (Ba)-Total (mg/kg wwt)	0.024	0.184	0.013	<0.010	0.177
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.045	<0.0050	<0.0050	0.079	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	0.0107	<0.0010	<0.0010	0.0187	<0.0010
	Calcium (Ca)-Total (mg/kg)	524	1490	908	197	1400
	Calcium (Ca)-Total (mg/kg wwt)	125	575	172	46.7	510
	Cesium (Cs)-Total (mg/kg)	0.0333	0.0132	0.0765	0.0305	0.0131
	Cesium (Cs)-Total (mg/kg wwt)	0.0079	0.0051	0.0145	0.0072	0.0048
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.050	0.322	<0.20	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	<0.010	0.061	<0.040	<0.010
	Cobalt (Co)-Total (mg/kg)	0.063	0.087	0.022	0.053	0.087
	Cobalt (Co)-Total (mg/kg wwt)	0.0150	0.0336	0.0041	0.0125	0.0318
	Copper (Cu)-Total (mg/kg)	44.2	10.8	2.58	18.7	6.82
	Copper (Cu)-Total (mg/kg wwt)	10.5	4.17	0.488	4.43	2.49
	Iron (Fe)-Total (mg/kg)	623	34.2	35.8	739	33.6
	Iron (Fe)-Total (mg/kg wwt)	149	13.2	6.77	175	12.3
	Lead (Pb)-Total (mg/kg)	<0.050	<0.020	<0.020	<0.050	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.0040	<0.0040	<0.010	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	801	1450	1360	851	1560
	Magnesium (Mg)-Total (mg/kg wwt)	191	561	257	202	569
	Manganese (Mn)-Total (mg/kg)	7.48	4.07	0.766	7.68	2.77
	Manganese (Mn)-Total (mg/kg wwt)	1.78	1.57	0.145	1.82	1.01

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

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Sample ID Description Sampled Date Sampled Time Client ID	L1621082-21 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 7 - MUSCLE	L1621082-22 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 7 - LIVER	L1621082-23 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 7 - GONAD	L1621082-24 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 8 - MUSCLE	L1621082-25 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 8 - LIVER
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)				
	83.1	76.6	63.9	81.5	77.3
Metals	Aluminum (Al)-Total (mg/kg)				
	<2.0	<5.0	<5.0	<2.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)				
	<0.40	<1.0	<1.0	<0.40	<1.0
	Antimony (Sb)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)				
	<0.020	0.048	<0.030	<0.020	0.041
	Arsenic (As)-Total (mg/kg wwt)				
	<0.0040	0.0113	0.0091	<0.0040	0.0094
	Barium (Ba)-Total (mg/kg)				
	0.098	0.052	0.676	0.206	0.097
	Barium (Ba)-Total (mg/kg wwt)				
	0.017	0.012	0.244	0.038	0.022
	Beryllium (Be)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)				
	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)				
	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)				
	<0.0050	0.146	<0.010	<0.0050	0.165
	Cadmium (Cd)-Total (mg/kg wwt)				
	<0.0010	0.0342	<0.0020	<0.0010	0.0375
	Calcium (Ca)-Total (mg/kg)				
	949	202	1210	1930	241
	Calcium (Ca)-Total (mg/kg wwt)				
	161	47.4	438	357	54.7
	Cesium (Cs)-Total (mg/kg)				
	0.0712	0.0358	0.0116	0.0523	0.0211
	Cesium (Cs)-Total (mg/kg wwt)				
	0.0121	0.0084	0.0042	0.0097	0.0048
	Chromium (Cr)-Total (mg/kg)				
	<0.050	<0.20	<0.20	<0.050	<0.20
	Chromium (Cr)-Total (mg/kg wwt)				
	<0.010	<0.040	<0.040	<0.010	<0.040
	Cobalt (Co)-Total (mg/kg)				
	0.024	0.059	0.067	<0.020	0.063
	Cobalt (Co)-Total (mg/kg wwt)				
	0.0040	0.0139	0.0241	<0.0040	0.0143
	Copper (Cu)-Total (mg/kg)				
	3.16	70.5	8.09	2.94	44.4
	Copper (Cu)-Total (mg/kg wwt)				
	0.536	16.5	2.92	0.544	10.1
	Iron (Fe)-Total (mg/kg)				
	37.2	589	30.5	42.8	1440
	Iron (Fe)-Total (mg/kg wwt)				
	6.30	138	11.0	7.92	328
	Lead (Pb)-Total (mg/kg)				
	<0.020	<0.050	<0.050	<0.020	<0.050
	Lead (Pb)-Total (mg/kg wwt)				
	<0.0040	<0.010	<0.010	<0.0040	<0.010
	Lithium (Li)-Total (mg/kg)				
	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)				
	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)				
	1420	822	1340	1550	734
	Magnesium (Mg)-Total (mg/kg wwt)				
	241	192	484	286	167
	Manganese (Mn)-Total (mg/kg)				
	0.698	8.18	5.67	1.03	7.98
	Manganese (Mn)-Total (mg/kg wwt)				
	0.118	1.91	2.05	0.190	1.81

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

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	Sample ID Description Sampled Date Sampled Time Client ID	L1621082-26 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 8 - GONAD			
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)	61.5			
Metals	Aluminum (Al)-Total (mg/kg)	<2.0			
	Aluminum (Al)-Total (mg/kg wwt)	<0.40			
	Antimony (Sb)-Total (mg/kg)	<0.010			
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020			
	Arsenic (As)-Total (mg/kg)	0.027			
	Arsenic (As)-Total (mg/kg wwt)	0.0106			
	Barium (Ba)-Total (mg/kg)	0.654			
	Barium (Ba)-Total (mg/kg wwt)	0.251			
	Beryllium (Be)-Total (mg/kg)	<0.010			
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020			
	Bismuth (Bi)-Total (mg/kg)	<0.010			
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020			
	Boron (B)-Total (mg/kg)	<1.0			
	Boron (B)-Total (mg/kg wwt)	<0.20			
	Cadmium (Cd)-Total (mg/kg)	<0.0050			
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010			
	Calcium (Ca)-Total (mg/kg)	1380			
	Calcium (Ca)-Total (mg/kg wwt)	531			
	Cesium (Cs)-Total (mg/kg)	0.0104			
	Cesium (Cs)-Total (mg/kg wwt)	0.0040			
	Chromium (Cr)-Total (mg/kg)	<0.050			
	Chromium (Cr)-Total (mg/kg wwt)	<0.010			
	Cobalt (Co)-Total (mg/kg)	0.097			
	Cobalt (Co)-Total (mg/kg wwt)	0.0371			
	Copper (Cu)-Total (mg/kg)	9.85			
	Copper (Cu)-Total (mg/kg wwt)	3.79			
	Iron (Fe)-Total (mg/kg)	38.8			
	Iron (Fe)-Total (mg/kg wwt)	14.9			
	Lead (Pb)-Total (mg/kg)	<0.020			
	Lead (Pb)-Total (mg/kg wwt)	<0.0040			
	Lithium (Li)-Total (mg/kg)	<0.50			
	Lithium (Li)-Total (mg/kg wwt)	<0.10			
	Magnesium (Mg)-Total (mg/kg)	1420			
	Magnesium (Mg)-Total (mg/kg wwt)	547			
	Manganese (Mn)-Total (mg/kg)	5.94			
	Manganese (Mn)-Total (mg/kg wwt)	2.28			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

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Sample ID Description Sampled Date Sampled Time Client ID		L1621082-1 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-1 - MUSCLE	L1621082-2 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-1 - LIVER	L1621082-3 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-1 - GONAD	L1621082-4 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-2 - MUSCLE	L1621082-5 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-2 - LIVER
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.427	0.236	0.0120	0.406	0.258
	Mercury (Hg)-Total (mg/kg wwt)	0.0790	0.0518	0.0043	0.0779	0.0618
	Molybdenum (Mo)-Total (mg/kg)	<0.020	0.582	0.046	<0.020	0.903
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.128	0.0164	<0.0040	0.216
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	12400	14400	11900	12500	13900
	Phosphorus (P)-Total (mg/kg wwt)	2300	3150	4290	2400	3330
	Potassium (K)-Total (mg/kg)	21000	11700	6890	21100	10200
	Potassium (K)-Total (mg/kg wwt)	3890	2560	2480	4050	2430
	Rubidium (Rb)-Total (mg/kg)	11.0	13.0	3.83	11.4	9.20
	Rubidium (Rb)-Total (mg/kg wwt)	2.03	2.85	1.38	2.19	2.20
	Selenium (Se)-Total (mg/kg)	2.66	7.84	7.18	2.53	11.5
	Selenium (Se)-Total (mg/kg wwt)	0.491	1.72	2.58	0.485	2.74
	Sodium (Na)-Total (mg/kg)	870	2590	1610	939	3140
	Sodium (Na)-Total (mg/kg wwt)	161	568	581	180	752
	Strontium (Sr)-Total (mg/kg)	0.920	0.72	3.51	1.33	0.36
	Strontium (Sr)-Total (mg/kg wwt)	0.170	0.158	1.26	0.255	0.087
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0126	0.151	<0.0020	0.0117	0.174
	Thallium (Tl)-Total (mg/kg wwt)	0.00233	0.0331	<0.00040	0.00224	0.0416
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	0.027	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	0.0035
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	0.00085
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	0.18
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	0.042
	Zinc (Zn)-Total (mg/kg)	14.7	137	77.9	20.5	125
	Zinc (Zn)-Total (mg/kg wwt)	2.72	30.0	28.1	3.93	29.9
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

10-FEB-16 15:11 (MT)

Version: FINAL REV. 2

Sample ID Description Sampled Date Sampled Time Client ID		L1621082-6 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-2 - GONAD	L1621082-7 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-3 - MUSCLE	L1621082-8 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-3 - LIVER	L1621082-9 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-3 - GONAD	L1621082-10 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-3X - MUSCLE
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.0117	0.569	0.436	0.0086	0.554
	Mercury (Hg)-Total (mg/kg wwt)	0.0045	0.0890	0.0924	0.0032	0.0879
	Molybdenum (Mo)-Total (mg/kg)	0.040	<0.020	0.901	0.041	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0152	<0.0040	0.191	0.0151	<0.0040
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	11500	15300	14200	10300	16500
	Phosphorus (P)-Total (mg/kg wwt)	4380	2390	3000	3800	2620
	Potassium (K)-Total (mg/kg)	6660	25300	10800	6360	25600
	Potassium (K)-Total (mg/kg wwt)	2550	3950	2290	2350	4060
	Rubidium (Rb)-Total (mg/kg)	3.94	16.0	9.21	4.20	15.7
	Rubidium (Rb)-Total (mg/kg wwt)	1.51	2.50	1.95	1.55	2.49
	Selenium (Se)-Total (mg/kg)	7.20	2.57	14.6	3.78	2.37
	Selenium (Se)-Total (mg/kg wwt)	2.75	0.402	3.10	1.40	0.376
	Sodium (Na)-Total (mg/kg)	1430	1750	3700	1630	1830
	Sodium (Na)-Total (mg/kg wwt)	547	273	785	602	290
	Strontium (Sr)-Total (mg/kg)	4.02	1.21	0.46	4.12	3.39
	Strontium (Sr)-Total (mg/kg wwt)	1.54	0.189	0.097	1.52	0.538
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	<0.0020	0.0130	0.106	<0.0020	0.0123
	Thallium (Tl)-Total (mg/kg wwt)	<0.00040	0.00203	0.0224	<0.00040	0.00195
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	0.52
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	0.083
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	0.0100	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	0.00212	0.00041	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	0.25	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	0.054	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	86.9	30.3	151	75.5	25.2
	Zinc (Zn)-Total (mg/kg wwt)	33.3	4.74	31.9	27.9	4.00
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

10-FEB-16 15:11 (MT)

Version: FINAL REV. 2

Sample ID Description Sampled Date Sampled Time Client ID		L1621082-11 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB-3X - GONAD	L1621082-12 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 4 - MUSCLE	L1621082-13 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 4 - LIVER	L1621082-14 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 4 - GONAD	L1621082-15 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 5 - MUSCLE
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.0088	0.459	0.207	0.0093	0.394
	Mercury (Hg)-Total (mg/kg wwt)	0.0033	0.0860	0.0437	0.0035	0.0816
	Molybdenum (Mo)-Total (mg/kg)	0.044	<0.020	0.667	<0.040	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0166	<0.0040	0.141	0.0142	<0.0040
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	10500	12900	15500	10300	12900
	Phosphorus (P)-Total (mg/kg wwt)	3980	2410	3260	3900	2670
	Potassium (K)-Total (mg/kg)	6280	22200	12700	6090	20800
	Potassium (K)-Total (mg/kg wwt)	2390	4170	2680	2310	4310
	Rubidium (Rb)-Total (mg/kg)	4.07	11.4	10.6	3.46	11.5
	Rubidium (Rb)-Total (mg/kg wwt)	1.55	2.15	2.24	1.31	2.38
	Selenium (Se)-Total (mg/kg)	3.72	2.19	8.43	5.40	2.42
	Selenium (Se)-Total (mg/kg wwt)	1.41	0.410	1.78	2.05	0.501
	Sodium (Na)-Total (mg/kg)	1700	1620	3410	1590	808
	Sodium (Na)-Total (mg/kg wwt)	645	304	718	603	167
	Strontium (Sr)-Total (mg/kg)	4.24	1.30	0.43	4.98	1.31
	Strontium (Sr)-Total (mg/kg wwt)	1.61	0.245	0.091	1.89	0.272
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	<0.0020	0.0217	0.133	<0.0020	0.0134
	Thallium (Tl)-Total (mg/kg wwt)	<0.00040	0.00407	0.0280	<0.00040	0.00278
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	0.0057	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	0.00043	0.00106	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	73.9	20.5	116	53.1	26.6
	Zinc (Zn)-Total (mg/kg wwt)	28.1	3.85	24.6	20.1	5.51
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1621082-16 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 5 - LIVER	L1621082-17 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 5 - GONAD	L1621082-18 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 6 - MUSCLE	L1621082-19 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 6 - LIVER	L1621082-20 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 6 - GONAD
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.269	0.0102	0.424	0.221	0.0097
	Mercury (Hg)-Total (mg/kg wwt)	0.0641	0.0039	0.0801	0.0523	0.0035
	Molybdenum (Mo)-Total (mg/kg)	0.717	0.041	<0.020	0.564	0.031
	Molybdenum (Mo)-Total (mg/kg wwt)	0.171	0.0160	<0.0040	0.134	0.0112
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	13100	11400	13400	13900	12100
	Phosphorus (P)-Total (mg/kg wwt)	3130	4420	2540	3310	4400
	Potassium (K)-Total (mg/kg)	9980	7230	22300	11400	7110
	Potassium (K)-Total (mg/kg wwt)	2380	2790	4220	2700	2590
	Rubidium (Rb)-Total (mg/kg)	8.91	4.18	12.1	13.5	4.56
	Rubidium (Rb)-Total (mg/kg wwt)	2.12	1.62	2.29	3.19	1.66
	Selenium (Se)-Total (mg/kg)	9.10	6.06	2.28	7.01	6.16
	Selenium (Se)-Total (mg/kg wwt)	2.17	2.34	0.431	1.66	2.25
	Sodium (Na)-Total (mg/kg)	2690	1350	1220	2540	1290
	Sodium (Na)-Total (mg/kg wwt)	642	524	231	603	471
	Strontium (Sr)-Total (mg/kg)	1.11	4.29	1.37	0.31	4.31
	Strontium (Sr)-Total (mg/kg wwt)	0.265	1.66	0.259	0.073	1.57
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.138	<0.0020	0.0140	0.157	<0.0020
	Thallium (Tl)-Total (mg/kg wwt)	0.0328	<0.00040	0.00264	0.0371	<0.00040
	Tin (Sn)-Total (mg/kg)	0.14	<0.10	<0.10	0.14	<0.10
	Tin (Sn)-Total (mg/kg wwt)	0.033	<0.020	<0.020	0.034	0.023
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	0.021	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	125	49.1	30.6	113	53.3
	Zinc (Zn)-Total (mg/kg wwt)	29.9	19.0	5.78	26.7	19.4
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1621082-21 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 7 - MUSCLE	L1621082-22 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 7 - LIVER	L1621082-23 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 7 - GONAD	L1621082-24 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 8 - MUSCLE	L1621082-25 Tissue 22-MAY-15 16:15 BOOTJACK LK TRIB 10 RB- 8 - LIVER
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.565	0.365	0.0091	0.278	0.214
	Mercury (Hg)-Total (mg/kg wwt)	0.0958	0.0855	0.0033	0.0515	0.0485
	Molybdenum (Mo)-Total (mg/kg)	<0.020	1.01	<0.040	<0.020	0.901
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.235	0.0120	<0.0040	0.205
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	14100	13600	9830	14500	13100
	Phosphorus (P)-Total (mg/kg wwt)	2390	3190	3550	2690	2970
	Potassium (K)-Total (mg/kg)	22800	10300	6520	22200	11100
	Potassium (K)-Total (mg/kg wwt)	3860	2410	2350	4120	2510
	Rubidium (Rb)-Total (mg/kg)	10.9	7.68	3.25	11.0	7.55
	Rubidium (Rb)-Total (mg/kg wwt)	1.85	1.80	1.17	2.03	1.71
	Selenium (Se)-Total (mg/kg)	2.23	10.1	4.87	2.81	9.40
	Selenium (Se)-Total (mg/kg wwt)	0.378	2.38	1.76	0.521	2.13
	Sodium (Na)-Total (mg/kg)	1210	2810	1250	1060	2720
	Sodium (Na)-Total (mg/kg wwt)	205	658	450	197	619
	Strontium (Sr)-Total (mg/kg)	1.38	0.41	4.11	2.97	0.35
	Strontium (Sr)-Total (mg/kg wwt)	0.234	0.095	1.48	0.549	0.081
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0206	0.178	<0.0020	0.0107	0.119
	Thallium (Tl)-Total (mg/kg wwt)	0.00350	0.0416	<0.00040	0.00198	0.0269
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	0.13
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	0.030
	Uranium (U)-Total (mg/kg)	<0.0020	0.0029	<0.0020	<0.0020	0.0038
	Uranium (U)-Total (mg/kg wwt)	<0.00040	0.00067	<0.00040	<0.00040	0.00086
	Vanadium (V)-Total (mg/kg)	<0.10	0.16	<0.10	<0.10	0.23
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.038	<0.020	<0.020	0.052
	Zinc (Zn)-Total (mg/kg)	26.1	149	52.3	23.0	120
	Zinc (Zn)-Total (mg/kg wwt)	4.42	35.0	18.9	4.26	27.3
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1621082-26			
		Tissue			
		22-MAY-15			
		16:15			
		BOOTJACK LK			
		TRIB 10 RB- 8 -			
		GONAD			
Grouping	Analyte				
TISSUE					
Metals	Mercury (Hg)-Total (mg/kg)	0.0126			
	Mercury (Hg)-Total (mg/kg wwt)	0.0049			
	Molybdenum (Mo)-Total (mg/kg)	0.036			
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0140			
	Nickel (Ni)-Total (mg/kg)	<0.20			
	Nickel (Ni)-Total (mg/kg wwt)	<0.040			
	Phosphorus (P)-Total (mg/kg)	11700			
	Phosphorus (P)-Total (mg/kg wwt)	4500			
	Potassium (K)-Total (mg/kg)	7200			
	Potassium (K)-Total (mg/kg wwt)	2770			
	Rubidium (Rb)-Total (mg/kg)	3.66			
	Rubidium (Rb)-Total (mg/kg wwt)	1.41			
	Selenium (Se)-Total (mg/kg)	6.30			
	Selenium (Se)-Total (mg/kg wwt)	2.42			
	Sodium (Na)-Total (mg/kg)	1400			
	Sodium (Na)-Total (mg/kg wwt)	539			
	Strontium (Sr)-Total (mg/kg)	4.09			
	Strontium (Sr)-Total (mg/kg wwt)	1.57			
	Tellurium (Te)-Total (mg/kg)	<0.020			
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040			
	Thallium (Tl)-Total (mg/kg)	<0.0020			
	Thallium (Tl)-Total (mg/kg wwt)	<0.00040			
	Tin (Sn)-Total (mg/kg)	<0.10			
	Tin (Sn)-Total (mg/kg wwt)	<0.020			
	Uranium (U)-Total (mg/kg)	<0.0020			
	Uranium (U)-Total (mg/kg wwt)	<0.00040			
	Vanadium (V)-Total (mg/kg)	<0.10			
	Vanadium (V)-Total (mg/kg wwt)	<0.020			
	Zinc (Zn)-Total (mg/kg)	63.7			
	Zinc (Zn)-Total (mg/kg wwt)	24.5			
	Zirconium (Zr)-Total (mg/kg)	<0.20			
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Barium (Ba)-Total	DUP-H	L1621082-11, -13, -14, -16, -19, -2, -22, -23, -25, -5, -8, -9
Duplicate	Calcium (Ca)-Total	DUP-H	L1621082-11, -13, -14, -16, -19, -2, -22, -23, -25, -5, -8, -9
Duplicate	Strontium (Sr)-Total	DUP-H	L1621082-11, -13, -14, -16, -19, -2, -22, -23, -25, -5, -8, -9
Duplicate	Barium (Ba)-Total	DUP-H	L1621082-11, -13, -14, -16, -19, -2, -22, -23, -25, -5, -8, -9
Duplicate	Calcium (Ca)-Total	DUP-H	L1621082-11, -13, -14, -16, -19, -2, -22, -23, -25, -5, -8, -9
Duplicate	Strontium (Sr)-Total	DUP-H	L1621082-11, -13, -14, -16, -19, -2, -22, -23, -25, -5, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-WET-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-WET-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (WET)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			

Reference Information

partially recovered.

MET-WET-MICR-HRMS-VA Tissue Metals in Tissue by HR-ICPMS Micro (WET) EPA 200.3/200.8

Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on wet weight basis.

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MOISTURE-TISS-VA Tissue % Moisture in Tissues ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

FT-2

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Report to:		Report Format / Distribution			Service Requested: (rush - subject to availability)				
Company: MOUNT POLLEY MINING CORP.		<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Default)				
Contact: Colleen Hughes		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge				
Address: PO BOX 12, Likely, BC, V0L 1N0		Email 1: on file			<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge				
Phone: 250-790-2215 Fax:		Email 2:			<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS				
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No		Client / Project Information:			Analysis Request				
Company:		Job #:			Please indicate below Filtered, Preserved or both (F, P, F/P)				
Contact:		PO / AFE:							
Address:		Legal Site Description:							
Phone: Fax:		Quote #:							
Lab Work Order # (lab use only)		ALS Contact: Can Dang			Sampler: Norm Zirnhelt 25				
L1621082									
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	T-metals (HRICP-MS) (Wet&D)	Moisture	Liver Metals	Conad Metals	Number of Containers
	Bootjack Lk Trib 10 RB-1	22-May-15	8:00-16:15	Tissue	X	X	X	X	3
	Bootjack Lk Trib 10 RB-2	22-May-15	8:00-16:15	Tissue	X	X	X	X	3
	Bootjack Lk Trib 10 RB-3	22-May-15	8:00-16:15	Tissue	X	X	X	X	3
	Bootjack Lk Trib 10 RB-3X	22-May-15	8:00-16:15	Tissue	X	X		X	2
	Bootjack Lk Trib 10 RB-4	22-May-15	8:00-16:15	Tissue	X	X	X	X	3
	Bootjack Lk Trib 10 RB-5	22-May-15	8:00-16:15	Tissue	X	X	X	X	3
	Bootjack Lk Trib 10 RB-6	22-May-15	8:00-16:15	Tissue	X	X	X	X	3
	Bootjack Lk Trib 10 RB-7	22-May-15	8:00-16:15	Tissue	X	X	X	X	3
	Bootjack Lk Trib 10 RB-8	22-May-15	8:00-16:15	Tissue	X	X	X	X	3
Special Instructions / Regulations / Hazardous Details									
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.									
SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)			
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF	
N.Zirnhelt	June 2, 2015 1600hr	lady	06/03	9am	2.2°C				



L1621082-COFC



MOUNT POLLEY MINING CORP.
ATTN: Katie McMahan
PO Box 12
Likely BC VOL 1N0

Date Received: 03-SEP-15
Report Date: 19-OCT-15 17:03 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1667546
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: 2, 3, 4, B0023
Legal Site Desc:

Can Dang
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1667546-1 Tissue 30-AUG-15 RYE GRASS-1	L1667546-2 Tissue 30-AUG-15 RYE GRASS-2	L1667546-3 Tissue 30-AUG-15 RYE GRASS-3	L1667546-4 Tissue 30-AUG-15 RYE GRASS-4	L1667546-5 Tissue 30-AUG-15 RYE GRASS-4X
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	67.4	52.9	65.6	61.7	53.2
Metals	Aluminum (Al)-Total (mg/kg)	207	19.2	17.4	155	30.9
	Aluminum (Al)-Total (mg/kg wwt)	67.6	9.07	6.00	59.2	14.5
	Antimony (Sb)-Total (mg/kg)	0.013	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	0.0044	<0.0020	<0.0020	0.0023	<0.0020
	Arsenic (As)-Total (mg/kg)	0.422	0.039	0.026	0.138	0.033
	Arsenic (As)-Total (mg/kg wwt)	0.138	0.0184	0.0089	0.0530	0.0154
	Barium (Ba)-Total (mg/kg)	32.7	29.8	49.1	41.9	21.7
	Barium (Ba)-Total (mg/kg wwt)	10.7	14.1	16.9	16.0	10.1
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	0.0024	<0.0020	<0.0020	0.0028	<0.0020
	Bismuth (Bi)-Total (mg/kg)	0.052	0.026	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	0.0171	0.0124	<0.0020	<0.0020	0.0023
	Boron (B)-Total (mg/kg)	3.6	2.5	2.2	1.6	1.8
	Boron (B)-Total (mg/kg wwt)	1.19	1.17	0.77	0.59	0.83
	Cadmium (Cd)-Total (mg/kg)	0.137	0.105	0.211	0.102	0.0528
	Cadmium (Cd)-Total (mg/kg wwt)	0.0445	0.0495	0.0725	0.0392	0.0247
	Calcium (Ca)-Total (mg/kg)	3230	1240	3340	1850	1150
	Calcium (Ca)-Total (mg/kg wwt)	1050	586	1150	707	540
	Cesium (Cs)-Total (mg/kg)	0.0299	<0.0050	0.0091	0.186	0.165
	Cesium (Cs)-Total (mg/kg wwt)	0.0097	0.0023	0.0031	0.0714	0.0773
	Chromium (Cr)-Total (mg/kg)	0.294	0.067	0.052	0.141	0.055
	Chromium (Cr)-Total (mg/kg wwt)	0.096	0.032	0.018	0.054	0.026
	Cobalt (Co)-Total (mg/kg)	0.194	0.023	<0.020	0.182	0.047
	Cobalt (Co)-Total (mg/kg wwt)	0.0634	0.0110	0.0061	0.0697	0.0218
	Copper (Cu)-Total (mg/kg)	14.3	5.43	5.76	12.6	5.56
	Copper (Cu)-Total (mg/kg wwt)	4.67	2.56	1.98	4.81	2.60
	Iron (Fe)-Total (mg/kg)	496	101	66.9	355	97.4
	Iron (Fe)-Total (mg/kg wwt)	162	47.5	23.0	136	45.6
	Lead (Pb)-Total (mg/kg)	0.423	0.030	0.030	0.073	0.022
	Lead (Pb)-Total (mg/kg wwt)	0.138	0.0141	0.0103	0.0279	0.0102
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	984	808	813	811	500
	Magnesium (Mg)-Total (mg/kg wwt)	321	381	280	310	234
	Manganese (Mn)-Total (mg/kg)	32.5	16.8	19.0	39.8	28.9
	Manganese (Mn)-Total (mg/kg wwt)	10.6	7.91	6.55	15.2	13.5

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1667546-6	L1667546-7	L1667546-8	L1667546-9	L1667546-10
		Description	Tissue	Tissue	Tissue	Tissue	Tissue
		Sampled Date	30-AUG-15	30-AUG-15	30-AUG-15	30-AUG-15	30-AUG-15
		Sampled Time					
		Client ID	RYE GRASS-5	RYE GRASS-6	RYE GRASS-7	RYE GRASS-7X	RYE GRASS-8
Grouping	Analyte						
TISSUE							
Physical Tests	% Moisture (%)		66.6	76.2	71.1	72.3	62.5
Metals	Aluminum (Al)-Total (mg/kg)		449	36.5	31.4	20.5	54.3
	Aluminum (Al)-Total (mg/kg wwt)		150	8.68	9.07	5.67	20.3
	Antimony (Sb)-Total (mg/kg)		0.014	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)		0.0048	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)		0.338	0.053	0.040	0.031	0.077
	Arsenic (As)-Total (mg/kg wwt)		0.113	0.0126	0.0116	0.0085	0.0288
	Barium (Ba)-Total (mg/kg)		24.8	73.6	21.2	13.2	44.3
	Barium (Ba)-Total (mg/kg wwt)		8.29	17.5	6.14	3.65	16.6
	Beryllium (Be)-Total (mg/kg)		0.017	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)		0.0057	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)		<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	0.0022	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)		2.6	2.6	2.0	1.2	2.3
	Boron (B)-Total (mg/kg wwt)		0.86	0.63	0.58	0.34	0.88
	Cadmium (Cd)-Total (mg/kg)		0.0716	0.128	0.170	0.113	0.354
	Cadmium (Cd)-Total (mg/kg wwt)		0.0239	0.0304	0.0491	0.0313	0.133
	Calcium (Ca)-Total (mg/kg)		1580	5450	2260	1230	2300
	Calcium (Ca)-Total (mg/kg wwt)		527	1300	654	341	861
	Cesium (Cs)-Total (mg/kg)		0.0574	<0.0050	0.0106	0.0053	0.0070
	Cesium (Cs)-Total (mg/kg wwt)		0.0192	<0.0010	0.0031	0.0015	0.0026
	Chromium (Cr)-Total (mg/kg)		0.292	0.104	0.094	0.071	0.076
	Chromium (Cr)-Total (mg/kg wwt)		0.097	0.025	0.027	0.020	0.029
	Cobalt (Co)-Total (mg/kg)		0.399	0.068	0.040	0.023	0.050
	Cobalt (Co)-Total (mg/kg wwt)		0.133	0.0161	0.0115	0.0064	0.0189
	Copper (Cu)-Total (mg/kg)		27.6	7.09	6.16	3.35	5.04
	Copper (Cu)-Total (mg/kg wwt)		9.22	1.69	1.78	0.928	1.89
	Iron (Fe)-Total (mg/kg)		1030	86.7	109	65.0	101
	Iron (Fe)-Total (mg/kg wwt)		345	20.6	31.4	18.0	37.8
	Lead (Pb)-Total (mg/kg)		0.121	0.037	0.026	0.021	0.036
	Lead (Pb)-Total (mg/kg wwt)		0.0405	0.0088	0.0075	0.0059	0.0136
	Lithium (Li)-Total (mg/kg)		<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)		0.13	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)		899	1130	665	409	669
	Magnesium (Mg)-Total (mg/kg wwt)		300	270	192	113	251
	Manganese (Mn)-Total (mg/kg)		57.5	61.1	46.6	26.0	64.6
	Manganese (Mn)-Total (mg/kg wwt)		19.2	14.5	13.5	7.20	24.2

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1667546-11 Tissue 30-AUG-15 RYE GRASS-9	L1667546-12 Tissue 30-AUG-15 RYE GRASS-10	L1667546-13 Tissue 19-AUG-15 WILLOW SEEDLING-1	L1667546-14 Tissue 19-AUG-15 WILLOW WATTLE- 1	L1667546-15 Tissue 19-AUG-15 WILLOW STAKE-1
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	65.0	61.2	55.0	63.0	57.8
Metals	Aluminum (Al)-Total (mg/kg)	8.5	199	193	139	260
	Aluminum (Al)-Total (mg/kg wwt)	2.99	77.3	87.0	51.3	110
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	0.054	0.016
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	0.0026	0.0043	0.0200	0.0066
	Arsenic (As)-Total (mg/kg)	0.066	0.101	0.256	0.204	0.360
	Arsenic (As)-Total (mg/kg wwt)	0.0230	0.0394	0.115	0.0755	0.152
	Barium (Ba)-Total (mg/kg)	19.9	29.7	8.53	5.56	33.2
	Barium (Ba)-Total (mg/kg wwt)	6.98	11.5	3.84	2.06	14.0
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	0.0020	0.0021	<0.0020	0.0035
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	0.011	0.011
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	0.0035	0.0039	0.0046
	Boron (B)-Total (mg/kg)	2.2	4.6	19.9	24.6	12.7
	Boron (B)-Total (mg/kg wwt)	0.77	1.79	8.94	9.11	5.36
	Cadmium (Cd)-Total (mg/kg)	0.0857	0.168	0.216	0.248	1.69
	Cadmium (Cd)-Total (mg/kg wwt)	0.0300	0.0654	0.0973	0.0920	0.715
	Calcium (Ca)-Total (mg/kg)	2520	2710	7810	12500	22200
	Calcium (Ca)-Total (mg/kg wwt)	882	1050	3510	4640	9350
	Cesium (Cs)-Total (mg/kg)	0.0148	0.0758	0.0587	0.144	0.132
	Cesium (Cs)-Total (mg/kg wwt)	0.0052	0.0294	0.0264	0.0532	0.0556
	Chromium (Cr)-Total (mg/kg)	<0.050	0.388	0.381	0.289	0.554
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	0.151	0.171	0.107	0.234
	Cobalt (Co)-Total (mg/kg)	<0.020	0.138	0.305	0.393	0.790
	Cobalt (Co)-Total (mg/kg wwt)	0.0060	0.0537	0.137	0.145	0.333
	Copper (Cu)-Total (mg/kg)	4.92	7.52	3.71	5.21	7.28
	Copper (Cu)-Total (mg/kg wwt)	1.72	2.92	1.67	1.93	3.07
	Iron (Fe)-Total (mg/kg)	36.8	408	354	313	587
	Iron (Fe)-Total (mg/kg wwt)	12.9	159	159	116	248
	Lead (Pb)-Total (mg/kg)	0.053	0.069	0.162	0.091	0.203
	Lead (Pb)-Total (mg/kg wwt)	0.0185	0.0268	0.0730	0.0337	0.0857
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	0.15
	Magnesium (Mg)-Total (mg/kg)	811	1070	1860	3920	5240
	Magnesium (Mg)-Total (mg/kg wwt)	284	414	835	1450	2210
	Manganese (Mn)-Total (mg/kg)	23.7	25.2	68.4	196	328
	Manganese (Mn)-Total (mg/kg wwt)	8.31	9.80	30.8	72.6	138

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1667546-16 Tissue 19-AUG-15 WILLOW SEEDLING-2	L1667546-17 Tissue 19-AUG-15 WILLOW WATTLE- 2	L1667546-18 Tissue 19-AUG-15 WILLOW STAKE-2	L1667546-19 Tissue 19-AUG-15 WILLOW SEEDLING-3	L1667546-20 Tissue 19-AUG-15 WILLOW WATTLE- 3
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	57.0	58.0	56.8	60.0	63.5
Metals	Aluminum (Al)-Total (mg/kg)	321	293	175	245	99.2
	Aluminum (Al)-Total (mg/kg wwt)	138	123	75.9	98.2	36.2
	Antimony (Sb)-Total (mg/kg)	0.026	0.016	<0.010	0.017	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	0.0114	0.0066	0.0041	0.0068	0.0023
	Arsenic (As)-Total (mg/kg)	0.600	0.315	0.277	0.456	0.163
	Arsenic (As)-Total (mg/kg wwt)	0.258	0.132	0.120	0.182	0.0593
	Barium (Ba)-Total (mg/kg)	16.0	5.90	4.70	8.89	12.8
	Barium (Ba)-Total (mg/kg wwt)	6.87	2.48	2.03	3.56	4.68
	Beryllium (Be)-Total (mg/kg)	0.012	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	0.0051	0.0036	0.0026	0.0036	<0.0020
	Bismuth (Bi)-Total (mg/kg)	0.511	0.020	0.018	0.026	0.014
	Bismuth (Bi)-Total (mg/kg wwt)	0.220	0.0083	0.0077	0.0105	0.0050
	Boron (B)-Total (mg/kg)	60.9	24.4	20.0	19.5	46.9
	Boron (B)-Total (mg/kg wwt)	26.2	10.2	8.67	7.79	17.1
	Cadmium (Cd)-Total (mg/kg)	0.823	0.366	0.360	1.30	1.01
	Cadmium (Cd)-Total (mg/kg wwt)	0.354	0.153	0.156	0.522	0.369
	Calcium (Ca)-Total (mg/kg)	17700	9210	9260	11100	20700
	Calcium (Ca)-Total (mg/kg wwt)	7630	3860	4010	4430	7530
	Cesium (Cs)-Total (mg/kg)	0.0536	0.0603	0.0388	0.0780	0.0364
	Cesium (Cs)-Total (mg/kg wwt)	0.0231	0.0253	0.0168	0.0312	0.0133
	Chromium (Cr)-Total (mg/kg)	0.457	0.645	0.270	0.553	0.164
	Chromium (Cr)-Total (mg/kg wwt)	0.197	0.271	0.117	0.221	0.060
	Cobalt (Co)-Total (mg/kg)	0.612	0.695	0.513	0.651	0.793
	Cobalt (Co)-Total (mg/kg wwt)	0.263	0.292	0.222	0.261	0.289
	Copper (Cu)-Total (mg/kg)	16.5	8.69	5.42	6.94	7.49
	Copper (Cu)-Total (mg/kg wwt)	7.09	3.65	2.34	2.78	2.73
	Iron (Fe)-Total (mg/kg)	695	617	371	529	240
	Iron (Fe)-Total (mg/kg wwt)	299	259	160	212	87.4
	Lead (Pb)-Total (mg/kg)	0.162	0.161	0.123	0.188	0.071
	Lead (Pb)-Total (mg/kg wwt)	0.0696	0.0676	0.0533	0.0754	0.0258
	Lithium (Li)-Total (mg/kg)	0.56	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	0.24	0.17	0.12	0.13	0.10
	Magnesium (Mg)-Total (mg/kg)	4260	2420	2540	2870	5120
	Magnesium (Mg)-Total (mg/kg wwt)	1830	1020	1100	1150	1870
	Manganese (Mn)-Total (mg/kg)	127	89.9	202	113	167
	Manganese (Mn)-Total (mg/kg wwt)	54.5	37.7	87.4	45.4	60.8

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1667546-21 Tissue 19-AUG-15 WILLOW STAKE-3	L1667546-22 Tissue 25-AUG-15 WILLOW SEEDLING-4	L1667546-23 Tissue 25-AUG-15 WILLOW WATTLE- 4	L1667546-24 Tissue 25-AUG-15 WILLOW STAKE-4	L1667546-25 Tissue 25-AUG-15 WILLOW STAKE- 4X
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	57.3	59.8	62.9	60.8	60.9
Metals	Aluminum (Al)-Total (mg/kg)	112	580	160	344	367
	Aluminum (Al)-Total (mg/kg wwt)	47.7	233	59.2	135	144
	Antimony (Sb)-Total (mg/kg)	0.011	0.027	0.014	0.015	0.016
	Antimony (Sb)-Total (mg/kg wwt)	0.0048	0.0107	0.0052	0.0058	0.0064
	Arsenic (As)-Total (mg/kg)	0.333	0.540	0.830	0.598	0.635
	Arsenic (As)-Total (mg/kg wwt)	0.142	0.217	0.308	0.234	0.248
	Barium (Ba)-Total (mg/kg)	24.1	14.3	6.39	9.84	11.0
	Barium (Ba)-Total (mg/kg wwt)	10.3	5.76	2.37	3.85	4.31
	Beryllium (Be)-Total (mg/kg)	<0.010	0.016	<0.010	0.012	0.012
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	0.0063	0.0020	0.0045	0.0048
	Bismuth (Bi)-Total (mg/kg)	0.024	0.271	0.075	0.012	0.015
	Bismuth (Bi)-Total (mg/kg wwt)	0.0103	0.109	0.0278	0.0045	0.0058
	Boron (B)-Total (mg/kg)	57.8	19.9	76.9	48.3	49.7
	Boron (B)-Total (mg/kg wwt)	24.7	8.00	28.5	18.9	19.4
	Cadmium (Cd)-Total (mg/kg)	0.968	0.621	0.400	2.51	2.94
	Cadmium (Cd)-Total (mg/kg wwt)	0.413	0.250	0.148	0.982	1.15
	Calcium (Ca)-Total (mg/kg)	17900	15400	15800	13200	14000
	Calcium (Ca)-Total (mg/kg wwt)	7630	6200	5850	5170	5500
	Cesium (Cs)-Total (mg/kg)	0.0304	0.0871	0.0614	0.0512	0.0508
	Cesium (Cs)-Total (mg/kg wwt)	0.0130	0.0351	0.0228	0.0200	0.0199
	Chromium (Cr)-Total (mg/kg)	0.236	1.21	0.351	0.501	0.508
	Chromium (Cr)-Total (mg/kg wwt)	0.101	0.487	0.130	0.196	0.199
	Cobalt (Co)-Total (mg/kg)	0.451	1.11	1.63	0.508	0.526
	Cobalt (Co)-Total (mg/kg wwt)	0.193	0.446	0.603	0.199	0.206
	Copper (Cu)-Total (mg/kg)	8.16	10.4	9.36	19.0	19.4
	Copper (Cu)-Total (mg/kg wwt)	3.48	4.20	3.47	7.42	7.57
	Iron (Fe)-Total (mg/kg)	245	1070	321	798	821
	Iron (Fe)-Total (mg/kg wwt)	105	431	119	312	321
	Lead (Pb)-Total (mg/kg)	0.082	0.285	0.109	0.171	0.167
	Lead (Pb)-Total (mg/kg wwt)	0.0351	0.114	0.0403	0.0670	0.0652
	Lithium (Li)-Total (mg/kg)	<0.50	0.57	1.18	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	0.23	0.44	0.14	0.14
	Magnesium (Mg)-Total (mg/kg)	4190	3180	4360	2090	2070
	Magnesium (Mg)-Total (mg/kg wwt)	1790	1280	1620	818	809
	Manganese (Mn)-Total (mg/kg)	279	199	111	127	137
	Manganese (Mn)-Total (mg/kg wwt)	119	80.2	41.0	49.6	53.5

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1667546-26 Tissue 25-AUG-15 WILLOW WATTLE- 4X	L1667546-27 Tissue 25-AUG-15 WILLOW STAKE-5	L1667546-28 Tissue 25-AUG-15 WILLOW SEEDLING-5	L1667546-29 Tissue 25-AUG-15 WILLOW WATTLE- 5	L1667546-30 Tissue 25-AUG-15 WILLOW STAKE-6
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	62.3	58.7	56.3	60.1	59.5
Metals	Aluminum (Al)-Total (mg/kg)	179	250	300	109	199
	Aluminum (Al)-Total (mg/kg wwt)	67.4	103	131	43.4	80.6
	Antimony (Sb)-Total (mg/kg)	0.014	0.022	0.026	0.010	0.025
	Antimony (Sb)-Total (mg/kg wwt)	0.0052	0.0091	0.0111	0.0040	0.0100
	Arsenic (As)-Total (mg/kg)	0.595	0.526	0.459	0.163	1.09
	Arsenic (As)-Total (mg/kg wwt)	0.225	0.218	0.201	0.0651	0.439
	Barium (Ba)-Total (mg/kg)	6.43	7.67	6.99	3.34	8.02
	Barium (Ba)-Total (mg/kg wwt)	2.43	3.17	3.05	1.33	3.25
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	0.0021	0.0034	0.0041	<0.0020	0.0025
	Bismuth (Bi)-Total (mg/kg)	0.021	0.497	1.07	0.533	0.976
	Bismuth (Bi)-Total (mg/kg wwt)	0.0081	0.205	0.468	0.213	0.395
	Boron (B)-Total (mg/kg)	74.6	53.8	36.0	30.1	52.3
	Boron (B)-Total (mg/kg wwt)	28.2	22.2	15.7	12.0	21.2
	Cadmium (Cd)-Total (mg/kg)	0.345	0.577	1.70	0.436	0.569
	Cadmium (Cd)-Total (mg/kg wwt)	0.130	0.239	0.744	0.174	0.230
	Calcium (Ca)-Total (mg/kg)	16000	15200	11000	11100	13900
	Calcium (Ca)-Total (mg/kg wwt)	6040	6280	4790	4440	5610
	Cesium (Cs)-Total (mg/kg)	0.0685	0.0627	0.0914	0.0371	0.0237
	Cesium (Cs)-Total (mg/kg wwt)	0.0259	0.0259	0.0399	0.0148	0.0096
	Chromium (Cr)-Total (mg/kg)	0.361	0.517	0.689	0.198	0.383
	Chromium (Cr)-Total (mg/kg wwt)	0.136	0.214	0.301	0.079	0.155
	Cobalt (Co)-Total (mg/kg)	1.25	0.862	0.803	0.386	0.508
	Cobalt (Co)-Total (mg/kg wwt)	0.472	0.356	0.351	0.154	0.206
	Copper (Cu)-Total (mg/kg)	9.71	8.28	10.9	8.14	8.30
	Copper (Cu)-Total (mg/kg wwt)	3.67	3.43	4.78	3.25	3.36
	Iron (Fe)-Total (mg/kg)	357	505	617	279	448
	Iron (Fe)-Total (mg/kg wwt)	135	209	270	111	181
	Lead (Pb)-Total (mg/kg)	0.121	0.159	0.174	0.062	0.118
	Lead (Pb)-Total (mg/kg wwt)	0.0457	0.0657	0.0762	0.0245	0.0476
	Lithium (Li)-Total (mg/kg)	0.94	<0.50	<0.50	<0.50	0.62
	Lithium (Li)-Total (mg/kg wwt)	0.36	0.17	0.21	<0.10	0.25
	Magnesium (Mg)-Total (mg/kg)	4440	3580	3230	3110	4070
	Magnesium (Mg)-Total (mg/kg wwt)	1680	1480	1410	1240	1650
	Manganese (Mn)-Total (mg/kg)	113	188	117	104	295
	Manganese (Mn)-Total (mg/kg wwt)	42.5	77.8	51.2	41.6	119

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1667546-31 Tissue 25-AUG-15 WILLOW WATTLE-6	L1667546-32 Tissue 25-AUG-15 WILLOW SEEDLING-6	L1667546-33 Tissue 25-AUG-15 WILLOW-1	L1667546-34 Tissue 25-AUG-15 WILLOW-2	L1667546-35 Tissue 25-AUG-15 WILLOW-3
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	55.5	58.1	57.5	60.3	64.8
Metals	Aluminum (Al)-Total (mg/kg)	177	314	23.7	90.2	103
	Aluminum (Al)-Total (mg/kg wwt)	79.0	132	10.1	35.8	36.1
	Antimony (Sb)-Total (mg/kg)	<0.010	0.021	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	0.0038	0.0089	<0.0020	0.0025	0.0027
	Arsenic (As)-Total (mg/kg)	0.153	0.402	0.021	0.087	0.082
	Arsenic (As)-Total (mg/kg wwt)	0.0682	0.168	0.0091	0.0345	0.0288
	Barium (Ba)-Total (mg/kg)	3.87	11.6	10.0	5.47	18.0
	Barium (Ba)-Total (mg/kg wwt)	1.72	4.86	4.27	2.17	6.32
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	0.0021	0.0035	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	0.573	0.011	0.028	0.024
	Bismuth (Bi)-Total (mg/kg wwt)	0.0030	0.240	0.0046	0.0112	0.0086
	Boron (B)-Total (mg/kg)	28.7	25.9	24.1	33.0	68.1
	Boron (B)-Total (mg/kg wwt)	12.8	10.9	10.2	13.1	24.0
	Cadmium (Cd)-Total (mg/kg)	0.153	1.64	1.75	2.29	9.34
	Cadmium (Cd)-Total (mg/kg wwt)	0.0681	0.687	0.744	0.911	3.29
	Calcium (Ca)-Total (mg/kg)	11600	12600	22000	20200	24000
	Calcium (Ca)-Total (mg/kg wwt)	5150	5290	9370	8010	8440
	Cesium (Cs)-Total (mg/kg)	0.0633	0.0747	0.0082	0.0269	0.0182
	Cesium (Cs)-Total (mg/kg wwt)	0.0282	0.0313	0.0035	0.0107	0.0064
	Chromium (Cr)-Total (mg/kg)	0.407	0.771	0.057	0.167	0.215
	Chromium (Cr)-Total (mg/kg wwt)	0.181	0.323	0.024	0.066	0.075
	Cobalt (Co)-Total (mg/kg)	1.04	0.559	0.504	1.00	1.09
	Cobalt (Co)-Total (mg/kg wwt)	0.463	0.234	0.214	0.397	0.383
	Copper (Cu)-Total (mg/kg)	6.29	8.04	4.21	7.53	7.31
	Copper (Cu)-Total (mg/kg wwt)	2.80	3.37	1.79	2.99	2.57
	Iron (Fe)-Total (mg/kg)	350	572	72.4	202	269
	Iron (Fe)-Total (mg/kg wwt)	156	240	30.8	80.4	94.6
	Lead (Pb)-Total (mg/kg)	0.090	0.151	0.035	0.072	0.066
	Lead (Pb)-Total (mg/kg wwt)	0.0402	0.0635	0.0148	0.0285	0.0233
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	0.13	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	2470	3150	1170	1930	1690
	Magnesium (Mg)-Total (mg/kg wwt)	1100	1320	499	765	595
	Manganese (Mn)-Total (mg/kg)	162	91.7	48.6	75.0	68.4
	Manganese (Mn)-Total (mg/kg wwt)	72.3	38.5	20.7	29.8	24.1

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1667546-36 Tissue 25-AUG-15 WILLOW-3X	L1667546-37 Tissue 25-AUG-15 WILLOW-4	L1667546-38 Tissue 25-AUG-15 WILLOW-5	L1667546-39 Tissue 25-AUG-15 WILLOW-6	L1667546-40 Tissue 25-AUG-15 WILLOW-6X
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	62.3	61.4	61.2	57.7	57.9
Metals	Aluminum (Al)-Total (mg/kg)	87.8	40.8	89.8	40.5	48.6
	Aluminum (Al)-Total (mg/kg wwt)	33.0	15.7	34.8	17.1	20.4
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	0.0032	<0.0020	0.0051	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.086	0.049	0.066	0.038	0.041
	Arsenic (As)-Total (mg/kg wwt)	0.0322	0.0190	0.0255	0.0159	0.0173
	Barium (Ba)-Total (mg/kg)	17.8	93.3	51.2	38.2	38.6
	Barium (Ba)-Total (mg/kg wwt)	6.71	36.0	19.9	16.2	16.2
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	0.033	0.019	0.148	0.086	0.059
	Bismuth (Bi)-Total (mg/kg wwt)	0.0123	0.0073	0.0574	0.0364	0.0248
	Boron (B)-Total (mg/kg)	79.6	47.6	25.9	54.4	54.3
	Boron (B)-Total (mg/kg wwt)	30.0	18.3	10.0	23.0	22.8
	Cadmium (Cd)-Total (mg/kg)	9.74	4.83	3.16	1.72	1.94
	Cadmium (Cd)-Total (mg/kg wwt)	3.67	1.86	1.23	0.727	0.816
	Calcium (Ca)-Total (mg/kg)	24800	24500	20900	20900	21100
	Calcium (Ca)-Total (mg/kg wwt)	9320	9430	8090	8860	8860
	Cesium (Cs)-Total (mg/kg)	0.0168	0.0557	0.0139	0.0188	0.0208
	Cesium (Cs)-Total (mg/kg wwt)	0.0063	0.0215	0.0054	0.0080	0.0088
	Chromium (Cr)-Total (mg/kg)	0.192	0.173	0.188	0.108	0.120
	Chromium (Cr)-Total (mg/kg wwt)	0.072	0.067	0.073	0.046	0.051
	Cobalt (Co)-Total (mg/kg)	1.20	0.386	0.471	0.464	0.470
	Cobalt (Co)-Total (mg/kg wwt)	0.451	0.149	0.183	0.196	0.198
	Copper (Cu)-Total (mg/kg)	7.38	4.83	4.97	3.94	3.79
	Copper (Cu)-Total (mg/kg wwt)	2.78	1.86	1.93	1.67	1.59
	Iron (Fe)-Total (mg/kg)	256	107	182	89.4	104
	Iron (Fe)-Total (mg/kg wwt)	96.5	41.2	70.4	37.8	43.6
	Lead (Pb)-Total (mg/kg)	0.068	0.038	0.052	0.027	0.028
	Lead (Pb)-Total (mg/kg wwt)	0.0256	0.0146	0.0200	0.0112	0.0120
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1710	3450	2810	2620	2540
	Magnesium (Mg)-Total (mg/kg wwt)	645	1330	1090	1110	1070
	Manganese (Mn)-Total (mg/kg)	64.3	26.5	104	42.1	40.1
	Manganese (Mn)-Total (mg/kg wwt)	24.2	10.2	40.3	17.8	16.9

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1667546-41 Tissue 25-AUG-15 WILLOW-7	L1667546-42 Tissue 25-AUG-15 WILLOW-8	L1667546-43 Tissue 25-AUG-15 WILLOW-9	L1667546-44 Tissue 25-AUG-15 WILLOW-10	L1667546-45 Tissue 19-AUG-15 BERRIES-1
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	55.0	57.9	58.1	58.3	73.4
Metals	Aluminum (Al)-Total (mg/kg)	26.1	37.0	117	20.8	15.7
	Aluminum (Al)-Total (mg/kg wwt)	11.8	15.6	49.0	8.70	4.2
	Antimony (Sb)-Total (mg/kg)	<0.010	0.012	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	0.0051	0.0024	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.064	0.027	0.056	0.057	<0.030
	Arsenic (As)-Total (mg/kg wwt)	0.0287	0.0114	0.0234	0.0240	<0.0060
	Barium (Ba)-Total (mg/kg)	10.9	9.08	2.75	2.26	5.45
	Barium (Ba)-Total (mg/kg wwt)	4.93	3.82	1.15	0.942	1.45
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	1.37	0.012	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	0.0024	0.578	0.0049	0.0024	<0.0020
	Boron (B)-Total (mg/kg)	40.7	31.2	22.8	58.6	14.8
	Boron (B)-Total (mg/kg wwt)	18.3	13.1	9.55	24.4	3.92
	Cadmium (Cd)-Total (mg/kg)	1.93	4.92	2.82	0.383	0.020
	Cadmium (Cd)-Total (mg/kg wwt)	0.871	2.07	1.18	0.160	0.0054
	Calcium (Ca)-Total (mg/kg)	20900	32500	19200	17200	1860
	Calcium (Ca)-Total (mg/kg wwt)	9400	13700	8020	7160	493
	Cesium (Cs)-Total (mg/kg)	0.0576	0.0064	0.0158	0.0063	<0.0050
	Cesium (Cs)-Total (mg/kg wwt)	0.0259	0.0027	0.0066	0.0026	<0.0010
	Chromium (Cr)-Total (mg/kg)	0.066	0.110	0.245	0.051	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	0.030	0.046	0.103	0.021	<0.040
	Cobalt (Co)-Total (mg/kg)	2.71	1.35	0.502	0.638	<0.020
	Cobalt (Co)-Total (mg/kg wwt)	1.22	0.568	0.210	0.266	<0.0040
	Copper (Cu)-Total (mg/kg)	4.81	3.74	4.70	5.63	5.89
	Copper (Cu)-Total (mg/kg wwt)	2.17	1.57	1.97	2.35	1.57
	Iron (Fe)-Total (mg/kg)	93.8	80.0	205	62.1	34.6
	Iron (Fe)-Total (mg/kg wwt)	42.2	33.7	85.8	25.9	9.2
	Lead (Pb)-Total (mg/kg)	0.029	0.025	0.065	<0.020	<0.050
	Lead (Pb)-Total (mg/kg wwt)	0.0131	0.0104	0.0273	0.0076	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	3330	2250	1630	2210	973
	Magnesium (Mg)-Total (mg/kg wwt)	1500	944	684	921	258
	Manganese (Mn)-Total (mg/kg)	163	77.8	79.4	38.3	2.90
	Manganese (Mn)-Total (mg/kg wwt)	73.5	32.7	33.3	16.0	0.771

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1667546-46 Tissue 19-AUG-15 BERRIES-2	L1667546-47 Tissue 19-AUG-15 BERRIES-3	L1667546-48 Tissue 19-AUG-15 BERRIES-4	
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)	59.8	53.9	71.4	
Metals	Aluminum (Al)-Total (mg/kg)	52.7	20.5	60.4	
	Aluminum (Al)-Total (mg/kg wwt)	21.2	9.45	17.3	
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	
	Arsenic (As)-Total (mg/kg)	0.040	<0.020	<0.030	
	Arsenic (As)-Total (mg/kg wwt)	0.0159	0.0058	0.0084	
	Barium (Ba)-Total (mg/kg)	1.59	15.0	48.3	
	Barium (Ba)-Total (mg/kg wwt)	0.642	6.91	13.8	
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	
	Boron (B)-Total (mg/kg)	6.1	12.3	16.9	
	Boron (B)-Total (mg/kg wwt)	2.45	5.65	4.84	
	Cadmium (Cd)-Total (mg/kg)	0.445	0.0153	0.459	
	Cadmium (Cd)-Total (mg/kg wwt)	0.179	0.0070	0.132	
	Calcium (Ca)-Total (mg/kg)	1220	5630	2890	
	Calcium (Ca)-Total (mg/kg wwt)	492	2600	828	
	Cesium (Cs)-Total (mg/kg)	0.0091	0.0092	0.0402	
	Cesium (Cs)-Total (mg/kg wwt)	0.0037	0.0043	0.0115	
	Chromium (Cr)-Total (mg/kg)	0.595	<0.050	<0.20	
	Chromium (Cr)-Total (mg/kg wwt)	0.239	0.013	<0.040	
	Cobalt (Co)-Total (mg/kg)	0.047	0.031	0.097	
	Cobalt (Co)-Total (mg/kg wwt)	0.0187	0.0145	0.0278	
	Copper (Cu)-Total (mg/kg)	8.32	2.90	15.3	
	Copper (Cu)-Total (mg/kg wwt)	3.35	1.34	4.38	
	Iron (Fe)-Total (mg/kg)	133	53.0	128	
	Iron (Fe)-Total (mg/kg wwt)	53.5	24.5	36.6	
	Lead (Pb)-Total (mg/kg)	0.022	<0.020	<0.050	
	Lead (Pb)-Total (mg/kg wwt)	0.0087	<0.0040	<0.010	
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	
	Magnesium (Mg)-Total (mg/kg)	762	1420	1360	
	Magnesium (Mg)-Total (mg/kg wwt)	306	655	390	
	Manganese (Mn)-Total (mg/kg)	11.2	95.8	894	
	Manganese (Mn)-Total (mg/kg wwt)	4.49	44.2	256	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1667546-1	L1667546-2	L1667546-3	L1667546-4	L1667546-5
		Description	Tissue	Tissue	Tissue	Tissue	Tissue
		Sampled Date	30-AUG-15	30-AUG-15	30-AUG-15	30-AUG-15	30-AUG-15
		Sampled Time					
		Client ID	RYE GRASS-1	RYE GRASS-2	RYE GRASS-3	RYE GRASS-4	RYE GRASS-4X
Grouping	Analyte						
TISSUE							
Metals	Molybdenum (Mo)-Total (mg/kg)		5.83	2.42	2.76	0.823	0.599
	Molybdenum (Mo)-Total (mg/kg wwt)		1.90	1.14	0.949	0.315	0.280
	Nickel (Ni)-Total (mg/kg)		1.55	0.80	<0.20	0.27	<0.20
	Nickel (Ni)-Total (mg/kg wwt)		0.506	0.378	0.050	0.102	0.064
	Phosphorus (P)-Total (mg/kg)		1620	4290	2090	1660	1770
	Phosphorus (P)-Total (mg/kg wwt)		527	2020	719	636	827
	Potassium (K)-Total (mg/kg)		10600	17100	12700	13200	6410
	Potassium (K)-Total (mg/kg wwt)		3450	8080	4380	5030	3000
	Rubidium (Rb)-Total (mg/kg)		3.53	4.92	11.1	43.4	24.8
	Rubidium (Rb)-Total (mg/kg wwt)		1.15	2.32	3.82	16.6	11.6
	Selenium (Se)-Total (mg/kg)		0.244	<0.050	<0.050	0.076	0.061
	Selenium (Se)-Total (mg/kg wwt)		0.080	<0.010	0.012	0.029	0.028
	Sodium (Na)-Total (mg/kg)		264	48	33	64	28
	Sodium (Na)-Total (mg/kg wwt)		86.1	22.4	11.3	24.5	13.1
	Strontium (Sr)-Total (mg/kg)		31.5	8.80	24.6	15.0	7.47
	Strontium (Sr)-Total (mg/kg wwt)		10.3	4.15	8.48	5.74	3.49
	Tellurium (Te)-Total (mg/kg)		<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)		<0.0020	<0.0020	<0.0020	0.0054	<0.0020
	Thallium (Tl)-Total (mg/kg wwt)		0.00052	<0.00040	<0.00040	0.00206	<0.00040
	Tin (Sn)-Total (mg/kg)		<0.10	<0.10	<0.10	0.11	<0.10
	Tin (Sn)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	0.041	<0.020
	Uranium (U)-Total (mg/kg)		0.0154	<0.0020	<0.0020	0.0114	<0.0020
	Uranium (U)-Total (mg/kg wwt)		0.00501	0.00056	<0.00040	0.00435	0.00085
	Vanadium (V)-Total (mg/kg)		1.57	0.16	0.11	1.23	0.27
	Vanadium (V)-Total (mg/kg wwt)		0.513	0.075	0.039	0.470	0.124
	Zinc (Zn)-Total (mg/kg)		24.3	53.5	21.8	37.1	31.0
	Zinc (Zn)-Total (mg/kg wwt)		7.93	25.2	7.51	14.2	14.5
	Zirconium (Zr)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)		0.050	<0.040	<0.040	0.042	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1667546-6	L1667546-7	L1667546-8	L1667546-9	L1667546-10
		Description	Tissue	Tissue	Tissue	Tissue	Tissue
		Sampled Date	30-AUG-15	30-AUG-15	30-AUG-15	30-AUG-15	30-AUG-15
		Sampled Time					
		Client ID	RYE GRASS-5	RYE GRASS-6	RYE GRASS-7	RYE GRASS-7X	RYE GRASS-8
Grouping	Analyte						
TISSUE							
Metals	Molybdenum (Mo)-Total (mg/kg)		1.82	1.20	3.19	2.19	1.52
	Molybdenum (Mo)-Total (mg/kg wwt)		0.607	0.285	0.921	0.608	0.570
	Nickel (Ni)-Total (mg/kg)		0.40	0.36	0.21	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)		0.133	0.085	0.060	<0.040	0.042
	Phosphorus (P)-Total (mg/kg)		2530	2920	1050	724	1060
	Phosphorus (P)-Total (mg/kg wwt)		845	694	303	201	398
	Potassium (K)-Total (mg/kg)		12500	13500	11400	7580	8050
	Potassium (K)-Total (mg/kg wwt)		4180	3220	3300	2100	3020
	Rubidium (Rb)-Total (mg/kg)		5.86	6.06	7.63	4.40	2.04
	Rubidium (Rb)-Total (mg/kg wwt)		1.96	1.44	2.21	1.22	0.763
	Selenium (Se)-Total (mg/kg)		0.070	0.090	0.089	<0.050	1.48
	Selenium (Se)-Total (mg/kg wwt)		0.023	0.021	0.026	0.012	0.554
	Sodium (Na)-Total (mg/kg)		88	406	60	44	63
	Sodium (Na)-Total (mg/kg wwt)		29.4	96.6	17.2	12.1	23.6
	Strontium (Sr)-Total (mg/kg)		14.0	38.0	14.7	9.01	21.0
	Strontium (Sr)-Total (mg/kg wwt)		4.69	9.03	4.25	2.50	7.86
	Tellurium (Te)-Total (mg/kg)		<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)		<0.0020	0.0079	<0.0020	<0.0020	<0.0020
	Thallium (Tl)-Total (mg/kg wwt)		0.00052	0.00189	<0.00040	<0.00040	<0.00040
	Tin (Sn)-Total (mg/kg)		<0.10	<0.10	0.66	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)		0.020	<0.020	0.190	<0.020	<0.020
	Uranium (U)-Total (mg/kg)		0.0303	<0.0020	0.0027	<0.0020	0.0054
	Uranium (U)-Total (mg/kg wwt)		0.0101	0.00046	0.00079	<0.00040	0.00202
	Vanadium (V)-Total (mg/kg)		3.97	0.15	0.37	0.18	0.27
	Vanadium (V)-Total (mg/kg wwt)		1.32	0.035	0.107	0.050	0.100
	Zinc (Zn)-Total (mg/kg)		24.8	23.0	20.5	17.0	5.53
	Zinc (Zn)-Total (mg/kg wwt)		8.28	5.48	5.93	4.72	2.07
	Zirconium (Zr)-Total (mg/kg)		0.32	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)		0.108	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1667546-11 Tissue 30-AUG-15 RYE GRASS-9	L1667546-12 Tissue 30-AUG-15 RYE GRASS-10	L1667546-13 Tissue 19-AUG-15 WILLOW SEEDLING-1	L1667546-14 Tissue 19-AUG-15 WILLOW WATTLE- 1	L1667546-15 Tissue 19-AUG-15 WILLOW STAKE-1
Grouping	Analyte					
TISSUE						
Metals	Molybdenum (Mo)-Total (mg/kg)	2.10	8.56	0.324	0.477	0.478
	Molybdenum (Mo)-Total (mg/kg wwt)	0.738	3.32	0.146	0.177	0.202
	Nickel (Ni)-Total (mg/kg)	<0.20	0.37	0.75	0.94	2.08
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	0.142	0.336	0.348	0.880
	Phosphorus (P)-Total (mg/kg)	1830	1640	603	895	1600
	Phosphorus (P)-Total (mg/kg wwt)	641	637	271	331	674
	Potassium (K)-Total (mg/kg)	9740	10100	3340	4810	4920
	Potassium (K)-Total (mg/kg wwt)	3410	3930	1500	1780	2080
	Rubidium (Rb)-Total (mg/kg)	5.94	15.6	2.95	5.04	5.92
	Rubidium (Rb)-Total (mg/kg wwt)	2.08	6.05	1.33	1.87	2.50
	Selenium (Se)-Total (mg/kg)	0.189	0.113	0.154	0.548	<0.050
	Selenium (Se)-Total (mg/kg wwt)	0.066	0.044	0.069	0.203	0.018
	Sodium (Na)-Total (mg/kg)	670	64	<20	<20	32
	Sodium (Na)-Total (mg/kg wwt)	235	24.9	8.7	7.8	13.7
	Strontium (Sr)-Total (mg/kg)	21.4	26.8	39.4	108	136
	Strontium (Sr)-Total (mg/kg wwt)	7.52	10.4	17.7	40.0	57.4
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	<0.0020	0.0053	0.0048	0.0027	0.0053
	Thallium (Tl)-Total (mg/kg wwt)	<0.00040	0.00207	0.00214	0.00099	0.00223
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	0.0115	0.0090	0.0073	0.0132
	Uranium (U)-Total (mg/kg wwt)	<0.00040	0.00446	0.00405	0.00270	0.00556
	Vanadium (V)-Total (mg/kg)	<0.10	1.26	0.86	0.76	1.39
	Vanadium (V)-Total (mg/kg wwt)	0.023	0.488	0.386	0.281	0.588
	Zinc (Zn)-Total (mg/kg)	18.7	17.2	8.44	7.47	55.5
	Zinc (Zn)-Total (mg/kg wwt)	6.54	6.66	3.80	2.76	23.5
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	0.044	0.040	0.073

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1667546-16 Tissue 19-AUG-15 WILLOW SEEDLING-2	L1667546-17 Tissue 19-AUG-15 WILLOW WATTLE- 2	L1667546-18 Tissue 19-AUG-15 WILLOW STAKE-2	L1667546-19 Tissue 19-AUG-15 WILLOW SEEDLING-3	L1667546-20 Tissue 19-AUG-15 WILLOW WATTLE- 3
Grouping	Analyte					
TISSUE						
Metals	Molybdenum (Mo)-Total (mg/kg)	1.67	0.676	2.85	0.624	0.966
	Molybdenum (Mo)-Total (mg/kg wwt)	0.719	0.284	1.23	0.250	0.352
	Nickel (Ni)-Total (mg/kg)	1.38	1.58	0.50	2.00	2.32
	Nickel (Ni)-Total (mg/kg wwt)	0.594	0.662	0.218	0.802	0.844
	Phosphorus (P)-Total (mg/kg)	1110	968	996	1140	988
	Phosphorus (P)-Total (mg/kg wwt)	478	406	431	457	360
	Potassium (K)-Total (mg/kg)	5520	9430	7190	6080	8540
	Potassium (K)-Total (mg/kg wwt)	2370	3960	3110	2440	3110
	Rubidium (Rb)-Total (mg/kg)	2.32	7.49	6.50	4.36	6.77
	Rubidium (Rb)-Total (mg/kg wwt)	0.999	3.14	2.81	1.75	2.47
	Selenium (Se)-Total (mg/kg)	0.755	0.787	0.227	2.22	0.394
	Selenium (Se)-Total (mg/kg wwt)	0.325	0.330	0.098	0.888	0.144
	Sodium (Na)-Total (mg/kg)	120	38	79	55	47
	Sodium (Na)-Total (mg/kg wwt)	51.8	15.8	34.3	22.2	17.0
	Strontium (Sr)-Total (mg/kg)	111	54.9	98.2	47.0	149
	Strontium (Sr)-Total (mg/kg wwt)	47.6	23.1	42.5	18.8	54.4
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0058	0.0029	<0.0020	0.0116	0.0029
	Thallium (Tl)-Total (mg/kg wwt)	0.00248	0.00122	0.00062	0.00465	0.00105
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	0.025	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	0.0583	0.0276	0.0197	0.0491	0.0084
	Uranium (U)-Total (mg/kg wwt)	0.0251	0.0116	0.00850	0.0197	0.00308
	Vanadium (V)-Total (mg/kg)	2.33	1.56	1.09	1.35	0.66
	Vanadium (V)-Total (mg/kg wwt)	1.00	0.653	0.473	0.541	0.242
	Zinc (Zn)-Total (mg/kg)	40.9	14.8	9.15	46.9	26.4
	Zinc (Zn)-Total (mg/kg wwt)	17.6	6.23	3.96	18.8	9.63
	Zirconium (Zr)-Total (mg/kg)	0.23	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	0.098	0.051	0.054	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1667546-21 Tissue 19-AUG-15 WILLOW STAKE-3	L1667546-22 Tissue 25-AUG-15 WILLOW SEEDLING-4	L1667546-23 Tissue 25-AUG-15 WILLOW WATTLE- 4	L1667546-24 Tissue 25-AUG-15 WILLOW STAKE-4	L1667546-25 Tissue 25-AUG-15 WILLOW STAKE- 4X
Grouping	Analyte					
TISSUE						
Metals	Molybdenum (Mo)-Total (mg/kg)	0.647	0.726	2.65	2.37	2.45
	Molybdenum (Mo)-Total (mg/kg wwt)	0.276	0.292	0.984	0.929	0.959
	Nickel (Ni)-Total (mg/kg)	1.66	2.54	3.03	2.00	2.94
	Nickel (Ni)-Total (mg/kg wwt)	0.709	1.02	1.12	0.783	1.15
	Phosphorus (P)-Total (mg/kg)	1110	1460	1210	2010	1920
	Phosphorus (P)-Total (mg/kg wwt)	473	587	449	787	750
	Potassium (K)-Total (mg/kg)	5840	7890	9680	13100	13000
	Potassium (K)-Total (mg/kg wwt)	2490	3170	3590	5120	5070
	Rubidium (Rb)-Total (mg/kg)	2.96	3.25	6.36	5.25	5.18
	Rubidium (Rb)-Total (mg/kg wwt)	1.26	1.31	2.36	2.06	2.03
	Selenium (Se)-Total (mg/kg)	0.696	0.089	1.65	1.57	1.70
	Selenium (Se)-Total (mg/kg wwt)	0.297	0.036	0.613	0.613	0.666
	Sodium (Na)-Total (mg/kg)	28	70	79	57	75
	Sodium (Na)-Total (mg/kg wwt)	11.9	28.2	29.2	22.4	29.2
	Strontium (Sr)-Total (mg/kg)	120	54.7	179	80.3	90.0
	Strontium (Sr)-Total (mg/kg wwt)	51.1	22.0	66.4	31.5	35.2
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0050	0.0076	0.0048	0.0048	0.0058
	Thallium (Tl)-Total (mg/kg wwt)	0.00121	0.00306	0.00179	0.00188	0.00227
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	0.0266	0.0265	0.0168	0.0252	0.0257
	Uranium (U)-Total (mg/kg wwt)	0.0114	0.0107	0.00624	0.00988	0.0101
	Vanadium (V)-Total (mg/kg)	0.57	2.58	0.75	2.66	2.77
	Vanadium (V)-Total (mg/kg wwt)	0.243	1.04	0.279	1.04	1.08
	Zinc (Zn)-Total (mg/kg)	36.6	27.5	16.3	55.8	62.9
	Zinc (Zn)-Total (mg/kg wwt)	15.6	11.0	6.05	21.8	24.6
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	0.048	0.052	0.070	0.048

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1667546-26 Tissue 25-AUG-15 WILLOW WATTLE- 4X	L1667546-27 Tissue 25-AUG-15 WILLOW STAKE-5	L1667546-28 Tissue 25-AUG-15 WILLOW SEEDLING-5	L1667546-29 Tissue 25-AUG-15 WILLOW WATTLE- 5	L1667546-30 Tissue 25-AUG-15 WILLOW STAKE-6
Grouping	Analyte					
TISSUE						
Metals	Molybdenum (Mo)-Total (mg/kg)	2.03	0.884	0.555	0.458	1.46
	Molybdenum (Mo)-Total (mg/kg wwt)	0.767	0.365	0.242	0.183	0.590
	Nickel (Ni)-Total (mg/kg)	2.56	2.13	2.58	1.30	1.22
	Nickel (Ni)-Total (mg/kg wwt)	0.965	0.880	1.13	0.520	0.494
	Phosphorus (P)-Total (mg/kg)	1290	1250	1770	862	1170
	Phosphorus (P)-Total (mg/kg wwt)	488	516	771	344	475
	Potassium (K)-Total (mg/kg)	11300	11200	8220	12400	6850
	Potassium (K)-Total (mg/kg wwt)	4250	4630	3590	4940	2770
	Rubidium (Rb)-Total (mg/kg)	7.43	6.37	6.14	5.29	2.05
	Rubidium (Rb)-Total (mg/kg wwt)	2.80	2.63	2.68	2.11	0.829
	Selenium (Se)-Total (mg/kg)	1.61	0.438	0.975	0.215	0.646
	Selenium (Se)-Total (mg/kg wwt)	0.608	0.181	0.426	0.086	0.262
	Sodium (Na)-Total (mg/kg)	50	107	62	78	65
	Sodium (Na)-Total (mg/kg wwt)	18.9	44.2	27.0	31.0	26.5
	Strontium (Sr)-Total (mg/kg)	168	118	47.3	84.4	166
	Strontium (Sr)-Total (mg/kg wwt)	63.3	49.0	20.6	33.7	67.1
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0036	0.0070	0.0085	<0.0020	<0.0020
	Thallium (Tl)-Total (mg/kg wwt)	0.00136	0.00288	0.00371	0.00055	0.00066
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	0.035	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	0.0170	0.0552	0.0598	0.0133	0.0596
	Uranium (U)-Total (mg/kg wwt)	0.00643	0.0228	0.0261	0.00531	0.0241
	Vanadium (V)-Total (mg/kg)	0.87	1.35	1.57	0.86	1.36
	Vanadium (V)-Total (mg/kg wwt)	0.328	0.556	0.684	0.342	0.552
	Zinc (Zn)-Total (mg/kg)	13.0	22.0	53.2	15.4	13.9
	Zinc (Zn)-Total (mg/kg wwt)	4.90	9.11	23.3	6.14	5.61
	Zirconium (Zr)-Total (mg/kg)	<0.20	0.21	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	0.087	<0.040	0.056	0.067

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1667546-31 Tissue 25-AUG-15 WILLOW WATTLE-6	L1667546-32 Tissue 25-AUG-15 WILLOW SEEDLING-6	L1667546-33 Tissue 25-AUG-15 WILLOW-1	L1667546-34 Tissue 25-AUG-15 WILLOW-2	L1667546-35 Tissue 25-AUG-15 WILLOW-3
Grouping	Analyte					
TISSUE						
Metals	Molybdenum (Mo)-Total (mg/kg)	0.252	0.843	0.080	0.391	0.147
	Molybdenum (Mo)-Total (mg/kg wwt)	0.112	0.353	0.0341	0.155	0.0519
	Nickel (Ni)-Total (mg/kg)	1.12	2.01	1.58	3.25	4.37
	Nickel (Ni)-Total (mg/kg wwt)	0.498	0.842	0.673	1.29	1.54
	Phosphorus (P)-Total (mg/kg)	1040	1930	1550	1790	1790
	Phosphorus (P)-Total (mg/kg wwt)	465	809	659	709	631
	Potassium (K)-Total (mg/kg)	11700	9390	7160	11900	11100
	Potassium (K)-Total (mg/kg wwt)	5190	3930	3040	4740	3900
	Rubidium (Rb)-Total (mg/kg)	8.04	4.95	6.97	13.8	7.82
	Rubidium (Rb)-Total (mg/kg wwt)	3.58	2.07	2.96	5.46	2.75
	Selenium (Se)-Total (mg/kg)	0.456	0.707	0.097	0.279	0.793
	Selenium (Se)-Total (mg/kg wwt)	0.203	0.296	0.041	0.111	0.279
	Sodium (Na)-Total (mg/kg)	27	54	61	29	58
	Sodium (Na)-Total (mg/kg wwt)	12.0	22.5	25.9	11.4	20.5
	Strontium (Sr)-Total (mg/kg)	98.9	77.3	109	94.1	117
	Strontium (Sr)-Total (mg/kg wwt)	44.0	32.4	46.4	37.3	41.1
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	<0.0020	0.0146	<0.0020	0.0086	0.0030
	Thallium (Tl)-Total (mg/kg wwt)	0.00076	0.00611	<0.00040	0.00341	0.00106
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	0.021	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	0.0120	0.0180	<0.0020	0.0049	0.0064
	Uranium (U)-Total (mg/kg wwt)	0.00534	0.00755	0.00053	0.00195	0.00224
	Vanadium (V)-Total (mg/kg)	0.90	1.47	<0.10	0.46	0.51
	Vanadium (V)-Total (mg/kg wwt)	0.400	0.616	0.041	0.182	0.181
	Zinc (Zn)-Total (mg/kg)	7.52	42.8	36.8	75.3	111
	Zinc (Zn)-Total (mg/kg wwt)	3.35	17.9	15.6	29.9	39.0
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	0.065	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID Description Sampled Date Sampled Time Client ID	L1667546-36 Tissue 25-AUG-15 WILLOW-3X	L1667546-37 Tissue 25-AUG-15 WILLOW-4	L1667546-38 Tissue 25-AUG-15 WILLOW-5	L1667546-39 Tissue 25-AUG-15 WILLOW-6	L1667546-40 Tissue 25-AUG-15 WILLOW-6X
Grouping	Analyte						
TISSUE							
Metals	Molybdenum (Mo)-Total (mg/kg)	0.164	0.239	0.347	0.120	0.116	
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0616	0.0921	0.134	0.0509	0.0488	
	Nickel (Ni)-Total (mg/kg)	4.47	3.47	1.41	1.29	1.39	
	Nickel (Ni)-Total (mg/kg wwt)	1.68	1.34	0.547	0.544	0.584	
	Phosphorus (P)-Total (mg/kg)	1890	1730	3040	2110	1970	
	Phosphorus (P)-Total (mg/kg wwt)	711	668	1180	894	829	
	Potassium (K)-Total (mg/kg)	10400	8770	9780	7060	7500	
	Potassium (K)-Total (mg/kg wwt)	3920	3380	3790	2990	3150	
	Rubidium (Rb)-Total (mg/kg)	6.71	5.68	2.82	3.44	3.85	
	Rubidium (Rb)-Total (mg/kg wwt)	2.53	2.19	1.09	1.45	1.62	
	Selenium (Se)-Total (mg/kg)	0.932	0.466	<0.050	<0.050	<0.050	
	Selenium (Se)-Total (mg/kg wwt)	0.351	0.180	0.015	0.012	0.015	
	Sodium (Na)-Total (mg/kg)	44	35	38	51	29	
	Sodium (Na)-Total (mg/kg wwt)	16.4	13.4	14.6	21.5	12.1	
	Strontium (Sr)-Total (mg/kg)	125	110	152	124	122	
	Strontium (Sr)-Total (mg/kg wwt)	47.0	42.2	58.9	52.4	51.5	
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg)	0.0030	0.0035	<0.0020	<0.0020	<0.0020	
	Thallium (Tl)-Total (mg/kg wwt)	0.00113	0.00135	<0.00040	0.00056	0.00051	
	Tin (Sn)-Total (mg/kg)	<0.10	0.13	<0.10	<0.10	<0.10	
	Tin (Sn)-Total (mg/kg wwt)	<0.020	0.049	<0.020	<0.020	<0.020	
	Uranium (U)-Total (mg/kg)	0.0056	0.0023	0.0037	<0.0020	<0.0020	
	Uranium (U)-Total (mg/kg wwt)	0.00210	0.00090	0.00145	0.00074	0.00083	
	Vanadium (V)-Total (mg/kg)	0.43	0.24	0.41	0.18	0.22	
	Vanadium (V)-Total (mg/kg wwt)	0.162	0.094	0.160	0.076	0.092	
	Zinc (Zn)-Total (mg/kg)	112	62.4	128	25.2	25.7	
	Zinc (Zn)-Total (mg/kg wwt)	42.3	24.1	49.8	10.7	10.8	
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Zirconium (Zr)-Total (mg/kg wwt)	0.044	<0.040	<0.040	<0.040	<0.040	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1667546-41 Tissue 25-AUG-15 WILLOW-7	L1667546-42 Tissue 25-AUG-15 WILLOW-8	L1667546-43 Tissue 25-AUG-15 WILLOW-9	L1667546-44 Tissue 25-AUG-15 WILLOW-10	L1667546-45 Tissue 19-AUG-15 BERRIES-1
Grouping	Analyte					
TISSUE						
Metals	Molybdenum (Mo)-Total (mg/kg)	0.217	0.103	0.322	0.387	0.080
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0978	0.0433	0.135	0.161	0.0213
	Nickel (Ni)-Total (mg/kg)	1.27	5.75	3.32	1.97	2.21
	Nickel (Ni)-Total (mg/kg wwt)	0.571	2.42	1.39	0.821	0.587
	Phosphorus (P)-Total (mg/kg)	1340	2040	2020	1650	1600
	Phosphorus (P)-Total (mg/kg wwt)	605	857	847	689	426
	Potassium (K)-Total (mg/kg)	4010	10900	10400	12400	7320
	Potassium (K)-Total (mg/kg wwt)	1810	4570	4350	5170	1940
	Rubidium (Rb)-Total (mg/kg)	6.40	3.42	5.54	9.26	18.5
	Rubidium (Rb)-Total (mg/kg wwt)	2.88	1.44	2.32	3.86	4.90
	Selenium (Se)-Total (mg/kg)	<0.050	0.190	0.200	0.054	<0.10
	Selenium (Se)-Total (mg/kg wwt)	0.016	0.080	0.084	0.023	<0.020
	Sodium (Na)-Total (mg/kg)	30	52	<20	32	<20
	Sodium (Na)-Total (mg/kg wwt)	13.3	21.7	7.1	13.3	4.8
	Strontium (Sr)-Total (mg/kg)	91.6	152	62.8	54.7	10.0
	Strontium (Sr)-Total (mg/kg wwt)	41.2	64.1	26.3	22.8	2.66
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Thallium (Tl)-Total (mg/kg wwt)	0.00043	<0.00040	<0.00040	<0.00040	<0.00040
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	1.97
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	0.523
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	0.0046	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	0.00052	0.00058	0.00192	0.00062	<0.00040
	Vanadium (V)-Total (mg/kg)	0.12	0.15	0.41	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	0.054	0.065	0.170	0.038	<0.020
	Zinc (Zn)-Total (mg/kg)	25.1	68.5	84.5	11.1	19.7
	Zinc (Zn)-Total (mg/kg wwt)	11.3	28.8	35.4	4.62	5.22
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1667546-46 Tissue 19-AUG-15 BERRIES-2	L1667546-47 Tissue 19-AUG-15 BERRIES-3	L1667546-48 Tissue 19-AUG-15 BERRIES-4		
Grouping	Analyte					
TISSUE						
Metals	Molybdenum (Mo)-Total (mg/kg)	0.539	0.084	0.446		
	Molybdenum (Mo)-Total (mg/kg wwt)	0.217	0.0387	0.128		
	Nickel (Ni)-Total (mg/kg)	1.30	0.29	1.29		
	Nickel (Ni)-Total (mg/kg wwt)	0.523	0.133	0.369		
	Phosphorus (P)-Total (mg/kg)	2610	1570	2110		
	Phosphorus (P)-Total (mg/kg wwt)	1050	726	605		
	Potassium (K)-Total (mg/kg)	8790	12300	10500		
	Potassium (K)-Total (mg/kg wwt)	3540	5670	3010		
	Rubidium (Rb)-Total (mg/kg)	11.3	5.68	20.1		
	Rubidium (Rb)-Total (mg/kg wwt)	4.56	2.62	5.75		
	Selenium (Se)-Total (mg/kg)	<0.050	<0.050	<0.10		
	Selenium (Se)-Total (mg/kg wwt)	<0.010	<0.010	<0.020		
	Sodium (Na)-Total (mg/kg)	29	<20	123		
	Sodium (Na)-Total (mg/kg wwt)	11.6	7.6	35.2		
	Strontium (Sr)-Total (mg/kg)	7.46	38.0	10.4		
	Strontium (Sr)-Total (mg/kg wwt)	3.00	17.5	2.98		
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020		
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040		
	Thallium (Tl)-Total (mg/kg)	<0.0020	<0.0020	<0.0020		
	Thallium (Tl)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040		
	Tin (Sn)-Total (mg/kg)	0.44	<0.10	1.62		
	Tin (Sn)-Total (mg/kg wwt)	0.176	0.026	0.464		
	Uranium (U)-Total (mg/kg)	0.0021	<0.0020	<0.0020		
	Uranium (U)-Total (mg/kg wwt)	0.00085	0.00042	0.00048		
	Vanadium (V)-Total (mg/kg)	0.44	0.17	0.31		
	Vanadium (V)-Total (mg/kg wwt)	0.176	0.077	0.089		
	Zinc (Zn)-Total (mg/kg)	11.4	5.42	28.4		
	Zinc (Zn)-Total (mg/kg wwt)	4.57	2.50	8.14		
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	0.21		
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	0.061		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Aluminum (Al)-Total	DUP-H	L1667546-45, -48
Duplicate	Iron (Fe)-Total	DUP-H	L1667546-45, -48
Duplicate	Phosphorus (P)-Total	DUP-H	L1667546-45, -48
Duplicate	Potassium (K)-Total	DUP-H	L1667546-45, -48
Duplicate	Aluminum (Al)-Total	DUP-H	L1667546-45, -48
Duplicate	Iron (Fe)-Total	DUP-H	L1667546-45, -48
Duplicate	Phosphorus (P)-Total	DUP-H	L1667546-45, -48
Duplicate	Potassium (K)-Total	DUP-H	L1667546-45, -48

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (WET)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on wet weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
<p>This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

2	3	4	B0023
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Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Environmental Division

Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Katie McMahan	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file, Arainn Atkinson@golder.com	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
	Email 2: Evin Zapf-Gilje@golder.com	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Phone: 250-790-2215 Fax:	Analysis Request
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	
Contact:	
Address:	
Phone: Fax:	

Lab Work Order # (lab use only)	L1667546	ALS Contact: Can Dang	Sampler: GH, SF
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Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	HOLD															Number of Containers
	Rye grass - 1	30-Aug-15		Tissue	X															1
	Rye grass - 2	30-Aug-15		Tissue	X															1
	Rye grass - 3	30-Aug-15		Tissue	X															1
	Rye grass - 4	30-Aug-15		Tissue	X															1
	Rye grass - 4x	30-Aug-15		Tissue	X															1
	Rye grass - 5	30-Aug-15		Tissue	X															1
	Rye grass - 6	30-Aug-15		Tissue	X															1
	Rye grass - 7	30-Aug-15		Tissue	X															1
	Rye grass - 7x	30-Aug-15		Tissue	X															1
	Rye grass 8	30-Aug-15		Tissue	X															1
	Rye grass - 9	30-Aug-15		Tissue	X															1
	Rye grass - 10	30-Aug-15		Tissue	X															1



Special Instructions / Regulations / Hazardous Details

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SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: <i>[Signature]</i>	Date & Time: 02/09/15 15:30	Received by: Mike	Date: 9/3	Time: 9:25	Temperature: 8.6	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF	



Report to:		Report Format / Distribution			Service Requested: (rush - subject to availability)															
Company: MOUNT POLLEY MINING CORP.		<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Default)															
Contact: Katie McMahan		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge															
Address: PO BOX 12, Likely, BC, V0L 1N0		Email 1: on file, Arainn Atkinson@golder.com			<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge															
Phone: 250-790-2215 Fax:		Email 2: Evin Zapf-Gilje@golder.com			<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS															
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No		Client / Project Information:			Analysis Request															
Company:		Job #:			Please indicate below Filtered, Preserved or both (F, P, F/P)															
Contact:		PO / AFE:																		
Address:		Legal Site Description:																		
Phone: Fax:		Quote #:																		
Lab Work Order # (lab use only)		ALS Contact: Can Dang	Sampler: GH, SF		L1667546-CCFC															
Sample #	Sample Identification		Date	Time						Sample Type	HOLD	Number of Containers								
(This description will appear on the report)		(dd-mmm-yy)	(hh:mm)																	
Willow Seedling - 1			19-Aug-15							Tissue	X									1
Willow Wattle - 1			19-Aug-15							Tissue	X									1
Willow Stake - 1			19-Aug-15							Tissue	X									1
Willow Seedling - 2			19-Aug-15							Tissue	X									1
Willow Wattle - 2			19-Aug-15							Tissue	X									1
Willow Stake - 2			19-Aug-15							Tissue	X									1
Willow Seedling - 3			19-Aug-15							Tissue	X									1
Willow Wattle - 3			19-Aug-15							Tissue	X									1
Willow Stake - 3			19-Aug-15							Tissue	X									1
Willow Seedling - 4			25-Aug-15							Tissue	X									1
Willow Wattle - 4			25-Aug-15		Tissue	X					1									
Willow Stake - 4			25-Aug-15		Tissue	X					1									

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
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SHIPMENT, RELEASE (client use)			SHIPMENT, RECEPTION (lab use only)			SHIPMENT, VERIFICATION (lab use only)		
Released by: <i>K. McMahen</i>	Date & Time: 02/09/15 15:30	Received by: MIKE	Date: 9/3	Time: 9:25	Temperature: 8.6	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF



Report to:		Report Format / Distribution			Service Requested: (rush - subject to availability)					
Company: MOUNT POLLEY MINING CORP.		<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Default)					
Contact: Katie McMahan		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge					
Address: PO BOX 12, Likely, BC. V0L 1N0		Email 1: on file, Arainn Atkinson@golder.com			<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge					
		Email 2: Evin Zapf-Gilje@golder.com			<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS					
Phone: 250-790-2215 Fax:					Analysis Request					
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No		Client / Project Information:			Please indicate below Filtered, Preserved or both (F, P, F/P)					
Company:		Job #:								
Contact:		PO / AFE:								
Address:		Legal Site Description:								
Phone: Fax:		Quote #:								
Lab Work Order # (lab use only)		ALS Contact: Can Dang			Sampler: GH, SF			 L1667546-COFC	Number of Containers	
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HOLD					
	Willow Stake - 4x	25-Aug-15		Tissue	X					
	Willow Wattle - 4x	25-Aug-15		Tissue	X					
	Willow Stake - 5	25-Aug-15		Tissue	X					
	Willow Seedling - 5	25-Aug-15		Tissue	X					
	Willow Wattle - 5	25-Aug-15		Tissue	X					
	Willow Stake - 6	25-Aug-15		Tissue	X					
	Willow Wattle - 6	25-Aug-15		Tissue	X					
	Willow Seedling - 6	25-Aug-15		Tissue	X					
	Willow - 1	25-Aug-15		Tissue	X					
	Willow - 2	25-Aug-15		Tissue	X					
	Willow - 3	25-Aug-15		Tissue	X					
	Willow - 3x	25-Aug-15		Tissue	X					
Special Instructions / Regulations / Hazardous Details										
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SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)					
Released by:		Date & Time: 08/09/15 15:30	Received by: MIKE	Date: 9/3	Time: 9:25	Temperature: 8.6	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF	



Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Katie McMahan	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file, Arainn Atkinson@golder.com	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
	Email 2: Evin Zapf-Gilje@golder.com	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Phone: 250-790-2215 Fax:		Analysis Request	
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Please indicate below Filtered, Preserved or both (F, P, F/P)	
Company:	Job #:		
Contact:	PO / AFE:		
Address:	Legal Site Description:		
Phone: Fax:	Quote #:		
Lab Work Order # (lab use only)	ALS Contact: Can Dang	Sampler: GH, SF	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HOLD															Number of Containers
	Willow - 4	25-Aug-15		Tissue	X															1
	Willow - 5	25-Aug-15		Tissue	X															1
	Willow - 6	25-Aug-15		Tissue	X															1
	Willow - 6x	25-Aug-15		Tissue	X															1
	Willow - 7	25-Aug-15		Tissue	X															1
	Willow - 8	25-Aug-15		Tissue	X															1
	Willow - 9	25-Aug-15		Tissue	X															1
	Willow - 10	25-Aug-15		Tissue	X															1
	Berries - 1	19-Aug-15		Tissue	X															1
	Berries - 2	19-Aug-15		Tissue	X															1
	Berries - 3	19-Aug-15		Tissue	X															1
	Berries - 4	19-Aug-15		Tissue	X															1



Special Instructions / Regulations / Hazardous Details

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<input checked="" type="checkbox"/> SHIPMENT RELEASE (client use)				<input type="checkbox"/> SHIPMENT RECEPTION (lab use only)				<input type="checkbox"/> SHIPMENT VERIFICATION (lab use only)			
Released by: <i>[Signature]</i>	Date & Time: 01/09/15 15:30	Received by: MIKE	Date: 9/3	Time: 7:25	Temperature: 8.6	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF			



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 09-OCT-15
Report Date: 26-FEB-16 16:56 (MT)
Version: FINAL REV. 2

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1686208
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

Comments: ADDITIONAL 25-FEB-16 15:09

26-FEB-2016 Revision 2: As results from re-analysis of specific samples this revision includes the following modifications:

- The Aluminum data for the sample, L1686208-24, was modified;
- The Nickel data for the sample, L1686208-32, was modified;
- The data obtained from re-analysis of the sample, "QUL NEAR HAZELTINE CR LT #3 KIDNEY"(L1686208-12), is included under the additional sample "QUL NEAR HAZELTINE CR LT #3 KIDNEY (RECHECK)"(L1686208-36).

Can Dang
Senior Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1686208-1 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #1	L1686208-2 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #1 LIVER	L1686208-4 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #1 GONAD	L1686208-5 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #1X	L1686208-6 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #1X GONAD	
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)					
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<0.40	<0.40	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.215	0.312	0.125	0.291	0.104
	Arsenic (As)-Total (mg/kg wwt)	0.0491	0.0712	0.0448	0.0729	0.0375
	Barium (Ba)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Barium (Ba)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	0.144	0.0060	0.0076	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	0.0010	0.0328	0.0022	0.0019	<0.0010
	Calcium (Ca)-Total (mg/kg)	255	432	1050	244	1040
	Calcium (Ca)-Total (mg/kg wwt)	58.1	98.6	376	61.1	376
	Cesium (Cs)-Total (mg/kg)	0.344	0.273	0.0883	0.322	0.0880
	Cesium (Cs)-Total (mg/kg wwt)	0.0784	0.0622	0.0315	0.0808	0.0317
	Chromium (Cr)-Total (mg/kg)	<0.050	0.058	<0.050	<0.050	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	0.013	<0.010	<0.010	<0.010
	Cobalt (Co)-Total (mg/kg)	<0.020	0.064	0.037	<0.020	0.032
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040	0.0145	0.0132	<0.0040	0.0116
	Copper (Cu)-Total (mg/kg)	1.63	23.1	16.1	1.99	16.7
	Copper (Cu)-Total (mg/kg wwt)	0.371	5.27	5.74	0.499	6.01
	Iron (Fe)-Total (mg/kg)	14.3	296	52.9	18.3	53.5
	Iron (Fe)-Total (mg/kg wwt)	3.27	67.5	18.9	4.60	19.2
	Lead (Pb)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1130	918	1370	1040	1350
	Magnesium (Mg)-Total (mg/kg wwt)	258	209	488	260	487
	Manganese (Mn)-Total (mg/kg)	0.271	2.95	0.631	0.308	0.615
	Manganese (Mn)-Total (mg/kg wwt)	0.062	0.674	0.226	0.077	0.221

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1686208-7 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #2	L1686208-8 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #2 LIVER	L1686208-9 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #2 KIDNEY	L1686208-10 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #3	L1686208-11 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #3 LIVER
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	76.0	69.9	80.0	77.2	69.1
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<5.0	<5.0	<2.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<1.0	<1.0	<0.40	<1.0
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.215	0.357	0.290	0.316	0.560
	Arsenic (As)-Total (mg/kg wwt)	0.0517	0.107	0.0580	0.0721	0.173
	Barium (Ba)-Total (mg/kg)	<0.050	<0.050	0.137	<0.050	<0.050
	Barium (Ba)-Total (mg/kg wwt)	<0.010	<0.010	0.028	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	0.109	0.850	<0.0050	0.144
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	0.0328	0.170	<0.0010	0.0445
	Calcium (Ca)-Total (mg/kg)	242	178	445	303	229
	Calcium (Ca)-Total (mg/kg wwt)	58.0	53.4	89.2	69.0	70.9
	Cesium (Cs)-Total (mg/kg)	0.184	0.0970	0.181	0.195	0.103
	Cesium (Cs)-Total (mg/kg wwt)	0.0441	0.0292	0.0363	0.0445	0.0320
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.20	<0.20	<0.050	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.040	<0.040	<0.010	<0.040
	Cobalt (Co)-Total (mg/kg)	<0.020	0.047	0.146	<0.020	0.057
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040	0.0143	0.0292	<0.0040	0.0177
	Copper (Cu)-Total (mg/kg)	1.77	78.7	5.29	1.92	53.8
	Copper (Cu)-Total (mg/kg wwt)	0.425	23.7	1.06	0.438	16.7
	Iron (Fe)-Total (mg/kg)	9.0	197	284	12.8	106
	Iron (Fe)-Total (mg/kg wwt)	2.16	59.4	57.0	2.92	32.9
	Lead (Pb)-Total (mg/kg)	<0.020	<0.050	<0.050	<0.020	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.010	<0.010	<0.0040	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1160	392	625	1050	542
	Magnesium (Mg)-Total (mg/kg wwt)	279	118	125	240	168
	Manganese (Mn)-Total (mg/kg)	0.278	3.05	1.49	0.296	5.69
	Manganese (Mn)-Total (mg/kg wwt)	0.067	0.919	0.299	0.067	1.76

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1686208-12 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #3 KIDNEY	L1686208-13 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #4	L1686208-14 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #4 LIVER	L1686208-15 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #4 KIDNEY	L1686208-16 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #5	
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)					
Metals	Aluminum (Al)-Total (mg/kg)	5.2	<2.0	<5.0	8.1	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	1.0	<0.40	<1.0	1.5	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.369	0.193	0.601	0.373	0.329
	Arsenic (As)-Total (mg/kg wwt)	0.0747	0.0463	0.167	0.0698	0.0873
	Barium (Ba)-Total (mg/kg)	0.133	<0.050	<0.050	0.267	<0.050
	Barium (Ba)-Total (mg/kg wwt)	0.027	<0.010	<0.010	0.050	<0.010
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.613	<0.0050	0.202	1.34	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	0.124	<0.0010	0.0562	0.251	<0.0010
	Calcium (Ca)-Total (mg/kg)	462	271	223	426	186
	Calcium (Ca)-Total (mg/kg wwt)	93.6	65.1	61.9	79.8	49.5
	Cesium (Cs)-Total (mg/kg)	0.163	0.194	0.0940	0.254	0.184
	Cesium (Cs)-Total (mg/kg wwt)	0.0329	0.0467	0.0261	0.0477	0.0489
	Chromium (Cr)-Total (mg/kg)	0.24	<0.050	<0.20	0.44	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	0.049	<0.010	<0.040	0.082	<0.010
	Cobalt (Co)-Total (mg/kg)	0.169	<0.020	0.090	0.332	<0.020
	Cobalt (Co)-Total (mg/kg wwt)	0.0343	<0.0040	0.0251	0.0622	<0.0040
	Copper (Cu)-Total (mg/kg)	37.4	1.24	50.5	4.56	2.06
	Copper (Cu)-Total (mg/kg wwt)	7.57	0.298	14.0	0.854	0.546
	Iron (Fe)-Total (mg/kg)	361	8.9	177	304	16.1
	Iron (Fe)-Total (mg/kg wwt)	73.1	2.14	49.0	56.9	4.28
	Lead (Pb)-Total (mg/kg)	1.23	<0.020	<0.050	0.070	<0.020
	Lead (Pb)-Total (mg/kg wwt)	0.248	<0.0040	<0.010	0.013	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	700	1020	593	698	896
	Magnesium (Mg)-Total (mg/kg wwt)	142	245	165	131	238
	Manganese (Mn)-Total (mg/kg)	1.57	0.262	4.65	1.95	0.250
	Manganese (Mn)-Total (mg/kg wwt)	0.319	0.063	1.29	0.365	0.067

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1686208-17 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #5 LIVER	L1686208-18 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #5 KIDNEY	L1686208-19 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #6	L1686208-20 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #6 LIVER	L1686208-21 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #6 KIDNEY
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	63.8	79.6	76.2	72.5	78.5
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	5.3	<2.0	<2.0	5.5
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	1.1	<0.40	<0.40	1.2
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.324	0.326	0.309	0.419	0.355
	Arsenic (As)-Total (mg/kg wwt)	0.117	0.0664	0.0734	0.115	0.0761
	Barium (Ba)-Total (mg/kg)	<0.050	0.171	<0.050	<0.050	0.302
	Barium (Ba)-Total (mg/kg wwt)	<0.010	0.035	<0.010	<0.010	0.065
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.105	1.65	<0.0050	0.180	0.887
	Cadmium (Cd)-Total (mg/kg wwt)	0.0381	0.337	<0.0010	0.0496	0.190
	Calcium (Ca)-Total (mg/kg)	117	492	176	269	540
	Calcium (Ca)-Total (mg/kg wwt)	42.5	100	41.8	74.0	116
	Cesium (Cs)-Total (mg/kg)	0.0709	0.243	0.258	0.0762	0.152
	Cesium (Cs)-Total (mg/kg wwt)	0.0257	0.0496	0.0612	0.0209	0.0326
	Chromium (Cr)-Total (mg/kg)	<0.050	0.23	<0.050	0.056	0.27
	Chromium (Cr)-Total (mg/kg wwt)	0.014	0.046	<0.010	0.016	0.059
	Cobalt (Co)-Total (mg/kg)	0.044	0.477	<0.020	0.082	0.139
	Cobalt (Co)-Total (mg/kg wwt)	0.0160	0.0974	<0.0040	0.0224	0.0299
	Copper (Cu)-Total (mg/kg)	107	3.95	2.05	92.8	2.45
	Copper (Cu)-Total (mg/kg wwt)	38.7	0.805	0.488	25.5	0.525
	Iron (Fe)-Total (mg/kg)	222	345	12.1	284	574
	Iron (Fe)-Total (mg/kg wwt)	80.2	70.3	2.87	78.2	123
	Lead (Pb)-Total (mg/kg)	<0.020	<0.050	<0.020	<0.020	0.053
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.010	<0.0040	<0.0040	0.011
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	293	616	1110	412	489
	Magnesium (Mg)-Total (mg/kg wwt)	106	126	264	113	105
	Manganese (Mn)-Total (mg/kg)	2.14	1.11	0.250	3.56	0.916
	Manganese (Mn)-Total (mg/kg wwt)	0.774	0.226	0.059	0.979	0.197

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1686208-22 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #7	L1686208-23 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #7 LIVER	L1686208-24 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #7 KIDNEY	L1686208-25 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #7 GONAD	L1686208-26 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #8
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	78.0	78.0	81.4	81.1	79.1
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	2.5	21.3	<5.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	0.55	4.0	<1.0	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.161	0.449	0.396	0.143	0.210
	Arsenic (As)-Total (mg/kg wwt)	0.0354	0.0988	0.0736	0.0272	0.0439
	Barium (Ba)-Total (mg/kg)	<0.050	0.112	0.202	<0.050	<0.050
	Barium (Ba)-Total (mg/kg wwt)	<0.010	0.025	0.038	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	0.350	3.71	0.028	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	0.0770	0.690	0.0052	<0.0010
	Calcium (Ca)-Total (mg/kg)	293	330	804	940	208
	Calcium (Ca)-Total (mg/kg wwt)	64.3	72.5	149	178	43.4
	Cesium (Cs)-Total (mg/kg)	0.248	0.0750	0.187	0.341	0.303
	Cesium (Cs)-Total (mg/kg wwt)	0.0545	0.0165	0.0348	0.0646	0.0631
	Chromium (Cr)-Total (mg/kg)	<0.050	0.237	0.57	<0.20	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	0.052	0.105	<0.040	<0.010
	Cobalt (Co)-Total (mg/kg)	<0.020	0.186	0.353	0.228	<0.020
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040	0.0410	0.0655	0.0432	<0.0040
	Copper (Cu)-Total (mg/kg)	0.96	123	5.63	26.9	1.69
	Copper (Cu)-Total (mg/kg wwt)	0.210	27.0	1.05	5.09	0.352
	Iron (Fe)-Total (mg/kg)	7.7	1430	573	444	14.7
	Iron (Fe)-Total (mg/kg wwt)	1.70	315	106	84.1	3.06
	Lead (Pb)-Total (mg/kg)	<0.020	<0.020	<0.050	<0.050	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.010	<0.010	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1270	635	768	513	1100
	Magnesium (Mg)-Total (mg/kg wwt)	279	140	143	97.1	230
	Manganese (Mn)-Total (mg/kg)	0.258	3.79	2.17	6.12	0.254
	Manganese (Mn)-Total (mg/kg wwt)	0.057	0.832	0.403	1.16	0.053

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1686208-27 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #8 LIVER	L1686208-28 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #8 KIDNEY	L1686208-29 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #8 GONAD	L1686208-30 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #9	L1686208-31 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #9 LIVER
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	79.3	79.8	66.5	75.2	60.8
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	9.3	<2.0	<2.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	1.9	<0.40	<0.40	<1.0
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.261	0.365	0.099	0.230	0.250
	Arsenic (As)-Total (mg/kg wwt)	0.0540	0.0739	0.0332	0.0572	0.0979
	Barium (Ba)-Total (mg/kg)	<0.050	0.141	<0.050	<0.050	<0.050
	Barium (Ba)-Total (mg/kg wwt)	<0.010	0.029	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.240	3.58	<0.0050	<0.0050	0.143
	Cadmium (Cd)-Total (mg/kg wwt)	0.0496	0.725	<0.0010	<0.0010	0.0560
	Calcium (Ca)-Total (mg/kg)	363	734	1240	196	89
	Calcium (Ca)-Total (mg/kg wwt)	75.0	149	414	48.8	34.7
	Cesium (Cs)-Total (mg/kg)	0.253	0.250	0.0707	0.192	0.0830
	Cesium (Cs)-Total (mg/kg wwt)	0.0523	0.0506	0.0237	0.0476	0.0325
	Chromium (Cr)-Total (mg/kg)	0.170	0.77	<0.050	<0.050	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	0.035	0.155	<0.010	<0.010	<0.040
	Cobalt (Co)-Total (mg/kg)	0.074	0.175	0.037	<0.020	0.037
	Cobalt (Co)-Total (mg/kg wwt)	0.0152	0.0354	0.0125	<0.0040	0.0146
	Copper (Cu)-Total (mg/kg)	12.3	3.90	15.8	1.94	132
	Copper (Cu)-Total (mg/kg wwt)	2.55	0.790	5.29	0.481	51.7
	Iron (Fe)-Total (mg/kg)	499	459	55.3	11.5	87.3
	Iron (Fe)-Total (mg/kg wwt)	103	92.9	18.5	2.85	34.2
	Lead (Pb)-Total (mg/kg)	<0.020	<0.050	<0.020	<0.020	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.010	<0.0040	<0.0040	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1060	638	1540	956	331
	Magnesium (Mg)-Total (mg/kg wwt)	219	129	517	237	130
	Manganese (Mn)-Total (mg/kg)	5.10	0.950	0.543	0.228	2.82
	Manganese (Mn)-Total (mg/kg wwt)	1.05	0.192	0.182	0.057	1.11

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1686208-32 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #9 KIDNEY	L1686208-33 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #10	L1686208-34 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #10 LIVER	L1686208-35 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #10 KIDNEY	L1686208-36 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #3 KIDNEY (RECHECK)
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	78.1	71.5	69.1	73.5	79.8
Metals	Aluminum (Al)-Total (mg/kg)	11.7	<2.0	<5.0	<5.0	7.6
	Aluminum (Al)-Total (mg/kg wwt)	2.6	<0.40	<1.0	<1.0	1.5
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.356	0.140	0.539	0.363	0.366
	Arsenic (As)-Total (mg/kg wwt)	0.0779	0.0399	0.167	0.0962	0.0742
	Barium (Ba)-Total (mg/kg)	0.189	<0.050	<0.050	0.129	0.225
	Barium (Ba)-Total (mg/kg wwt)	0.041	<0.010	<0.010	0.034	0.046
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.820	<0.0050	0.219	0.536	0.464
	Cadmium (Cd)-Total (mg/kg wwt)	0.179	<0.0010	0.0679	0.142	0.0939
	Calcium (Ca)-Total (mg/kg)	445	273	278	368	709
	Calcium (Ca)-Total (mg/kg wwt)	97.4	77.8	85.9	97.5	144
	Cesium (Cs)-Total (mg/kg)	0.205	0.147	0.0753	0.121	0.153
	Cesium (Cs)-Total (mg/kg wwt)	0.0449	0.0418	0.0233	0.0320	0.0310
	Chromium (Cr)-Total (mg/kg)	0.28	<0.050	<0.20	<0.20	0.24
	Chromium (Cr)-Total (mg/kg wwt)	0.061	<0.010	<0.040	<0.040	0.049
	Cobalt (Co)-Total (mg/kg)	0.312	<0.020	0.070	0.081	0.171
	Cobalt (Co)-Total (mg/kg wwt)	0.0682	<0.0040	0.0216	0.0213	0.0345
	Copper (Cu)-Total (mg/kg)	4.37	1.18	80.7	2.26	3.71
	Copper (Cu)-Total (mg/kg wwt)	0.957	0.337	25.0	0.598	0.750
	Iron (Fe)-Total (mg/kg)	366	7.0	119	344	427
	Iron (Fe)-Total (mg/kg wwt)	80.2	2.00	36.9	91.1	86.4
	Lead (Pb)-Total (mg/kg)	0.066	<0.020	<0.050	0.082	0.083
	Lead (Pb)-Total (mg/kg wwt)	0.014	<0.0040	<0.010	0.022	0.017
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	599	871	477	416	665
	Magnesium (Mg)-Total (mg/kg wwt)	131	248	147	110	135
	Manganese (Mn)-Total (mg/kg)	1.29	0.252	4.88	1.00	1.67
	Manganese (Mn)-Total (mg/kg wwt)	0.282	0.072	1.51	0.265	0.339

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1686208-1 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #1	L1686208-2 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #1 LIVER	L1686208-4 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #1 GONAD	L1686208-5 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #1X	L1686208-6 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #1X GONAD
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	1.50	0.691	0.0898	1.28	0.0991
	Mercury (Hg)-Total (mg/kg wwt)	0.341	0.158	0.0321	0.321	0.0357
	Molybdenum (Mo)-Total (mg/kg)	<0.020	0.278	<0.020	<0.020	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.0633	0.0057	<0.0040	0.0053
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	11200	19600	11500	10500	11300
	Phosphorus (P)-Total (mg/kg wwt)	2560	4460	4100	2620	4070
	Potassium (K)-Total (mg/kg)	18600	17200	6090	17000	6020
	Potassium (K)-Total (mg/kg wwt)	4230	3920	2170	4260	2170
	Rubidium (Rb)-Total (mg/kg)	49.6	84.3	15.4	45.9	15.0
	Rubidium (Rb)-Total (mg/kg wwt)	11.3	19.2	5.48	11.5	5.39
	Selenium (Se)-Total (mg/kg)	1.88	5.23	4.21	1.77	4.24
	Selenium (Se)-Total (mg/kg wwt)	0.429	1.19	1.50	0.444	1.53
	Sodium (Na)-Total (mg/kg)	1630	5230	3110	1650	2850
	Sodium (Na)-Total (mg/kg wwt)	371	1190	1110	414	1030
	Strontium (Sr)-Total (mg/kg)	0.215	0.517	2.56	0.266	2.48
	Strontium (Sr)-Total (mg/kg wwt)	0.049	0.118	0.913	0.067	0.893
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0269	0.602	0.0189	0.0286	0.0181
	Thallium (Tl)-Total (mg/kg wwt)	0.00614	0.137	0.00677	0.00717	0.00650
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	12.6	97.3	58.8	13.4	57.1
	Zinc (Zn)-Total (mg/kg wwt)	2.86	22.2	21.0	3.37	20.5
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1686208-7 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #2	L1686208-8 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #2 LIVER	L1686208-9 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #2 KIDNEY	L1686208-10 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #3	L1686208-11 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #3 LIVER
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.329	0.183	0.516	0.357	0.219
	Mercury (Hg)-Total (mg/kg wwt)	0.0791	0.0551	0.103	0.0815	0.0677
	Molybdenum (Mo)-Total (mg/kg)	<0.020	0.417	0.273	<0.020	0.490
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.125	0.0546	<0.0040	0.152
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	11600	7400	12300	10600	9770
	Phosphorus (P)-Total (mg/kg wwt)	2780	2230	2460	2410	3020
	Potassium (K)-Total (mg/kg)	18800	6600	10600	17900	7130
	Potassium (K)-Total (mg/kg wwt)	4500	1990	2120	4080	2210
	Rubidium (Rb)-Total (mg/kg)	40.8	18.6	27.8	39.6	20.4
	Rubidium (Rb)-Total (mg/kg wwt)	9.79	5.59	5.57	9.02	6.32
	Selenium (Se)-Total (mg/kg)	2.02	5.83	5.38	1.93	7.10
	Selenium (Se)-Total (mg/kg wwt)	0.484	1.75	1.08	0.441	2.20
	Sodium (Na)-Total (mg/kg)	1120	3590	8660	727	2330
	Sodium (Na)-Total (mg/kg wwt)	270	1080	1730	166	720
	Strontium (Sr)-Total (mg/kg)	0.168	0.27	0.70	0.253	0.28
	Strontium (Sr)-Total (mg/kg wwt)	0.040	0.082	0.141	0.058	0.085
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0339	0.431	0.140	0.0681	0.303
	Thallium (Tl)-Total (mg/kg wwt)	0.00814	0.130	0.0281	0.0155	0.0938
	Tin (Sn)-Total (mg/kg)	<0.10	0.18	0.55	<0.10	0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	0.054	0.110	<0.020	0.032
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	13.5	89.3	94.1	15.4	86.7
	Zinc (Zn)-Total (mg/kg wwt)	3.23	26.9	18.9	3.51	26.8
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1686208-12 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #3 KIDNEY	L1686208-13 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #4	L1686208-14 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #4 LIVER	L1686208-15 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #4 KIDNEY	L1686208-16 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #5
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.463	0.363	0.255	0.724	0.842
	Mercury (Hg)-Total (mg/kg wwt)	0.0937	0.0872	0.0707	0.136	0.224
	Molybdenum (Mo)-Total (mg/kg)	0.163	<0.020	0.537	0.245	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0329	<0.0040	0.149	0.0460	<0.0040
	Nickel (Ni)-Total (mg/kg)	0.39	<0.20	<0.20	0.36	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	0.079	<0.040	<0.040	0.067	<0.040
	Phosphorus (P)-Total (mg/kg)	12800	10600	10600	12600	9040
	Phosphorus (P)-Total (mg/kg wwt)	2580	2540	2940	2360	2400
	Potassium (K)-Total (mg/kg)	10200	17700	8390	11000	14000
	Potassium (K)-Total (mg/kg wwt)	2070	4250	2330	2060	3730
	Rubidium (Rb)-Total (mg/kg)	28.4	40.1	23.2	39.6	31.0
	Rubidium (Rb)-Total (mg/kg wwt)	5.75	9.63	6.43	7.41	8.24
	Selenium (Se)-Total (mg/kg)	5.56	1.84	6.73	6.48	1.58
	Selenium (Se)-Total (mg/kg wwt)	1.13	0.442	1.87	1.21	0.420
	Sodium (Na)-Total (mg/kg)	4960	964	3050	5850	1500
	Sodium (Na)-Total (mg/kg wwt)	1000	232	846	1100	399
	Strontium (Sr)-Total (mg/kg)	0.62	0.217	0.30	0.65	0.119
	Strontium (Sr)-Total (mg/kg wwt)	0.126	0.052	0.082	0.122	0.032
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.188	0.0441	0.371	0.192	0.0334
	Thallium (Tl)-Total (mg/kg wwt)	0.0381	0.0106	0.103	0.0360	0.00887
	Tin (Sn)-Total (mg/kg)	1.12	<0.10	0.11	2.34	<0.10
	Tin (Sn)-Total (mg/kg wwt)	0.227	<0.020	0.031	0.438	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	120	12.3	105	113	12.7
	Zinc (Zn)-Total (mg/kg wwt)	24.2	2.95	29.0	21.1	3.36
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1686208-17 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #5 LIVER	L1686208-18 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #5 KIDNEY	L1686208-19 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #6	L1686208-20 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #6 LIVER	L1686208-21 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #6 KIDNEY
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.426	1.50	0.758	0.509	1.16
	Mercury (Hg)-Total (mg/kg wwt)	0.154	0.306	0.180	0.140	0.249
	Molybdenum (Mo)-Total (mg/kg)	0.228	0.267	<0.020	0.415	0.164
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0825	0.0545	<0.0040	0.114	0.0352
	Nickel (Ni)-Total (mg/kg)	<0.20	0.22	<0.20	<0.20	0.24
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	0.044	<0.040	<0.040	0.051
	Phosphorus (P)-Total (mg/kg)	6570	11200	10800	8720	8370
	Phosphorus (P)-Total (mg/kg wwt)	2380	2290	2580	2400	1800
	Potassium (K)-Total (mg/kg)	5840	9740	16700	7760	7580
	Potassium (K)-Total (mg/kg wwt)	2110	1990	3980	2130	1630
	Rubidium (Rb)-Total (mg/kg)	16.4	27.0	41.4	23.5	22.8
	Rubidium (Rb)-Total (mg/kg wwt)	5.93	5.51	9.85	6.46	4.89
	Selenium (Se)-Total (mg/kg)	5.37	6.83	1.90	6.28	5.22
	Selenium (Se)-Total (mg/kg wwt)	1.94	1.39	0.453	1.73	1.12
	Sodium (Na)-Total (mg/kg)	3190	8330	1090	5450	7640
	Sodium (Na)-Total (mg/kg wwt)	1150	1700	260	1500	1640
	Strontium (Sr)-Total (mg/kg)	0.182	1.09	0.119	0.494	1.16
	Strontium (Sr)-Total (mg/kg wwt)	0.066	0.223	0.028	0.136	0.249
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.226	0.158	0.0477	0.176	0.0987
	Thallium (Tl)-Total (mg/kg wwt)	0.0817	0.0322	0.0113	0.0483	0.0212
	Tin (Sn)-Total (mg/kg)	<0.10	0.48	<0.10	0.11	0.80
	Tin (Sn)-Total (mg/kg wwt)	0.020	0.098	<0.020	0.029	0.171
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	79.0	77.4	14.2	120	73.8
	Zinc (Zn)-Total (mg/kg wwt)	28.6	15.8	3.36	33.0	15.8
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1686208-22 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #7	L1686208-23 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #7 LIVER	L1686208-24 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #7 KIDNEY	L1686208-25 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #7 GONAD	L1686208-26 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #8
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	2.16	2.40	5.02	0.915	2.55
	Mercury (Hg)-Total (mg/kg wwt)	0.474	0.527	0.932	0.173	0.533
	Molybdenum (Mo)-Total (mg/kg)	<0.020	0.474	0.341	0.096	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.104	0.0633	0.0181	<0.0040
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	0.44	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	0.082	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	12400	13000	12100	8240	11100
	Phosphorus (P)-Total (mg/kg wwt)	2730	2860	2240	1560	2310
	Potassium (K)-Total (mg/kg)	21700	10800	11900	11400	18800
	Potassium (K)-Total (mg/kg wwt)	4770	2380	2210	2150	3910
	Rubidium (Rb)-Total (mg/kg)	36.4	20.4	22.8	24.1	38.9
	Rubidium (Rb)-Total (mg/kg wwt)	8.00	4.49	4.23	4.56	8.11
	Selenium (Se)-Total (mg/kg)	2.27	9.38	13.2	6.49	1.99
	Selenium (Se)-Total (mg/kg wwt)	0.498	2.06	2.46	1.23	0.414
	Sodium (Na)-Total (mg/kg)	1720	7620	9570	9150	1650
	Sodium (Na)-Total (mg/kg wwt)	377	1680	1780	1730	345
	Strontium (Sr)-Total (mg/kg)	0.205	0.756	2.44	0.88	0.154
	Strontium (Sr)-Total (mg/kg wwt)	0.045	0.166	0.454	0.166	0.032
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0288	0.109	0.130	0.0700	0.0216
	Thallium (Tl)-Total (mg/kg wwt)	0.00632	0.0240	0.0241	0.0132	0.00451
	Tin (Sn)-Total (mg/kg)	<0.10	0.14	0.83	0.16	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	0.030	0.154	0.030	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	0.0029	0.0035	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	0.00064	0.00064	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	0.14	0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.030	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	13.7	139	90.7	149	12.1
	Zinc (Zn)-Total (mg/kg wwt)	3.02	30.6	16.9	28.2	2.53
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1686208-27 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #8 LIVER	L1686208-28 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #8 KIDNEY	L1686208-29 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #8 GONAD	L1686208-30 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #9	L1686208-31 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #9 LIVER
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	2.41	4.67	0.214	0.382	0.151
	Mercury (Hg)-Total (mg/kg wwt)	0.498	0.945	0.0716	0.0949	0.0593
	Molybdenum (Mo)-Total (mg/kg)	0.296	0.258	<0.020	<0.020	0.245
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0612	0.0522	0.0050	<0.0040	0.0960
	Nickel (Ni)-Total (mg/kg)	<0.20	0.42	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	0.086	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	20900	11000	11500	9710	6760
	Phosphorus (P)-Total (mg/kg wwt)	4320	2220	3840	2410	2650
	Potassium (K)-Total (mg/kg)	19600	10600	6560	16000	5000
	Potassium (K)-Total (mg/kg wwt)	4050	2150	2200	3990	1960
	Rubidium (Rb)-Total (mg/kg)	72.7	26.0	12.8	39.6	17.0
	Rubidium (Rb)-Total (mg/kg wwt)	15.0	5.26	4.29	9.83	6.64
	Selenium (Se)-Total (mg/kg)	4.85	9.57	4.46	1.62	5.50
	Selenium (Se)-Total (mg/kg wwt)	1.00	1.94	1.49	0.402	2.15
	Sodium (Na)-Total (mg/kg)	5010	8140	2910	1330	1740
	Sodium (Na)-Total (mg/kg wwt)	1030	1650	974	330	680
	Strontium (Sr)-Total (mg/kg)	0.406	2.44	2.89	0.152	0.12
	Strontium (Sr)-Total (mg/kg wwt)	0.084	0.495	0.967	0.038	0.049
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.654	0.119	0.0209	0.0369	0.197
	Thallium (Tl)-Total (mg/kg wwt)	0.135	0.0241	0.00699	0.00916	0.0773
	Tin (Sn)-Total (mg/kg)	<0.10	0.68	<0.10	<0.10	0.15
	Tin (Sn)-Total (mg/kg wwt)	<0.020	0.138	<0.020	<0.020	0.060
	Uranium (U)-Total (mg/kg)	<0.0020	0.0036	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	0.00074	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	94.4	72.3	64.0	13.0	72.4
	Zinc (Zn)-Total (mg/kg wwt)	19.5	14.6	21.4	3.23	28.3
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1686208-32 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #9 KIDNEY	L1686208-33 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #10	L1686208-34 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #10 LIVER	L1686208-35 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #10 KIDNEY	L1686208-36 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR LT #3 KIDNEY (RECHECK)
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.438	0.297	0.216	0.337	
	Mercury (Hg)-Total (mg/kg wwt)	0.0959	0.0846	0.0667	0.0892	
	Molybdenum (Mo)-Total (mg/kg)	0.229	<0.020	0.528	0.094	0.165
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0501	<0.0040	0.163	0.0249	0.0335
	Nickel (Ni)-Total (mg/kg)	0.23	<0.20	<0.20	0.30	0.54
	Nickel (Ni)-Total (mg/kg wwt)	0.051	<0.040	<0.040	0.079	0.108
	Phosphorus (P)-Total (mg/kg)	11300	8280	8780	7170	11500
	Phosphorus (P)-Total (mg/kg wwt)	2470	2360	2720	1900	2330
	Potassium (K)-Total (mg/kg)	10700	14000	6140	7430	10500
	Potassium (K)-Total (mg/kg wwt)	2340	3970	1900	1970	2130
	Rubidium (Rb)-Total (mg/kg)	31.4	30.6	17.6	19.2	25.7
	Rubidium (Rb)-Total (mg/kg wwt)	6.88	8.71	5.44	5.09	5.20
	Selenium (Se)-Total (mg/kg)	5.21	1.57	6.88	3.16	6.53
	Selenium (Se)-Total (mg/kg wwt)	1.14	0.446	2.13	0.836	1.32
	Sodium (Na)-Total (mg/kg)	6700	986	3210	3050	4670
	Sodium (Na)-Total (mg/kg wwt)	1470	281	992	807	945
	Strontium (Sr)-Total (mg/kg)	0.74	0.244	0.36	0.64	0.76
	Strontium (Sr)-Total (mg/kg wwt)	0.162	0.070	0.112	0.170	0.155
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.160	0.0479	0.238	0.0871	0.169
	Thallium (Tl)-Total (mg/kg wwt)	0.0350	0.0136	0.0736	0.0231	0.0341
	Tin (Sn)-Total (mg/kg)	0.95	<0.10	0.26	0.95	1.95
	Tin (Sn)-Total (mg/kg wwt)	0.207	0.025	0.079	0.252	0.395
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	77.7	10.6	98.3	51.4	147
	Zinc (Zn)-Total (mg/kg wwt)	17.0	3.03	30.4	13.6	29.8
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Barium (Ba)-Total	DUP-H	L1686208-24, -32, -36
Duplicate	Barium (Ba)-Total	DUP-H	L1686208-24, -32, -36

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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HG-DRY-CVAFS-N-VA Tissue Mercury in Tissue by CVAFS (DRY) EPA 200.3, EPA 245.7

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.

HG-DRY-MICR-CVAF-VA Tissue Mercury in Tissue by CVAFS Micro (DRY) EPA 200.3, EPA 245.7

This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.

HG-WET-CVAFS-N-VA Tissue Mercury in Tissue by CVAFS (WET) EPA 200.3, EPA 245.7

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.

HG-WET-MICR-CVAF-VA Tissue Mercury in Tissue by CVAFS Micro (WET) EPA 200.3, EPA 245.7

This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.

MET-DRY-CCMS-N-VA Tissue Metals in Tissue by CRC ICPMS (DRY) EPA 200.3/6020A

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MET-DRY-MICR-HRMS-VA Tissue Metals in Tissue by HR-ICPMS Micro (DRY) EPA 200.3/200.8

Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MET-WET-CCMS-N-VA Tissue Metals in Tissue by CRC ICPMS (WET) EPA 200.3/6020A

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MET-WET-MICR-HRMS-VA Tissue Metals in Tissue by HR-ICPMS Micro (WET) EPA 200.3/200.8

Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on wet weight basis.

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

Reference Information

MOISTURE-TISS-VA Tissue % Moisture in Tissues ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Environmental Division

Rush Processing

Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Colleen Hughes	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
Phone: 250-790-2215 Fax: _____	Email 2: _____	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Analysis Request										
Company: _____	Job #: _____	Please indicate below Filtered, Preserved or both (F, P, F/P)										
Contact: _____	PO / AFE: _____	T-metals(HR/CP-MS)(Weir&D)	Moisture	Liver Metals	Kidney Metals	Gonad Metals						Number of Containers
Address: _____	Site Description: _____											
Phone: _____	Site #: _____											
Lab Work Order # (lab use only)	Contact: Can Dang	Sampler: Zirnheld, Dolghar										



Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	T-metals(HR/CP-MS)(Weir&D)	Moisture	Liver Metals	Kidney Metals	Gonad Metals											Number of Containers
	QUL near Hazeltine Cr LT #1	04-Oct-15	8:00-16:15	Tissue	X	X	X	X	X											4
	QUL near Hazeltine Cr LT #1X	04-Oct-15	8:00-16:15	Tissue	X	X			X											2
	QUL near Hazeltine Cr LT #2	04-Oct-15	8:00-16:15	Tissue	X	X	X	X												3
	QUL near Hazeltine Cr LT #3	04-Oct-15	8:00-16:15	Tissue	X	X	X	X												3
	QUL near Hazeltine Cr LT #4	04-Oct-15	8:00-16:15	Tissue	X	X	X	X												3
	QUL near Hazeltine Cr LT #5	04-Oct-15	8:00-16:15	Tissue	X	X	X	X												3
	QUL near Hazeltine Cr LT #6	04-Oct-15	8:00-16:15	Tissue	X	X	X	X												3
	QUL near Hazeltine Cr LT #7	04-Oct-15	8:00-16:15	Tissue	X	X	X	X	X											4
	QUL near Hazeltine Cr LT #8	04-Oct-15	8:00-16:15	Tissue	X	X	X	X	X											4
	QUL near Hazeltine Cr LT #9	04-Oct-15	8:00-16:15	Tissue	X	X	X	X												3
	QUL near Hazeltine Cr LT #10	04-Oct-15	8:00-16:15	Tissue	X	X	X	X												3

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations:
N. Zirnheld	08/10/2015 16:30	Secm	9 Oct	9:25	-1.6C			Yes / No? If Yes attach SIF



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 14-OCT-15
Report Date: 10-NOV-15 16:33 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1687334
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
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ALS ENVIRONMENTAL ANALYTICAL REPORT

10-NOV-15 16:33 (MT)

Version: FINAL

Sample ID Description Sampled Date Sampled Time Client ID		L1687334-1 Tissue 10-SEP-15 16:15 QUL NEAR GRAIN CR. CSU #1	L1687334-2 Tissue 10-SEP-15 16:15 QUL NEAR GRAIN CR. CSU #2	L1687334-3 Tissue 10-SEP-15 16:15 QUL NEAR GRAIN CR. CSU #3	L1687334-4 Tissue 10-SEP-15 16:15 QUL NEAR GRAIN CR. CSU #3X	L1687334-5 Tissue 10-SEP-15 16:15 QUL NEAR GRAIN CR. CSU #4
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	82.6	80.6	80.5	80.0	80.8
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<0.40	<0.40	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.110	0.170	0.355	0.405	0.150
	Arsenic (As)-Total (mg/kg wwt)	0.0191	0.0330	0.0694	0.0813	0.0288
	Barium (Ba)-Total (mg/kg)	0.208	0.131	0.186	0.083	0.109
	Barium (Ba)-Total (mg/kg wwt)	0.036	0.026	0.036	0.017	0.021
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	0.012	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	0.0023	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.0051	<0.0050	<0.0050	<0.0050	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Calcium (Ca)-Total (mg/kg)	1340	1190	2220	853	1340
	Calcium (Ca)-Total (mg/kg wwt)	233	231	434	171	257
	Cesium (Cs)-Total (mg/kg)	0.217	0.172	0.192	0.168	0.147
	Cesium (Cs)-Total (mg/kg wwt)	0.0378	0.0333	0.0374	0.0336	0.0283
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cobalt (Co)-Total (mg/kg)	0.022	0.024	0.021	<0.020	<0.020
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040	0.0047	0.0042	<0.0040	<0.0040
	Copper (Cu)-Total (mg/kg)	1.33	1.41	1.38	1.03	1.52
	Copper (Cu)-Total (mg/kg wwt)	0.231	0.273	0.269	0.207	0.292
	Iron (Fe)-Total (mg/kg)	14.2	11.4	12.8	10.2	12.1
	Iron (Fe)-Total (mg/kg wwt)	2.47	2.21	2.50	2.04	2.32
	Lead (Pb)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1500	1470	1500	1470	1480
	Magnesium (Mg)-Total (mg/kg wwt)	260	286	292	294	285
	Manganese (Mn)-Total (mg/kg)	1.22	0.758	1.37	0.908	1.10
	Manganese (Mn)-Total (mg/kg wwt)	0.213	0.147	0.268	0.182	0.211

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1687334-6 Tissue 10-SEP-15 16:15 QUL NEAR GRAIN CR. CSU #5	L1687334-7 Tissue 10-SEP-15 16:15 QUL NEAR GRAIN CR. CSU #6	L1687334-8 Tissue 10-SEP-15 16:15 QUL NEAR GRAIN CR. CSU #7	L1687334-9 Tissue 10-SEP-15 16:15 QUL NEAR GRAIN CR. CSU #8
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)	81.3	81.8	81.4	81.0
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<2.0	<2.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<0.40	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.114	0.337	0.205	0.177
	Arsenic (As)-Total (mg/kg wwt)	0.0214	0.0615	0.0381	0.0336
	Barium (Ba)-Total (mg/kg)	0.200	0.141	0.121	0.283
	Barium (Ba)-Total (mg/kg wwt)	0.037	0.026	0.023	0.054
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	0.016	0.014	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	0.0030	0.0025	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	<0.0050	0.0058	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	<0.0010	0.0011	<0.0010
	Calcium (Ca)-Total (mg/kg)	1360	967	1520	1290
	Calcium (Ca)-Total (mg/kg wwt)	254	176	283	245
	Cesium (Cs)-Total (mg/kg)	0.265	0.173	0.181	0.143
	Cesium (Cs)-Total (mg/kg wwt)	0.0496	0.0316	0.0337	0.0271
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010
	Cobalt (Co)-Total (mg/kg)	<0.020	0.021	0.025	0.021
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040	<0.0040	0.0047	<0.0040
	Copper (Cu)-Total (mg/kg)	1.57	1.16	1.68	0.99
	Copper (Cu)-Total (mg/kg wwt)	0.294	0.212	0.313	0.189
	Iron (Fe)-Total (mg/kg)	10.3	11.8	12.3	10.0
	Iron (Fe)-Total (mg/kg wwt)	1.94	2.15	2.29	1.91
	Lead (Pb)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1550	1460	1370	1350
	Magnesium (Mg)-Total (mg/kg wwt)	291	266	256	256
	Manganese (Mn)-Total (mg/kg)	1.50	1.36	0.908	1.55
	Manganese (Mn)-Total (mg/kg wwt)	0.280	0.248	0.169	0.295

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

10-NOV-15 16:33 (MT)

Version: FINAL

Sample ID Description Sampled Date Sampled Time Client ID		L1687334-1 Tissue 10-SEP-15 16:15 QUL NEAR GRAIN CR. CSU #1	L1687334-2 Tissue 10-SEP-15 16:15 QUL NEAR GRAIN CR. CSU #2	L1687334-3 Tissue 10-SEP-15 16:15 QUL NEAR GRAIN CR. CSU #3	L1687334-4 Tissue 10-SEP-15 16:15 QUL NEAR GRAIN CR. CSU #3X	L1687334-5 Tissue 10-SEP-15 16:15 QUL NEAR GRAIN CR. CSU #4
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.701	0.484	0.342	0.313	0.393
	Mercury (Hg)-Total (mg/kg wwt)	0.122	0.0940	0.0668	0.0627	0.0755
	Molybdenum (Mo)-Total (mg/kg)	<0.020	0.026	0.024	<0.020	0.024
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.0050	0.0046	<0.0040	0.0046
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	10900	10700	11700	10300	10900
	Phosphorus (P)-Total (mg/kg wwt)	1890	2080	2290	2070	2090
	Potassium (K)-Total (mg/kg)	18500	18800	19800	18600	19400
	Potassium (K)-Total (mg/kg wwt)	3210	3660	3870	3720	3720
	Rubidium (Rb)-Total (mg/kg)	25.3	27.2	26.7	25.6	18.9
	Rubidium (Rb)-Total (mg/kg wwt)	4.40	5.29	5.21	5.12	3.62
	Selenium (Se)-Total (mg/kg)	1.22	1.31	1.61	1.51	2.16
	Selenium (Se)-Total (mg/kg wwt)	0.212	0.255	0.315	0.302	0.415
	Sodium (Na)-Total (mg/kg)	2470	2290	2240	1980	2440
	Sodium (Na)-Total (mg/kg wwt)	430	444	436	398	469
	Strontium (Sr)-Total (mg/kg)	2.28	1.68	3.69	0.975	1.85
	Strontium (Sr)-Total (mg/kg wwt)	0.396	0.327	0.721	0.195	0.355
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0048	0.0047	0.0089	0.0067	0.0065
	Thallium (Tl)-Total (mg/kg wwt)	0.00084	0.00092	0.00174	0.00133	0.00125
	Tin (Sn)-Total (mg/kg)	0.14	<0.10	0.11	<0.10	0.11
	Tin (Sn)-Total (mg/kg wwt)	0.025	<0.020	0.022	<0.020	0.021
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	38.5	41.5	27.3	20.9	29.0
	Zinc (Zn)-Total (mg/kg wwt)	6.69	8.06	5.33	4.19	5.58
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1687334-6	L1687334-7	L1687334-8	L1687334-9
		Description	Tissue	Tissue	Tissue	Tissue
		Sampled Date	10-SEP-15	10-SEP-15	10-SEP-15	10-SEP-15
		Sampled Time	16:15	16:15	16:15	16:15
		Client ID	QUL NEAR GRAIN CR. CSU #5	QUL NEAR GRAIN CR. CSU #6	QUL NEAR GRAIN CR. CSU #7	QUL NEAR GRAIN CR. CSU #8
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)		0.601	0.688	1.02	0.448
	Mercury (Hg)-Total (mg/kg wwt)		0.113	0.125	0.190	0.0852
	Molybdenum (Mo)-Total (mg/kg)		<0.020	0.022	<0.020	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)		<0.0040	0.0040	<0.0040	<0.0040
	Nickel (Ni)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)		11000	10500	10400	10400
	Phosphorus (P)-Total (mg/kg wwt)		2060	1910	1940	1980
	Potassium (K)-Total (mg/kg)		20200	18700	17300	17900
	Potassium (K)-Total (mg/kg wwt)		3780	3400	3230	3410
	Rubidium (Rb)-Total (mg/kg)		24.2	28.0	27.6	24.0
	Rubidium (Rb)-Total (mg/kg wwt)		4.52	5.11	5.13	4.57
	Selenium (Se)-Total (mg/kg)		1.74	1.03	1.34	2.27
	Selenium (Se)-Total (mg/kg wwt)		0.326	0.188	0.249	0.431
	Sodium (Na)-Total (mg/kg)		2560	2890	3050	2530
	Sodium (Na)-Total (mg/kg wwt)		479	528	567	482
	Strontium (Sr)-Total (mg/kg)		2.09	1.28	2.19	1.41
	Strontium (Sr)-Total (mg/kg wwt)		0.392	0.234	0.408	0.269
	Tellurium (Te)-Total (mg/kg)		<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)		0.0063	0.0027	0.0050	0.0066
	Thallium (Tl)-Total (mg/kg wwt)		0.00118	0.00049	0.00093	0.00125
	Tin (Sn)-Total (mg/kg)		0.16	0.15	0.16	0.12
	Tin (Sn)-Total (mg/kg wwt)		0.030	0.028	0.029	0.023
	Uranium (U)-Total (mg/kg)		<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)		<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)		<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)		38.7	32.6	41.6	35.7
	Zinc (Zn)-Total (mg/kg wwt)		7.26	5.94	7.75	6.79
	Zirconium (Zr)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Copper (Cu)-Total	MB-LOR	L1687334-1, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Manganese (Mn)-Total	MB-LOR	L1687334-1, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Copper (Cu)-Total	MB-LOR	L1687334-1, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Manganese (Mn)-Total	MB-LOR	L1687334-1, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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HG-DRY-CVAFS-N-VA Tissue Mercury in Tissue by CVAFS (DRY) EPA 200.3, EPA 245.7

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.

HG-WET-CVAFS-N-VA Tissue Mercury in Tissue by CVAFS (WET) EPA 200.3, EPA 245.7

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.

MET-DRY-CCMS-N-VA Tissue Metals in Tissue by CRC ICPMS (DRY) EPA 200.3/6020A

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MET-WET-CCMS-N-VA Tissue Metals in Tissue by CRC ICPMS (WET) EPA 200.3/6020A

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MOISTURE-TISS-VA Tissue % Moisture in Tissues ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Environmental Division

Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Colleen Hughes	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
Phone: 250-790-2215 Fax:	Email 2:	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Please indicate below Filtered, Preserved or both (F, P, F/P)																																			
Company:	Job #:	<table border="1"> <tr> <th>T-metals(HR/CP-MS)(Wet&D)</th> <th>Moisture</th> <th>Liver Metals</th> <th>Kidney Metals</th> <th>Gonad metals</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>Number of Containers</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>										T-metals(HR/CP-MS)(Wet&D)	Moisture	Liver Metals	Kidney Metals	Gonad metals								Number of Containers													
T-metals(HR/CP-MS)(Wet&D)	Moisture											Liver Metals	Kidney Metals	Gonad metals								Number of Containers															
Contact:	PO / AFE:																																				
Address:	Legal Site Description:																																				
Phone: Fax:	Quote #:																																				

Lab Work Order # (lab-use only)	L1687334	ALS Contact: Can Dang	Sampler: Dolighan, Zirnhelt
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Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	T-metals(HR/CP-MS)(Wet&D)	Moisture	Liver Metals	Kidney Metals	Gonad metals								Number of Containers
	QUL near Grain Cr. CSU # 1	10-Sep-15	8:00-16:15	Tissue	X	X											1
	QUL near Grain Cr. CSU # 2	10-Sep-15	8:00-16:15	Tissue	X	X											1
	QUL near Grain Cr. CSU # 3	10-Sep-15	8:00-16:15	Tissue	X	X											1
	QUL near Grain Cr. CSU # 3X	10-Sep-15	8:00-16:15	Tissue	X	X											1
	QUL near Grain Cr. CSU # 4	10-Sep-15	8:00-16:15	Tissue	X	X											1
	QUL near Grain Cr. CSU # 5	10-Sep-15	8:00-16:15	Tissue	X	X											1
	QUL near Grain Cr. CSU # 6	10-Sep-15	8:00-16:15	Tissue	X	X											1
	QUL near Grain Cr. CSU # 7	10-Sep-15	8:00-16:15	Tissue	X	X											1
	QUL near Grain Cr. CSU # 8	10-Sep-15	8:00-16:15	Tissue	X	X											1

Special Instructions / Regulations / Hazardous Details



Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)			
Released by: N.Zirnhelt	Date & Time: Oct. 13, 2015	Received by: <i>Lady</i>	Date: Oct 14 2015	Time: 9:30 AM	Temperature: -2.8	Verified by:	Date & Time:	Observations: Yes / No? If Yes attach SIF



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 14-OCT-15
Report Date: 09-DEC-15 11:50 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1687336
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

Can Dang
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1687336-1 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #1 MUSCLE	L1687336-2 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #1 LIVER	L1687336-3 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #1 KIDNEY	L1687336-4 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #2 MUSCLE	L1687336-5 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #2 LIVER
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)				
	76.6	71.3	72.5	79.8	69.9
Metals	Aluminum (Al)-Total (mg/kg)				
	<2.0	9.9	21.7	<2.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)				
	<0.40	2.8	6.0	<0.40	1.3
	Antimony (Sb)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)				
	<0.0020	<0.0020	0.0023	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)				
	0.043	0.097	1.25	0.236	0.193
	Arsenic (As)-Total (mg/kg wwt)				
	0.0101	0.0279	0.344	0.0475	0.0582
	Barium (Ba)-Total (mg/kg)				
	0.113	0.100	1.19	0.177	0.262
	Barium (Ba)-Total (mg/kg wwt)				
	0.027	0.029	0.327	0.036	0.079
	Beryllium (Be)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)				
	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)				
	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)				
	<0.0050	0.790	1.51	0.0067	1.12
	Cadmium (Cd)-Total (mg/kg wwt)				
	<0.0010	0.227	0.414	0.0014	0.336
	Calcium (Ca)-Total (mg/kg)				
	1230	573	1060	1160	464
	Calcium (Ca)-Total (mg/kg wwt)				
	287	164	292	233	140
	Cesium (Cs)-Total (mg/kg)				
	0.0805	0.0352	0.0798	0.0968	0.0461
	Cesium (Cs)-Total (mg/kg wwt)				
	0.0188	0.0101	0.0219	0.0195	0.0139
	Chromium (Cr)-Total (mg/kg)				
	<0.050	<0.20	<0.20	<0.050	<0.20
	Chromium (Cr)-Total (mg/kg wwt)				
	0.011	<0.040	0.050	<0.010	<0.040
	Cobalt (Co)-Total (mg/kg)				
	0.056	0.377	1.01	0.096	0.392
	Cobalt (Co)-Total (mg/kg wwt)				
	0.0132	0.108	0.278	0.0193	0.118
	Copper (Cu)-Total (mg/kg)				
	1.24	39.4	5.67	1.78	290
	Copper (Cu)-Total (mg/kg wwt)				
	0.290	11.3	1.56	0.359	87.3
	Iron (Fe)-Total (mg/kg)				
	18.6	1500	777	17.7	1050
	Iron (Fe)-Total (mg/kg wwt)				
	4.36	431	214	3.56	316
	Lead (Pb)-Total (mg/kg)				
	<0.020	<0.050	0.055	<0.020	<0.050
	Lead (Pb)-Total (mg/kg wwt)				
	<0.0040	<0.010	0.015	<0.0040	<0.010
	Lithium (Li)-Total (mg/kg)				
	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)				
	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)				
	1110	641	917	1330	729
	Magnesium (Mg)-Total (mg/kg wwt)				
	260	184	252	267	219
	Manganese (Mn)-Total (mg/kg)				
	0.550	9.75	2.90	0.691	14.3
	Manganese (Mn)-Total (mg/kg wwt)				
	0.129	2.80	0.798	0.139	4.30

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1687336-6 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #2 KIDNEY	L1687336-7 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #3 MUSCLE	L1687336-8 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #3 LIVER	L1687336-9 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #3 KIDNEY	L1687336-10 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #4 MUSCLE
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)				
	74.2	77.7	64.7	74.4	77.3
Metals	Aluminum (Al)-Total (mg/kg)				
	<5.0	<2.0	<5.0	<5.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)				
	<1.0	<0.40	<1.0	<1.0	<1.0
	Antimony (Sb)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)				
	0.829	0.136	0.372	0.358	0.152
	Arsenic (As)-Total (mg/kg wwt)				
	0.214	0.0304	0.132	0.0915	0.0345
	Barium (Ba)-Total (mg/kg)				
	2.19	0.092	0.175	0.244	<0.050
	Barium (Ba)-Total (mg/kg wwt)				
	0.565	0.021	0.062	0.062	<0.010
	Beryllium (Be)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)				
	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)				
	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)				
	1.40	0.0057	0.230	0.372	<0.010
	Cadmium (Cd)-Total (mg/kg wwt)				
	0.360	0.0013	0.0812	0.0952	<0.0020
	Calcium (Ca)-Total (mg/kg)				
	1070	1230	495	1040	636
	Calcium (Ca)-Total (mg/kg wwt)				
	277	274	175	267	144
	Cesium (Cs)-Total (mg/kg)				
	0.0826	0.0706	0.0456	0.0544	0.157
	Cesium (Cs)-Total (mg/kg wwt)				
	0.0213	0.0158	0.0161	0.0139	0.0355
	Chromium (Cr)-Total (mg/kg)				
	<0.20	<0.050	<0.20	<0.20	<0.20
	Chromium (Cr)-Total (mg/kg wwt)				
	0.046	<0.010	<0.040	<0.040	<0.040
	Cobalt (Co)-Total (mg/kg)				
	1.79	0.079	0.247	0.407	0.067
	Cobalt (Co)-Total (mg/kg wwt)				
	0.462	0.0177	0.0871	0.104	0.0151
	Copper (Cu)-Total (mg/kg)				
	6.95	1.83	70.6	3.70	0.74
	Copper (Cu)-Total (mg/kg wwt)				
	1.79	0.408	24.9	0.947	0.167
	Iron (Fe)-Total (mg/kg)				
	1050	16.4	429	538	15.0
	Iron (Fe)-Total (mg/kg wwt)				
	270	3.66	151	138	3.4
	Lead (Pb)-Total (mg/kg)				
	<0.050	<0.020	<0.050	<0.050	<0.050
	Lead (Pb)-Total (mg/kg wwt)				
	<0.010	<0.0040	<0.010	<0.010	<0.010
	Lithium (Li)-Total (mg/kg)				
	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)				
	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)				
	909	1110	741	713	1120
	Magnesium (Mg)-Total (mg/kg wwt)				
	234	248	262	182	253
	Manganese (Mn)-Total (mg/kg)				
	4.17	0.899	9.43	2.58	0.339
	Manganese (Mn)-Total (mg/kg wwt)				
	1.07	0.201	3.33	0.662	0.077

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1687336-11 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #4 LIVER	L1687336-12 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #4 KIDNEY	L1687336-13 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #4 GONAD	L1687336-14 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #4X MUSCLE	L1687336-15 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #5 MUSCLE
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	67.8	75.8	65.1	77.2	77.5
Metals	Aluminum (Al)-Total (mg/kg)	8.4	8.1	<5.0	<2.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	2.7	2.0	<1.0	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.261	0.607	0.083	0.134	0.196
	Arsenic (As)-Total (mg/kg wwt)	0.0840	0.147	0.0289	0.0306	0.0440
	Barium (Ba)-Total (mg/kg)	0.067	0.674	0.440	<0.050	0.055
	Barium (Ba)-Total (mg/kg wwt)	0.022	0.163	0.153	<0.010	0.012
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.592	0.976	0.025	<0.0050	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	0.191	0.236	0.0088	<0.0010	<0.0010
	Calcium (Ca)-Total (mg/kg)	316	1280	916	408	715
	Calcium (Ca)-Total (mg/kg wwt)	102	309	319	93.0	161
	Cesium (Cs)-Total (mg/kg)	0.0875	0.120	0.0478	0.114	0.0771
	Cesium (Cs)-Total (mg/kg wwt)	0.0282	0.0291	0.0167	0.0259	0.0173
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.050	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	0.044	<0.040	<0.010	<0.010
	Cobalt (Co)-Total (mg/kg)	0.192	1.20	0.287	0.085	0.048
	Cobalt (Co)-Total (mg/kg wwt)	0.0617	0.292	0.100	0.0193	0.0108
	Copper (Cu)-Total (mg/kg)	12.8	5.91	36.0	1.93	1.77
	Copper (Cu)-Total (mg/kg wwt)	4.13	1.43	12.6	0.440	0.397
	Iron (Fe)-Total (mg/kg)	1060	909	174	23.8	16.5
	Iron (Fe)-Total (mg/kg wwt)	342	220	60.8	5.42	3.70
	Lead (Pb)-Total (mg/kg)	<0.050	0.060	<0.050	<0.020	<0.020
	Lead (Pb)-Total (mg/kg wwt)	0.010	0.015	<0.010	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	796	990	1120	1150	1230
	Magnesium (Mg)-Total (mg/kg wwt)	256	240	389	261	276
	Manganese (Mn)-Total (mg/kg)	9.34	3.47	17.5	0.383	0.494
	Manganese (Mn)-Total (mg/kg wwt)	3.01	0.840	6.12	0.087	0.111

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1687336-16 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #5 LIVER	L1687336-17 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #5 KIDNEY	L1687336-18 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #6 MUSCLE	L1687336-19 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #6 LIVER	L1687336-20 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #6 KIDNEY	
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)					
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	<5.0	<2.0	16.4	7.5
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	<1.0	<0.40	4.9	1.9
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	0.027
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	0.0071
	Arsenic (As)-Total (mg/kg)	0.391	0.789	0.341	0.238	1.36
	Arsenic (As)-Total (mg/kg wwt)	0.110	0.199	0.0727	0.0717	0.352
	Barium (Ba)-Total (mg/kg)	0.117	0.417	0.152	0.058	0.659
	Barium (Ba)-Total (mg/kg wwt)	0.033	0.105	0.032	0.017	0.171
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	1.2	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	0.37	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.391	0.988	<0.0050	0.913	1.54
	Cadmium (Cd)-Total (mg/kg wwt)	0.110	0.249	<0.0010	0.275	0.398
	Calcium (Ca)-Total (mg/kg)	367	801	1770	343	1250
	Calcium (Ca)-Total (mg/kg wwt)	103	202	376	103	325
	Cesium (Cs)-Total (mg/kg)	0.0385	0.0714	0.162	0.0732	0.154
	Cesium (Cs)-Total (mg/kg wwt)	0.0108	0.0180	0.0344	0.0220	0.0400
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.20	<0.050	<0.20	0.33
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	<0.040	<0.010	<0.040	0.085
	Cobalt (Co)-Total (mg/kg)	0.178	0.660	0.050	0.216	0.939
	Cobalt (Co)-Total (mg/kg wwt)	0.0501	0.166	0.0106	0.0650	0.243
	Copper (Cu)-Total (mg/kg)	57.7	7.71	1.64	128	6.34
	Copper (Cu)-Total (mg/kg wwt)	16.2	1.95	0.349	38.5	1.64
	Iron (Fe)-Total (mg/kg)	505	580	18.3	1040	775
	Iron (Fe)-Total (mg/kg wwt)	142	146	3.90	314	201
	Lead (Pb)-Total (mg/kg)	<0.050	<0.050	<0.020	<0.050	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.010	<0.0040	<0.010	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	641	851	1480	665	1010
	Magnesium (Mg)-Total (mg/kg wwt)	180	215	315	200	262
	Manganese (Mn)-Total (mg/kg)	11.0	4.02	0.766	9.24	3.28
	Manganese (Mn)-Total (mg/kg wwt)	3.10	1.01	0.163	2.78	0.851

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1687336-21 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #7 MUSCLE	L1687336-22 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #7 LIVER	L1687336-23 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #7 KIDNEY	L1687336-24 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #8 MUSCLE	L1687336-25 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #8 LIVER
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	77.9	69.9	77.2	76.0	67.4
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	8.5	<5.0	<2.0	5.5
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	2.5	1.0	<0.40	1.8
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.106	0.233	0.670	0.102	0.286
	Arsenic (As)-Total (mg/kg wwt)	0.0234	0.0701	0.153	0.0246	0.0934
	Barium (Ba)-Total (mg/kg)	0.231	0.090	1.00	0.069	<0.050
	Barium (Ba)-Total (mg/kg wwt)	0.051	0.027	0.229	0.017	0.016
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	0.631	0.804	<0.0050	0.286
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	0.190	0.184	<0.0010	0.0933
	Calcium (Ca)-Total (mg/kg)	2430	283	913	576	296
	Calcium (Ca)-Total (mg/kg wwt)	538	85.1	208	138	96.6
	Cesium (Cs)-Total (mg/kg)	0.124	0.0505	0.111	0.113	0.0434
	Cesium (Cs)-Total (mg/kg wwt)	0.0274	0.0152	0.0254	0.0272	0.0142
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.20	<0.20	<0.050	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.040	<0.040	<0.010	<0.040
	Cobalt (Co)-Total (mg/kg)	0.098	0.402	0.937	0.054	0.188
	Cobalt (Co)-Total (mg/kg wwt)	0.0216	0.121	0.214	0.0129	0.0614
	Copper (Cu)-Total (mg/kg)	1.43	30.6	6.03	1.89	23.8
	Copper (Cu)-Total (mg/kg wwt)	0.317	9.21	1.38	0.454	7.77
	Iron (Fe)-Total (mg/kg)	18.1	937	791	19.3	1120
	Iron (Fe)-Total (mg/kg wwt)	4.00	282	181	4.63	364
	Lead (Pb)-Total (mg/kg)	<0.020	<0.050	<0.050	<0.020	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.010	<0.010	<0.0040	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1330	667	850	1200	667
	Magnesium (Mg)-Total (mg/kg wwt)	294	201	194	287	217
	Manganese (Mn)-Total (mg/kg)	0.935	11.2	3.33	0.452	8.56
	Manganese (Mn)-Total (mg/kg wwt)	0.207	3.36	0.760	0.108	2.79

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1687336-26 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #8 KIDNEY			
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)	75.1			
Metals	Aluminum (Al)-Total (mg/kg)	<5.0			
	Aluminum (Al)-Total (mg/kg wwt)	<1.0			
	Antimony (Sb)-Total (mg/kg)	<0.010			
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020			
	Arsenic (As)-Total (mg/kg)	0.710			
	Arsenic (As)-Total (mg/kg wwt)	0.177			
	Barium (Ba)-Total (mg/kg)	0.907			
	Barium (Ba)-Total (mg/kg wwt)	0.226			
	Beryllium (Be)-Total (mg/kg)	<0.010			
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020			
	Bismuth (Bi)-Total (mg/kg)	<0.010			
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020			
	Boron (B)-Total (mg/kg)	<1.0			
	Boron (B)-Total (mg/kg wwt)	<0.20			
	Cadmium (Cd)-Total (mg/kg)	0.757			
	Cadmium (Cd)-Total (mg/kg wwt)	0.188			
	Calcium (Ca)-Total (mg/kg)	1080			
	Calcium (Ca)-Total (mg/kg wwt)	268			
	Cesium (Cs)-Total (mg/kg)	0.0966			
	Cesium (Cs)-Total (mg/kg wwt)	0.0241			
	Chromium (Cr)-Total (mg/kg)	0.22			
	Chromium (Cr)-Total (mg/kg wwt)	0.056			
	Cobalt (Co)-Total (mg/kg)	0.794			
	Cobalt (Co)-Total (mg/kg wwt)	0.198			
	Copper (Cu)-Total (mg/kg)	6.51			
	Copper (Cu)-Total (mg/kg wwt)	1.62			
	Iron (Fe)-Total (mg/kg)	579			
	Iron (Fe)-Total (mg/kg wwt)	144			
	Lead (Pb)-Total (mg/kg)	<0.050			
	Lead (Pb)-Total (mg/kg wwt)	0.010			
	Lithium (Li)-Total (mg/kg)	<0.50			
	Lithium (Li)-Total (mg/kg wwt)	<0.10			
	Magnesium (Mg)-Total (mg/kg)	818			
	Magnesium (Mg)-Total (mg/kg wwt)	204			
	Manganese (Mn)-Total (mg/kg)	2.87			
	Manganese (Mn)-Total (mg/kg wwt)	0.714			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1687336-1 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #1 MUSCLE	L1687336-2 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #1 LIVER	L1687336-3 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #1 KIDNEY	L1687336-4 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #2 MUSCLE	L1687336-5 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #2 LIVER
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.324	0.258	0.366	0.203	0.180
	Mercury (Hg)-Total (mg/kg wwt)	0.0759	0.0740	0.101	0.0410	0.0542
	Molybdenum (Mo)-Total (mg/kg)	<0.020	1.39	0.647	<0.020	1.07
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.399	0.178	<0.0040	0.323
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	0.65	<0.20	0.21
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	0.178	<0.040	0.064
	Phosphorus (P)-Total (mg/kg)	9540	12600	11300	11100	13200
	Phosphorus (P)-Total (mg/kg wwt)	2230	3610	3110	2230	3970
	Potassium (K)-Total (mg/kg)	15900	8440	13000	19400	7850
	Potassium (K)-Total (mg/kg wwt)	3720	2420	3570	3920	2360
	Rubidium (Rb)-Total (mg/kg)	14.9	7.63	10.9	21.6	9.36
	Rubidium (Rb)-Total (mg/kg wwt)	3.49	2.19	2.99	4.35	2.81
	Selenium (Se)-Total (mg/kg)	1.97	17.6	10.5	2.49	72.7
	Selenium (Se)-Total (mg/kg wwt)	0.462	5.03	2.90	0.502	21.9
	Sodium (Na)-Total (mg/kg)	1920	3810	3290	2530	3330
	Sodium (Na)-Total (mg/kg wwt)	448	1090	904	509	1000
	Strontium (Sr)-Total (mg/kg)	1.49	0.98	3.90	1.97	1.66
	Strontium (Sr)-Total (mg/kg wwt)	0.349	0.282	1.07	0.396	0.501
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	0.0048	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0121	0.0536	0.0873	0.0222	0.149
	Thallium (Tl)-Total (mg/kg wwt)	0.00282	0.0154	0.0240	0.00448	0.0447
	Tin (Sn)-Total (mg/kg)	<0.10	0.14	0.27	<0.10	0.25
	Tin (Sn)-Total (mg/kg wwt)	<0.020	0.040	0.075	<0.020	0.076
	Uranium (U)-Total (mg/kg)	<0.0020	0.0068	0.0118	<0.0020	0.0039
	Uranium (U)-Total (mg/kg wwt)	<0.00040	0.00194	0.00326	<0.00040	0.00118
	Vanadium (V)-Total (mg/kg)	<0.10	0.43	0.44	<0.10	0.12
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.122	0.121	<0.020	0.036
	Zinc (Zn)-Total (mg/kg)	13.6	154	85.1	23.4	146
	Zinc (Zn)-Total (mg/kg wwt)	3.18	44.2	23.4	4.71	44.0
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1687336-6 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #2 KIDNEY	L1687336-7 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #3 MUSCLE	L1687336-8 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #3 LIVER	L1687336-9 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #3 KIDNEY	L1687336-10 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #4 MUSCLE
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.306	0.180	0.101	0.211	0.349
	Mercury (Hg)-Total (mg/kg wwt)	0.0790	0.0402	0.0358	0.0539	0.0790
	Molybdenum (Mo)-Total (mg/kg)	0.504	<0.020	0.436	0.153	<0.040
	Molybdenum (Mo)-Total (mg/kg wwt)	0.130	<0.0040	0.154	0.0391	<0.0080
	Nickel (Ni)-Total (mg/kg)	0.50	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	0.128	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	9620	10000	13400	8530	8950
	Phosphorus (P)-Total (mg/kg wwt)	2480	2240	4740	2180	2030
	Potassium (K)-Total (mg/kg)	12400	15800	7250	10000	15200
	Potassium (K)-Total (mg/kg wwt)	3200	3530	2560	2560	3440
	Rubidium (Rb)-Total (mg/kg)	11.4	14.4	7.57	7.64	15.4
	Rubidium (Rb)-Total (mg/kg wwt)	2.95	3.21	2.67	1.96	3.49
	Selenium (Se)-Total (mg/kg)	11.3	2.36	27.7	5.32	1.99
	Selenium (Se)-Total (mg/kg wwt)	2.92	0.528	9.77	1.36	0.451
	Sodium (Na)-Total (mg/kg)	2600	2440	2900	2070	1910
	Sodium (Na)-Total (mg/kg wwt)	670	546	1030	530	434
	Strontium (Sr)-Total (mg/kg)	3.60	1.94	0.87	1.68	0.73
	Strontium (Sr)-Total (mg/kg wwt)	0.928	0.434	0.308	0.429	0.166
	Tellurium (Te)-Total (mg/kg)	0.024	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	0.0061	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.104	0.0137	0.0830	0.0298	0.0195
	Thallium (Tl)-Total (mg/kg wwt)	0.0267	0.00305	0.0293	0.00764	0.00442
	Tin (Sn)-Total (mg/kg)	0.43	0.13	0.13	0.38	<0.10
	Tin (Sn)-Total (mg/kg wwt)	0.112	0.028	0.046	0.097	<0.020
	Uranium (U)-Total (mg/kg)	0.0068	<0.0020	<0.0020	0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	0.00174	<0.00040	<0.00040	0.00052	<0.00040
	Vanadium (V)-Total (mg/kg)	0.17	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	0.044	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	101	28.4	187	95.3	16.6
	Zinc (Zn)-Total (mg/kg wwt)	26.1	6.33	66.1	24.4	3.76
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1687336-11 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #4 LIVER	L1687336-12 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #4 KIDNEY	L1687336-13 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #4 GONAD	L1687336-14 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #4X MUSCLE	L1687336-15 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #5 MUSCLE
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.140	0.543	0.0405	0.313	0.225
	Mercury (Hg)-Total (mg/kg wwt)	0.0452	0.131	0.0141	0.0714	0.0507
	Molybdenum (Mo)-Total (mg/kg)	1.22	0.460	<0.040	<0.020	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	0.392	0.111	0.0137	<0.0040	<0.0040
	Nickel (Ni)-Total (mg/kg)	<0.20	0.78	0.24	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	0.189	0.084	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	13600	11200	8950	9380	10700
	Phosphorus (P)-Total (mg/kg wwt)	4370	2710	3120	2130	2410
	Potassium (K)-Total (mg/kg)	8610	12700	5220	15200	17000
	Potassium (K)-Total (mg/kg wwt)	2770	3080	1820	3470	3820
	Rubidium (Rb)-Total (mg/kg)	12.9	14.3	6.24	18.6	13.4
	Rubidium (Rb)-Total (mg/kg wwt)	4.15	3.46	2.18	4.24	3.01
	Selenium (Se)-Total (mg/kg)	9.81	9.90	9.51	2.04	1.93
	Selenium (Se)-Total (mg/kg wwt)	3.16	2.40	3.32	0.464	0.433
	Sodium (Na)-Total (mg/kg)	2850	4010	1860	2080	1980
	Sodium (Na)-Total (mg/kg wwt)	918	972	648	473	445
	Strontium (Sr)-Total (mg/kg)	0.62	2.73	2.61	0.549	0.970
	Strontium (Sr)-Total (mg/kg wwt)	0.200	0.662	0.909	0.125	0.218
	Tellurium (Te)-Total (mg/kg)	<0.020	0.026	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	0.0064	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.101	0.0848	0.0141	0.0182	0.0136
	Thallium (Tl)-Total (mg/kg wwt)	0.0325	0.0205	0.00491	0.00414	0.00305
	Tin (Sn)-Total (mg/kg)	0.15	0.63	0.16	<0.10	0.13
	Tin (Sn)-Total (mg/kg wwt)	0.049	0.154	0.057	0.020	0.029
	Uranium (U)-Total (mg/kg)	0.0072	0.0131	0.0025	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	0.00233	0.00318	0.00088	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	0.12	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.028	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	112	117	187	17.6	18.2
	Zinc (Zn)-Total (mg/kg wwt)	36.2	28.4	65.1	4.01	4.10
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1687336-16 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #5 LIVER	L1687336-17 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #5 KIDNEY	L1687336-18 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #6 MUSCLE	L1687336-19 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #6 LIVER	L1687336-20 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #6 KIDNEY
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.152	0.227	0.467	0.251	0.475
	Mercury (Hg)-Total (mg/kg wwt)	0.0427	0.0572	0.0995	0.0757	0.123
	Molybdenum (Mo)-Total (mg/kg)	0.655	0.365	<0.020	1.28	0.531
	Molybdenum (Mo)-Total (mg/kg wwt)	0.184	0.0921	<0.0040	0.387	0.138
	Nickel (Ni)-Total (mg/kg)	<0.20	0.29	<0.20	<0.20	0.85
	Nickel (Ni)-Total (mg/kg wwt)	0.055	0.074	<0.040	0.044	0.220
	Phosphorus (P)-Total (mg/kg)	10600	11700	13000	14100	12200
	Phosphorus (P)-Total (mg/kg wwt)	2990	2960	2770	4230	3170
	Potassium (K)-Total (mg/kg)	8570	13000	22300	8320	14000
	Potassium (K)-Total (mg/kg wwt)	2410	3290	4760	2500	3620
	Rubidium (Rb)-Total (mg/kg)	6.34	8.64	25.3	10.3	14.2
	Rubidium (Rb)-Total (mg/kg wwt)	1.78	2.18	5.38	3.11	3.68
	Selenium (Se)-Total (mg/kg)	23.9	9.11	2.28	42.1	11.4
	Selenium (Se)-Total (mg/kg wwt)	6.73	2.30	0.486	12.7	2.95
	Sodium (Na)-Total (mg/kg)	3450	4210	2830	3400	4020
	Sodium (Na)-Total (mg/kg wwt)	969	1060	602	1020	1040
	Strontium (Sr)-Total (mg/kg)	0.76	2.18	2.17	0.54	3.24
	Strontium (Sr)-Total (mg/kg wwt)	0.215	0.549	0.462	0.162	0.838
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	0.028
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	0.0072
	Thallium (Tl)-Total (mg/kg)	0.0458	0.0505	0.0225	0.119	0.125
	Thallium (Tl)-Total (mg/kg wwt)	0.0129	0.0127	0.00480	0.0357	0.0324
	Tin (Sn)-Total (mg/kg)	0.36	0.29	<0.10	<0.10	0.42
	Tin (Sn)-Total (mg/kg wwt)	0.100	0.072	0.021	<0.020	0.108
	Uranium (U)-Total (mg/kg)	0.0056	0.0080	<0.0020	0.0082	0.0142
	Uranium (U)-Total (mg/kg wwt)	0.00158	0.00203	<0.00040	0.00247	0.00368
	Vanadium (V)-Total (mg/kg)	<0.10	0.19	<0.10	0.21	0.27
	Vanadium (V)-Total (mg/kg wwt)	0.020	0.049	<0.020	0.064	0.070
	Zinc (Zn)-Total (mg/kg)	124	90.0	19.7	94.6	100
	Zinc (Zn)-Total (mg/kg wwt)	34.8	22.7	4.21	28.5	25.9
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1687336-21 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #7 MUSCLE	L1687336-22 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #7 LIVER	L1687336-23 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #7 KIDNEY	L1687336-24 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #8 MUSCLE	L1687336-25 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #8 LIVER
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.332	0.204	0.376	0.236	0.146
	Mercury (Hg)-Total (mg/kg wwt)	0.0735	0.0613	0.0858	0.0568	0.0475
	Molybdenum (Mo)-Total (mg/kg)	<0.020	1.17	0.454	<0.020	0.914
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.352	0.104	<0.0040	0.298
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	0.59	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	0.045	0.136	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	11400	11800	11300	10600	12400
	Phosphorus (P)-Total (mg/kg wwt)	2510	3560	2570	2540	4040
	Potassium (K)-Total (mg/kg)	17600	8590	12900	17800	7880
	Potassium (K)-Total (mg/kg wwt)	3890	2590	2950	4270	2570
	Rubidium (Rb)-Total (mg/kg)	19.3	8.59	12.7	20.0	9.13
	Rubidium (Rb)-Total (mg/kg wwt)	4.28	2.58	2.89	4.79	2.98
	Selenium (Se)-Total (mg/kg)	2.27	15.7	10.5	2.05	10.3
	Selenium (Se)-Total (mg/kg wwt)	0.502	4.73	2.40	0.493	3.37
	Sodium (Na)-Total (mg/kg)	2230	3080	3330	1830	2820
	Sodium (Na)-Total (mg/kg wwt)	492	927	759	439	919
	Strontium (Sr)-Total (mg/kg)	4.07	0.69	2.69	0.856	0.65
	Strontium (Sr)-Total (mg/kg wwt)	0.901	0.206	0.613	0.206	0.211
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	0.0042	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0212	0.105	0.0720	0.0162	0.0668
	Thallium (Tl)-Total (mg/kg wwt)	0.00470	0.0315	0.0164	0.00388	0.0218
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	0.34	<0.10	0.18
	Tin (Sn)-Total (mg/kg wwt)	<0.020	0.028	0.077	<0.020	0.060
	Uranium (U)-Total (mg/kg)	<0.0020	0.0059	0.0079	<0.0020	0.0050
	Uranium (U)-Total (mg/kg wwt)	<0.00040	0.00177	0.00180	<0.00040	0.00164
	Vanadium (V)-Total (mg/kg)	<0.10	0.17	0.16	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.051	0.036	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	17.8	124	84.5	16.6	102
	Zinc (Zn)-Total (mg/kg wwt)	3.95	37.2	19.3	3.98	33.4
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1687336-26 Tissue 29-SEP-15 16:15 QUR NEAR D/S LIKELY RB #8 KIDNEY			
Grouping	Analyte				
TISSUE					
Metals	Mercury (Hg)-Total (mg/kg)	0.260			
	Mercury (Hg)-Total (mg/kg wwt)	0.0646			
	Molybdenum (Mo)-Total (mg/kg)	0.394			
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0982			
	Nickel (Ni)-Total (mg/kg)	0.54			
	Nickel (Ni)-Total (mg/kg wwt)	0.135			
	Phosphorus (P)-Total (mg/kg)	10900			
	Phosphorus (P)-Total (mg/kg wwt)	2720			
	Potassium (K)-Total (mg/kg)	12800			
	Potassium (K)-Total (mg/kg wwt)	3180			
	Rubidium (Rb)-Total (mg/kg)	13.2			
	Rubidium (Rb)-Total (mg/kg wwt)	3.29			
	Selenium (Se)-Total (mg/kg)	7.77			
	Selenium (Se)-Total (mg/kg wwt)	1.93			
	Sodium (Na)-Total (mg/kg)	4450			
	Sodium (Na)-Total (mg/kg wwt)	1110			
	Strontium (Sr)-Total (mg/kg)	3.23			
	Strontium (Sr)-Total (mg/kg wwt)	0.804			
	Tellurium (Te)-Total (mg/kg)	<0.020			
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040			
	Thallium (Tl)-Total (mg/kg)	0.0499			
	Thallium (Tl)-Total (mg/kg wwt)	0.0124			
	Tin (Sn)-Total (mg/kg)	0.95			
	Tin (Sn)-Total (mg/kg wwt)	0.237			
	Uranium (U)-Total (mg/kg)	0.0096			
	Uranium (U)-Total (mg/kg wwt)	0.00239			
	Vanadium (V)-Total (mg/kg)	<0.10			
	Vanadium (V)-Total (mg/kg wwt)	<0.020			
	Zinc (Zn)-Total (mg/kg)	127			
	Zinc (Zn)-Total (mg/kg wwt)	31.6			
	Zirconium (Zr)-Total (mg/kg)	<0.20			
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Barium (Ba)-Total	DUP-H	L1687336-10, -12, -13, -16, -17, -19, -2, -20, -22, -23, -25, -26, -3, -5, -6, -9
Duplicate	Calcium (Ca)-Total	DUP-H	L1687336-10, -12, -13, -16, -17, -19, -2, -20, -22, -23, -25, -26, -3, -5, -6, -9
Duplicate	Manganese (Mn)-Total	DUP-H	L1687336-10, -12, -13, -16, -17, -19, -2, -20, -22, -23, -25, -26, -3, -5, -6, -9
Duplicate	Strontium (Sr)-Total	DUP-H	L1687336-10, -12, -13, -16, -17, -19, -2, -20, -22, -23, -25, -26, -3, -5, -6, -9
Duplicate	Barium (Ba)-Total	DUP-H	L1687336-10, -12, -13, -16, -17, -19, -2, -20, -22, -23, -25, -26, -3, -5, -6, -9
Duplicate	Calcium (Ca)-Total	DUP-H	L1687336-10, -12, -13, -16, -17, -19, -2, -20, -22, -23, -25, -26, -3, -5, -6, -9
Duplicate	Manganese (Mn)-Total	DUP-H	L1687336-10, -12, -13, -16, -17, -19, -2, -20, -22, -23, -25, -26, -3, -5, -6, -9
Duplicate	Strontium (Sr)-Total	DUP-H	L1687336-10, -12, -13, -16, -17, -19, -2, -20, -22, -23, -25, -26, -3, -5, -6, -9
Method Blank	Copper (Cu)-Total	MB-LOR	L1687336-1, -14, -15, -18, -21, -24, -4, -7
Method Blank	Strontium (Sr)-Total	MB-LOR	L1687336-1, -14, -15, -18, -21, -24, -4, -7
Method Blank	Copper (Cu)-Total	MB-LOR	L1687336-1, -14, -15, -18, -21, -24, -4, -7
Method Blank	Strontium (Sr)-Total	MB-LOR	L1687336-1, -14, -15, -18, -21, -24, -4, -7

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-WET-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-WET-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (WET)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p>			
<p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.</p>			

Reference Information

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MET-WET-CCMS-N-VA Tissue Metals in Tissue by CRC ICPMS (WET) EPA 200.3/6020A

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MET-WET-MICR-HRMS-VA Tissue Metals in Tissue by HR-ICPMS Micro (WET) EPA 200.3/200.8

Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on wet weight basis.

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MOISTURE-TISS-VA Tissue % Moisture in Tissues ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Report to:		Report Format / Distribution			Service Requested: (rush - subject to availability)					
Company: MOUNT POLLEY MINING CORP.		<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax			<input checked="" type="radio"/> Regular (Default) <input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge <input type="radio"/> Emergency (1 Business Day) - 100% Surcharge <input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS					
Contact: Colleen Hughes		Email 1: on file								
Address: PO BOX 12, Likely, BC, V0L 1N0		Email 2:								
Phone: 250-790-2215 Fax:		Analysis Request								
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No		Client / Project Information:			Please indicate below Filtered, Preserved or both (F, P, F/P)					
Company:		Job #:								
Contact:		PO / A/E:								
Address:		Legal Site Description:								
Phone: Fax:		Quote #:								
Lab Work Order # (lab use only)		ALS Contact: Can Dang			Sampler: Dolighan, Zirnheit					
L1687336										
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	T-metals(HRCP-MS)(Wet&D)	Moisture	Liver Metals	Kidney Metals	Gonad Metals	Number of Containers
	QUR near d/s Likely RB # 1	29-Sep-15	8:00-16:15	Tissue	X	X	X	X		3
	QUR near d/s Likely RB # 2	29-Sep-15	8:00-16:15	Tissue	X	X	X	X		3
	QUR near d/s Likely RB # 3	29-Sep-15	8:00-16:15	Tissue	X	X	X	X		3
	QUR near d/s Likely RB # 4	29-Sep-15	8:00-16:15	Tissue	X	X	X	X	X	4
	QUR near d/s Likely RB # 4X	29-Sep-15	8:00-16:15	Tissue	X	X				1
	QUR near d/s Likely RB # 5	29-Sep-15	8:00-16:15	Tissue	X	X	X	X		3
	QUR near d/s Likely RB # 6	29-Sep-15	8:00-16:15	Tissue	X	X	X	X		3
	QUR near d/s Likely RB # 7	29-Sep-15	8:00-16:15	Tissue	X	X	X	X		3
	QUR near d/s Likely RB # 8	29-Sep-15	8:00-16:15	Tissue	X	X	X	X		3
Special Instructions / Regulations / Hazardous Details										
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.										
SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)				
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No? If Yes attach SIF		
N. Zirnheit	Oct. 13, 2015	<i>lady</i>	OCT 14 2015	9:30 AM	-2.8					





MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 14-OCT-15
Report Date: 10-NOV-15 16:39 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1687337
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc: 42281

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

10-NOV-15 16:39 (MT)

Version: FINAL

Sample ID Description Sampled Date Sampled Time Client ID	L1687337-1 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. CSU#1	L1687337-2 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. CSU#2	L1687337-3 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. CSU#3	L1687337-4 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. CSU#4	L1687337-5 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. CSU#5
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)				
	83.3	83.2	82.3	83.7	82.8
Metals	Aluminum (Al)-Total (mg/kg)				
	<2.0	<2.0	<2.0	<2.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)				
	<0.40	<0.40	<0.40	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)				
	0.118	0.060	0.067	0.075	0.136
	Arsenic (As)-Total (mg/kg wwt)				
	0.0197	0.0100	0.0119	0.0123	0.0234
	Barium (Ba)-Total (mg/kg)				
	0.276	0.469	0.468	0.478	0.189
	Barium (Ba)-Total (mg/kg wwt)				
	0.046	0.079	0.083	0.078	0.033
	Beryllium (Be)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)				
	<0.010	<0.010	0.011	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)				
	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)				
	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)				
	0.0052	<0.0050	<0.0050	0.0071	0.0129
	Cadmium (Cd)-Total (mg/kg wwt)				
	<0.0010	<0.0010	<0.0010	0.0012	0.0022
	Calcium (Ca)-Total (mg/kg)				
	2790	4720	3950	3420	1890
	Calcium (Ca)-Total (mg/kg wwt)				
	466	793	700	558	326
	Cesium (Cs)-Total (mg/kg)				
	0.102	0.0995	0.0552	0.0634	0.122
	Cesium (Cs)-Total (mg/kg wwt)				
	0.0170	0.0167	0.0098	0.0104	0.0210
	Chromium (Cr)-Total (mg/kg)				
	<0.050	<0.050	<0.050	<0.050	<0.050
	Chromium (Cr)-Total (mg/kg wwt)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Cobalt (Co)-Total (mg/kg)				
	0.027	<0.020	<0.020	<0.020	0.051
	Cobalt (Co)-Total (mg/kg wwt)				
	0.0045	<0.0040	<0.0040	<0.0040	0.0088
	Copper (Cu)-Total (mg/kg)				
	1.32	1.47	1.67	2.25	1.82
	Copper (Cu)-Total (mg/kg wwt)				
	0.220	0.247	0.296	0.368	0.313
	Iron (Fe)-Total (mg/kg)				
	13.9	16.6	17.5	20.8	16.3
	Iron (Fe)-Total (mg/kg wwt)				
	2.33	2.78	3.11	3.40	2.80
	Lead (Pb)-Total (mg/kg)				
	<0.020	<0.020	<0.020	<0.020	<0.020
	Lead (Pb)-Total (mg/kg wwt)				
	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg)				
	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)				
	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)				
	1390	1350	1260	1280	1330
	Magnesium (Mg)-Total (mg/kg wwt)				
	232	227	223	209	230
	Manganese (Mn)-Total (mg/kg)				
	3.63	5.36	3.01	3.47	1.84
	Manganese (Mn)-Total (mg/kg wwt)				
	0.607	0.901	0.533	0.567	0.318

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1687337-6 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. CSU#6	L1687337-7 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. CSU#7	L1687337-8 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. CSU#7X	L1687337-9 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. CSU#8
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)	84.8	81.8	80.9	82.4
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<2.0	<2.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<0.40	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.099	0.208	0.190	0.123
	Arsenic (As)-Total (mg/kg wwt)	0.0150	0.0379	0.0362	0.0217
	Barium (Ba)-Total (mg/kg)	0.339	0.224	0.288	0.404
	Barium (Ba)-Total (mg/kg wwt)	0.051	0.041	0.055	0.071
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.125	<0.0050	<0.0050	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	0.0190	<0.0010	<0.0010	<0.0010
	Calcium (Ca)-Total (mg/kg)	2080	2280	2790	2460
	Calcium (Ca)-Total (mg/kg wwt)	316	414	532	432
	Cesium (Cs)-Total (mg/kg)	0.165	0.0509	0.0560	0.0950
	Cesium (Cs)-Total (mg/kg wwt)	0.0250	0.0093	0.0107	0.0167
	Chromium (Cr)-Total (mg/kg)	0.052	<0.050	<0.050	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010
	Cobalt (Co)-Total (mg/kg)	0.023	<0.020	0.022	0.025
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040	<0.0040	0.0042	0.0043
	Copper (Cu)-Total (mg/kg)	1.87	1.00	1.33	1.56
	Copper (Cu)-Total (mg/kg wwt)	0.284	0.181	0.254	0.275
	Iron (Fe)-Total (mg/kg)	18.2	10.9	12.9	13.8
	Iron (Fe)-Total (mg/kg wwt)	2.77	1.99	2.46	2.43
	Lead (Pb)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1340	1320	1310	1320
	Magnesium (Mg)-Total (mg/kg wwt)	204	239	250	232
	Manganese (Mn)-Total (mg/kg)	2.13	1.46	2.00	3.36
	Manganese (Mn)-Total (mg/kg wwt)	0.324	0.266	0.382	0.591

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1687337-1 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. CSU#1	L1687337-2 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. CSU#2	L1687337-3 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. CSU#3	L1687337-4 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. CSU#4	L1687337-5 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. CSU#5	
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.776	0.733	0.691	0.960	0.390
	Mercury (Hg)-Total (mg/kg wwt)	0.129	0.123	0.123	0.157	0.0673
	Molybdenum (Mo)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	11900	12700	11300	11300	10700
	Phosphorus (P)-Total (mg/kg wwt)	1980	2130	2010	1850	1840
	Potassium (K)-Total (mg/kg)	22100	21600	18400	19500	18200
	Potassium (K)-Total (mg/kg wwt)	3690	3630	3270	3180	3140
	Rubidium (Rb)-Total (mg/kg)	20.5	23.4	13.2	16.6	17.5
	Rubidium (Rb)-Total (mg/kg wwt)	3.42	3.93	2.35	2.71	3.02
	Selenium (Se)-Total (mg/kg)	2.50	2.68	3.65	4.62	2.72
	Selenium (Se)-Total (mg/kg wwt)	0.417	0.451	0.647	0.755	0.468
	Sodium (Na)-Total (mg/kg)	2040	1760	1720	2810	1870
	Sodium (Na)-Total (mg/kg wwt)	341	296	304	459	323
	Strontium (Sr)-Total (mg/kg)	3.63	6.97	5.52	5.05	3.49
	Strontium (Sr)-Total (mg/kg wwt)	0.605	1.17	0.979	0.825	0.601
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0113	0.0083	0.0027	0.0122	0.0077
	Thallium (Tl)-Total (mg/kg wwt)	0.00189	0.00140	0.00048	0.00200	0.00133
	Tin (Sn)-Total (mg/kg)	0.15	0.15	0.10	0.15	0.18
	Tin (Sn)-Total (mg/kg wwt)	0.024	0.025	<0.020	0.024	0.031
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	31.3	25.1	36.7	39.4	32.1
	Zinc (Zn)-Total (mg/kg wwt)	5.23	4.23	6.50	6.42	5.53
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

10-NOV-15 16:39 (MT)

Version: FINAL

Sample ID Description Sampled Date Sampled Time Client ID		L1687337-6 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. CSU#6	L1687337-7 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. CSU#7	L1687337-8 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. CSU#7X	L1687337-9 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. CSU#8
Grouping	Analyte				
TISSUE					
Metals	Mercury (Hg)-Total (mg/kg)	0.811	0.490	0.521	0.772
	Mercury (Hg)-Total (mg/kg wwt)	0.123	0.0891	0.0994	0.136
	Molybdenum (Mo)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	12100	10100	10500	11100
	Phosphorus (P)-Total (mg/kg wwt)	1850	1840	2010	1950
	Potassium (K)-Total (mg/kg)	22200	17800	18600	19800
	Potassium (K)-Total (mg/kg wwt)	3370	3240	3550	3480
	Rubidium (Rb)-Total (mg/kg)	23.8	14.1	15.4	18.2
	Rubidium (Rb)-Total (mg/kg wwt)	3.62	2.57	2.94	3.20
	Selenium (Se)-Total (mg/kg)	3.34	3.10	3.21	2.46
	Selenium (Se)-Total (mg/kg wwt)	0.507	0.564	0.613	0.432
	Sodium (Na)-Total (mg/kg)	1900	1680	1700	2740
	Sodium (Na)-Total (mg/kg wwt)	289	305	324	482
	Strontium (Sr)-Total (mg/kg)	3.66	3.05	3.96	3.87
	Strontium (Sr)-Total (mg/kg wwt)	0.556	0.555	0.755	0.681
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0030	0.0042	0.0046	0.0057
	Thallium (Tl)-Total (mg/kg wwt)	0.00046	0.00076	0.00087	0.00100
	Tin (Sn)-Total (mg/kg)	0.16	<0.10	0.14	0.11
	Tin (Sn)-Total (mg/kg wwt)	0.024	<0.020	0.026	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	39.1	32.2	36.3	38.0
	Zinc (Zn)-Total (mg/kg wwt)	5.95	5.86	6.93	6.69
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Copper (Cu)-Total	MB-LOR	L1687337-1, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Manganese (Mn)-Total	MB-LOR	L1687337-1, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Copper (Cu)-Total	MB-LOR	L1687337-1, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Manganese (Mn)-Total	MB-LOR	L1687337-1, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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HG-DRY-CVAFS-N-VA Tissue Mercury in Tissue by CVAFS (DRY) EPA 200.3, EPA 245.7

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.

HG-WET-CVAFS-N-VA Tissue Mercury in Tissue by CVAFS (WET) EPA 200.3, EPA 245.7

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.

MET-DRY-CCMS-N-VA Tissue Metals in Tissue by CRC ICPMS (DRY) EPA 200.3/6020A

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MET-WET-CCMS-N-VA Tissue Metals in Tissue by CRC ICPMS (WET) EPA 200.3/6020A

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MOISTURE-TISS-VA Tissue % Moisture in Tissues ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Environmental Division

Report to:		Report Format / Distribution		Service Requested: (rush - subject to availability)	
Company: MOUNT POLLEY MINING CORP.		<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other		<input checked="" type="radio"/> Regular (Default)	
Contact: Colleen Hughes		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax		<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge	
Address: PO BOX 12, Likely, BC, V0L 1N0		Email 1: on file		<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge	
Phone: 250-790-2215 Fax: _____		Email 2: _____		<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS	

Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No		Client / Project Information:		Please indicate below Filtered, Preserved or both (F, P, F/P)						Number of Containers
Company: _____		Job #: _____		T-metals(HR/CP-MS)(Wet&D)	Moisture	Liver Metals	Kidney Metals	Gonad metals		
Contact: _____		PO / AFE: _____								
Address: _____		Legal Site Description: 42281								
Phone: _____ Fax: _____		Quote #: _____								

Lab Work Order # (lab use only)		L1687337		ALS Contact: Can Dang	Sampler: Dolighan, ZirnHELL					
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	T-metals(HR/CP-MS)(Wet&D)	Moisture	Liver Metals	Kidney Metals	Gonad metals	Number of Containers
	QUL near Hazeltine Cr. CSU # 1	04-Oct-15	8:00-16:15	Tissue	X	X				1
	QUL near Hazeltine Cr. CSU # 2	04-Oct-15	8:00-16:15	Tissue	X	X				1
	QUL near Hazeltine Cr. CSU # 3	04-Oct-15	8:00-16:15	Tissue	X	X				1
	QUL near Hazeltine Cr. CSU # 4	04-Oct-15	8:00-16:15	Tissue	X	X				1
	QUL near Hazeltine Cr. CSU # 5	04-Oct-15	8:00-16:15	Tissue	X	X				1
	QUL near Hazeltine Cr. CSU # 6	04-Oct-15	8:00-16:15	Tissue	X	X				1
	QUL near Hazeltine Cr. CSU # 7	04-Oct-15	8:00-16:15	Tissue	X	X				1
	QUL near Hazeltine Cr. CSU # 7X	04-Oct-15	8:00-16:15	Tissue	X	X				1
	QUL near Hazeltine Cr. CSU # 8	04-Oct-15	8:00-16:15	Tissue	X	X				1



Special instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)			
Released by: N.ZirnHELL	Date & Time: Oct. 13, 2015	Received by: <i>lady</i>	Date: OCT 14 2015	Time: 9:30 AM	Temperature: -2.8	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 15-OCT-15
Report Date: 14-DEC-15 10:47 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1688080
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc: 42281

Can Dang
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688080-1 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#1 MUSCLE	L1688080-2 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#1 LIVER	L1688080-3 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#1 KIDNEY	L1688080-4 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#2 MUSCLE	L1688080-5 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#2 LIVER
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	80.1	78.1	77.6	78.9	67.3
Metals	Aluminum (Al)-Total (mg/kg)	2.2	<5.0	20.6	<2.0	2.6
	Aluminum (Al)-Total (mg/kg wwt)	0.44	<1.0	4.6	<0.40	0.86
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.108	0.313	0.198	0.094	0.192
	Arsenic (As)-Total (mg/kg wwt)	0.0215	0.0686	0.0444	0.0199	0.0627
	Barium (Ba)-Total (mg/kg)	<0.050	<0.050	0.094	<0.050	<0.050
	Barium (Ba)-Total (mg/kg wwt)	<0.010	<0.010	0.021	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	0.0033
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	0.154	1.02	<0.0050	0.108
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	0.0337	0.229	<0.0010	0.0353
	Calcium (Ca)-Total (mg/kg)	744	549	612	376	220
	Calcium (Ca)-Total (mg/kg wwt)	148	120	137	79.2	71.9
	Cesium (Cs)-Total (mg/kg)	0.215	0.151	0.277	0.348	0.0999
	Cesium (Cs)-Total (mg/kg wwt)	0.0427	0.0330	0.0621	0.0734	0.0327
	Chromium (Cr)-Total (mg/kg)	<0.050	0.34	<0.20	<0.050	0.127
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	0.075	<0.040	<0.010	0.041
	Cobalt (Co)-Total (mg/kg)	0.066	0.472	0.711	<0.020	0.103
	Cobalt (Co)-Total (mg/kg wwt)	0.0131	0.103	0.159	<0.0040	0.0338
	Copper (Cu)-Total (mg/kg)	1.58	27.2	4.16	2.00	37.9
	Copper (Cu)-Total (mg/kg wwt)	0.314	5.94	0.930	0.422	12.4
	Iron (Fe)-Total (mg/kg)	13.3	304	443	26.3	1060
	Iron (Fe)-Total (mg/kg wwt)	2.65	66.5	99.2	5.55	346
	Lead (Pb)-Total (mg/kg)	<0.020	<0.050	<0.050	<0.020	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.010	<0.010	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1200	686	852	1070	428
	Magnesium (Mg)-Total (mg/kg wwt)	238	150	191	226	140
	Manganese (Mn)-Total (mg/kg)	0.384	4.67	0.971	0.343	2.65
	Manganese (Mn)-Total (mg/kg wwt)	0.076	1.02	0.217	0.072	0.865

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688080-6 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#2 KIDNEY	L1688080-7 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#3 MUSCLE	L1688080-8 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#3 LIVER	L1688080-9 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#3 KIDNEY	L1688080-10 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#4 MUSCLE
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	80.0	74.1	64.8	80.0	77.4
Metals	Aluminum (Al)-Total (mg/kg)	17.6	2.3	<5.0	<5.0	2.2
	Aluminum (Al)-Total (mg/kg wwt)	3.5	0.60	<1.0	<1.0	0.49
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.173	0.159	0.242	0.129	0.242
	Arsenic (As)-Total (mg/kg wwt)	0.0347	0.0411	0.0851	0.0257	0.0547
	Barium (Ba)-Total (mg/kg)	0.110	<0.050	<0.050	<0.050	<0.050
	Barium (Ba)-Total (mg/kg wwt)	0.022	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	1.54	<0.0050	0.064	0.383	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	0.308	<0.0010	0.0224	0.0767	<0.0010
	Calcium (Ca)-Total (mg/kg)	784	394	231	488	282
	Calcium (Ca)-Total (mg/kg wwt)	157	102	81.2	97.7	63.8
	Cesium (Cs)-Total (mg/kg)	0.462	0.207	0.145	0.422	0.328
	Cesium (Cs)-Total (mg/kg wwt)	0.0924	0.0535	0.0511	0.0845	0.0740
	Chromium (Cr)-Total (mg/kg)	0.28	<0.050	<0.20	<0.20	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	0.056	<0.010	<0.040	<0.040	<0.010
	Cobalt (Co)-Total (mg/kg)	0.378	<0.020	0.092	0.324	<0.020
	Cobalt (Co)-Total (mg/kg wwt)	0.0755	<0.0040	0.0325	0.0649	<0.0040
	Copper (Cu)-Total (mg/kg)	6.16	1.58	27.0	5.98	2.67
	Copper (Cu)-Total (mg/kg wwt)	1.23	0.409	9.52	1.20	0.602
	Iron (Fe)-Total (mg/kg)	793	11.4	167	761	28.3
	Iron (Fe)-Total (mg/kg wwt)	159	2.96	58.8	152	6.39
	Lead (Pb)-Total (mg/kg)	<0.050	<0.020	<0.050	<0.050	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.0040	<0.010	<0.010	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	834	917	424	882	1040
	Magnesium (Mg)-Total (mg/kg wwt)	167	237	149	176	236
	Manganese (Mn)-Total (mg/kg)	1.09	0.261	2.58	0.821	0.391
	Manganese (Mn)-Total (mg/kg wwt)	0.219	0.068	0.907	0.164	0.088

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688080-11 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#4 LIVER	L1688080-12 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#4 KIDNEY	L1688080-13 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#4 GONAD	L1688080-17 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#4X GONAD	L1688080-18 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#5 MUSCLE
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	75.5	78.5	64.1	63.8	74.5
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	12.5	<5.0	<2.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	2.7	<1.0	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.267	0.183	0.073	0.081	0.123
	Arsenic (As)-Total (mg/kg wwt)	0.0653	0.0393	0.0262	0.0292	0.0313
	Barium (Ba)-Total (mg/kg)	<0.050	0.109	<0.050	<0.050	<0.050
	Barium (Ba)-Total (mg/kg wwt)	<0.010	0.023	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.125	1.16	<0.010	<0.0050	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	0.0307	0.250	<0.0020	<0.0010	<0.0010
	Calcium (Ca)-Total (mg/kg)	461	661	944	886	513
	Calcium (Ca)-Total (mg/kg wwt)	113	142	339	321	131
	Cesium (Cs)-Total (mg/kg)	0.241	0.382	0.109	0.0780	0.273
	Cesium (Cs)-Total (mg/kg wwt)	0.0590	0.0823	0.0390	0.0283	0.0695
	Chromium (Cr)-Total (mg/kg)	0.056	0.27	<0.20	<0.050	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	0.014	0.058	<0.040	<0.010	<0.010
	Cobalt (Co)-Total (mg/kg)	0.124	0.213	0.039	0.045	<0.020
	Cobalt (Co)-Total (mg/kg wwt)	0.0304	0.0459	0.0139	0.0163	<0.0040
	Copper (Cu)-Total (mg/kg)	12.5	3.39	12.8	12.3	1.29
	Copper (Cu)-Total (mg/kg wwt)	3.05	0.730	4.62	4.47	0.330
	Iron (Fe)-Total (mg/kg)	432	767	56.0	43.8	10.5
	Iron (Fe)-Total (mg/kg wwt)	106	165	20.1	15.9	2.68
	Lead (Pb)-Total (mg/kg)	<0.020	<0.050	<0.050	<0.020	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.010	<0.010	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1060	600	1360	1210	1050
	Magnesium (Mg)-Total (mg/kg wwt)	260	129	491	437	268
	Manganese (Mn)-Total (mg/kg)	5.68	1.57	2.64	1.73	0.251
	Manganese (Mn)-Total (mg/kg wwt)	1.39	0.337	0.950	0.628	0.064

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688080-19 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#5 LIVER	L1688080-20 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#5 KIDNEY	L1688080-21 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#5X MUSCLE	L1688080-22 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#6 MUSCLE	L1688080-23 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#6 LIVER
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	68.6	79.7	76.9	73.9	62.3
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	12.8	<2.0	<2.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	2.6	<0.40	<0.40	<1.0
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.283	0.212	0.093	0.160	0.326
	Arsenic (As)-Total (mg/kg wwt)	0.0887	0.0431	0.0215	0.0416	0.123
	Barium (Ba)-Total (mg/kg)	<0.050	0.086	<0.050	<0.050	<0.050
	Barium (Ba)-Total (mg/kg wwt)	<0.010	0.018	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.130	0.787	<0.0050	<0.0050	0.048
	Cadmium (Cd)-Total (mg/kg wwt)	0.0407	0.160	<0.0010	<0.0010	0.0182
	Calcium (Ca)-Total (mg/kg)	269	535	386	408	278
	Calcium (Ca)-Total (mg/kg wwt)	84.5	109	89.0	106	105
	Cesium (Cs)-Total (mg/kg)	0.165	0.635	0.319	0.184	0.116
	Cesium (Cs)-Total (mg/kg wwt)	0.0518	0.129	0.0737	0.0480	0.0439
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.20	<0.050	<0.050	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	<0.040	<0.010	<0.010	<0.040
	Cobalt (Co)-Total (mg/kg)	0.092	0.419	<0.020	0.021	0.069
	Cobalt (Co)-Total (mg/kg wwt)	0.0289	0.0851	<0.0040	0.0054	0.0260
	Copper (Cu)-Total (mg/kg)	59.3	3.73	1.68	1.93	21.4
	Copper (Cu)-Total (mg/kg wwt)	18.6	0.756	0.387	0.504	8.09
	Iron (Fe)-Total (mg/kg)	256	381	13.5	11.1	147
	Iron (Fe)-Total (mg/kg wwt)	80.5	77.3	3.11	2.89	55.6
	Lead (Pb)-Total (mg/kg)	<0.050	<0.050	<0.020	<0.020	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.010	<0.0040	<0.0040	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	431	771	1100	890	442
	Magnesium (Mg)-Total (mg/kg wwt)	135	156	254	232	167
	Manganese (Mn)-Total (mg/kg)	4.74	0.631	0.247	0.305	3.04
	Manganese (Mn)-Total (mg/kg wwt)	1.49	0.128	0.057	0.079	1.15

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688080-24 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#6 KIDNEY	L1688080-25 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#7 MUSCLE	L1688080-26 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#7 LIVER	L1688080-27 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#7 KIDNEY	L1688080-28 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#6 MUSCLE
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	76.3	79.1	55.9	77.0	78.0
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	4.3	<5.0	6.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	0.89	<1.0	1.4	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.190	0.128	0.243	0.250	0.154
	Arsenic (As)-Total (mg/kg wwt)	0.0449	0.0267	0.107	0.0576	0.0339
	Barium (Ba)-Total (mg/kg)	<0.050	<0.050	<0.050	0.074	<0.050
	Barium (Ba)-Total (mg/kg wwt)	0.011	<0.010	<0.010	0.017	<0.010
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.205	<0.0050	0.040	0.228	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	0.0486	<0.0010	0.0176	0.0524	<0.0010
	Calcium (Ca)-Total (mg/kg)	490	474	271	676	228
	Calcium (Ca)-Total (mg/kg wwt)	116	98.9	119	156	50.0
	Cesium (Cs)-Total (mg/kg)	0.309	0.210	0.0854	0.295	0.323
	Cesium (Cs)-Total (mg/kg wwt)	0.0732	0.0439	0.0376	0.0680	0.0709
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.050	<0.20	<0.20	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	<0.010	<0.040	<0.040	<0.010
	Cobalt (Co)-Total (mg/kg)	0.181	0.021	0.069	0.241	<0.020
	Cobalt (Co)-Total (mg/kg wwt)	0.0428	0.0044	0.0302	0.0555	<0.0040
	Copper (Cu)-Total (mg/kg)	10.7	1.56	36.0	7.08	1.48
	Copper (Cu)-Total (mg/kg wwt)	2.53	0.325	15.9	1.63	0.326
	Iron (Fe)-Total (mg/kg)	487	15.5	110	327	14.5
	Iron (Fe)-Total (mg/kg wwt)	115	3.24	48.5	75.3	3.19
	Lead (Pb)-Total (mg/kg)	<0.050	<0.020	<0.050	<0.050	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.0040	<0.010	<0.010	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	750	1080	347	892	1070
	Magnesium (Mg)-Total (mg/kg wwt)	178	226	153	206	235
	Manganese (Mn)-Total (mg/kg)	1.06	0.362	1.94	0.839	0.235
	Manganese (Mn)-Total (mg/kg wwt)	0.250	0.076	0.854	0.193	0.052

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688080-29 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#8 LIVER	L1688080-30 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#8 KIDNEY	L1688080-31 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#8 GONAD	L1688080-32 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#9 MUSCLE	L1688080-33 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#9 LIVER
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	86.8	81.5	70.2	77.8	70.5
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	<5.0	<2.0	<2.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	<1.0	0.57	<0.40	<1.0
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.310	0.154	0.061	0.099	0.175
	Arsenic (As)-Total (mg/kg wwt)	0.0410	0.0284	0.0181	0.0220	0.0516
	Barium (Ba)-Total (mg/kg)	<0.050	0.053	<0.050	<0.050	<0.050
	Barium (Ba)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.378	0.770	<0.0050	<0.0050	0.212
	Cadmium (Cd)-Total (mg/kg wwt)	0.0500	0.142	<0.0010	<0.0010	0.0624
	Calcium (Ca)-Total (mg/kg)	964	539	1020	337	233
	Calcium (Ca)-Total (mg/kg wwt)	128	99.4	303	74.8	68.8
	Cesium (Cs)-Total (mg/kg)	0.399	0.502	0.108	0.530	0.267
	Cesium (Cs)-Total (mg/kg wwt)	0.0528	0.0926	0.0323	0.118	0.0786
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.20	<0.050	<0.050	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	<0.040	<0.010	<0.010	<0.040
	Cobalt (Co)-Total (mg/kg)	0.164	0.132	0.034	<0.020	0.162
	Cobalt (Co)-Total (mg/kg wwt)	0.0217	0.0243	0.0102	<0.0040	0.0479
	Copper (Cu)-Total (mg/kg)	50.5	3.98	12.1	2.10	32.8
	Copper (Cu)-Total (mg/kg wwt)	6.68	0.735	3.60	0.467	9.68
	Iron (Fe)-Total (mg/kg)	679	710	51.3	22.8	1190
	Iron (Fe)-Total (mg/kg wwt)	89.9	131	15.3	5.06	351
	Lead (Pb)-Total (mg/kg)	<0.050	<0.050	<0.020	<0.020	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.010	<0.0040	<0.0040	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1220	574	1250	977	389
	Magnesium (Mg)-Total (mg/kg wwt)	161	106	373	217	115
	Manganese (Mn)-Total (mg/kg)	7.26	0.694	0.576	0.296	2.59
	Manganese (Mn)-Total (mg/kg wwt)	0.961	0.128	0.172	0.066	0.765

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688080-34 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#9 KIDNEY	L1688080-35 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#10 MUSCLE	L1688080-36 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#10 LIVER	L1688080-37 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#10 KIDNEY
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)	80.4	78.3	79.9	82.0
Metals	Aluminum (Al)-Total (mg/kg)	11.1	<2.0	<5.0	19.9
	Aluminum (Al)-Total (mg/kg wwt)	2.2	<0.40	<1.0	3.6
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.149	0.243	0.908	0.234
	Arsenic (As)-Total (mg/kg wwt)	0.0292	0.0529	0.182	0.0421
	Barium (Ba)-Total (mg/kg)	0.160	<0.050	<0.050	0.145
	Barium (Ba)-Total (mg/kg wwt)	0.031	<0.010	<0.010	0.026
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	1.26	<0.0050	0.415	2.65
	Cadmium (Cd)-Total (mg/kg wwt)	0.248	<0.0010	0.0834	0.477
	Calcium (Ca)-Total (mg/kg)	652	428	383	584
	Calcium (Ca)-Total (mg/kg wwt)	128	93.1	76.9	105
	Cesium (Cs)-Total (mg/kg)	0.447	0.303	0.209	0.578
	Cesium (Cs)-Total (mg/kg wwt)	0.0877	0.0658	0.0420	0.104
	Chromium (Cr)-Total (mg/kg)	0.29	<0.050	<0.20	0.32
	Chromium (Cr)-Total (mg/kg wwt)	0.057	<0.010	<0.040	0.057
	Cobalt (Co)-Total (mg/kg)	0.290	<0.020	0.172	0.468
	Cobalt (Co)-Total (mg/kg wwt)	0.0569	<0.0040	0.0346	0.0843
	Copper (Cu)-Total (mg/kg)	3.29	3.03	86.1	3.76
	Copper (Cu)-Total (mg/kg wwt)	0.646	0.659	17.3	0.677
	Iron (Fe)-Total (mg/kg)	851	40.1	1810	1160
	Iron (Fe)-Total (mg/kg wwt)	167	8.71	363	209
	Lead (Pb)-Total (mg/kg)	<0.050	<0.020	<0.050	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.0040	<0.010	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	673	969	659	687
	Magnesium (Mg)-Total (mg/kg wwt)	132	211	132	124
	Manganese (Mn)-Total (mg/kg)	0.947	0.369	5.52	0.954
	Manganese (Mn)-Total (mg/kg wwt)	0.186	0.080	1.11	0.172

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Sample ID Description Sampled Date Sampled Time Client ID		L1688080-1 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#1 MUSCLE	L1688080-2 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#1 LIVER	L1688080-3 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#1 KIDNEY	L1688080-4 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#2 MUSCLE	L1688080-5 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#2 LIVER
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.899	0.673	1.23	2.37	2.37
	Mercury (Hg)-Total (mg/kg wwt)	0.179	0.147	0.275	0.499	0.776
	Molybdenum (Mo)-Total (mg/kg)	<0.020	0.568	0.181	<0.020	0.231
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.124	0.0405	<0.0040	0.0756
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	0.23	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	0.052	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	10000	12100	11800	9600	8220
	Phosphorus (P)-Total (mg/kg wwt)	1990	2650	2650	2020	2690
	Potassium (K)-Total (mg/kg)	16900	8850	14200	16800	6110
	Potassium (K)-Total (mg/kg wwt)	3370	1940	3170	3550	2000
	Rubidium (Rb)-Total (mg/kg)	29.5	15.1	21.1	26.7	11.0
	Rubidium (Rb)-Total (mg/kg wwt)	5.88	3.30	4.72	5.63	3.59
	Selenium (Se)-Total (mg/kg)	2.15	7.21	5.10	1.61	6.69
	Selenium (Se)-Total (mg/kg wwt)	0.428	1.58	1.14	0.339	2.19
	Sodium (Na)-Total (mg/kg)	2560	4840	3640	2010	3230
	Sodium (Na)-Total (mg/kg wwt)	509	1060	815	425	1060
	Strontium (Sr)-Total (mg/kg)	0.793	0.81	0.83	0.302	0.319
	Strontium (Sr)-Total (mg/kg wwt)	0.158	0.178	0.185	0.064	0.104
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0355	0.336	0.153	0.0307	0.0662
	Thallium (Tl)-Total (mg/kg wwt)	0.00707	0.0735	0.0343	0.00647	0.0216
	Tin (Sn)-Total (mg/kg)	0.11	0.31	0.40	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	0.022	0.069	0.089	<0.020	0.028
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	0.0027
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	0.00042	<0.00040	0.00089
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	17.5	87.0	69.2	15.9	79.4
	Zinc (Zn)-Total (mg/kg wwt)	3.47	19.0	15.5	3.35	26.0
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

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Sample ID Description Sampled Date Sampled Time Client ID		L1688080-6 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#2 KIDNEY	L1688080-7 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#3 MUSCLE	L1688080-8 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#3 LIVER	L1688080-9 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#3 KIDNEY	L1688080-10 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#4 MUSCLE
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	5.35	0.277	0.138	0.496	1.36
	Mercury (Hg)-Total (mg/kg wwt)	1.07	0.0718	0.0485	0.0992	0.308
	Molybdenum (Mo)-Total (mg/kg)	0.226	<0.020	0.419	0.170	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0452	<0.0040	0.147	0.0339	<0.0040
	Nickel (Ni)-Total (mg/kg)	0.33	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	0.066	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	11200	7620	7380	12400	9020
	Phosphorus (P)-Total (mg/kg wwt)	2240	1970	2600	2480	2030
	Potassium (K)-Total (mg/kg)	12700	12700	5200	16500	15400
	Potassium (K)-Total (mg/kg wwt)	2550	3280	1830	3300	3490
	Rubidium (Rb)-Total (mg/kg)	20.5	32.8	15.1	37.5	36.7
	Rubidium (Rb)-Total (mg/kg wwt)	4.10	8.48	5.33	7.50	8.29
	Selenium (Se)-Total (mg/kg)	10.2	1.36	5.28	4.02	1.27
	Selenium (Se)-Total (mg/kg wwt)	2.04	0.353	1.86	0.805	0.286
	Sodium (Na)-Total (mg/kg)	4860	1520	2180	4070	988
	Sodium (Na)-Total (mg/kg wwt)	973	393	769	815	223
	Strontium (Sr)-Total (mg/kg)	1.85	0.351	0.36	0.78	0.214
	Strontium (Sr)-Total (mg/kg wwt)	0.369	0.091	0.126	0.155	0.048
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.160	0.0231	0.241	0.0838	0.0374
	Thallium (Tl)-Total (mg/kg wwt)	0.0319	0.00598	0.0849	0.0168	0.00843
	Tin (Sn)-Total (mg/kg)	0.37	<0.10	0.10	0.54	<0.10
	Tin (Sn)-Total (mg/kg wwt)	0.073	<0.020	0.037	0.108	<0.020
	Uranium (U)-Total (mg/kg)	0.0024	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	0.00048	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	82.1	11.2	58.9	63.0	14.2
	Zinc (Zn)-Total (mg/kg wwt)	16.4	2.90	20.7	12.6	3.20
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

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Sample ID Description Sampled Date Sampled Time Client ID		L1688080-11 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#4 LIVER	L1688080-12 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#4 KIDNEY	L1688080-13 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#4 GONAD	L1688080-17 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#4X GONAD	L1688080-18 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#5 MUSCLE
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	1.26	2.46	0.0858	0.0798	0.538
	Mercury (Hg)-Total (mg/kg wwt)	0.309	0.530	0.0308	0.0289	0.137
	Molybdenum (Mo)-Total (mg/kg)	0.331	0.205	<0.040	<0.020	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0810	0.0441	<0.0080	0.0047	<0.0040
	Nickel (Ni)-Total (mg/kg)	<0.20	0.26	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	0.056	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	17400	10600	9600	8940	8380
	Phosphorus (P)-Total (mg/kg wwt)	4250	2290	3450	3240	2140
	Potassium (K)-Total (mg/kg)	12300	10300	4890	4940	14400
	Potassium (K)-Total (mg/kg wwt)	3010	2210	1760	1790	3680
	Rubidium (Rb)-Total (mg/kg)	42.6	26.8	9.34	12.3	37.4
	Rubidium (Rb)-Total (mg/kg wwt)	10.4	5.78	3.36	4.46	9.53
	Selenium (Se)-Total (mg/kg)	3.68	5.04	2.92	3.11	1.48
	Selenium (Se)-Total (mg/kg wwt)	0.901	1.09	1.05	1.13	0.377
	Sodium (Na)-Total (mg/kg)	3940	4400	2050	2160	1610
	Sodium (Na)-Total (mg/kg wwt)	965	947	736	782	410
	Strontium (Sr)-Total (mg/kg)	0.582	0.86	3.02	2.08	0.455
	Strontium (Sr)-Total (mg/kg wwt)	0.142	0.186	1.09	0.752	0.116
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.540	0.144	0.0203	0.0172	0.0250
	Thallium (Tl)-Total (mg/kg wwt)	0.132	0.0310	0.00731	0.00622	0.00637
	Tin (Sn)-Total (mg/kg)	<0.10	0.40	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	0.022	0.085	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	111	79.5	47.4	50.8	11.8
	Zinc (Zn)-Total (mg/kg wwt)	27.2	17.1	17.0	18.4	3.02
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

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		Sample ID	L1688080-19	L1688080-20	L1688080-21	L1688080-22	L1688080-23
		Description	Tissue	Tissue	Tissue	Tissue	Tissue
		Sampled Date	10-SEP-15	10-SEP-15	10-SEP-15	10-SEP-15	10-SEP-15
		Sampled Time	16:15	16:15	16:15	16:15	16:15
		Client ID	QUL EAST ARM LT#5 LIVER	QUL EAST ARM LT#5 KIDNEY	QUL EAST ARM LT#5X MUSCLE	QUL EAST ARM LT#6 MUSCLE	QUL EAST ARM LT#6 LIVER
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)	0.243	0.611	0.663	0.174	0.0836	
	Mercury (Hg)-Total (mg/kg wwt)	0.0763	0.124	0.153	0.0455	0.0316	
	Molybdenum (Mo)-Total (mg/kg)	0.344	0.184	<0.020	<0.020	0.318	
	Molybdenum (Mo)-Total (mg/kg wwt)	0.108	0.0374	<0.0040	<0.0040	0.120	
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	
	Phosphorus (P)-Total (mg/kg)	8550	11000	8920	8020	6890	
	Phosphorus (P)-Total (mg/kg wwt)	2680	2240	2060	2090	2600	
	Potassium (K)-Total (mg/kg)	6140	14500	15900	13100	5210	
	Potassium (K)-Total (mg/kg wwt)	1930	2950	3660	3420	1970	
	Rubidium (Rb)-Total (mg/kg)	14.9	33.6	41.0	32.9	11.9	
	Rubidium (Rb)-Total (mg/kg wwt)	4.67	6.82	9.46	8.58	4.49	
	Selenium (Se)-Total (mg/kg)	4.93	3.78	1.54	1.42	5.11	
	Selenium (Se)-Total (mg/kg wwt)	1.55	0.768	0.357	0.369	1.93	
	Sodium (Na)-Total (mg/kg)	3090	3680	1920	1870	2030	
	Sodium (Na)-Total (mg/kg wwt)	971	746	444	487	767	
	Strontium (Sr)-Total (mg/kg)	0.33	0.91	0.352	0.424	0.48	
	Strontium (Sr)-Total (mg/kg wwt)	0.104	0.184	0.081	0.111	0.182	
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg)	0.278	0.0836	0.0306	0.0235	0.249	
	Thallium (Tl)-Total (mg/kg wwt)	0.0872	0.0170	0.00706	0.00612	0.0941	
	Tin (Sn)-Total (mg/kg)	0.11	0.40	<0.10	<0.10	<0.10	
	Tin (Sn)-Total (mg/kg wwt)	0.034	0.080	<0.020	<0.020	0.028	
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020	
	Zinc (Zn)-Total (mg/kg)	74.8	59.4	14.0	14.4	61.4	
	Zinc (Zn)-Total (mg/kg wwt)	23.5	12.0	3.23	3.74	23.2	
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040	

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Sample ID Description Sampled Date Sampled Time Client ID		L1688080-24 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#6 KIDNEY	L1688080-25 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#7 MUSCLE	L1688080-26 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#7 LIVER	L1688080-27 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#7 KIDNEY	L1688080-28 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#8 MUSCLE
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.280	0.208	0.0614	0.281	1.52
	Mercury (Hg)-Total (mg/kg wwt)	0.0663	0.0434	0.0271	0.0647	0.333
	Molybdenum (Mo)-Total (mg/kg)	0.150	<0.020	0.249	0.184	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0355	<0.0040	0.110	0.0423	<0.0040
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	0.32	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	0.073	<0.040
	Phosphorus (P)-Total (mg/kg)	11700	9350	4870	11900	8860
	Phosphorus (P)-Total (mg/kg wwt)	2770	1950	2140	2740	1940
	Potassium (K)-Total (mg/kg)	13300	16700	3990	13900	15300
	Potassium (K)-Total (mg/kg wwt)	3140	3490	1760	3210	3350
	Rubidium (Rb)-Total (mg/kg)	29.2	42.0	10.0	35.0	38.6
	Rubidium (Rb)-Total (mg/kg wwt)	6.92	8.77	4.42	8.07	8.47
	Selenium (Se)-Total (mg/kg)	3.94	1.69	3.92	4.02	1.54
	Selenium (Se)-Total (mg/kg wwt)	0.932	0.352	1.73	0.927	0.337
	Sodium (Na)-Total (mg/kg)	3350	1220	1160	2150	1840
	Sodium (Na)-Total (mg/kg wwt)	792	255	509	496	404
	Strontium (Sr)-Total (mg/kg)	0.79	0.515	0.35	0.71	0.137
	Strontium (Sr)-Total (mg/kg wwt)	0.187	0.107	0.153	0.164	0.030
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0980	0.0255	0.186	0.113	0.0251
	Thallium (Tl)-Total (mg/kg wwt)	0.0232	0.00532	0.0819	0.0261	0.00551
	Tin (Sn)-Total (mg/kg)	0.46	0.12	<0.10	0.72	<0.10
	Tin (Sn)-Total (mg/kg wwt)	0.109	0.025	0.031	0.165	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	69.1	14.8	52.4	84.6	10.6
	Zinc (Zn)-Total (mg/kg wwt)	16.4	3.09	23.1	19.5	2.32
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688080-29 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#8 LIVER	L1688080-30 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#8 KIDNEY	L1688080-31 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#8 GONAD	L1688080-32 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#9 MUSCLE	L1688080-33 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#9 LIVER
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	3.43	2.99	0.145	2.35	1.99
	Mercury (Hg)-Total (mg/kg wwt)	0.453	0.552	0.0433	0.521	0.588
	Molybdenum (Mo)-Total (mg/kg)	0.295	0.131	<0.020	<0.020	0.280
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0390	0.0241	0.0040	<0.0040	0.0826
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	18700	9940	10000	8420	7060
	Phosphorus (P)-Total (mg/kg wwt)	2470	1830	2990	1870	2080
	Potassium (K)-Total (mg/kg)	15100	11700	7410	14400	6510
	Potassium (K)-Total (mg/kg wwt)	2000	2160	2210	3190	1920
	Rubidium (Rb)-Total (mg/kg)	34.6	26.8	16.2	28.4	11.9
	Rubidium (Rb)-Total (mg/kg wwt)	4.58	4.95	4.83	6.31	3.50
	Selenium (Se)-Total (mg/kg)	7.56	4.34	3.59	1.81	4.64
	Selenium (Se)-Total (mg/kg wwt)	1.00	0.801	1.07	0.401	1.37
	Sodium (Na)-Total (mg/kg)	8440	5330	3120	2240	3550
	Sodium (Na)-Total (mg/kg wwt)	1120	984	931	498	1050
	Strontium (Sr)-Total (mg/kg)	1.59	0.87	2.52	0.315	0.29
	Strontium (Sr)-Total (mg/kg wwt)	0.210	0.160	0.751	0.070	0.085
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.504	0.0629	0.0371	0.0265	0.129
	Thallium (Tl)-Total (mg/kg wwt)	0.0667	0.0116	0.0111	0.00587	0.0380
	Tin (Sn)-Total (mg/kg)	0.28	0.27	<0.10	<0.10	0.11
	Tin (Sn)-Total (mg/kg wwt)	0.037	0.050	<0.020	<0.020	0.032
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	147	60.0	49.6	14.9	67.3
	Zinc (Zn)-Total (mg/kg wwt)	19.5	11.1	14.8	3.32	19.9
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1688080-34 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#9 KIDNEY	L1688080-35 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#10 MUSCLE	L1688080-36 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#10 LIVER	L1688080-37 Tissue 10-SEP-15 16:15 QUL EAST ARM LT#10 KIDNEY
Grouping	Analyte				
TISSUE					
Metals	Mercury (Hg)-Total (mg/kg)	4.44	2.24	2.42	4.14
	Mercury (Hg)-Total (mg/kg wwt)	0.871	0.487	0.486	0.744
	Molybdenum (Mo)-Total (mg/kg)	0.204	<0.020	0.636	0.217
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0399	<0.0040	0.128	0.0391
	Nickel (Ni)-Total (mg/kg)	0.27	<0.20	<0.20	0.40
	Nickel (Ni)-Total (mg/kg wwt)	0.053	<0.040	<0.040	0.073
	Phosphorus (P)-Total (mg/kg)	11000	8710	12500	11100
	Phosphorus (P)-Total (mg/kg wwt)	2150	1890	2520	1990
	Potassium (K)-Total (mg/kg)	13100	14900	9230	15800
	Potassium (K)-Total (mg/kg wwt)	2570	3240	1850	2830
	Rubidium (Rb)-Total (mg/kg)	22.2	32.1	19.1	26.3
	Rubidium (Rb)-Total (mg/kg wwt)	4.35	6.97	3.83	4.74
	Selenium (Se)-Total (mg/kg)	8.51	1.61	10.1	9.42
	Selenium (Se)-Total (mg/kg wwt)	1.67	0.349	2.04	1.69
	Sodium (Na)-Total (mg/kg)	5970	2280	6030	5990
	Sodium (Na)-Total (mg/kg wwt)	1170	496	1210	1080
	Strontium (Sr)-Total (mg/kg)	1.76	0.407	0.50	1.39
	Strontium (Sr)-Total (mg/kg wwt)	0.345	0.089	0.101	0.251
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0921	0.0333	0.323	0.0892
	Thallium (Tl)-Total (mg/kg wwt)	0.0181	0.00723	0.0648	0.0160
	Tin (Sn)-Total (mg/kg)	0.36	<0.10	0.18	0.22
	Tin (Sn)-Total (mg/kg wwt)	0.071	<0.020	0.037	0.039
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	0.0027
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	0.00049
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	64.6	16.5	117	68.1
	Zinc (Zn)-Total (mg/kg wwt)	12.7	3.60	23.5	12.3
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-WET-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-WET-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (WET)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (WET)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on wet weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
<p>This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.


Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Environmental Division

Report to: Company: MOUNT POLLEY MINING CORP. Contact: Colleen Hughes Address: PO BOX 12, Likely, BC, VOL 1N0 Phone: 250-790-2215 Fax:			Report Format / Distribution <input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax Email 1: on file Email 2:			Service Requested: (rush - subject to availability) <input checked="" type="radio"/> Regular (Default) <input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge <input type="radio"/> Emergency (1 Business Day) - 100% Surcharge <input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS			
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No Company: Contact: Address: Phone: Fax:			Client / Project Information: Job #: PO / AFE: Legal Site Description: 42281 Quote #:			Analysis Request Please indicate below Filtered, Preserved or both (F, P, F/P)			
Lab Work Order # (lab use only)		L1688080		ALS Contact: Can Dang		Sampler: Dolighan, Zimhelt		 L1688080-COFC	Number of Containers
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	T-metals(HRCP-MS)(Met&C)	Moisture	Liver Metals		
	QUL East Arm LT # 1	10-Sep-15	8:00-16:15	Tissue	X	X	X		
	QUL East Arm LT # 2	10-Sep-15	8:00-16:15	Tissue	X	X	X		
	QUL East Arm LT # 3	10-Sep-15	8:00-16:15	Tissue	X	X	X		
	QUL East Arm LT # 4	10-Sep-15	8:00-16:15	Tissue	X	X	X		
	QUL East Arm LT # 4X	10-Sep-15	8:00-16:15	Tissue	X	X	X		
	QUL East Arm LT # 5	10-Sep-15	8:00-16:15	Tissue	X	X	X		
	QUL East Arm LT # 5X	10-Sep-15	8:00-16:15	Tissue	X	X			
	QUL East Arm LT # 6	10-Sep-15	8:00-16:15	Tissue	X	X	X		
	QUL East Arm LT # 7	10-Sep-15	8:00-16:15	Tissue	X	X	X		
	QUL East Arm LT # 8	10-Sep-15	8:00-16:15	Tissue	X	X	X		
	QUL East Arm LT # 9	10-Sep-15	8:00-16:15	Tissue	X	X	X		
	QUL East Arm LT # 10								

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)			
Released by: N.Zimhelt	Date & Time: Oct. 14, 2015	Received by: <i>[Signature]</i>	Date: OCT 15 2015	Time: 9:30 AM	Temperature: -2.0 C	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 15-OCT-15
Report Date: 08-DEC-15 16:52 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1688082
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc: 42281

Comments: The sample identify as "QUL NEAR HAZELTINE CR. NSC#3 KIDNEY" was not received. Five extra tissue samples were received. Metals analyses was performed on the five extra samples as requested.

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688082-1 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#1 MUSCLE	L1688082-2 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#1 LIVER	L1688082-3 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#1 KIDNEY	L1688082-4 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#2 MUSCLE	L1688082-5 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#2 LIVER
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	79.2	66.0	71.5	79.4	70.8
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<5.0	<5.0	<2.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<1.0	<1.0	<0.40	<1.0
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.063	0.147	0.133	0.067	0.334
	Arsenic (As)-Total (mg/kg wwt)	0.0131	0.0499	0.0378	0.0137	0.0975
	Barium (Ba)-Total (mg/kg)	0.116	0.099	0.144	0.165	0.054
	Barium (Ba)-Total (mg/kg wwt)	0.024	0.034	0.041	0.034	0.016
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	0.065	0.955	0.0052	0.058
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	0.0220	0.272	0.0011	0.0169
	Calcium (Ca)-Total (mg/kg)	1980	458	579	1500	363
	Calcium (Ca)-Total (mg/kg wwt)	413	156	165	308	106
	Cesium (Cs)-Total (mg/kg)	0.193	0.0765	0.167	0.157	0.125
	Cesium (Cs)-Total (mg/kg wwt)	0.0402	0.0260	0.0477	0.0324	0.0364
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.20	<0.20	<0.050	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.040	<0.040	<0.010	<0.040
	Cobalt (Co)-Total (mg/kg)	<0.020	<0.020	0.419	<0.020	<0.020
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040	<0.0040	0.119	<0.0040	0.0050
	Copper (Cu)-Total (mg/kg)	3.33	7.06	2.80	2.02	8.69
	Copper (Cu)-Total (mg/kg wwt)	0.695	2.40	0.798	0.415	2.54
	Iron (Fe)-Total (mg/kg)	21.6	233	269	12.7	115
	Iron (Fe)-Total (mg/kg wwt)	4.51	79.1	76.6	2.61	33.5
	Lead (Pb)-Total (mg/kg)	<0.020	<0.050	<0.050	<0.020	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.010	<0.010	<0.0040	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1360	452	616	1190	641
	Magnesium (Mg)-Total (mg/kg wwt)	283	154	176	244	187
	Manganese (Mn)-Total (mg/kg)	0.665	1.43	1.34	0.534	1.85
	Manganese (Mn)-Total (mg/kg wwt)	0.139	0.486	0.380	0.110	0.541

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1688082-6 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#2 KIDNEY	L1688082-7 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#3 MUSCLE	L1688082-9 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#4 MUSCLE	L1688082-10 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#4 LIVER	L1688082-11 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#4 KIDNEY
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)				
	53.6	79.0	79.7	71.2	71.7
Metals	Aluminum (Al)-Total (mg/kg)				
	<5.0	<2.0	<2.0	11.2	<5.0
	Aluminum (Al)-Total (mg/kg wwt)				
	<1.0	<0.40	<0.40	3.2	<1.0
	Antimony (Sb)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)				
	0.539	0.095	0.032	0.112	0.117
	Arsenic (As)-Total (mg/kg wwt)				
	0.250	0.0199	0.0064	0.0322	0.0331
	Barium (Ba)-Total (mg/kg)				
	0.562	0.144	0.156	0.267	0.248
	Barium (Ba)-Total (mg/kg wwt)				
	0.261	0.030	0.032	0.077	0.070
	Beryllium (Be)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)				
	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)				
	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)				
	0.266	<0.0050	<0.0050	0.046	0.958
	Cadmium (Cd)-Total (mg/kg wwt)				
	0.124	<0.0010	<0.0010	0.0132	0.271
	Calcium (Ca)-Total (mg/kg)				
	477	2320	2290	383	520
	Calcium (Ca)-Total (mg/kg wwt)				
	221	488	465	110	147
	Cesium (Cs)-Total (mg/kg)				
	0.0803	0.188	0.220	0.154	0.192
	Cesium (Cs)-Total (mg/kg wwt)				
	0.0372	0.0395	0.0446	0.0444	0.0544
	Chromium (Cr)-Total (mg/kg)				
	<0.20	<0.050	<0.050	<0.20	<0.20
	Chromium (Cr)-Total (mg/kg wwt)				
	<0.040	<0.010	<0.010	<0.040	<0.040
	Cobalt (Co)-Total (mg/kg)				
	0.086	<0.020	<0.020	<0.020	0.470
	Cobalt (Co)-Total (mg/kg wwt)				
	0.0398	<0.0040	<0.0040	0.0056	0.133
	Copper (Cu)-Total (mg/kg)				
	1.96	2.55	1.82	6.18	4.46
	Copper (Cu)-Total (mg/kg wwt)				
	0.910	0.535	0.370	1.78	1.26
	Iron (Fe)-Total (mg/kg)				
	102	14.5	13.0	152	327
	Iron (Fe)-Total (mg/kg wwt)				
	47.2	3.05	2.64	43.9	92.6
	Lead (Pb)-Total (mg/kg)				
	<0.050	<0.020	<0.020	<0.050	<0.050
	Lead (Pb)-Total (mg/kg wwt)				
	<0.010	<0.0040	<0.0040	<0.010	<0.010
	Lithium (Li)-Total (mg/kg)				
	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)				
	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)				
	420	1160	1160	487	682
	Magnesium (Mg)-Total (mg/kg wwt)				
	195	243	236	140	193
	Manganese (Mn)-Total (mg/kg)				
	0.507	0.558	0.669	1.91	1.79
	Manganese (Mn)-Total (mg/kg wwt)				
	0.235	0.117	0.136	0.549	0.507

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688082-12 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#4 GONAD	L1688082-13 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#4X MUSCLE	L1688082-14 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#5 MUSCLE	L1688082-15 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#5 LIVER	L1688082-16 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#5 KIDNEY
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	71.8	78.4	79.9	75.7	80.5
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	<2.0	<2.0	14.9	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	<0.40	<0.40	3.6	<1.0
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.067	0.038	0.077	0.256	0.209
	Arsenic (As)-Total (mg/kg wwt)	0.0189	0.0082	0.0156	0.0620	0.0408
	Barium (Ba)-Total (mg/kg)	<0.050	0.097	0.142	0.183	0.167
	Barium (Ba)-Total (mg/kg wwt)	0.011	0.021	0.029	0.044	0.033
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.023	<0.0050	<0.0050	0.142	1.36
	Cadmium (Cd)-Total (mg/kg wwt)	0.0066	<0.0010	<0.0010	0.0344	0.266
	Calcium (Ca)-Total (mg/kg)	730	1180	2500	611	1020
	Calcium (Ca)-Total (mg/kg wwt)	206	255	503	148	198
	Cesium (Cs)-Total (mg/kg)	0.255	0.198	0.214	0.129	0.279
	Cesium (Cs)-Total (mg/kg wwt)	0.0720	0.0428	0.0430	0.0313	0.0544
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.050	<0.050	<0.20	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	<0.010	<0.010	<0.040	<0.040
	Cobalt (Co)-Total (mg/kg)	0.035	<0.020	<0.020	0.033	0.311
	Cobalt (Co)-Total (mg/kg wwt)	0.0099	<0.0040	<0.0040	0.0080	0.0606
	Copper (Cu)-Total (mg/kg)	3.33	1.56	2.00	7.80	3.06
	Copper (Cu)-Total (mg/kg wwt)	0.938	0.336	0.401	1.89	0.596
	Iron (Fe)-Total (mg/kg)	93.2	12.2	15.8	157	212
	Iron (Fe)-Total (mg/kg wwt)	26.2	2.63	3.17	38.0	41.3
	Lead (Pb)-Total (mg/kg)	<0.050	<0.020	<0.020	<0.050	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.0040	<0.0040	<0.010	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	695	1090	1250	730	965
	Magnesium (Mg)-Total (mg/kg wwt)	196	235	252	177	188
	Manganese (Mn)-Total (mg/kg)	5.71	0.447	0.826	5.15	1.43
	Manganese (Mn)-Total (mg/kg wwt)	1.61	0.096	0.166	1.25	0.279

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688082-17 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#7 MUSCLE	L1688082-18 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#7 KIDNEY	L1688082-19 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#5 GONAD (2)	L1688082-20 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#6 MUSCLE (2)	L1688082-21 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#6 KIDNEY (2)
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	78.3	68.8	72.8	76.7	83.3
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<5.0	<5.0	<2.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<1.0	<1.0	<0.40	<1.0
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.034	0.085	0.133	0.053	0.125
	Arsenic (As)-Total (mg/kg wwt)	0.0075	0.0264	0.0360	0.0124	0.0209
	Barium (Ba)-Total (mg/kg)	0.193	0.114	0.055	0.126	0.146
	Barium (Ba)-Total (mg/kg wwt)	0.042	0.036	0.015	0.029	0.024
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	0.308	0.087	<0.0050	1.06
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	0.0962	0.0236	<0.0010	0.177
	Calcium (Ca)-Total (mg/kg)	3170	544	808	1740	914
	Calcium (Ca)-Total (mg/kg wwt)	688	170	219	405	153
	Cesium (Cs)-Total (mg/kg)	0.197	0.168	0.140	0.186	0.383
	Cesium (Cs)-Total (mg/kg wwt)	0.0428	0.0526	0.0379	0.0433	0.0641
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.20	<0.20	<0.050	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.040	<0.040	<0.010	<0.040
	Cobalt (Co)-Total (mg/kg)	<0.020	0.173	0.052	<0.020	0.414
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040	0.0542	0.0141	<0.0040	0.0694
	Copper (Cu)-Total (mg/kg)	1.81	1.90	2.83	1.77	4.61
	Copper (Cu)-Total (mg/kg wwt)	0.394	0.594	0.768	0.412	0.772
	Iron (Fe)-Total (mg/kg)	13.6	101	145	14.4	293
	Iron (Fe)-Total (mg/kg wwt)	2.96	31.4	39.3	3.34	49.0
	Lead (Pb)-Total (mg/kg)	<0.020	<0.050	<0.050	<0.020	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.010	<0.010	<0.0040	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1260	472	721	1040	1100
	Magnesium (Mg)-Total (mg/kg wwt)	274	147	196	242	184
	Manganese (Mn)-Total (mg/kg)	1.08	0.854	2.50	0.527	1.84
	Manganese (Mn)-Total (mg/kg wwt)	0.235	0.267	0.680	0.123	0.308

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688082-22 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#6 GONAD (2)	L1688082-23 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#7 GONAD (2)		
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)	75.2	75.6		
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	<5.0		
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	<1.0		
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010		
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020		
	Arsenic (As)-Total (mg/kg)	0.149	0.057		
	Arsenic (As)-Total (mg/kg wwt)	0.0371	0.0140		
	Barium (Ba)-Total (mg/kg)	<0.050	<0.050		
	Barium (Ba)-Total (mg/kg wwt)	<0.010	<0.010		
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010		
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020		
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010		
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020		
	Boron (B)-Total (mg/kg)	<1.0	<1.0		
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20		
	Cadmium (Cd)-Total (mg/kg)	0.042	0.042		
	Cadmium (Cd)-Total (mg/kg wwt)	0.0103	0.0103		
	Calcium (Ca)-Total (mg/kg)	784	857		
	Calcium (Ca)-Total (mg/kg wwt)	195	209		
	Cesium (Cs)-Total (mg/kg)	0.263	0.245		
	Cesium (Cs)-Total (mg/kg wwt)	0.0653	0.0598		
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.20		
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	<0.040		
	Cobalt (Co)-Total (mg/kg)	0.034	0.043		
	Cobalt (Co)-Total (mg/kg wwt)	0.0084	0.0106		
	Copper (Cu)-Total (mg/kg)	3.81	3.48		
	Copper (Cu)-Total (mg/kg wwt)	0.944	0.850		
	Iron (Fe)-Total (mg/kg)	117	129		
	Iron (Fe)-Total (mg/kg wwt)	29.0	31.4		
	Lead (Pb)-Total (mg/kg)	<0.050	<0.050		
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.010		
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50		
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10		
	Magnesium (Mg)-Total (mg/kg)	893	747		
	Magnesium (Mg)-Total (mg/kg wwt)	222	182		
	Manganese (Mn)-Total (mg/kg)	3.93	5.69		
	Manganese (Mn)-Total (mg/kg wwt)	0.975	1.39		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688082-1 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#1 MUSCLE	L1688082-2 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#1 LIVER	L1688082-3 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#1 KIDNEY	L1688082-4 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#2 MUSCLE	L1688082-5 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#2 LIVER
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	1.31	0.160	0.142	0.589	0.126
	Mercury (Hg)-Total (mg/kg wwt)	0.272	0.0545	0.0403	0.121	0.0369
	Molybdenum (Mo)-Total (mg/kg)	<0.020	0.143	0.275	<0.020	0.186
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.0484	0.0785	<0.0040	0.0542
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	11700	3280	8980	8960	6740
	Phosphorus (P)-Total (mg/kg wwt)	2430	1110	2560	1840	1970
	Potassium (K)-Total (mg/kg)	18700	4920	10900	14800	7160
	Potassium (K)-Total (mg/kg wwt)	3900	1670	3100	3040	2090
	Rubidium (Rb)-Total (mg/kg)	41.4	12.8	26.6	32.3	17.8
	Rubidium (Rb)-Total (mg/kg wwt)	8.63	4.36	7.58	6.64	5.18
	Selenium (Se)-Total (mg/kg)	2.62	3.96	3.37	1.76	2.49
	Selenium (Se)-Total (mg/kg wwt)	0.546	1.35	0.959	0.362	0.726
	Sodium (Na)-Total (mg/kg)	1970	1850	2560	1160	1280
	Sodium (Na)-Total (mg/kg wwt)	410	627	728	239	372
	Strontium (Sr)-Total (mg/kg)	2.27	0.58	0.42	1.56	0.39
	Strontium (Sr)-Total (mg/kg wwt)	0.473	0.196	0.120	0.320	0.113
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0089	0.0041	0.0071	0.0107	0.0296
	Thallium (Tl)-Total (mg/kg wwt)	0.00185	0.00138	0.00203	0.00219	0.00865
	Tin (Sn)-Total (mg/kg)	0.20	0.19	1.40	0.15	0.15
	Tin (Sn)-Total (mg/kg wwt)	0.042	0.064	0.400	0.032	0.045
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	0.0057	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	0.00161	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	30.0	58.9	73.7	26.6	55.7
	Zinc (Zn)-Total (mg/kg wwt)	6.24	20.0	21.0	5.48	16.3
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1688082-6 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#2 KIDNEY	L1688082-7 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#3 MUSCLE	L1688082-9 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#4 MUSCLE	L1688082-10 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#4 LIVER	L1688082-11 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#4 KIDNEY
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.0570	0.341	1.74	0.280	0.204
	Mercury (Hg)-Total (mg/kg wwt)	0.0264	0.0717	0.353	0.0808	0.0576
	Molybdenum (Mo)-Total (mg/kg)	0.096	<0.020	<0.020	0.121	0.283
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0445	<0.0040	<0.0040	0.0347	0.0800
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	4940	9130	9080	5290	9870
	Phosphorus (P)-Total (mg/kg wwt)	2290	1920	1840	1520	2790
	Potassium (K)-Total (mg/kg)	6140	13100	14900	6400	9850
	Potassium (K)-Total (mg/kg wwt)	2850	2760	3030	1840	2790
	Rubidium (Rb)-Total (mg/kg)	14.3	30.5	33.9	17.1	24.2
	Rubidium (Rb)-Total (mg/kg wwt)	6.62	6.41	6.88	4.92	6.85
	Selenium (Se)-Total (mg/kg)	1.17	1.65	1.90	3.09	3.57
	Selenium (Se)-Total (mg/kg wwt)	0.542	0.347	0.387	0.891	1.01
	Sodium (Na)-Total (mg/kg)	770	1350	1160	2060	2100
	Sodium (Na)-Total (mg/kg wwt)	357	283	236	593	593
	Strontium (Sr)-Total (mg/kg)	0.38	3.09	3.45	0.58	0.50
	Strontium (Sr)-Total (mg/kg wwt)	0.177	0.650	0.701	0.168	0.142
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0081	0.0106	0.0074	0.0104	0.0277
	Thallium (Tl)-Total (mg/kg wwt)	0.00377	0.00223	0.00151	0.00300	0.00783
	Tin (Sn)-Total (mg/kg)	0.38	0.11	<0.10	0.16	0.49
	Tin (Sn)-Total (mg/kg wwt)	0.175	0.023	<0.020	0.047	0.140
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	0.0028
	Uranium (U)-Total (mg/kg wwt)	0.00062	<0.00040	<0.00040	<0.00040	0.00080
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	79.5	41.9	18.4	58.7	97.1
	Zinc (Zn)-Total (mg/kg wwt)	36.9	8.79	3.74	16.9	27.5
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688082-12 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#4 GONAD	L1688082-13 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#4X MUSCLE	L1688082-14 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#5 MUSCLE	L1688082-15 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#5 LIVER	L1688082-16 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#5 KIDNEY
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.0930	1.58	1.19	0.166	0.171
	Mercury (Hg)-Total (mg/kg wwt)	0.0262	0.342	0.239	0.0403	0.0333
	Molybdenum (Mo)-Total (mg/kg)	0.152	<0.020	<0.020	0.207	0.312
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0428	<0.0040	<0.0040	0.0502	0.0608
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	8560	8100	10600	7320	10800
	Phosphorus (P)-Total (mg/kg wwt)	2410	1750	2120	1780	2110
	Potassium (K)-Total (mg/kg)	8080	13900	16900	7930	15300
	Potassium (K)-Total (mg/kg wwt)	2280	2990	3390	1920	2990
	Rubidium (Rb)-Total (mg/kg)	20.7	32.1	36.7	15.8	34.8
	Rubidium (Rb)-Total (mg/kg wwt)	5.82	6.92	7.39	3.82	6.79
	Selenium (Se)-Total (mg/kg)	5.24	1.74	2.46	3.55	4.27
	Selenium (Se)-Total (mg/kg wwt)	1.48	0.375	0.494	0.861	0.833
	Sodium (Na)-Total (mg/kg)	1580	1100	1600	2320	2600
	Sodium (Na)-Total (mg/kg wwt)	446	238	322	563	506
	Strontium (Sr)-Total (mg/kg)	0.39	1.59	3.05	0.79	0.76
	Strontium (Sr)-Total (mg/kg wwt)	0.110	0.344	0.612	0.192	0.147
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0071	0.0048	0.0093	0.0168	0.0144
	Thallium (Tl)-Total (mg/kg wwt)	0.00200	0.00104	0.00187	0.00407	0.00281
	Tin (Sn)-Total (mg/kg)	0.12	<0.10	0.18	0.39	1.30
	Tin (Sn)-Total (mg/kg wwt)	0.035	<0.020	0.037	0.094	0.253
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	0.0040
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	0.00077
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	103	18.5	24.4	59.1	94.5
	Zinc (Zn)-Total (mg/kg wwt)	29.1	3.99	4.90	14.3	18.4
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688082-17 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#7 MUSCLE	L1688082-18 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#7 KIDNEY	L1688082-19 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#5 GONAD (2)	L1688082-20 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#6 MUSCLE (2)	L1688082-21 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#6 KIDNEY (2)
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	1.56	0.114	0.0776	1.33	0.282
	Mercury (Hg)-Total (mg/kg wwt)	0.339	0.0355	0.0211	0.310	0.0472
	Molybdenum (Mo)-Total (mg/kg)	<0.020	0.145	0.172	<0.020	0.360
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.0454	0.0468	<0.0040	0.0603
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	10300	6240	8330	8450	13100
	Phosphorus (P)-Total (mg/kg wwt)	2230	1950	2260	1970	2200
	Potassium (K)-Total (mg/kg)	15300	8260	8050	13200	18700
	Potassium (K)-Total (mg/kg wwt)	3310	2580	2180	3070	3130
	Rubidium (Rb)-Total (mg/kg)	30.5	17.3	18.8	28.6	37.6
	Rubidium (Rb)-Total (mg/kg wwt)	6.62	5.40	5.11	6.66	6.29
	Selenium (Se)-Total (mg/kg)	2.13	1.96	5.92	1.63	4.41
	Selenium (Se)-Total (mg/kg wwt)	0.461	0.613	1.61	0.378	0.738
	Sodium (Na)-Total (mg/kg)	1710	1800	1880	1180	4040
	Sodium (Na)-Total (mg/kg wwt)	372	562	511	275	677
	Strontium (Sr)-Total (mg/kg)	3.95	0.61	0.44	2.17	0.75
	Strontium (Sr)-Total (mg/kg wwt)	0.857	0.192	0.119	0.505	0.126
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0033	0.0043	0.0090	0.0062	0.0136
	Thallium (Tl)-Total (mg/kg wwt)	0.00071	0.00135	0.00244	0.00144	0.00228
	Tin (Sn)-Total (mg/kg)	<0.10	0.58	0.22	<0.10	0.89
	Tin (Sn)-Total (mg/kg wwt)	<0.020	0.181	0.058	0.021	0.150
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	0.0022	<0.0020	0.0048
	Uranium (U)-Total (mg/kg wwt)	<0.00040	0.00058	0.00059	<0.00040	0.00080
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	0.13
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	0.022
	Zinc (Zn)-Total (mg/kg)	26.9	48.3	146	18.9	89.3
	Zinc (Zn)-Total (mg/kg wwt)	5.83	15.1	39.6	4.41	15.0
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1688082-22 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#6 GONAD (2)	L1688082-23 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. NSC#7 GONAD (2)		
Grouping	Analyte				
TISSUE					
Metals	Mercury (Hg)-Total (mg/kg)	0.124	0.151		
	Mercury (Hg)-Total (mg/kg wwt)	0.0307	0.0370		
	Molybdenum (Mo)-Total (mg/kg)	0.177	0.157		
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0440	0.0383		
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20		
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040		
	Phosphorus (P)-Total (mg/kg)	8460	8180		
	Phosphorus (P)-Total (mg/kg wwt)	2100	2000		
	Potassium (K)-Total (mg/kg)	9390	10100		
	Potassium (K)-Total (mg/kg wwt)	2330	2470		
	Rubidium (Rb)-Total (mg/kg)	21.3	19.8		
	Rubidium (Rb)-Total (mg/kg wwt)	5.29	4.84		
	Selenium (Se)-Total (mg/kg)	4.63	4.51		
	Selenium (Se)-Total (mg/kg wwt)	1.15	1.10		
	Sodium (Na)-Total (mg/kg)	2350	2840		
	Sodium (Na)-Total (mg/kg wwt)	582	693		
	Strontium (Sr)-Total (mg/kg)	0.41	0.65		
	Strontium (Sr)-Total (mg/kg wwt)	0.102	0.159		
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020		
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040		
	Thallium (Tl)-Total (mg/kg)	0.0117	0.0040		
	Thallium (Tl)-Total (mg/kg wwt)	0.00290	0.00098		
	Tin (Sn)-Total (mg/kg)	0.15	0.15		
	Tin (Sn)-Total (mg/kg wwt)	0.037	0.036		
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020		
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040		
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10		
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020		
	Zinc (Zn)-Total (mg/kg)	119	109		
	Zinc (Zn)-Total (mg/kg wwt)	29.6	26.6		
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20		
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Molybdenum (Mo)-Total	DUP-H	L1688082-1
Duplicate	Molybdenum (Mo)-Total	DUP-H	L1688082-1
Method Blank	Uranium (U)-Total	MB-LOR	L1688082-1
Method Blank	Uranium (U)-Total	MB-LOR	L1688082-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-WET-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-WET-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (WET)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (WET)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on wet weight basis.</p>			

Reference Information

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MOISTURE-TISS-VA Tissue % Moisture in Tissues ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.


Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Colleen Hughes	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, VOL 1N0	Email 1: on file	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
	Email 2:	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Phone: 250-790-2215 Fax:	Analysis Request	
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Please
Company:	Job #:	 L1688082-COFC
Contact:	PO / AFE:	
Address:	Legal Site Description: 42281	
Phone: Fax:	Quote #:	

Lab Work Order # (lab use only)	L1688082	ALS Contact: Can Dang	Sampler: Dolighan, Zimhelt
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Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	T-metals (HRICP-MS/Me&D)	Moisture	Liver Metals	Kidney Metals	Gonad metals					Number of Containers	
	QUL near Hazeltine Cr. NSC # 1	15-Oct-15	8:00-16:15	Tissue	X	X	X	X							3
	QUL near Hazeltine Cr. NSC # 2	15-Oct-15	8:00-16:15	Tissue	X	X	X	X							3
	QUL near Hazeltine Cr. NSC # 3	15-Oct-15	8:00-16:15	Tissue	X	X		X							2
	QUL near Hazeltine Cr. NSC # 4	15-Oct-15	8:00-16:15	Tissue	X	X	X	X	X						4
	QUL near Hazeltine Cr. NSC # 4X	15-Oct-15	8:00-16:15	Tissue	X	X									1
	QUL near Hazeltine Cr. NSC # 5	15-Oct-15	8:00-16:15	Tissue	X	X	X	X							3
	QUL near Hazeltine Cr. NSC # 7	15-Oct-15	8:00-16:15	Tissue	X	X		X							2
	Note to lab: Liver # 4 was very small, difficult to dissect (extr. material?)														

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)			
Released by: N. Zimhelt	Date & Time: Oct. 14, 2015	Received by: <i>Lady</i>	Date: OCT 15 2015	Time: 9:30 AM	Temperature: -2.0 C	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 16-OCT-15
Report Date: 09-DEC-15 12:21 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1688995
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc: 42281

Can Dang
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1688995-1 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#1 MUSCLE	L1688995-2 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#1 LIVER	L1688995-3 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#1 KIDNEY	L1688995-4 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#1X MUSCLE	L1688995-5 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#2 MUSCLE
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)				
	85.3	78.0	80.9	86.4	82.8
Metals	Aluminum (Al)-Total (mg/kg)				
	<2.0	<5.0	<5.0	<2.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)				
	<0.40	<1.0	<1.0	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)				
	0.074	0.225	0.279	0.075	0.073
	Arsenic (As)-Total (mg/kg wwt)				
	0.0109	0.0495	0.0533	0.0102	0.0127
	Barium (Ba)-Total (mg/kg)				
	<0.050	<0.050	<0.050	0.059	<0.050
	Barium (Ba)-Total (mg/kg wwt)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)				
	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)				
	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)				
	<0.0050	0.575	2.03	<0.0050	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)				
	<0.0010	0.127	0.388	<0.0010	<0.0010
	Calcium (Ca)-Total (mg/kg)				
	825	282	624	1280	651
	Calcium (Ca)-Total (mg/kg wwt)				
	121	62.1	119	175	112
	Cesium (Cs)-Total (mg/kg)				
	0.209	0.0546	0.0889	0.209	0.189
	Cesium (Cs)-Total (mg/kg wwt)				
	0.0306	0.0120	0.0170	0.0284	0.0326
	Chromium (Cr)-Total (mg/kg)				
	<0.050	<0.20	0.49	<0.050	<0.050
	Chromium (Cr)-Total (mg/kg wwt)				
	<0.010	<0.040	0.093	<0.010	<0.010
	Cobalt (Co)-Total (mg/kg)				
	0.025	0.096	0.791	0.031	<0.020
	Cobalt (Co)-Total (mg/kg wwt)				
	<0.0040	0.0211	0.151	0.0042	<0.0040
	Copper (Cu)-Total (mg/kg)				
	3.36	621	22.1	3.92	3.24
	Copper (Cu)-Total (mg/kg wwt)				
	0.493	137	4.22	0.535	0.559
	Iron (Fe)-Total (mg/kg)				
	31.5	1250	595	39.5	28.0
	Iron (Fe)-Total (mg/kg wwt)				
	4.62	275	114	5.38	4.83
	Lead (Pb)-Total (mg/kg)				
	<0.020	<0.050	<0.050	<0.020	<0.020
	Lead (Pb)-Total (mg/kg wwt)				
	<0.0040	<0.010	<0.010	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg)				
	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)				
	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)				
	1240	634	734	1330	1210
	Magnesium (Mg)-Total (mg/kg wwt)				
	183	140	140	182	209
	Manganese (Mn)-Total (mg/kg)				
	0.609	7.34	2.22	0.823	0.505
	Manganese (Mn)-Total (mg/kg wwt)				
	0.089	1.62	0.425	0.112	0.087

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1688995-6 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#2 LIVER	L1688995-7 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#2 KIDNEY	L1688995-8 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#3 MUSCLE	L1688995-9 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#3 LIVER	L1688995-10 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#3 KIDNEY
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	76.2	80.5	82.8	78.2	81.3
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	<5.0	<2.0	<5.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	<1.0	<0.40	<1.0	<1.0
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.222	0.216	0.080	0.245	0.292
	Arsenic (As)-Total (mg/kg wwt)	0.0530	0.0422	0.0138	0.0533	0.0545
	Barium (Ba)-Total (mg/kg)	<0.050	0.108	<0.050	<0.050	0.080
	Barium (Ba)-Total (mg/kg wwt)	<0.010	0.021	<0.010	<0.010	0.015
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.485	1.87	<0.0050	0.517	1.58
	Cadmium (Cd)-Total (mg/kg wwt)	0.116	0.365	<0.0010	0.112	0.295
	Calcium (Ca)-Total (mg/kg)	257	612	818	304	1090
	Calcium (Ca)-Total (mg/kg wwt)	61.3	119	141	66.2	203
	Cesium (Cs)-Total (mg/kg)	0.0526	0.0875	0.193	0.0477	0.0742
	Cesium (Cs)-Total (mg/kg wwt)	0.0125	0.0171	0.0333	0.0104	0.0139
	Chromium (Cr)-Total (mg/kg)	<0.20	0.29	<0.050	<0.20	0.33
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	0.057	<0.010	<0.040	0.061
	Cobalt (Co)-Total (mg/kg)	0.088	0.686	<0.020	0.093	0.706
	Cobalt (Co)-Total (mg/kg wwt)	0.0210	0.134	<0.0040	0.0203	0.132
	Copper (Cu)-Total (mg/kg)	572	34.6	3.24	618	22.8
	Copper (Cu)-Total (mg/kg wwt)	136	6.75	0.559	135	4.26
	Iron (Fe)-Total (mg/kg)	993	558	22.8	1440	579
	Iron (Fe)-Total (mg/kg wwt)	236	109	3.94	313	108
	Lead (Pb)-Total (mg/kg)	<0.050	<0.050	<0.020	<0.050	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.010	<0.0040	<0.010	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	697	743	1150	662	729
	Magnesium (Mg)-Total (mg/kg wwt)	166	145	198	144	136
	Manganese (Mn)-Total (mg/kg)	6.44	2.75	0.474	6.14	2.07
	Manganese (Mn)-Total (mg/kg wwt)	1.53	0.536	0.082	1.34	0.386

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688995-11 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#4 MUSCLE	L1688995-12 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#4 LIVER	L1688995-13 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#4 KIDNEY	L1688995-14 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#5 MUSCLE	L1688995-15 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#5 LIVER
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	86.7	76.8	79.7	80.6	77.5
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<5.0	<5.0	<2.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<1.0	<1.0	<0.40	<1.0
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.084	0.292	0.336	0.089	0.189
	Arsenic (As)-Total (mg/kg wwt)	0.0112	0.0677	0.0683	0.0173	0.0426
	Barium (Ba)-Total (mg/kg)	<0.050	<0.050	0.098	<0.050	<0.050
	Barium (Ba)-Total (mg/kg wwt)	<0.010	<0.010	0.020	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	0.455	1.88	<0.0050	0.579
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	0.105	0.382	<0.0010	0.130
	Calcium (Ca)-Total (mg/kg)	851	253	587	742	291
	Calcium (Ca)-Total (mg/kg wwt)	113	58.7	119	144	65.5
	Cesium (Cs)-Total (mg/kg)	0.205	0.0318	0.0712	0.186	0.0531
	Cesium (Cs)-Total (mg/kg wwt)	0.0273	0.0074	0.0145	0.0360	0.0119
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.20	0.37	0.166	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.040	0.076	0.032	<0.040
	Cobalt (Co)-Total (mg/kg)	0.020	0.109	1.06	0.021	0.094
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040	0.0252	0.215	<0.0040	0.0211
	Copper (Cu)-Total (mg/kg)	3.15	460	25.5	3.17	371
	Copper (Cu)-Total (mg/kg wwt)	0.420	107	5.18	0.615	83.5
	Iron (Fe)-Total (mg/kg)	38.8	1060	613	24.0	1320
	Iron (Fe)-Total (mg/kg wwt)	5.17	246	125	4.66	297
	Lead (Pb)-Total (mg/kg)	<0.020	<0.050	<0.050	<0.020	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.010	<0.010	<0.0040	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1400	698	716	1080	687
	Magnesium (Mg)-Total (mg/kg wwt)	187	162	146	209	155
	Manganese (Mn)-Total (mg/kg)	0.668	7.11	2.63	0.448	5.00
	Manganese (Mn)-Total (mg/kg wwt)	0.089	1.65	0.535	0.087	1.13

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688995-16 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#5 KIDNEY	L1688995-17 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#6 MUSCLE	L1688995-18 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#6 LIVER	L1688995-19 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#6 KIDNEY	L1688995-20 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#6 GONAD
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	80.4	83.7	75.8	81.4	62.3
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	<2.0	<5.0	<5.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	<0.40	<1.0	<1.0	<1.0
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.317	0.062	0.192	0.329	0.053
	Arsenic (As)-Total (mg/kg wwt)	0.0621	0.0101	0.0465	0.0610	0.0200
	Barium (Ba)-Total (mg/kg)	0.093	<0.050	<0.050	0.177	0.180
	Barium (Ba)-Total (mg/kg wwt)	0.018	<0.010	<0.010	0.033	0.068
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	1.89	<0.0050	0.788	2.08	<0.010
	Cadmium (Cd)-Total (mg/kg wwt)	0.370	<0.0010	0.191	0.386	<0.0020
	Calcium (Ca)-Total (mg/kg)	1080	336	419	851	1010
	Calcium (Ca)-Total (mg/kg wwt)	211	54.8	101	158	380
	Cesium (Cs)-Total (mg/kg)	0.0893	0.161	0.0279	0.0801	0.0242
	Cesium (Cs)-Total (mg/kg wwt)	0.0175	0.0263	0.0068	0.0149	0.0091
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.050	<0.20	0.42	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	<0.010	<0.040	0.079	<0.040
	Cobalt (Co)-Total (mg/kg)	0.888	<0.020	0.116	0.437	0.027
	Cobalt (Co)-Total (mg/kg wwt)	0.174	<0.0040	0.0282	0.0810	0.0103
	Copper (Cu)-Total (mg/kg)	22.8	2.70	158	13.6	36.3
	Copper (Cu)-Total (mg/kg wwt)	4.46	0.441	38.2	2.53	13.7
	Iron (Fe)-Total (mg/kg)	497	29.4	1700	610	34.2
	Iron (Fe)-Total (mg/kg wwt)	97.4	4.80	411	113	12.9
	Lead (Pb)-Total (mg/kg)	<0.050	<0.020	<0.050	<0.050	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.0040	<0.010	<0.010	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	688	1300	713	773	1370
	Magnesium (Mg)-Total (mg/kg wwt)	135	212	173	143	517
	Manganese (Mn)-Total (mg/kg)	2.23	0.477	6.29	3.09	4.98
	Manganese (Mn)-Total (mg/kg wwt)	0.437	0.078	1.52	0.574	1.88

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688995-22 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#6X GONAD	L1688995-23 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#7 MUSCLE	L1688995-24 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#7 LIVER	L1688995-25 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#7 KIDNEY	L1688995-26 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#8 MUSCLE
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	61.3	85.1	75.3	80.3	86.0
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	<2.0	<5.0	<5.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	<0.40	<1.0	<1.0	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	0.013
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.058	0.042	0.163	0.255	0.090
	Arsenic (As)-Total (mg/kg wwt)	0.0226	0.0063	0.0404	0.0502	0.0126
	Barium (Ba)-Total (mg/kg)	0.161	0.054	<0.050	0.119	0.053
	Barium (Ba)-Total (mg/kg wwt)	0.062	<0.010	<0.010	0.023	<0.010
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	0.014
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.010	<0.0050	0.667	2.65	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0020	<0.0010	0.165	0.523	<0.0010
	Calcium (Ca)-Total (mg/kg)	921	1500	262	1010	1160
	Calcium (Ca)-Total (mg/kg wwt)	356	222	64.8	200	162
	Cesium (Cs)-Total (mg/kg)	0.0226	0.290	0.0528	0.134	0.342
	Cesium (Cs)-Total (mg/kg wwt)	0.0087	0.0431	0.0130	0.0265	0.0478
	Chromium (Cr)-Total (mg/kg)	<0.20	0.093	<0.20	0.40	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	0.014	<0.040	0.080	<0.010
	Cobalt (Co)-Total (mg/kg)	0.025	0.023	0.129	0.800	0.027
	Cobalt (Co)-Total (mg/kg wwt)	0.0098	<0.0040	0.0318	0.158	<0.0040
	Copper (Cu)-Total (mg/kg)	34.4	2.68	149	14.8	3.31
	Copper (Cu)-Total (mg/kg wwt)	13.3	0.398	36.7	2.92	0.463
	Iron (Fe)-Total (mg/kg)	32.7	33.7	1780	808	37.8
	Iron (Fe)-Total (mg/kg wwt)	12.6	5.02	440	159	5.28
	Lead (Pb)-Total (mg/kg)	<0.050	<0.020	<0.050	<0.050	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.0040	<0.010	<0.010	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1240	1390	714	761	1430
	Magnesium (Mg)-Total (mg/kg wwt)	480	207	177	150	200
	Manganese (Mn)-Total (mg/kg)	3.93	0.908	6.39	2.27	0.962
	Manganese (Mn)-Total (mg/kg wwt)	1.52	0.135	1.58	0.447	0.134

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1688995-27	L1688995-28		
		Description	Tissue	Tissue		
		Sampled Date	13-OCT-15	13-OCT-15		
		Sampled Time	16:15	16:15		
		Client ID	QUL NEAR LIKELY KO#8 LIVER	QUL NEAR LIKELY KO#8 KIDNEY		
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)		77.4	83.0		
Metals	Aluminum (Al)-Total (mg/kg)		<5.0	<5.0		
	Aluminum (Al)-Total (mg/kg wwt)		<1.0	<1.0		
	Antimony (Sb)-Total (mg/kg)		<0.010	<0.010		
	Antimony (Sb)-Total (mg/kg wwt)		<0.0020	<0.0020		
	Arsenic (As)-Total (mg/kg)		0.145	0.441		
	Arsenic (As)-Total (mg/kg wwt)		0.0328	0.0750		
	Barium (Ba)-Total (mg/kg)		<0.050	0.236		
	Barium (Ba)-Total (mg/kg wwt)		<0.010	0.040		
	Beryllium (Be)-Total (mg/kg)		<0.010	<0.010		
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020		
	Bismuth (Bi)-Total (mg/kg)		<0.010	<0.010		
	Bismuth (Bi)-Total (mg/kg wwt)		<0.0020	<0.0020		
	Boron (B)-Total (mg/kg)		<1.0	<1.0		
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20		
	Cadmium (Cd)-Total (mg/kg)		0.929	1.88		
	Cadmium (Cd)-Total (mg/kg wwt)		0.210	0.321		
	Calcium (Ca)-Total (mg/kg)		397	1060		
	Calcium (Ca)-Total (mg/kg wwt)		89.6	180		
	Cesium (Cs)-Total (mg/kg)		0.0522	0.117		
	Cesium (Cs)-Total (mg/kg wwt)		0.0118	0.0199		
	Chromium (Cr)-Total (mg/kg)		0.23	0.58		
	Chromium (Cr)-Total (mg/kg wwt)		0.053	0.099		
	Cobalt (Co)-Total (mg/kg)		0.198	0.471		
	Cobalt (Co)-Total (mg/kg wwt)		0.0447	0.0800		
	Copper (Cu)-Total (mg/kg)		205	13.8		
	Copper (Cu)-Total (mg/kg wwt)		46.2	2.35		
	Iron (Fe)-Total (mg/kg)		2280	573		
	Iron (Fe)-Total (mg/kg wwt)		516	97.4		
	Lead (Pb)-Total (mg/kg)		<0.050	<0.050		
	Lead (Pb)-Total (mg/kg wwt)		<0.010	<0.010		
	Lithium (Li)-Total (mg/kg)		<0.50	<0.50		
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10		
	Magnesium (Mg)-Total (mg/kg)		775	636		
	Magnesium (Mg)-Total (mg/kg wwt)		175	108		
	Manganese (Mn)-Total (mg/kg)		9.85	2.25		
	Manganese (Mn)-Total (mg/kg wwt)		2.22	0.383		

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688995-1 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#1 MUSCLE	L1688995-2 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#1 LIVER	L1688995-3 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#1 KIDNEY	L1688995-4 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#1X MUSCLE	L1688995-5 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#2 MUSCLE
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.551	0.399	0.671	0.530	0.387
	Mercury (Hg)-Total (mg/kg wwt)	0.0808	0.0878	0.128	0.0722	0.0667
	Molybdenum (Mo)-Total (mg/kg)	<0.020	0.727	0.336	0.021	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.160	0.0642	<0.0040	<0.0040
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	0.23	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	0.044	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	14000	12400	14400	14700	12200
	Phosphorus (P)-Total (mg/kg wwt)	2050	2730	2740	2010	2100
	Potassium (K)-Total (mg/kg)	25400	9260	11300	26300	20400
	Potassium (K)-Total (mg/kg wwt)	3730	2040	2170	3590	3510
	Rubidium (Rb)-Total (mg/kg)	23.7	9.54	10.4	24.8	29.2
	Rubidium (Rb)-Total (mg/kg wwt)	3.48	2.10	1.99	3.38	5.03
	Selenium (Se)-Total (mg/kg)	2.64	70.6	5.13	2.80	2.12
	Selenium (Se)-Total (mg/kg wwt)	0.387	15.6	0.980	0.381	0.366
	Sodium (Na)-Total (mg/kg)	6420	4780	7940	7290	3560
	Sodium (Na)-Total (mg/kg wwt)	942	1050	1520	993	614
	Strontium (Sr)-Total (mg/kg)	1.00	0.31	0.73	1.69	0.781
	Strontium (Sr)-Total (mg/kg wwt)	0.147	0.068	0.140	0.230	0.135
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0172	0.178	0.0532	0.0165	0.0178
	Thallium (Tl)-Total (mg/kg wwt)	0.00252	0.0393	0.0102	0.00225	0.00308
	Tin (Sn)-Total (mg/kg)	0.16	0.30	1.03	0.15	<0.10
	Tin (Sn)-Total (mg/kg wwt)	0.023	0.066	0.197	0.021	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	0.0027	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	0.00051	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	21.6	270	191	40.9	22.1
	Zinc (Zn)-Total (mg/kg wwt)	3.16	59.5	36.6	5.57	3.81
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688995-6 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#2 LIVER	L1688995-7 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#2 KIDNEY	L1688995-8 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#3 MUSCLE	L1688995-9 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#3 LIVER	L1688995-10 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#3 KIDNEY
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.260	0.396	0.508	0.364	0.583
	Mercury (Hg)-Total (mg/kg wwt)	0.0620	0.0772	0.0876	0.0793	0.109
	Molybdenum (Mo)-Total (mg/kg)	0.579	0.375	<0.020	0.786	0.396
	Molybdenum (Mo)-Total (mg/kg wwt)	0.138	0.0731	<0.0040	0.171	0.0740
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	13000	13400	12300	12100	14500
	Phosphorus (P)-Total (mg/kg wwt)	3090	2610	2110	2640	2710
	Potassium (K)-Total (mg/kg)	9760	10300	20700	9360	9950
	Potassium (K)-Total (mg/kg wwt)	2320	2000	3570	2040	1860
	Rubidium (Rb)-Total (mg/kg)	12.5	13.6	25.8	13.0	12.5
	Rubidium (Rb)-Total (mg/kg wwt)	2.98	2.66	4.45	2.83	2.34
	Selenium (Se)-Total (mg/kg)	58.1	5.07	2.36	77.4	3.96
	Selenium (Se)-Total (mg/kg wwt)	13.8	0.989	0.408	16.9	0.739
	Sodium (Na)-Total (mg/kg)	4500	7000	3820	6170	9790
	Sodium (Na)-Total (mg/kg wwt)	1070	1370	659	1340	1830
	Strontium (Sr)-Total (mg/kg)	0.24	0.74	1.10	0.36	1.12
	Strontium (Sr)-Total (mg/kg wwt)	0.057	0.145	0.189	0.078	0.208
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.209	0.0513	0.0185	0.190	0.0501
	Thallium (Tl)-Total (mg/kg wwt)	0.0499	0.0100	0.00319	0.0412	0.00934
	Tin (Sn)-Total (mg/kg)	0.22	0.89	<0.10	0.37	1.31
	Tin (Sn)-Total (mg/kg wwt)	0.052	0.174	<0.020	0.081	0.244
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	224	139	29.9	321	224
	Zinc (Zn)-Total (mg/kg wwt)	53.3	27.1	5.16	69.8	41.8
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688995-11 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#4 MUSCLE	L1688995-12 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#4 LIVER	L1688995-13 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#4 KIDNEY	L1688995-14 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#5 MUSCLE	L1688995-15 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#5 LIVER
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.748	0.468	0.783	0.381	0.274
	Mercury (Hg)-Total (mg/kg wwt)	0.0996	0.108	0.159	0.0740	0.0615
	Molybdenum (Mo)-Total (mg/kg)	<0.020	0.845	0.396	<0.020	0.653
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.196	0.0805	<0.0040	0.147
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	15000	12500	13000	11500	12200
	Phosphorus (P)-Total (mg/kg wwt)	1990	2910	2630	2240	2740
	Potassium (K)-Total (mg/kg)	26100	8400	9270	19300	10000
	Potassium (K)-Total (mg/kg wwt)	3470	1950	1890	3750	2250
	Rubidium (Rb)-Total (mg/kg)	19.6	5.55	6.90	22.9	12.4
	Rubidium (Rb)-Total (mg/kg wwt)	2.61	1.29	1.40	4.43	2.78
	Selenium (Se)-Total (mg/kg)	2.93	67.5	4.67	2.44	55.4
	Selenium (Se)-Total (mg/kg wwt)	0.390	15.7	0.949	0.474	12.5
	Sodium (Na)-Total (mg/kg)	4350	3740	5120	3130	5280
	Sodium (Na)-Total (mg/kg wwt)	579	868	1040	607	1190
	Strontium (Sr)-Total (mg/kg)	1.02	0.24	0.81	1.00	0.30
	Strontium (Sr)-Total (mg/kg wwt)	0.135	0.056	0.165	0.195	0.068
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0204	0.200	0.0745	0.0226	0.180
	Thallium (Tl)-Total (mg/kg wwt)	0.00272	0.0465	0.0151	0.00439	0.0406
	Tin (Sn)-Total (mg/kg)	0.14	0.11	0.78	0.14	0.31
	Tin (Sn)-Total (mg/kg wwt)	<0.020	0.025	0.160	0.028	0.069
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	52.2	471	189	35.1	198
	Zinc (Zn)-Total (mg/kg wwt)	6.96	109	38.5	6.80	44.6
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

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Sample ID Description Sampled Date Sampled Time Client ID		L1688995-16 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#5 KIDNEY	L1688995-17 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#6 MUSCLE	L1688995-18 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#6 LIVER	L1688995-19 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#6 KIDNEY	L1688995-20 Tissue 13-OCT-15 16:15 QUL NEAR LIKELY KO#6 GONAD
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.428	0.569	0.425	0.529	0.0148
	Mercury (Hg)-Total (mg/kg wwt)	0.0839	0.0929	0.103	0.0982	0.0056
	Molybdenum (Mo)-Total (mg/kg)	0.477	<0.020	0.867	0.472	0.043
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0934	<0.0040	0.210	0.0875	0.0163
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	12200	12900	12800	14200	9650
	Phosphorus (P)-Total (mg/kg wwt)	2390	2110	3100	2630	3640
	Potassium (K)-Total (mg/kg)	9870	23700	8600	12600	6660
	Potassium (K)-Total (mg/kg wwt)	1930	3870	2080	2350	2510
	Rubidium (Rb)-Total (mg/kg)	11.2	27.2	9.88	14.0	6.33
	Rubidium (Rb)-Total (mg/kg wwt)	2.19	4.45	2.39	2.59	2.39
	Selenium (Se)-Total (mg/kg)	6.23	2.45	25.6	7.05	5.35
	Selenium (Se)-Total (mg/kg wwt)	1.22	0.400	6.20	1.31	2.02
	Sodium (Na)-Total (mg/kg)	8790	3820	5030	9070	1460
	Sodium (Na)-Total (mg/kg wwt)	1720	624	1220	1680	550
	Strontium (Sr)-Total (mg/kg)	1.34	0.376	0.46	1.27	3.92
	Strontium (Sr)-Total (mg/kg wwt)	0.263	0.061	0.112	0.235	1.48
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0649	0.0285	0.108	0.0781	<0.0020
	Thallium (Tl)-Total (mg/kg wwt)	0.0127	0.00465	0.0261	0.0145	0.00047
	Tin (Sn)-Total (mg/kg)	0.61	0.15	0.29	0.65	0.20
	Tin (Sn)-Total (mg/kg wwt)	0.119	0.025	0.069	0.120	0.074
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	0.0027	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	0.00049	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	371	21.6	235	176	47.1
	Zinc (Zn)-Total (mg/kg wwt)	72.8	3.52	56.9	32.7	17.7
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1688995-22	L1688995-23	L1688995-24	L1688995-25	L1688995-26
		Description	Tissue	Tissue	Tissue	Tissue	Tissue
		Sampled Date	13-OCT-15	13-OCT-15	13-OCT-15	13-OCT-15	13-OCT-15
		Sampled Time	16:15	16:15	16:15	16:15	16:15
		Client ID	QUL NEAR LIKELY KO#6X GONAD	QUL NEAR LIKELY KO#7 MUSCLE	QUL NEAR LIKELY KO#7 LIVER	QUL NEAR LIKELY KO#7 KIDNEY	QUL NEAR LIKELY KO#8 MUSCLE
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)		0.0147	0.719	0.679	0.922	0.917
	Mercury (Hg)-Total (mg/kg wwt)		0.0057	0.107	0.168	0.182	0.128
	Molybdenum (Mo)-Total (mg/kg)		0.047	0.023	0.941	0.464	0.036
	Molybdenum (Mo)-Total (mg/kg wwt)		0.0180	<0.0040	0.233	0.0916	0.0050
	Nickel (Ni)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)		8660	15600	13400	12100	16700
	Phosphorus (P)-Total (mg/kg wwt)		3350	2320	3310	2390	2330
	Potassium (K)-Total (mg/kg)		7300	29000	8640	13200	30800
	Potassium (K)-Total (mg/kg wwt)		2820	4310	2140	2600	4300
	Rubidium (Rb)-Total (mg/kg)		6.11	37.3	10.7	15.7	36.2
	Rubidium (Rb)-Total (mg/kg wwt)		2.36	5.55	2.64	3.10	5.05
	Selenium (Se)-Total (mg/kg)		5.12	2.24	24.7	6.24	2.26
	Selenium (Se)-Total (mg/kg wwt)		1.98	0.333	6.11	1.23	0.315
	Sodium (Na)-Total (mg/kg)		1530	4710	5460	7110	4560
	Sodium (Na)-Total (mg/kg wwt)		590	700	1350	1400	638
	Strontium (Sr)-Total (mg/kg)		4.32	2.17	0.30	1.42	1.50
	Strontium (Sr)-Total (mg/kg wwt)		1.67	0.323	0.075	0.280	0.210
	Tellurium (Te)-Total (mg/kg)		<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)		<0.0020	0.0317	0.121	0.0695	0.0425
	Thallium (Tl)-Total (mg/kg wwt)		0.00045	0.00472	0.0299	0.0137	0.00594
	Tin (Sn)-Total (mg/kg)		0.14	0.21	0.23	0.56	0.16
	Tin (Sn)-Total (mg/kg wwt)		0.053	0.031	0.056	0.110	0.023
	Uranium (U)-Total (mg/kg)		<0.0020	<0.0020	<0.0020	0.0027	0.0026
	Uranium (U)-Total (mg/kg wwt)		<0.00040	<0.00040	<0.00040	0.00053	<0.00040
	Vanadium (V)-Total (mg/kg)		<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)		46.0	33.2	304	191	38.4
	Zinc (Zn)-Total (mg/kg wwt)		17.8	4.93	75.2	37.6	5.37
	Zirconium (Zr)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1688995-27	L1688995-28		
		Description	Tissue	Tissue		
		Sampled Date	13-OCT-15	13-OCT-15		
		Sampled Time	16:15	16:15		
		Client ID	QUL NEAR LIKELY KO#8 LIVER	QUL NEAR LIKELY KO#8 KIDNEY		
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.890	0.824			
	Mercury (Hg)-Total (mg/kg wwt)	0.201	0.140			
	Molybdenum (Mo)-Total (mg/kg)	1.32	0.506			
	Molybdenum (Mo)-Total (mg/kg wwt)	0.299	0.0860			
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20			
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040			
	Phosphorus (P)-Total (mg/kg)	14000	11100			
	Phosphorus (P)-Total (mg/kg wwt)	3160	1880			
	Potassium (K)-Total (mg/kg)	8100	9990			
	Potassium (K)-Total (mg/kg wwt)	1830	1700			
	Rubidium (Rb)-Total (mg/kg)	9.58	11.2			
	Rubidium (Rb)-Total (mg/kg wwt)	2.16	1.91			
	Selenium (Se)-Total (mg/kg)	26.8	5.66			
	Selenium (Se)-Total (mg/kg wwt)	6.05	0.962			
	Sodium (Na)-Total (mg/kg)	7000	6740			
	Sodium (Na)-Total (mg/kg wwt)	1580	1150			
	Strontium (Sr)-Total (mg/kg)	0.44	1.53			
	Strontium (Sr)-Total (mg/kg wwt)	0.100	0.259			
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020			
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040			
	Thallium (Tl)-Total (mg/kg)	0.124	0.0802			
	Thallium (Tl)-Total (mg/kg wwt)	0.0281	0.0136			
	Tin (Sn)-Total (mg/kg)	0.38	0.50			
	Tin (Sn)-Total (mg/kg wwt)	0.086	0.084			
	Uranium (U)-Total (mg/kg)	0.0022	0.0033			
	Uranium (U)-Total (mg/kg wwt)	0.00049	0.00055			
	Vanadium (V)-Total (mg/kg)	0.12	<0.10			
	Vanadium (V)-Total (mg/kg wwt)	0.027	<0.020			
	Zinc (Zn)-Total (mg/kg)	306	329			
	Zinc (Zn)-Total (mg/kg wwt)	69.1	56.0			
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20			
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-WET-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-WET-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (WET)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (WET)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on wet weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
<p>This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Environmental Division

Rush Processing

Report to:			Report Format / Distribution				Service Requested: (rush - subject to availability)										
Company: MOUNT POLLEY MINING CORP.			<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax				<input checked="" type="radio"/> Regular (Default) <input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge <input type="radio"/> Emergency (1 Business Day) - 100% Surcharge <input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS										
Contact: Colleen Hughes			Email 1: on file				Analysis Request										
Address: PO BOX 12, Likely, BC, V0L 1N0			Email 2:				Please indicate below Filtered, Preserved or both (F, P, F/P)										
Phone: 250-790-2215 Fax:			Client / Project Information:														
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No			Job #:														
Company:			PO / AFE:														
Address:			Legal Site Description: 42281														
Phone: Fax:			Quote #:														
Lab Work Order # (lab use only)			ALS Contact: Can Dang		Sampler: Dolighan, Zirnhelt												
Sample			Sample Identification		Date	Time	Sample Type	T-metals(HR/CP-MS)(We&D)	Moisture	Liver Metals	Kidney Metals	Gonad metals	Number of Containers				
#			(This description will appear on the report)		(dd-mm-yy)	(hh:mm)											
QUL near Likely KO # 1					13-Oct-15	8:00-16:15	Tissue	X	X	X	X				3		
QUL near Likely KO # 1X					13-Oct-15	8:00-16:15	Tissue	X	X						1		
QUL near Likely KO # 2					13-Oct-15	8:00-16:15	Tissue	X	X	X	X				3		
QUL near Likely KO # 3					13-Oct-15	8:00-16:15	Tissue	X	X	X	X				3		
QUL near Likely KO # 4					13-Oct-15	8:00-16:15	Tissue	X	X	X	X				3		
QUL near Likely KO # 5					13-Oct-15	8:00-16:15	Tissue	X	X	X	X				3		
QUL near Likely KO # 6					13-Oct-15	8:00-16:15	Tissue	X	X	X	X	X			4		
QUL near Likely KO # 6X					13-Oct-15	8:00-16:15	Tissue		X			X			1		
QUL near Likely KO # 7					13-Oct-15	8:00-16:15	Tissue	X	X	X	X				3		
QUL near Likely KO # 8					13-Oct-15	8:00-16:15	Tissue	X	X	X	X				3		
Special Instructions / Regulations / Hazardous Details																	
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.																	
SHIPMENT RELEASE (client use)				SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)									
Released by:		Date & Time:		Received by:		Date:		Time:		Temperature:		Verified by:		Date & Time:		Observations: Yes / No ? If Yes attach SIF	
N.Zirnhelt		Oct. 15, 2015		Jean		OCT 16 2015		9:35		-1.8K							



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 16-OCT-15
Report Date: 09-DEC-15 12:41 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1688997
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc: 42281

Can Dang
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1688997-1 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #1 MUSCLE	L1688997-2 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #1 LIVER	L1688997-3 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #2 MUSCLE	L1688997-4 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #2 LIVER	L1688997-5 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #3 MUSCLE
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)				
	85.6	48.3	84.0	53.9	81.2
Metals	Aluminum (Al)-Total (mg/kg)				
	<2.0	<5.0	4.1	<5.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)				
	<0.40	<1.0	0.66	1.2	<0.40
	Antimony (Sb)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)				
	0.333	0.520	0.145	0.464	0.145
	Arsenic (As)-Total (mg/kg wwt)				
	0.0478	0.269	0.0233	0.214	0.0273
	Barium (Ba)-Total (mg/kg)				
	<0.050	<0.050	<0.050	<0.050	<0.050
	Barium (Ba)-Total (mg/kg wwt)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)				
	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)				
	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)				
	<0.0050	0.405	<0.0050	0.264	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)				
	<0.0010	0.209	<0.0010	0.122	<0.0010
	Calcium (Ca)-Total (mg/kg)				
	724	140	556	126	507
	Calcium (Ca)-Total (mg/kg wwt)				
	104	72.5	89.2	58.3	95.3
	Cesium (Cs)-Total (mg/kg)				
	0.539	0.0409	0.278	0.0426	0.360
	Cesium (Cs)-Total (mg/kg wwt)				
	0.0775	0.0211	0.0446	0.0197	0.0676
	Chromium (Cr)-Total (mg/kg)				
	<0.050	<0.20	<0.050	<0.20	<0.050
	Chromium (Cr)-Total (mg/kg wwt)				
	<0.010	<0.040	<0.010	<0.040	<0.010
	Cobalt (Co)-Total (mg/kg)				
	0.051	0.495	0.036	0.435	0.026
	Cobalt (Co)-Total (mg/kg wwt)				
	0.0073	0.256	0.0058	0.200	0.0050
	Copper (Cu)-Total (mg/kg)				
	1.75	17.6	1.42	38.9	1.25
	Copper (Cu)-Total (mg/kg wwt)				
	0.251	9.07	0.228	17.9	0.236
	Iron (Fe)-Total (mg/kg)				
	16.1	151	37.9	217	12.2
	Iron (Fe)-Total (mg/kg wwt)				
	2.32	78.1	6.08	100	2.29
	Lead (Pb)-Total (mg/kg)				
	<0.020	<0.050	<0.020	<0.050	<0.020
	Lead (Pb)-Total (mg/kg wwt)				
	<0.0040	<0.010	<0.0040	<0.010	<0.0040
	Lithium (Li)-Total (mg/kg)				
	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)				
	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)				
	1600	182	1220	211	1110
	Magnesium (Mg)-Total (mg/kg wwt)				
	230	93.8	196	97.4	208
	Manganese (Mn)-Total (mg/kg)				
	1.05	1.57	0.679	3.55	0.706
	Manganese (Mn)-Total (mg/kg wwt)				
	0.151	0.813	0.109	1.64	0.133

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1688997-6 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #3 LIVER	L1688997-7 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #3X MUSCLE	L1688997-8 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #4 MUSCLE	L1688997-9 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #4 LIVER	L1688997-10 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #5 MUSCLE
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)				
	47.8	81.6	82.0	59.0	82.0
Metals	Aluminum (Al)-Total (mg/kg)				
	<2.0	<2.0	<2.0	<5.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)				
	<0.40	<0.40	<0.40	<1.0	<0.40
	Antimony (Sb)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)				
	0.0027	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)				
	0.254	0.142	0.263	1.44	0.397
	Arsenic (As)-Total (mg/kg wwt)				
	0.133	0.0261	0.0475	0.591	0.0714
	Barium (Ba)-Total (mg/kg)				
	<0.050	<0.050	0.081	<0.050	<0.050
	Barium (Ba)-Total (mg/kg wwt)				
	<0.010	<0.010	0.015	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)				
	0.0033	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)				
	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)				
	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)				
	0.0605	<0.0050	<0.0050	0.284	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)				
	0.0316	<0.0010	<0.0010	0.117	<0.0010
	Calcium (Ca)-Total (mg/kg)				
	41	440	1390	216	485
	Calcium (Ca)-Total (mg/kg wwt)				
	21.4	80.9	252	88.7	87.2
	Cesium (Cs)-Total (mg/kg)				
	0.0196	0.351	0.292	0.0474	0.324
	Cesium (Cs)-Total (mg/kg wwt)				
	0.0102	0.0644	0.0526	0.0195	0.0583
	Chromium (Cr)-Total (mg/kg)				
	<0.050	<0.050	<0.050	<0.20	<0.050
	Chromium (Cr)-Total (mg/kg wwt)				
	<0.010	<0.010	<0.010	<0.040	<0.010
	Cobalt (Co)-Total (mg/kg)				
	0.202	0.033	0.031	0.710	0.029
	Cobalt (Co)-Total (mg/kg wwt)				
	0.105	0.0061	0.0056	0.291	0.0051
	Copper (Cu)-Total (mg/kg)				
	14.0	1.75	1.14	20.9	3.09
	Copper (Cu)-Total (mg/kg wwt)				
	7.29	0.321	0.205	8.56	0.555
	Iron (Fe)-Total (mg/kg)				
	96.2	16.0	11.2	282	42.4
	Iron (Fe)-Total (mg/kg wwt)				
	50.2	2.93	2.03	116	7.63
	Lead (Pb)-Total (mg/kg)				
	<0.020	<0.020	<0.020	<0.050	<0.020
	Lead (Pb)-Total (mg/kg wwt)				
	<0.0040	<0.0040	<0.0040	<0.010	<0.0040
	Lithium (Li)-Total (mg/kg)				
	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)				
	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)				
	84.3	1020	1170	245	962
	Magnesium (Mg)-Total (mg/kg wwt)				
	44.0	188	212	101	173
	Manganese (Mn)-Total (mg/kg)				
	0.622	0.709	1.39	2.30	0.452
	Manganese (Mn)-Total (mg/kg wwt)				
	0.324	0.130	0.251	0.945	0.081

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688997-11 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #5 LIVER	L1688997-12 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #6 MUSCLE	L1688997-13 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #6 LIVER	L1688997-14 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #7 MUSCLE	L1688997-15 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #7 LIVER
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	55.7	81.3	49.0	79.1	56.9
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<2.0	<2.0	<2.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	0.78	<0.40	0.81	<0.40	1.1
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	1.11	0.207	0.696	0.416	0.820
	Arsenic (As)-Total (mg/kg wwt)	0.493	0.0387	0.355	0.0867	0.353
	Barium (Ba)-Total (mg/kg)	<0.050	<0.050	<0.050	0.057	0.070
	Barium (Ba)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	0.012	0.030
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.188	<0.0050	0.283	<0.0050	0.756
	Cadmium (Cd)-Total (mg/kg wwt)	0.0833	<0.0010	0.144	<0.0010	0.326
	Calcium (Ca)-Total (mg/kg)	101	471	72	745	243
	Calcium (Ca)-Total (mg/kg wwt)	44.9	88.1	36.8	155	105
	Cesium (Cs)-Total (mg/kg)	0.0554	0.432	0.0472	0.220	0.0671
	Cesium (Cs)-Total (mg/kg wwt)	0.0246	0.0807	0.0241	0.0460	0.0289
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.040
	Cobalt (Co)-Total (mg/kg)	0.339	0.020	0.442	0.037	0.965
	Cobalt (Co)-Total (mg/kg wwt)	0.150	<0.0040	0.226	0.0077	0.416
	Copper (Cu)-Total (mg/kg)	28.8	1.24	23.9	1.44	25.6
	Copper (Cu)-Total (mg/kg wwt)	12.8	0.232	12.2	0.301	11.1
	Iron (Fe)-Total (mg/kg)	195	13.3	176	18.2	223
	Iron (Fe)-Total (mg/kg wwt)	86.5	2.49	89.9	3.80	95.9
	Lead (Pb)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	186	1060	177	1070	275
	Magnesium (Mg)-Total (mg/kg wwt)	82.4	198	90.3	223	119
	Manganese (Mn)-Total (mg/kg)	1.20	0.644	1.28	0.648	4.57
	Manganese (Mn)-Total (mg/kg wwt)	0.532	0.120	0.654	0.135	1.97

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688997-1 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #1 MUSCLE	L1688997-2 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #1 LIVER	L1688997-3 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #2 MUSCLE	L1688997-4 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #2 LIVER	L1688997-5 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #3 MUSCLE
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.466	0.0461	0.565	0.0446	2.29
	Mercury (Hg)-Total (mg/kg wwt)	0.0670	0.0238	0.0906	0.0206	0.430
	Molybdenum (Mo)-Total (mg/kg)	<0.020	0.188	<0.020	0.279	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.0971	<0.0040	0.129	<0.0040
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	0.047	<0.040
	Phosphorus (P)-Total (mg/kg)	12600	2880	9240	3520	9560
	Phosphorus (P)-Total (mg/kg wwt)	1810	1490	1480	1620	1800
	Potassium (K)-Total (mg/kg)	23400	2150	16600	3010	15900
	Potassium (K)-Total (mg/kg wwt)	3360	1110	2660	1390	2990
	Rubidium (Rb)-Total (mg/kg)	34.6	3.03	20.7	3.76	24.0
	Rubidium (Rb)-Total (mg/kg wwt)	4.97	1.57	3.32	1.73	4.50
	Selenium (Se)-Total (mg/kg)	3.44	1.74	2.61	2.01	2.10
	Selenium (Se)-Total (mg/kg wwt)	0.495	0.900	0.418	0.927	0.394
	Sodium (Na)-Total (mg/kg)	4890	1410	3840	1670	4330
	Sodium (Na)-Total (mg/kg wwt)	702	726	616	771	813
	Strontium (Sr)-Total (mg/kg)	1.60	0.26	1.19	0.34	1.31
	Strontium (Sr)-Total (mg/kg wwt)	0.230	0.133	0.191	0.158	0.247
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0116	0.0061	0.0065	0.0062	0.0054
	Thallium (Tl)-Total (mg/kg wwt)	0.00167	0.00316	0.00104	0.00285	0.00102
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	0.11	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	0.022	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	0.0023	<0.0020	0.0040	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	0.00119	<0.00040	0.00186	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	0.043	<0.020
	Zinc (Zn)-Total (mg/kg)	35.3	35.2	28.9	54.1	33.3
	Zinc (Zn)-Total (mg/kg wwt)	5.08	18.2	4.63	24.9	6.25
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688997-6 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #3 LIVER	L1688997-7 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #3X MUSCLE	L1688997-8 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #4 MUSCLE	L1688997-9 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #4 LIVER	L1688997-10 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #5 MUSCLE
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.0995	2.18	0.799	0.0823	2.84
	Mercury (Hg)-Total (mg/kg wwt)	0.0519	0.400	0.144	0.0338	0.511
	Molybdenum (Mo)-Total (mg/kg)	0.096	<0.020	<0.020	0.413	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0503	<0.0040	<0.0040	0.170	<0.0040
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	0.045	<0.040
	Phosphorus (P)-Total (mg/kg)	1620	8860	9720	3650	9380
	Phosphorus (P)-Total (mg/kg wwt)	846	1630	1750	1500	1690
	Potassium (K)-Total (mg/kg)	1470	14700	16000	2910	15100
	Potassium (K)-Total (mg/kg wwt)	769	2700	2890	1190	2720
	Rubidium (Rb)-Total (mg/kg)	2.46	22.0	23.0	4.22	26.1
	Rubidium (Rb)-Total (mg/kg wwt)	1.28	4.04	4.15	1.73	4.70
	Selenium (Se)-Total (mg/kg)	0.861	2.00	2.28	2.42	2.18
	Selenium (Se)-Total (mg/kg wwt)	0.449	0.367	0.411	0.993	0.392
	Sodium (Na)-Total (mg/kg)	836	3730	3650	2150	3970
	Sodium (Na)-Total (mg/kg wwt)	436	685	659	880	715
	Strontium (Sr)-Total (mg/kg)	0.191	1.08	3.48	0.61	1.25
	Strontium (Sr)-Total (mg/kg wwt)	0.100	0.199	0.628	0.249	0.226
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0031	0.0056	0.0098	0.0071	0.0157
	Thallium (Tl)-Total (mg/kg wwt)	0.00160	0.00103	0.00176	0.00293	0.00282
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	0.026	<0.020
	Uranium (U)-Total (mg/kg)	0.0022	<0.0020	<0.0020	0.0031	<0.0020
	Uranium (U)-Total (mg/kg wwt)	0.00113	<0.00040	<0.00040	0.00129	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	0.043	<0.020
	Zinc (Zn)-Total (mg/kg)	25.7	35.7	25.8	49.9	44.3
	Zinc (Zn)-Total (mg/kg wwt)	13.4	6.56	4.65	20.5	7.97
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1688997-11 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #5 LIVER	L1688997-12 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #6 MUSCLE	L1688997-13 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #6 LIVER	L1688997-14 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #7 MUSCLE	L1688997-15 Tissue 13-OCT-15 16:15 QUL EAST ARM BB #7 LIVER
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.350	2.18	0.159	0.669	0.0611
	Mercury (Hg)-Total (mg/kg wwt)	0.155	0.408	0.0808	0.140	0.0263
	Molybdenum (Mo)-Total (mg/kg)	0.230	<0.020	0.153	<0.020	0.275
	Molybdenum (Mo)-Total (mg/kg wwt)	0.102	<0.0040	0.0779	<0.0040	0.118
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	0.042	<0.040	0.045
	Phosphorus (P)-Total (mg/kg)	3470	9230	3020	8900	4140
	Phosphorus (P)-Total (mg/kg wwt)	1540	1720	1540	1860	1790
	Potassium (K)-Total (mg/kg)	2970	15700	2350	14600	4000
	Potassium (K)-Total (mg/kg wwt)	1320	2930	1200	3050	1720
	Rubidium (Rb)-Total (mg/kg)	6.22	26.1	4.86	23.7	6.81
	Rubidium (Rb)-Total (mg/kg wwt)	2.76	4.87	2.48	4.94	2.93
	Selenium (Se)-Total (mg/kg)	2.29	2.05	1.81	2.20	2.88
	Selenium (Se)-Total (mg/kg wwt)	1.02	0.382	0.923	0.458	1.24
	Sodium (Na)-Total (mg/kg)	1710	3800	1470	2900	1630
	Sodium (Na)-Total (mg/kg wwt)	759	710	748	606	701
	Strontium (Sr)-Total (mg/kg)	0.446	1.04	0.281	1.80	0.64
	Strontium (Sr)-Total (mg/kg wwt)	0.198	0.195	0.143	0.375	0.277
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0067	0.0085	0.0042	0.0121	0.0116
	Thallium (Tl)-Total (mg/kg wwt)	0.00298	0.00158	0.00216	0.00252	0.00499
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	0.0049	<0.0020	0.0027	<0.0020	0.0054
	Uranium (U)-Total (mg/kg wwt)	0.00217	<0.00040	0.00140	<0.00040	0.00231
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	0.12
	Vanadium (V)-Total (mg/kg wwt)	0.033	<0.020	0.030	<0.020	0.052
	Zinc (Zn)-Total (mg/kg)	46.2	26.8	41.4	25.0	50.9
	Zinc (Zn)-Total (mg/kg wwt)	20.5	5.01	21.1	5.22	22.0
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7
This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.			
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.			
HG-WET-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.			
HG-WET-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (WET)	EPA 200.3, EPA 245.7
This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.			
MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A
This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).			
Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.			
Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.			
MET-WET-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).			
Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.			
MET-WET-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (WET)	EPA 200.3/200.8
Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on wet weight basis.			
Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.			
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Report to:			Report Format / Distribution				Service Requested: (rush - subject to availability)													
Company: MOUNT POLLEY MINING CORP.			<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax				<input checked="" type="radio"/> Regular (Default) <input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge <input type="radio"/> Emergency (1 Business Day) - 100% Surcharge <input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS													
Contact: Colleen Hughes			Email 1: on file																	
Address: PO BOX 12, Likely, BC, V0L 1N0			Email 2:																	
Phone: 250-790-2215 Fax:							Analysis Request													
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No			Client / Project Information:				Please indicate below Filtered, Preserved or both (F, P, F/P)													
Company:			Job #:																	
Contact:			PO / AFE:																	
Address:			Legal Site Description: 42281																	
Phone:			Quote #:																	
Lab Work Order # (lab use only)			ALS Contact: Can Dang				Sampler: Dolighan, Zirnhe													
L1688997																				
Sample #	Sample Identification (This description will appear on the report)		Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	T-metals (HRICP-MS) (We&D)	Moisture	Liver Metals								Number of Containers				
	QUL East Arm BB # 1		13-Sep-15	8:00-16:15	Tissue	X	X	X								2				
	QUL East Arm BB # 2		13-Sep-15	8:00-16:15	Tissue	X	X	X								2				
	QUL East Arm BB # 3		13-Sep-15	8:00-16:15	Tissue	X	X	X								2				
	QUL East Arm BB # 3X		13-Sep-15	8:00-16:15	Tissue	X	X									1				
	QUL East Arm BB # 4		13-Sep-15	8:00-16:15	Tissue	X	X	X								2				
	QUL East Arm BB # 5		13-Sep-15	8:00-16:15	Tissue	X	X	X								2				
	QUL East Arm BB # 6		13-Sep-15	8:00-16:15	Tissue	X	X	X								2				
	QUL East Arm BB # 7		13-Sep-15	8:00-16:15	Tissue	X	X	X								2				
Special Instructions / Regulations / Hazardous Details																				
<p>Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.</p>																				
SHIPMENT RELEASE (client use)					SHIPMENT RECEPTION (lab use only)					SHIPMENT VERIFICATION (lab use only)										
Released by: N. Zirnhe	Date & Time: Oct. 14, 2015	Received by: Jean	Date: Oct 16 2015	Time: 9:35	Temperature: -1.8°C	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF												





MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 10-OCT-15
Report Date: 24-NOV-15 17:03 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1691825
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

Can Dang
Senior Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1691825-1 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. BB#1 MUSCLE	L1691825-2 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. BB#1 LIVER	L1691825-3 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. BB#1 GONADS	L1691825-4 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. BB#2 MUSCLE	L1691825-5 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. BB#2 LIVER
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	82.4	34.9	74.3	81.4	44.1
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	2.3	<2.0	<2.0	2.6
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	1.47	<0.40	<0.40	1.45
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	0.011
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	0.0041	<0.0020	<0.0020	0.0059
	Arsenic (As)-Total (mg/kg)	0.551	0.644	0.675	0.376	1.02
	Arsenic (As)-Total (mg/kg wwt)	0.0967	0.419	0.174	0.0701	0.572
	Barium (Ba)-Total (mg/kg)	0.050	<0.050	0.354	<0.050	<0.050
	Barium (Ba)-Total (mg/kg wwt)	<0.010	<0.010	0.091	<0.010	0.011
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	0.159	0.0058	<0.0050	0.231
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	0.104	0.0015	<0.0010	0.129
	Calcium (Ca)-Total (mg/kg)	559	<20	5260	389	35
	Calcium (Ca)-Total (mg/kg wwt)	98.2	11.2	1350	72.6	19.6
	Cesium (Cs)-Total (mg/kg)	0.479	0.0115	0.119	0.373	0.0230
	Cesium (Cs)-Total (mg/kg wwt)	0.0841	0.0075	0.0305	0.0695	0.0128
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cobalt (Co)-Total (mg/kg)	0.023	0.166	0.143	<0.020	0.458
	Cobalt (Co)-Total (mg/kg wwt)	0.0041	0.108	0.0369	<0.0040	0.256
	Copper (Cu)-Total (mg/kg)	1.60	7.27	13.1	1.41	24.8
	Copper (Cu)-Total (mg/kg wwt)	0.281	4.73	3.37	0.263	13.9
	Iron (Fe)-Total (mg/kg)	18.2	53.3	44.2	11.1	105
	Iron (Fe)-Total (mg/kg wwt)	3.19	34.7	11.4	2.06	58.8
	Lead (Pb)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1400	55.1	500	1210	142
	Magnesium (Mg)-Total (mg/kg wwt)	246	35.9	129	225	79.3
	Manganese (Mn)-Total (mg/kg)	0.808	0.284	1.17	0.777	1.20
	Manganese (Mn)-Total (mg/kg wwt)	0.142	0.185	0.301	0.145	0.672

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	Description	Sampled Date	Sampled Time	Client ID	L1691825-6	L1691825-7	L1691825-8	L1691825-9	L1691825-10
					Tissue	Tissue	Tissue	Tissue	Tissue
					04-OCT-15	04-OCT-15	04-OCT-15	04-OCT-15	04-OCT-15
					16:15	16:15	16:15	16:15	16:15
					QUL NEAR HAZELTINE CR. BB#3 MUSCLE	QUL NEAR HAZELTINE CR. BB#3 LIVER	QUL NEAR HAZELTINE CR. BB#4 MUSCLE	QUL NEAR HAZELTINE CR. BB#4 LIVER	QUL NEAR HAZELTINE CR. BB#4X MUSCLE
Grouping	Analyte								
TISSUE									
Physical Tests	% Moisture (%)	81.5	29.2	83.3	42.9	80.2			
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	2.1	<2.0	<2.0	<2.0			
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	1.52	<0.40	0.50	<0.40			
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010			
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	0.0027	<0.0020	0.0021	<0.0020			
	Arsenic (As)-Total (mg/kg)	0.440	0.568	0.933	2.74	0.704			
	Arsenic (As)-Total (mg/kg wwt)	0.0816	0.402	0.156	1.56	0.140			
	Barium (Ba)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050			
	Barium (Ba)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	0.027	<0.010			
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010			
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020			
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010			
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020			
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0			
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20			
	Cadmium (Cd)-Total (mg/kg)	<0.0050	0.0750	<0.0050	0.104	<0.0050			
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	0.0531	<0.0010	0.0592	<0.0010			
	Calcium (Ca)-Total (mg/kg)	365	23	462	54	382			
	Calcium (Ca)-Total (mg/kg wwt)	67.7	16.4	77.2	31.0	75.7			
	Cesium (Cs)-Total (mg/kg)	0.270	0.0086	0.166	0.0192	0.145			
	Cesium (Cs)-Total (mg/kg wwt)	0.0501	0.0061	0.0277	0.0109	0.0288			
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050			
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010			
	Cobalt (Co)-Total (mg/kg)	0.020	0.207	<0.020	0.212	<0.020			
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040	0.147	<0.0040	0.121	<0.0040			
	Copper (Cu)-Total (mg/kg)	2.44	16.3	1.92	7.26	1.51			
	Copper (Cu)-Total (mg/kg wwt)	0.452	11.5	0.321	4.14	0.299			
	Iron (Fe)-Total (mg/kg)	23.9	63.0	18.0	60.5	10.1			
	Iron (Fe)-Total (mg/kg wwt)	4.43	44.6	3.01	34.5	2.00			
	Lead (Pb)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020			
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040			
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50			
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10			
	Magnesium (Mg)-Total (mg/kg)	1180	64.6	1250	103	1130			
	Magnesium (Mg)-Total (mg/kg wwt)	218	45.8	209	58.8	224			
	Manganese (Mn)-Total (mg/kg)	0.626	0.662	0.705	1.05	0.629			
	Manganese (Mn)-Total (mg/kg wwt)	0.116	0.469	0.118	0.602	0.125			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1691825-1 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. BB#1 MUSCLE	L1691825-2 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. BB#1 LIVER	L1691825-3 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. BB#1 GONADS	L1691825-4 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. BB#2 MUSCLE	L1691825-5 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. BB#2 LIVER
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	2.72	0.0989	0.373	2.11	0.161
	Mercury (Hg)-Total (mg/kg wwt)	0.478	0.0643	0.0960	0.394	0.0897
	Molybdenum (Mo)-Total (mg/kg)	<0.020	0.071	0.071	<0.020	0.258
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.0464	0.0183	<0.0040	0.144
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	0.41	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	0.105	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	12200	1110	10100	9600	3000
	Phosphorus (P)-Total (mg/kg wwt)	2150	723	2600	1790	1680
	Potassium (K)-Total (mg/kg)	18900	1260	8990	16800	3100
	Potassium (K)-Total (mg/kg wwt)	3320	823	2320	3130	1730
	Rubidium (Rb)-Total (mg/kg)	33.7	1.94	18.5	29.5	4.79
	Rubidium (Rb)-Total (mg/kg wwt)	5.91	1.26	4.76	5.50	2.68
	Selenium (Se)-Total (mg/kg)	2.40	0.842	7.34	2.27	1.77
	Selenium (Se)-Total (mg/kg wwt)	0.422	0.548	1.89	0.423	0.988
	Sodium (Na)-Total (mg/kg)	3270	544	5670	3450	1020
	Sodium (Na)-Total (mg/kg wwt)	574	354	1460	642	572
	Strontium (Sr)-Total (mg/kg)	1.11	0.065	13.3	0.593	0.125
	Strontium (Sr)-Total (mg/kg wwt)	0.195	0.042	3.43	0.110	0.070
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0089	<0.0020	0.0086	0.0103	0.0059
	Thallium (Tl)-Total (mg/kg wwt)	0.00157	0.00109	0.00220	0.00191	0.00330
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	0.0054	0.0086	<0.0020	0.0033
	Uranium (U)-Total (mg/kg wwt)	<0.00040	0.00351	0.00222	<0.00040	0.00184
	Vanadium (V)-Total (mg/kg)	<0.10	0.11	0.10	<0.10	0.11
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.072	0.026	<0.020	0.060
	Zinc (Zn)-Total (mg/kg)	30.5	19.0	91.0	29.4	40.1
	Zinc (Zn)-Total (mg/kg wwt)	5.35	12.4	23.4	5.47	22.4
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1691825-6 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. BB#3 MUSCLE	L1691825-7 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. BB#3 LIVER	L1691825-8 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. BB#4 MUSCLE	L1691825-9 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. BB#4 LIVER	L1691825-10 Tissue 04-OCT-15 16:15 QUL NEAR HAZELTINE CR. BB#4X MUSCLE
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	2.35	0.0944	0.625	0.0438	0.546
	Mercury (Hg)-Total (mg/kg wwt)	0.436	0.0669	0.104	0.0250	0.108
	Molybdenum (Mo)-Total (mg/kg)	<0.020	0.058	<0.020	0.135	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.0413	<0.0040	0.0772	<0.0040
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	10800	1270	10700	2120	9310
	Phosphorus (P)-Total (mg/kg wwt)	2000	898	1780	1210	1850
	Potassium (K)-Total (mg/kg)	18400	1560	18000	2210	15700
	Potassium (K)-Total (mg/kg wwt)	3420	1100	3010	1260	3110
	Rubidium (Rb)-Total (mg/kg)	27.6	2.18	27.9	3.53	24.2
	Rubidium (Rb)-Total (mg/kg wwt)	5.11	1.54	4.65	2.02	4.79
	Selenium (Se)-Total (mg/kg)	2.56	0.980	3.93	1.63	3.46
	Selenium (Se)-Total (mg/kg wwt)	0.474	0.694	0.655	0.931	0.686
	Sodium (Na)-Total (mg/kg)	2750	639	3570	1270	2890
	Sodium (Na)-Total (mg/kg wwt)	511	453	596	724	573
	Strontium (Sr)-Total (mg/kg)	0.736	0.082	0.882	0.200	0.705
	Strontium (Sr)-Total (mg/kg wwt)	0.136	0.058	0.147	0.114	0.140
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0173	0.0027	0.0163	0.0057	0.0144
	Thallium (Tl)-Total (mg/kg wwt)	0.00321	0.00191	0.00272	0.00328	0.00286
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	0.00081	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.024	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	42.0	25.0	31.7	20.6	27.8
	Zinc (Zn)-Total (mg/kg wwt)	7.78	17.7	5.29	11.7	5.52
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Aluminum (Al)-Total	DUP-H	L1691825-2, -5, -7, -9
Method Blank	Copper (Cu)-Total	MB-LOR	L1691825-2, -5, -7, -9
Method Blank	Copper (Cu)-Total	MB-LOR	L1691825-2, -5, -7, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-WET-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
<p>This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Colleen Hughes	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
Phone: 250-790-2215 Fax:	Email 2:	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Invoice To: Same as Report ? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Analysis Request Please indicate below Filtered, Preserved or both (F, P, F/P)													
Company:	Job #:	T-metals (HRICP-MS)(Wet&D	Moisture	Liver Metals	Gonads										Number of Containers
Contact:	PO / AFE:														
Address:	Legal Site Description:														
Quote #:	ALS Contact: Can Dang														
Phone:	Sampler: Dolighan, Zirnheit														



Lab Work (lab use)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	T-metals (HRICP-MS)(Wet&D	Moisture	Liver Metals	Gonads													
	QUL near Hazeltine Cr. BB # 1	04-Oct-15	8:00-16:15	Tissue	X	X	X	X													
	Qul near Hazeltine Cr. BB # 2	04-Oct-15	8:00-16:15	Tissue	X	X	X														
	QUL near Hazeltine Cr. BB # 3	04-Oct-15	8:00-16:15	Tissue	X	X	X														
	QUL near Hazeltine Cr. BB # 4	04-Oct-15	8:00-16:15	Tissue	X	X	X														
	QUL near Hazeltine Cr. BB # 4 X	04-Oct-15	8:00-16:15	Tissue	X	X															

Short Holding Time
Rush Processing

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by: N.Zirnheit	Date & Time: Oct 9 2015 1630	Received by: <i>ul</i>	Date: Oct 10	Time: 16:00	Temperature: 0	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF	



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 10-OCT-15
Report Date: 07-DEC-15 17:45 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1691836
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

Can Dang
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1691836-1 Tissue 04-AUG-15 16:15 TRIO LAKE RB#1 MUSCLE	L1691836-2 Tissue 04-AUG-15 16:15 TRIO LAKE RB#1 LIVER	L1691836-3 Tissue 04-AUG-15 16:15 TRIO LAKE RB#1 KIDNEY	L1691836-4 Tissue 04-AUG-15 16:15 TRIO LAKE RB#1X MUSCLE	L1691836-5 Tissue 04-AUG-15 16:15 TRIO LAKE RB#2 MUSCLE
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	76.0	70.5	69.1	76.6	81.8
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	<1.0	<1.0	<1.0	<1.0
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	<0.030	<0.030	0.079	<0.030	<0.030
	Arsenic (As)-Total (mg/kg wwt)	<0.0060	0.0085	0.0244	<0.0060	<0.0060
	Barium (Ba)-Total (mg/kg)	0.109	<0.050	0.265	0.148	0.105
	Barium (Ba)-Total (mg/kg wwt)	0.026	0.012	0.082	0.035	0.019
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.010	0.190	0.477	<0.010	<0.010
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0020	0.0561	0.147	<0.0020	<0.0020
	Calcium (Ca)-Total (mg/kg)	864	232	896	2160	925
	Calcium (Ca)-Total (mg/kg wwt)	208	68.5	277	505	168
	Cesium (Cs)-Total (mg/kg)	0.0290	0.0054	0.0153	0.0289	0.0347
	Cesium (Cs)-Total (mg/kg wwt)	0.0070	0.0016	0.0047	0.0068	0.0063
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.20	0.44	<0.20	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	0.041	0.135	<0.040	<0.040
	Cobalt (Co)-Total (mg/kg)	<0.020	0.055	0.762	<0.020	<0.020
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040	0.0163	0.235	<0.0040	<0.0040
	Copper (Cu)-Total (mg/kg)	0.68	110	4.21	0.60	0.75
	Copper (Cu)-Total (mg/kg wwt)	0.164	32.3	1.30	0.141	0.136
	Iron (Fe)-Total (mg/kg)	10.9	1040	552	11.5	28.7
	Iron (Fe)-Total (mg/kg wwt)	2.6	308	170	2.7	5.2
	Lead (Pb)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1270	672	609	1320	1300
	Magnesium (Mg)-Total (mg/kg wwt)	306	198	188	308	235
	Manganese (Mn)-Total (mg/kg)	0.239	6.24	0.981	0.491	0.380
	Manganese (Mn)-Total (mg/kg wwt)	0.057	1.84	0.303	0.115	0.069

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1691836-6 Tissue 04-AUG-15 16:15 TRIO LAKE RB#2 LIVER	L1691836-7 Tissue 04-AUG-15 16:15 TRIO LAKE RB#2 KIDNEY	L1691836-8 Tissue 04-AUG-15 16:15 TRIO LAKE RB#3 MUSCLE	L1691836-9 Tissue 04-AUG-15 16:15 TRIO LAKE RB#3 LIVER	L1691836-10 Tissue 04-AUG-15 16:15 TRIO LAKE RB#3 KIDNEY
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	75.8	87.4	77.4	73.5	78.4
Metals	Aluminum (Al)-Total (mg/kg)	27.3	27.1	<5.0	8.2	14.8
	Aluminum (Al)-Total (mg/kg wwt)	6.6	3.4	<1.0	2.2	3.2
	Antimony (Sb)-Total (mg/kg)	0.014	0.024	<0.010	<0.010	0.039
	Antimony (Sb)-Total (mg/kg wwt)	0.0034	0.0030	<0.0020	<0.0020	0.0084
	Arsenic (As)-Total (mg/kg)	0.073	0.179	<0.030	0.044	0.403
	Arsenic (As)-Total (mg/kg wwt)	0.0176	0.0225	<0.0060	0.0116	0.0871
	Barium (Ba)-Total (mg/kg)	0.111	0.850	0.079	0.052	1.50
	Barium (Ba)-Total (mg/kg wwt)	0.027	0.107	0.018	0.014	0.324
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	1.1
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	0.25
	Cadmium (Cd)-Total (mg/kg)	0.656	0.806	<0.010	0.156	1.29
	Cadmium (Cd)-Total (mg/kg wwt)	0.159	0.101	<0.0020	0.0414	0.278
	Calcium (Ca)-Total (mg/kg)	462	2460	508	240	1740
	Calcium (Ca)-Total (mg/kg wwt)	112	309	115	63.6	376
	Cesium (Cs)-Total (mg/kg)	0.0106	0.0309	0.0277	0.0085	0.0261
	Cesium (Cs)-Total (mg/kg wwt)	0.0026	0.0039	0.0063	0.0023	0.0056
	Chromium (Cr)-Total (mg/kg)	0.42	1.46	<0.20	0.29	1.09
	Chromium (Cr)-Total (mg/kg wwt)	0.102	0.184	<0.040	0.076	0.235
	Cobalt (Co)-Total (mg/kg)	0.114	1.97	0.027	0.072	1.45
	Cobalt (Co)-Total (mg/kg wwt)	0.0276	0.248	0.0061	0.0190	0.314
	Copper (Cu)-Total (mg/kg)	196	7.25	1.08	193	8.01
	Copper (Cu)-Total (mg/kg wwt)	47.6	0.912	0.243	51.0	1.73
	Iron (Fe)-Total (mg/kg)	4920	3300	33.4	1790	681
	Iron (Fe)-Total (mg/kg wwt)	1190	415	7.5	475	147
	Lead (Pb)-Total (mg/kg)	<0.050	0.082	<0.050	<0.050	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.010	0.010	<0.010	<0.010	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	715	1120	1140	649	1250
	Magnesium (Mg)-Total (mg/kg wwt)	173	141	258	172	270
	Manganese (Mn)-Total (mg/kg)	6.01	2.79	0.237	3.74	2.77
	Manganese (Mn)-Total (mg/kg wwt)	1.46	0.350	0.054	0.990	0.599

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1691836-11 Tissue 04-AUG-15 16:15 TRIO LAKE RB#4 MUSCLE	L1691836-12 Tissue 04-AUG-15 16:15 TRIO LAKE RB#4 LIVER	L1691836-13 Tissue 04-AUG-15 16:15 TRIO LAKE RB#4 KIDNEY	L1691836-14 Tissue 04-AUG-15 16:15 TRIO LAKE RB#5 MUSCLE	L1691836-15 Tissue 04-AUG-15 16:15 TRIO LAKE RB#5 LIVER
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	82.0	80.4	82.9	78.3	76.2
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	9.4	11.5	<5.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	1.8	2.0	<1.0	<1.0
	Antimony (Sb)-Total (mg/kg)	<0.010	0.013	0.017	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	0.0026	0.0029	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	<0.030	0.057	0.399	<0.030	0.069
	Arsenic (As)-Total (mg/kg wwt)	<0.0060	0.0112	0.0680	<0.0060	0.0164
	Barium (Ba)-Total (mg/kg)	0.097	<0.050	0.826	0.064	<0.050
	Barium (Ba)-Total (mg/kg wwt)	0.017	<0.010	0.141	0.014	<0.010
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.010	0.592	1.18	<0.010	0.274
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0020	0.116	0.201	<0.0020	0.0653
	Calcium (Ca)-Total (mg/kg)	735	320	2160	778	278
	Calcium (Ca)-Total (mg/kg wwt)	133	62.6	369	169	66.1
	Cesium (Cs)-Total (mg/kg)	0.0345	0.0087	0.0226	0.0325	0.0097
	Cesium (Cs)-Total (mg/kg wwt)	0.0062	0.0017	0.0039	0.0070	0.0023
	Chromium (Cr)-Total (mg/kg)	<0.20	0.50	1.91	<0.20	0.37
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	0.097	0.326	<0.040	0.089
	Cobalt (Co)-Total (mg/kg)	0.022	0.176	1.87	<0.020	0.086
	Cobalt (Co)-Total (mg/kg wwt)	0.0040	0.0346	0.319	<0.0040	0.0204
	Copper (Cu)-Total (mg/kg)	0.91	220	9.66	0.87	153
	Copper (Cu)-Total (mg/kg wwt)	0.164	43.1	1.65	0.189	36.3
	Iron (Fe)-Total (mg/kg)	32.8	2980	2860	21.1	1750
	Iron (Fe)-Total (mg/kg wwt)	5.9	583	487	4.6	417
	Lead (Pb)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1310	742	1170	1190	602
	Magnesium (Mg)-Total (mg/kg wwt)	236	145	199	259	143
	Manganese (Mn)-Total (mg/kg)	0.260	8.16	2.77	0.306	4.34
	Manganese (Mn)-Total (mg/kg wwt)	0.047	1.60	0.472	0.066	1.03

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1691836-16 Tissue 04-AUG-15 16:15 TRIO LAKE RB#5 KIDNEY	L1691836-17 Tissue 04-AUG-15 16:15 TRIO LAKE RB#6 MUSCLE	L1691836-18 Tissue 04-AUG-15 16:15 TRIO LAKE RB#6 LIVER	L1691836-19 Tissue 04-AUG-15 16:15 TRIO LAKE RB#6 KIDNEY	L1691836-20 Tissue 04-AUG-15 16:15 TRIO LAKE RB#7 MUSCLE
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	78.9	76.7	72.3	82.5	75.1
Metals	Aluminum (Al)-Total (mg/kg)	13.3	<5.0	<5.0	5.8	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	2.8	<1.0	1.2	1.0	<1.0
	Antimony (Sb)-Total (mg/kg)	0.011	<0.010	<0.010	0.015	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	0.0024	<0.0020	<0.0020	0.0026	<0.0020
	Arsenic (As)-Total (mg/kg)	0.245	0.034	0.043	0.438	0.069
	Arsenic (As)-Total (mg/kg wwt)	0.0518	0.0080	0.0120	0.0768	0.0171
	Barium (Ba)-Total (mg/kg)	0.522	<0.050	<0.050	0.618	0.112
	Barium (Ba)-Total (mg/kg wwt)	0.110	0.010	0.010	0.108	0.028
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	1.3	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	0.23	<0.20
	Cadmium (Cd)-Total (mg/kg)	1.12	<0.010	0.322	0.828	<0.010
	Cadmium (Cd)-Total (mg/kg wwt)	0.236	<0.0020	0.0891	0.145	<0.0020
	Calcium (Ca)-Total (mg/kg)	1420	608	212	2370	591
	Calcium (Ca)-Total (mg/kg wwt)	299	141	58.8	416	147
	Cesium (Cs)-Total (mg/kg)	0.0283	0.0238	0.0072	0.0300	0.0514
	Cesium (Cs)-Total (mg/kg wwt)	0.0060	0.0055	0.0020	0.0053	0.0128
	Chromium (Cr)-Total (mg/kg)	1.28	<0.20	0.26	1.93	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	0.271	<0.040	0.072	0.338	<0.040
	Cobalt (Co)-Total (mg/kg)	2.13	<0.020	0.066	1.19	0.029
	Cobalt (Co)-Total (mg/kg wwt)	0.450	0.0045	0.0181	0.208	0.0072
	Copper (Cu)-Total (mg/kg)	7.07	1.30	166	6.98	1.58
	Copper (Cu)-Total (mg/kg wwt)	1.49	0.303	46.0	1.22	0.394
	Iron (Fe)-Total (mg/kg)	1230	28.5	2350	955	26.8
	Iron (Fe)-Total (mg/kg wwt)	260	6.6	651	167	6.7
	Lead (Pb)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	967	1160	622	1310	1050
	Magnesium (Mg)-Total (mg/kg wwt)	204	271	172	230	263
	Manganese (Mn)-Total (mg/kg)	2.03	0.223	4.79	2.39	0.381
	Manganese (Mn)-Total (mg/kg wwt)	0.428	0.052	1.33	0.419	0.095

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1691836-21 Tissue 04-AUG-15 16:15 TRIO LAKE RB#7 LIVER	L1691836-22 Tissue 04-AUG-15 16:15 TRIO LAKE RB#7 KIDNEY	L1691836-23 Tissue 04-AUG-15 16:15 TRIO LAKE RB#8 MUSCLE	L1691836-24 Tissue 04-AUG-15 16:15 TRIO LAKE RB#8 LIVER	L1691836-25 Tissue 04-AUG-15 16:15 TRIO LAKE RB#8 KIDNEY
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	73.9	74.7	76.5	76.1	76.6
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	1.1	<1.0	<1.0	1.1
	Antimony (Sb)-Total (mg/kg)	<0.010	0.012	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	0.0029	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.152	0.206	0.035	0.053	0.078
	Arsenic (As)-Total (mg/kg wwt)	0.0398	0.0521	0.0082	0.0126	0.0182
	Barium (Ba)-Total (mg/kg)	<0.050	0.489	0.191	0.071	0.832
	Barium (Ba)-Total (mg/kg wwt)	<0.010	0.124	0.045	0.017	0.195
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.123	0.730	<0.010	0.099	0.383
	Cadmium (Cd)-Total (mg/kg wwt)	0.0321	0.185	<0.0020	0.0237	0.0897
	Calcium (Ca)-Total (mg/kg)	423	1680	1290	414	930
	Calcium (Ca)-Total (mg/kg wwt)	111	426	304	98.8	218
	Cesium (Cs)-Total (mg/kg)	0.0206	0.0329	0.0540	0.0196	0.0367
	Cesium (Cs)-Total (mg/kg wwt)	0.0054	0.0083	0.0127	0.0047	0.0086
	Chromium (Cr)-Total (mg/kg)	<0.20	0.59	<0.20	<0.20	2.24
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	0.149	<0.040	<0.040	0.525
	Cobalt (Co)-Total (mg/kg)	0.171	1.36	<0.020	0.166	1.31
	Cobalt (Co)-Total (mg/kg wwt)	0.0446	0.345	0.0045	0.0396	0.307
	Copper (Cu)-Total (mg/kg)	272	7.26	1.10	188	7.11
	Copper (Cu)-Total (mg/kg wwt)	71.0	1.84	0.257	44.8	1.66
	Iron (Fe)-Total (mg/kg)	484	585	14.9	894	721
	Iron (Fe)-Total (mg/kg wwt)	126	148	3.5	213	169
	Lead (Pb)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	705	829	1100	583	724
	Magnesium (Mg)-Total (mg/kg wwt)	184	210	257	139	169
	Manganese (Mn)-Total (mg/kg)	7.42	3.30	0.491	5.56	2.24
	Manganese (Mn)-Total (mg/kg wwt)	1.94	0.836	0.115	1.33	0.524

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1691836-1 Tissue 04-AUG-15 16:15 TRIO LAKE RB#1 MUSCLE	L1691836-2 Tissue 04-AUG-15 16:15 TRIO LAKE RB#1 LIVER	L1691836-3 Tissue 04-AUG-15 16:15 TRIO LAKE RB#1 KIDNEY	L1691836-4 Tissue 04-AUG-15 16:15 TRIO LAKE RB#1X MUSCLE	L1691836-5 Tissue 04-AUG-15 16:15 TRIO LAKE RB#2 MUSCLE
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	1.20	0.655	0.804	1.17	2.27
	Mercury (Hg)-Total (mg/kg wwt)	0.288	0.193	0.248	0.273	0.412
	Molybdenum (Mo)-Total (mg/kg)	<0.040	1.24	0.288	<0.040	<0.040
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0080	0.367	0.0888	<0.0080	<0.0080
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	0.21	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	0.066	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	10000	13900	8440	10600	12200
	Phosphorus (P)-Total (mg/kg wwt)	2410	4100	2610	2470	2210
	Potassium (K)-Total (mg/kg)	16900	9020	9010	16700	20700
	Potassium (K)-Total (mg/kg wwt)	4070	2660	2780	3910	3750
	Rubidium (Rb)-Total (mg/kg)	3.67	2.69	2.38	3.76	6.36
	Rubidium (Rb)-Total (mg/kg wwt)	0.882	0.793	0.736	0.881	1.16
	Selenium (Se)-Total (mg/kg)	0.65	29.1	2.44	0.71	0.81
	Selenium (Se)-Total (mg/kg wwt)	0.157	8.58	0.753	0.166	0.147
	Sodium (Na)-Total (mg/kg)	949	2740	2240	986	1780
	Sodium (Na)-Total (mg/kg wwt)	228	809	690	231	324
	Strontium (Sr)-Total (mg/kg)	1.54	0.33	1.95	6.93	1.59
	Strontium (Sr)-Total (mg/kg wwt)	0.371	0.096	0.601	1.62	0.288
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0166	0.0486	0.0569	0.0162	0.0121
	Thallium (Tl)-Total (mg/kg wwt)	0.00399	0.0143	0.0176	0.00379	0.00219
	Tin (Sn)-Total (mg/kg)	<0.10	0.12	0.13	<0.10	0.12
	Tin (Sn)-Total (mg/kg wwt)	0.022	0.034	0.039	<0.020	0.021
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	0.00057	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	0.16	0.19	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.046	0.059	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	13.7	131	121	17.9	19.3
	Zinc (Zn)-Total (mg/kg wwt)	3.29	38.8	37.5	4.19	3.50
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1691836-6	L1691836-7	L1691836-8	L1691836-9	L1691836-10
		Description	Tissue	Tissue	Tissue	Tissue	Tissue
		Sampled Date	04-AUG-15	04-AUG-15	04-AUG-15	04-AUG-15	04-AUG-15
		Sampled Time	16:15	16:15	16:15	16:15	16:15
		Client ID	TRIO LAKE RB#2 LIVER	TRIO LAKE RB#2 KIDNEY	TRIO LAKE RB#3 MUSCLE	TRIO LAKE RB#3 LIVER	TRIO LAKE RB#3 KIDNEY
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)		2.82	3.78	1.95	1.59	2.38
	Mercury (Hg)-Total (mg/kg wwt)		0.684	0.475	0.439	0.422	0.515
	Molybdenum (Mo)-Total (mg/kg)		2.77	0.653	<0.040	1.46	0.684
	Molybdenum (Mo)-Total (mg/kg wwt)		0.671	0.0822	<0.0080	0.387	0.148
	Nickel (Ni)-Total (mg/kg)		<0.20	1.16	<0.20	<0.20	0.36
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	0.146	<0.040	<0.040	0.077
	Phosphorus (P)-Total (mg/kg)		13800	15900	10000	12400	11300
	Phosphorus (P)-Total (mg/kg wwt)		3350	2000	2270	3280	2450
	Potassium (K)-Total (mg/kg)		10400	18300	17300	8860	12700
	Potassium (K)-Total (mg/kg wwt)		2530	2300	3910	2350	2750
	Rubidium (Rb)-Total (mg/kg)		3.90	6.12	6.31	4.43	5.32
	Rubidium (Rb)-Total (mg/kg wwt)		0.946	0.770	1.42	1.17	1.15
	Selenium (Se)-Total (mg/kg)		17.3	6.51	0.76	41.6	7.45
	Selenium (Se)-Total (mg/kg wwt)		4.19	0.819	0.170	11.0	1.61
	Sodium (Na)-Total (mg/kg)		4370	7830	1280	2740	3300
	Sodium (Na)-Total (mg/kg wwt)		1060	985	288	725	713
	Strontium (Sr)-Total (mg/kg)		0.75	5.54	0.65	0.44	5.69
	Strontium (Sr)-Total (mg/kg wwt)		0.182	0.696	0.146	0.117	1.23
	Tellurium (Te)-Total (mg/kg)		<0.020	0.044	<0.020	<0.020	0.035
	Tellurium (Te)-Total (mg/kg wwt)		0.0045	0.0056	<0.0040	<0.0040	0.0075
	Thallium (Tl)-Total (mg/kg)		0.0893	0.0658	0.0174	0.0806	0.158
	Thallium (Tl)-Total (mg/kg wwt)		0.0217	0.00828	0.00392	0.0214	0.0341
	Tin (Sn)-Total (mg/kg)		0.28	2.10	<0.10	0.18	0.71
	Tin (Sn)-Total (mg/kg wwt)		0.068	0.265	<0.020	0.048	0.154
	Uranium (U)-Total (mg/kg)		0.0348	0.0382	<0.0020	0.0050	0.0102
	Uranium (U)-Total (mg/kg wwt)		0.00845	0.00480	<0.00040	0.00133	0.00219
	Vanadium (V)-Total (mg/kg)		4.12	2.73	<0.10	2.02	1.73
	Vanadium (V)-Total (mg/kg wwt)		0.998	0.343	<0.020	0.534	0.374
	Zinc (Zn)-Total (mg/kg)		189	251	32.3	148	194
	Zinc (Zn)-Total (mg/kg wwt)		45.7	31.6	7.29	39.3	42.0
	Zirconium (Zr)-Total (mg/kg)		<0.20	0.37	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	0.047	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1691836-11	L1691836-12	L1691836-13	L1691836-14	L1691836-15
		Description	Tissue	Tissue	Tissue	Tissue	Tissue
		Sampled Date	04-AUG-15	04-AUG-15	04-AUG-15	04-AUG-15	04-AUG-15
		Sampled Time	16:15	16:15	16:15	16:15	16:15
		Client ID	TRIO LAKE RB#4 MUSCLE	TRIO LAKE RB#4 LIVER	TRIO LAKE RB#4 KIDNEY	TRIO LAKE RB#5 MUSCLE	TRIO LAKE RB#5 LIVER
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)		3.70	3.69	5.55	1.56	1.77
	Mercury (Hg)-Total (mg/kg wwt)		0.668	0.723	0.946	0.339	0.420
	Molybdenum (Mo)-Total (mg/kg)		<0.040	3.96	0.817	<0.040	1.89
	Molybdenum (Mo)-Total (mg/kg wwt)		<0.0080	0.776	0.139	<0.0080	0.450
	Nickel (Ni)-Total (mg/kg)		<0.20	<0.20	0.75	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	0.127	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)		11000	14900	12100	10500	13000
	Phosphorus (P)-Total (mg/kg wwt)		1980	2910	2060	2280	3090
	Potassium (K)-Total (mg/kg)		20400	10500	14000	19100	8910
	Potassium (K)-Total (mg/kg wwt)		3680	2050	2380	4140	2120
	Rubidium (Rb)-Total (mg/kg)		4.17	3.10	3.07	5.96	3.64
	Rubidium (Rb)-Total (mg/kg wwt)		0.753	0.608	0.524	1.29	0.866
	Selenium (Se)-Total (mg/kg)		0.72	25.9	10.3	0.70	28.5
	Selenium (Se)-Total (mg/kg wwt)		0.129	5.07	1.76	0.151	6.79
	Sodium (Na)-Total (mg/kg)		2290	5390	5470	1480	3980
	Sodium (Na)-Total (mg/kg wwt)		413	1060	932	321	948
	Strontium (Sr)-Total (mg/kg)		0.80	0.49	7.19	0.97	0.56
	Strontium (Sr)-Total (mg/kg wwt)		0.145	0.095	1.23	0.211	0.133
	Tellurium (Te)-Total (mg/kg)		<0.020	<0.020	0.053	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	0.0091	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)		0.0191	0.104	0.162	0.0160	0.0556
	Thallium (Tl)-Total (mg/kg wwt)		0.00344	0.0204	0.0276	0.00348	0.0132
	Tin (Sn)-Total (mg/kg)		<0.10	0.22	1.16	<0.10	0.24
	Tin (Sn)-Total (mg/kg wwt)		<0.020	0.043	0.198	<0.020	0.057
	Uranium (U)-Total (mg/kg)		<0.0020	0.0128	0.0228	<0.0020	0.0032
	Uranium (U)-Total (mg/kg wwt)		<0.00040	0.00250	0.00389	<0.00040	0.00077
	Vanadium (V)-Total (mg/kg)		<0.10	1.73	2.69	<0.10	0.56
	Vanadium (V)-Total (mg/kg wwt)		<0.020	0.340	0.459	<0.020	0.132
	Zinc (Zn)-Total (mg/kg)		20.8	177	199	15.8	134
	Zinc (Zn)-Total (mg/kg wwt)		3.75	34.8	33.9	3.44	31.9
	Zirconium (Zr)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1691836-16 Tissue 04-AUG-15 16:15 TRIO LAKE RB#5 KIDNEY	L1691836-17 Tissue 04-AUG-15 16:15 TRIO LAKE RB#6 MUSCLE	L1691836-18 Tissue 04-AUG-15 16:15 TRIO LAKE RB#6 LIVER	L1691836-19 Tissue 04-AUG-15 16:15 TRIO LAKE RB#6 KIDNEY	L1691836-20 Tissue 04-AUG-15 16:15 TRIO LAKE RB#7 MUSCLE
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	3.12	1.65	0.980	2.10	0.465
	Mercury (Hg)-Total (mg/kg wwt)	0.660	0.383	0.271	0.367	0.116
	Molybdenum (Mo)-Total (mg/kg)	0.602	<0.040	1.63	0.714	<0.040
	Molybdenum (Mo)-Total (mg/kg wwt)	0.127	<0.0080	0.452	0.125	<0.0080
	Nickel (Ni)-Total (mg/kg)	0.45	<0.20	<0.20	0.84	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	0.095	<0.040	<0.040	0.148	<0.040
	Phosphorus (P)-Total (mg/kg)	12700	9680	12200	14300	9390
	Phosphorus (P)-Total (mg/kg wwt)	2680	2250	3390	2510	2340
	Potassium (K)-Total (mg/kg)	14700	15600	9280	16700	14600
	Potassium (K)-Total (mg/kg wwt)	3100	3630	2570	2930	3640
	Rubidium (Rb)-Total (mg/kg)	5.14	4.84	3.42	5.58	7.70
	Rubidium (Rb)-Total (mg/kg wwt)	1.09	1.12	0.947	0.978	1.92
	Selenium (Se)-Total (mg/kg)	5.74	0.75	23.0	7.31	0.69
	Selenium (Se)-Total (mg/kg wwt)	1.21	0.174	6.38	1.28	0.171
	Sodium (Na)-Total (mg/kg)	4040	1220	3110	5130	1020
	Sodium (Na)-Total (mg/kg wwt)	854	283	860	899	255
	Strontium (Sr)-Total (mg/kg)	3.33	0.74	0.37	4.92	1.13
	Strontium (Sr)-Total (mg/kg wwt)	0.702	0.172	0.102	0.862	0.281
	Tellurium (Te)-Total (mg/kg)	0.060	<0.020	<0.020	0.045	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	0.0127	<0.0040	<0.0040	0.0079	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0893	0.0186	0.0814	0.105	0.0142
	Thallium (Tl)-Total (mg/kg wwt)	0.0189	0.00432	0.0225	0.0185	0.00353
	Tin (Sn)-Total (mg/kg)	1.64	<0.10	0.21	4.79	0.19
	Tin (Sn)-Total (mg/kg wwt)	0.347	<0.020	0.058	0.839	0.046
	Uranium (U)-Total (mg/kg)	0.0078	<0.0020	0.0039	0.0081	<0.0020
	Uranium (U)-Total (mg/kg wwt)	0.00166	<0.00040	0.00109	0.00141	<0.00040
	Vanadium (V)-Total (mg/kg)	0.92	<0.10	0.90	0.76	<0.10
	Vanadium (V)-Total (mg/kg wwt)	0.194	<0.020	0.249	0.134	<0.020
	Zinc (Zn)-Total (mg/kg)	222	24.2	162	188	26.5
	Zinc (Zn)-Total (mg/kg wwt)	46.8	5.62	44.8	33.0	6.59
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1691836-21 Tissue 04-AUG-15 16:15 TRIO LAKE RB#7 LIVER	L1691836-22 Tissue 04-AUG-15 16:15 TRIO LAKE RB#7 KIDNEY	L1691836-23 Tissue 04-AUG-15 16:15 TRIO LAKE RB#8 MUSCLE	L1691836-24 Tissue 04-AUG-15 16:15 TRIO LAKE RB#8 LIVER	L1691836-25 Tissue 04-AUG-15 16:15 TRIO LAKE RB#8 KIDNEY
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.462	0.780	0.757	0.730	0.957
	Mercury (Hg)-Total (mg/kg wwt)	0.121	0.198	0.178	0.174	0.224
	Molybdenum (Mo)-Total (mg/kg)	0.956	0.612	<0.040	0.800	0.385
	Molybdenum (Mo)-Total (mg/kg wwt)	0.250	0.155	<0.0080	0.191	0.0901
	Nickel (Ni)-Total (mg/kg)	<0.20	0.38	<0.20	<0.20	1.12
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	0.095	<0.040	<0.040	0.263
	Phosphorus (P)-Total (mg/kg)	12800	9610	9400	11600	10300
	Phosphorus (P)-Total (mg/kg wwt)	3330	2430	2210	2760	2420
	Potassium (K)-Total (mg/kg)	9080	9720	15600	8780	10500
	Potassium (K)-Total (mg/kg wwt)	2370	2460	3660	2100	2470
	Rubidium (Rb)-Total (mg/kg)	7.66	5.56	8.03	6.27	5.97
	Rubidium (Rb)-Total (mg/kg wwt)	2.00	1.41	1.89	1.50	1.40
	Selenium (Se)-Total (mg/kg)	29.1	3.75	0.59	26.5	2.99
	Selenium (Se)-Total (mg/kg wwt)	7.61	0.951	0.138	6.33	0.699
	Sodium (Na)-Total (mg/kg)	3800	2550	993	4370	2620
	Sodium (Na)-Total (mg/kg wwt)	994	645	233	1040	613
	Strontium (Sr)-Total (mg/kg)	0.77	3.10	3.67	1.37	3.19
	Strontium (Sr)-Total (mg/kg wwt)	0.200	0.785	0.862	0.328	0.746
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0695	0.0786	0.0210	0.0864	0.0633
	Thallium (Tl)-Total (mg/kg wwt)	0.0182	0.0199	0.00493	0.0206	0.0148
	Tin (Sn)-Total (mg/kg)	0.16	0.36	0.31	0.13	0.98
	Tin (Sn)-Total (mg/kg wwt)	0.043	0.091	0.072	0.030	0.229
	Uranium (U)-Total (mg/kg)	<0.0020	0.0064	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	0.00050	0.00162	<0.00040	<0.00040	0.00046
	Vanadium (V)-Total (mg/kg)	0.14	0.28	<0.10	0.17	0.23
	Vanadium (V)-Total (mg/kg wwt)	0.038	0.072	<0.020	0.040	0.053
	Zinc (Zn)-Total (mg/kg)	134	120	28.6	143	143
	Zinc (Zn)-Total (mg/kg wwt)	35.0	30.5	6.71	34.1	33.5
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Mercury (Hg)-Total	DUP-H	L1691836-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -3, -4, -5, -6, -7, -8, -9
Duplicate	Iron (Fe)-Total	DUP-H	L1691836-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -3, -4, -5, -6, -7, -8, -9
Duplicate	Mercury (Hg)-Total	LCS-L	L1691836-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
LCS-L	Lab Control Sample recovery was below ALS DQO. Reference Material and/or Matrix Spike results were acceptable. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-WET-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (WET)	EPA 200.3, EPA 245.7
<p>This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (WET)	EPA 200.3/200.8
<p>Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on wet weight basis.</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
<p>This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Environmental Division

Report to: Company: MOUNT POLLEY MINING CORP. Contact: Colleen Hughes Address: PO BOX 12, Likely, BC, V0L 1N0 Phone: 250-790-2215 Fax:	Report Format / Distribution <input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax Email 1: on file Email 2:	Service Requested: (rush - subject to availability) <input checked="" type="radio"/> Regular (Default) <input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge <input type="radio"/> Emergency (1 Business Day) - 100% Surcharge <input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS
---	---	---

Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No Company: Contact: Address:	Client / Project Information: Job #: PO / AFE: Legal Site Description: Quote #:	Analysis Request Please indicate below Filtered, Preserved or both (F, P, F/P)
--	--	--



L1691836-COFC

Lab Work
(lab use)

Sample #	Description (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type
██████	Trio Lake RB # 1	04-Aug-15	8:00-16:15	Tissue
██████	Trio Lake RB # 1X	04-Aug-15	8:00-16:15	Tissue
██████	Trio Lake RB # 2	04-Aug-15	8:00-16:15	Tissue
██████	Trio Lake RB # 3	04-Aug-15	8:00-16:15	Tissue
██████	Trio Lake RB # 4	04-Aug-15	8:00-16:15	Tissue
██████	Trio Lake RB # 5	04-Aug-15	8:00-16:15	Tissue
██████	Trio Lake RB # 6	04-Aug-15	8:00-16:15	Tissue
██████	Trio Lake RB # 7	04-Aug-15	8:00-16:15	Tissue
██████	Trio Lake RB # 8	04-Aug-15	8:00-16:15	Tissue

ALS Contact: Can Dang	Sampler: Dolighan, Zirnheit	T-metals (HRCP-MS) (Metals)	Moisture	Liver Metals	Kidney Metals											Number of Containers		
X	X	X	X															3
X	X																	1
X	X	X	X															3
X	X	X	X															3
X	X	X	X															3
X	X	X	X															3
X	X	X	X															3
X	X	X	X															3

Short Holding Time

Rush Processing

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by: N. Zirnheit	Date & Time: Oct 9 2015 1630	Received by: <i>[Signature]</i>	Date: Oct 10	Time: 16:00	Temperature: 9.	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 08-DEC-15
Report Date: 15-JAN-16 18:23 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1712033
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc: 42281

Can Dang
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1712033-1 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR.PCC #1	L1712033-2 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR.PCC #2	L1712033-3 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR.PCC #3	L1712033-4 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR.PCC #4	L1712033-5 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR.PCC #5
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	74.5	72.9	66.8	72.2	71.2
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<0.40	<0.40	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.164	0.136	0.110	0.132	0.195
	Arsenic (As)-Total (mg/kg wwt)	0.0419	0.0369	0.0366	0.0366	0.0561
	Barium (Ba)-Total (mg/kg)	4.21	3.33	2.50	2.45	1.63
	Barium (Ba)-Total (mg/kg wwt)	1.08	0.905	0.829	0.680	0.470
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	0.0024	0.0026	0.0028	0.0024	0.0027
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.0736	0.127	0.0472	0.0502	0.0543
	Cadmium (Cd)-Total (mg/kg wwt)	0.0188	0.0345	0.0157	0.0139	0.0156
	Calcium (Ca)-Total (mg/kg)	50500	37800	42800	27800	26800
	Calcium (Ca)-Total (mg/kg wwt)	12900	10300	14200	7720	7710
	Cesium (Cs)-Total (mg/kg)	0.112	0.0922	0.0885	0.136	0.108
	Cesium (Cs)-Total (mg/kg wwt)	0.0286	0.0250	0.0294	0.0379	0.0311
	Chromium (Cr)-Total (mg/kg)	0.104	0.302	<0.050	0.056	0.057
	Chromium (Cr)-Total (mg/kg wwt)	0.026	0.082	0.013	0.015	0.016
	Cobalt (Co)-Total (mg/kg)	0.159	0.156	0.073	0.153	0.099
	Cobalt (Co)-Total (mg/kg wwt)	0.0406	0.0422	0.0241	0.0425	0.0286
	Copper (Cu)-Total (mg/kg)	2.22	2.46	1.63	2.10	1.98
	Copper (Cu)-Total (mg/kg wwt)	0.567	0.669	0.541	0.583	0.569
	Iron (Fe)-Total (mg/kg)	61.4	82.0	54.3	52.6	55.4
	Iron (Fe)-Total (mg/kg wwt)	15.7	22.2	18.0	14.6	15.9
	Lead (Pb)-Total (mg/kg)	0.034	0.037	0.036	0.025	0.025
	Lead (Pb)-Total (mg/kg wwt)	0.0086	0.0099	0.0121	0.0070	0.0072
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1710	1500	1420	1340	1250
	Magnesium (Mg)-Total (mg/kg wwt)	437	407	472	373	360
	Manganese (Mn)-Total (mg/kg)	13.5	9.03	7.87	7.21	6.43
	Manganese (Mn)-Total (mg/kg wwt)	3.45	2.45	2.61	2.00	1.85

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1712033-6 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR.PCC #6	L1712033-7 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR.PCC #7	L1712033-8 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR.PCC #8		
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	73.6	73.6	74.7		
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	6.7	76.7		
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	1.78	19.4		
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010		
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020		
	Arsenic (As)-Total (mg/kg)	0.121	0.179	0.136		
	Arsenic (As)-Total (mg/kg wwt)	0.0319	0.0473	0.0346		
	Barium (Ba)-Total (mg/kg)	3.09	3.00	2.84		
	Barium (Ba)-Total (mg/kg wwt)	0.815	0.793	0.718		
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010		
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020		
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010		
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	0.0022	<0.0020		
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0		
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20		
	Cadmium (Cd)-Total (mg/kg)	0.0591	0.0832	0.0630		
	Cadmium (Cd)-Total (mg/kg wwt)	0.0156	0.0219	0.0160		
	Calcium (Ca)-Total (mg/kg)	44200	31800	30800		
	Calcium (Ca)-Total (mg/kg wwt)	11700	8380	7810		
	Cesium (Cs)-Total (mg/kg)	0.126	0.0911	0.120		
	Cesium (Cs)-Total (mg/kg wwt)	0.0331	0.0240	0.0305		
	Chromium (Cr)-Total (mg/kg)	0.092	0.198	0.346		
	Chromium (Cr)-Total (mg/kg wwt)	0.024	0.052	0.088		
	Cobalt (Co)-Total (mg/kg)	0.119	0.105	0.165		
	Cobalt (Co)-Total (mg/kg wwt)	0.0313	0.0276	0.0419		
	Copper (Cu)-Total (mg/kg)	2.08	2.21	2.74		
	Copper (Cu)-Total (mg/kg wwt)	0.548	0.582	0.695		
	Iron (Fe)-Total (mg/kg)	64.6	69.6	188		
	Iron (Fe)-Total (mg/kg wwt)	17.0	18.4	47.6		
	Lead (Pb)-Total (mg/kg)	0.025	0.023	0.052		
	Lead (Pb)-Total (mg/kg wwt)	0.0067	0.0059	0.0132		
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50		
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10		
	Magnesium (Mg)-Total (mg/kg)	1660	1340	1380		
	Magnesium (Mg)-Total (mg/kg wwt)	438	353	350		
	Manganese (Mn)-Total (mg/kg)	6.80	7.99	8.54		
	Manganese (Mn)-Total (mg/kg wwt)	1.79	2.11	2.16		

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1712033-1 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR.PCC #1	L1712033-2 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR.PCC #2	L1712033-3 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR.PCC #3	L1712033-4 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR.PCC #4	L1712033-5 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR.PCC #5
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.339	0.290	0.289	0.365	0.298
	Mercury (Hg)-Total (mg/kg wwt)	0.0865	0.0786	0.0960	0.101	0.0857
	Molybdenum (Mo)-Total (mg/kg)	0.083	0.088	0.057	0.059	0.055
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0213	0.0240	0.0189	0.0164	0.0158
	Nickel (Ni)-Total (mg/kg)	<0.20	0.23	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	0.062	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	34700	27400	28500	22200	21500
	Phosphorus (P)-Total (mg/kg wwt)	8860	7420	9480	6150	6180
	Potassium (K)-Total (mg/kg)	13000	11800	10000	11800	11500
	Potassium (K)-Total (mg/kg wwt)	3330	3190	3320	3270	3310
	Rubidium (Rb)-Total (mg/kg)	15.2	14.3	10.4	14.0	13.7
	Rubidium (Rb)-Total (mg/kg wwt)	3.89	3.88	3.44	3.88	3.94
	Selenium (Se)-Total (mg/kg)	2.11	3.03	1.80	1.81	2.02
	Selenium (Se)-Total (mg/kg wwt)	0.539	0.822	0.599	0.503	0.582
	Sodium (Na)-Total (mg/kg)	3520	3050	2690	2890	2610
	Sodium (Na)-Total (mg/kg wwt)	898	826	893	804	750
	Strontium (Sr)-Total (mg/kg)	110	71.9	92.4	60.7	58.4
	Strontium (Sr)-Total (mg/kg wwt)	28.1	19.5	30.7	16.9	16.8
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0050	0.0038	0.0033	0.0049	0.0034
	Thallium (Tl)-Total (mg/kg wwt)	0.00127	0.00103	0.00108	0.00136	0.00099
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	0.11
	Tin (Sn)-Total (mg/kg wwt)	0.025	<0.020	<0.020	<0.020	0.030
	Uranium (U)-Total (mg/kg)	0.0308	0.0146	0.0253	0.0196	0.0161
	Uranium (U)-Total (mg/kg wwt)	0.00786	0.00396	0.00841	0.00544	0.00462
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.022	0.035	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	114	117	96.1	97.9	94.4
	Zinc (Zn)-Total (mg/kg wwt)	29.1	31.7	32.0	27.2	27.2
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
Aggregate Organics	Lipid Content (% wwt)	3.9	6.0	2.7	5.3	5.5

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1712033-6 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR.PCC #6	L1712033-7 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR.PCC #7	L1712033-8 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR.PCC #8		
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.264	0.271	0.180		
	Mercury (Hg)-Total (mg/kg wwt)	0.0697	0.0714	0.0457		
	Molybdenum (Mo)-Total (mg/kg)	0.058	0.081	0.084		
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0152	0.0214	0.0214		
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	0.36		
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	0.048	0.091		
	Phosphorus (P)-Total (mg/kg)	31400	23100	22100		
	Phosphorus (P)-Total (mg/kg wwt)	8260	6080	5600		
	Potassium (K)-Total (mg/kg)	12200	12300	12200		
	Potassium (K)-Total (mg/kg wwt)	3220	3240	3100		
	Rubidium (Rb)-Total (mg/kg)	15.2	13.9	20.6		
	Rubidium (Rb)-Total (mg/kg wwt)	4.02	3.67	5.21		
	Selenium (Se)-Total (mg/kg)	1.97	2.47	2.27		
	Selenium (Se)-Total (mg/kg wwt)	0.519	0.651	0.574		
	Sodium (Na)-Total (mg/kg)	2940	2880	3020		
	Sodium (Na)-Total (mg/kg wwt)	774	761	766		
	Strontium (Sr)-Total (mg/kg)	96.4	56.2	70.8		
	Strontium (Sr)-Total (mg/kg wwt)	25.4	14.8	17.9		
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020		
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040		
	Thallium (Tl)-Total (mg/kg)	0.0065	0.0042	0.0052		
	Thallium (Tl)-Total (mg/kg wwt)	0.00171	0.00110	0.00130		
	Tin (Sn)-Total (mg/kg)	0.12	<0.10	<0.10		
	Tin (Sn)-Total (mg/kg wwt)	0.032	<0.020	<0.020		
	Uranium (U)-Total (mg/kg)	0.0260	0.0193	0.0187		
	Uranium (U)-Total (mg/kg wwt)	0.00684	0.00508	0.00473		
	Vanadium (V)-Total (mg/kg)	<0.10	0.11	0.27		
	Vanadium (V)-Total (mg/kg wwt)	0.022	0.028	0.068		
	Zinc (Zn)-Total (mg/kg)	109	96.9	87.7		
	Zinc (Zn)-Total (mg/kg wwt)	28.8	25.6	22.2		
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20		
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040		
Aggregate Organics	Lipid Content (% wwt)	5.1	5.5	5.2		

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-WET-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
LIPIDS-GRAV-VA	Tissue	Lipids in Tissue by Gravimetric	EPA 3570, 8290
<p>A portion of homogenized sample is extracted with dichloromethane. The extract is evaporated to dryness and the lipid content determined gravimetrically.</p>			
MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p> <p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
<p>This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Colleen Hughes	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
Phone: 250-790-2215 Fax:	Email 2:	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Please indicate below Filtered, Preserved or both (F, P, F/P)									
Company:	Job #:										
Contact:	PO / AFE:										
Address:	Legal Site Description: 42281										
Phone: Fax:	Quote #:										

Lab Work Order # (lab use only)	ALS Contact: Can Dang	Sampler: Dolighan, Zirnheft
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Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	T-metals(HRCP-MS)(Wet&D)	Moisture	% Lipid	Mercury MDL < 0.1 mg/kg ww											Number of Containers
	QUL near Grain Cr. PCC # 1	10-Sep-15	8:00-16:15	Tissue	X	X	X	X											1
	QUL near Grain Cr. PCC # 2	10-Sep-15	8:00-16:15	Tissue	X	X	X	X											1
	QUL near Grain Cr. PCC # 3	10-Sep-15	8:00-16:15	Tissue	X	X	X	X											1
	QUL near Grain Cr. PCC # 4	10-Sep-15	8:00-16:15	Tissue	X	X	X	X											1
	QUL near Grain Cr. PCC # 5	10-Sep-15	8:00-16:15	Tissue	X	X	X	X											1
	QUL near Grain Cr. PCC # 6	10-Sep-15	8:00-16:15	Tissue	X	X	X	X											1
	QUL near Grain Cr. PCC # 7	10-Sep-15	8:00-16:15	Tissue	X	X	X	X											1
	QUL near Grain Cr. PCC # 8	10-Sep-15	8:00-16:15	Tissue	X	X	X	X											1



Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)		
Released by: N. Zirnheft	Date & Time: Dec. 7, 2015 1630 hr	Received by: <i>Lady</i>	Date: Dec. 8	Time: 9:40 AM	Temperature: -20 °C	Verified by:	Date & Time:	Observations: Yes / No? If Yes attach SIF



Sample Receipt Confirmation

Report Distribution:

Company Name: MOUNT POLLEY MINING CORP.
Contact: Colleen Hughes
Address: PO Box 12,
Likely, BC, V0L 1N0
Phone: 250-790-2215
Fax: 250-790-2268
Email: chughes@mountpolley.com
kcmahen@mountpolley.com
slitke@mountpolley.com
EDD Email: chughes@mountpolley.com
kcmahen@mountpolley.com
slitke@mountpolley.com
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Invoice Distribution:

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Address: PO Box 12,
Likely, BC, V0L 1N0
Phone: 250-790-2215
Fax: --
Invoice Email: prosette@mountpolley.com
chughes@mountpolley.com
Project #: N/A
Account #: MPM100

Client Information:

Job Reference #:
Project PO #:
Legal Site Description: 42281
Quote #: N/A
Date Sampled: 10-SEP-15
Date Received: 08-DEC-15
Sampled By: Dolighan,Zirnhelp
Chain Of Custody: --

Workorder Summary:

Lab Work Order #: L1712033
Estimated completion date: 17-DEC-15
8 Samples received at ALS in: VANCOUVER
Account Manager: Can Dang
Estimated sample disposal date: See Sample Disposal Information section below.

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type	Client Job#
L1712033-1	QUL NEAR GRAIN CR.PCC #1	10-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712033-2	QUL NEAR GRAIN CR.PCC #2	10-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712033-3	QUL NEAR GRAIN CR.PCC #3	10-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712033-4	QUL NEAR GRAIN CR.PCC #4	10-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712033-5	QUL NEAR GRAIN CR.PCC #5	10-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712033-6	QUL NEAR GRAIN CR.PCC #6	10-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712033-7	QUL NEAR GRAIN CR.PCC #7	10-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712033-8	QUL NEAR GRAIN CR.PCC #8	10-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	



Analysis Requested :

	Sample Handling and Disposal Fee	Mercury in Tissue by CVAFS [DRY]	Mercury in Tissue by CVAFS [WET]	Lipids in Tissue by Gravimetric	Metals in Tissue by CRC ICPMS [DRY]	Metals in Tissue by CRC ICPMS [WET]	% Moisture in Tissues	Tissue/Vegetation Sample Preparation
QUL NEAR GRAIN CR.PCC #1	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR GRAIN CR.PCC #2	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR GRAIN CR.PCC #3	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR GRAIN CR.PCC #4	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR GRAIN CR.PCC #5	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR GRAIN CR.PCC #6	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR GRAIN CR.PCC #7	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR GRAIN CR.PCC #8	✓	✓	✓	✓	✓	✓	✓	✓

Sample Integrity Observations: No observations were identified for this work order submission.

Sample Disposal Information:

Where possible, ALS will store samples for 30 days from the date a final report is issued, or 30 days from the date samples are placed on hold without analytical requests, after which samples may be discarded. Air samples collected on re-usable media are an exception, and are stored for 7 days from the date a final report is issued. Longer storage times are available upon request.

For information about ALS accreditations and certifications please contact your Account Manager or visit our webpage at www.alsglobal.com (see Canada downloads).

ALS Group strives to deliver on-time results to our clients at all times. However, there are times when due to capacity issues or other unforeseen circumstances we are unable to meet our expected turnaround times. The information above is related to a recent workorder you have submitted to our laboratory. In the event that you have an inquiry, please refer to the Lab Work Order # when calling your Account Manager.

ALS Group appreciates your business. Thank you for the opportunity to work with you.



Environmental Division

Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Colleen Hughes	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
	Email 2:	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Phone: 250-790-2215 Fax:		Analysis Request
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	Job #:	
Contact:	PO / AFE:	
Address:	Legal Site Description: 42281	
Phone: Fax:	Quote #:	

Lab Work Order # (lab use only)	ALS Contact: Can Dang	Sampler: Dolighan, Zirnheft
---	------------------------------	------------------------------------

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	T-metals (HRICP-MS)	Wet&D	Moisture	% Lipid	Mercury MDL < 0.1 mg/kg ww											Number of Containers	
	QUL near Grain Cr.PCC # 1	10-Sep-15	8:00-16:15	Tissue	X	X	X	X													1
	QUL near Grain Cr.PCC # 2	10-Sep-15	8:00-16:15	Tissue	X	X	X	X													1
	QUL near Grain Cr.PCC # 3	10-Sep-15	8:00-16:15	Tissue	X	X	X	X													1
	QUL near Grain Cr.PCC # 4	10-Sep-15	8:00-16:15	Tissue	X	X	X	X													1
	QUL near Grain Cr.PCC # 5	10-Sep-15	8:00-16:15	Tissue	X	X	X	X													1
	QUL near Grain Cr.PCC # 6	10-Sep-15	8:00-16:15	Tissue	X	X	X	X													1
	QUL near Grain Cr.PCC # 7	10-Sep-15	8:00-16:15	Tissue	X	X	X	X													1
	QUL near Grain Cr.PCC # 8	10-Sep-15	8:00-16:15	Tissue	X	X	X	X													1



Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)				SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No? If Yes attach SIF			
N.Zirnheft	Dec.7, 2015 1630 hr	<i>Lady</i>	Dec.8	9:40AM	-20°C						



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 08-DEC-15
Report Date: 21-JAN-16 16:41 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1712036
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc: 42281

Comments: Due to limited samples weight available, as instructed, lipid analysis was performed on a composited sample instead. The samples which could be used for compositing are listed in the "Client ID" description.

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1712036-1 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR. RSC#1	L1712036-2 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR. RSC#2	L1712036-3 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR. RSC#3	L1712036-4 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR. RSC#4	L1712036-5 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR. RSC#5
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	72.9	73.0	76.8	72.4	74.2
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<2.0	5.7	3.4	3.2
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<0.40	1.32	0.94	0.83
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.133	0.091	0.063	0.162	0.068
	Arsenic (As)-Total (mg/kg wwt)	0.0361	0.0245	0.0145	0.0446	0.0175
	Barium (Ba)-Total (mg/kg)	2.12	1.40	2.45	1.90	2.79
	Barium (Ba)-Total (mg/kg wwt)	0.574	0.377	0.568	0.525	0.719
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.190	0.0750	0.0633	0.0668	0.0963
	Cadmium (Cd)-Total (mg/kg wwt)	0.0516	0.0203	0.0147	0.0184	0.0248
	Calcium (Ca)-Total (mg/kg)	35800	32100	48900	45200	54500
	Calcium (Ca)-Total (mg/kg wwt)	9720	8660	11300	12500	14100
	Cesium (Cs)-Total (mg/kg)	0.0841	0.119	0.149	0.0781	0.131
	Cesium (Cs)-Total (mg/kg wwt)	0.0228	0.0322	0.0346	0.0216	0.0338
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cobalt (Co)-Total (mg/kg)	0.048	0.037	0.057	0.071	0.047
	Cobalt (Co)-Total (mg/kg wwt)	0.0130	0.0100	0.0133	0.0196	0.0122
	Copper (Cu)-Total (mg/kg)	1.78	2.29	2.28	1.68	2.44
	Copper (Cu)-Total (mg/kg wwt)	0.483	0.618	0.528	0.463	0.629
	Iron (Fe)-Total (mg/kg)	40.4	40.5	50.3	42.9	60.9
	Iron (Fe)-Total (mg/kg wwt)	11.0	11.0	11.6	11.8	15.7
	Lead (Pb)-Total (mg/kg)	<0.020	<0.020	0.027	0.021	0.021
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	0.0050	0.0063	0.0058	0.0055
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1450	1690	1860	1630	1710
	Magnesium (Mg)-Total (mg/kg wwt)	393	457	430	449	442
	Manganese (Mn)-Total (mg/kg)	13.5	9.33	15.5	12.2	17.7
	Manganese (Mn)-Total (mg/kg wwt)	3.67	2.52	3.59	3.38	4.55

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1712036-6 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR. RSC#6	L1712036-7 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR. RSC#7	L1712036-8 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR. RSC#8	L1712036-9 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR. COMPOSITE (2, 5, 6, 8)
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)	73.7	76.5	77.1	
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	2.1	<2.0	
	Aluminum (Al)-Total (mg/kg wwt)	0.52	0.50	0.42	
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	
	Arsenic (As)-Total (mg/kg)	0.030	0.068	0.051	
	Arsenic (As)-Total (mg/kg wwt)	0.0079	0.0159	0.0118	
	Barium (Ba)-Total (mg/kg)	1.14	2.38	3.33	
	Barium (Ba)-Total (mg/kg wwt)	0.299	0.559	0.764	
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	
	Cadmium (Cd)-Total (mg/kg)	0.0700	0.0667	0.0870	
	Cadmium (Cd)-Total (mg/kg wwt)	0.0184	0.0157	0.0199	
	Calcium (Ca)-Total (mg/kg)	25300	46100	57600	
	Calcium (Ca)-Total (mg/kg wwt)	6630	10800	13200	
	Cesium (Cs)-Total (mg/kg)	0.119	0.149	0.123	
	Cesium (Cs)-Total (mg/kg wwt)	0.0312	0.0350	0.0283	
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.050	<0.050	
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	
	Cobalt (Co)-Total (mg/kg)	0.035	0.063	0.023	
	Cobalt (Co)-Total (mg/kg wwt)	0.0093	0.0148	0.0052	
	Copper (Cu)-Total (mg/kg)	2.55	2.91	2.16	
	Copper (Cu)-Total (mg/kg wwt)	0.671	0.685	0.496	
	Iron (Fe)-Total (mg/kg)	39.4	58.8	65.8	
	Iron (Fe)-Total (mg/kg wwt)	10.3	13.8	15.1	
	Lead (Pb)-Total (mg/kg)	0.043	0.042	0.022	
	Lead (Pb)-Total (mg/kg wwt)	0.0113	0.0098	0.0049	
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	
	Magnesium (Mg)-Total (mg/kg)	2180	2840	1880	
	Magnesium (Mg)-Total (mg/kg wwt)	573	668	430	
	Manganese (Mn)-Total (mg/kg)	12.0	20.3	22.6	
	Manganese (Mn)-Total (mg/kg wwt)	3.15	4.78	5.19	

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1712036-1 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR. RSC#1	L1712036-2 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR. RSC#2	L1712036-3 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR. RSC#3	L1712036-4 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR. RSC#4	L1712036-5 Tissue 10-SEP-15 08:00 QUL NEAR GRAIN CR. RSC#5
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.112	0.0891	0.347	0.0849	0.182
	Mercury (Hg)-Total (mg/kg wwt)	0.0303	0.0241	0.0804	0.0234	0.0470
	Molybdenum (Mo)-Total (mg/kg)	0.031	0.033	0.065	0.049	0.055
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0084	0.0089	0.0151	0.0135	0.0141
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	26000	24000	35700	31400	36800
	Phosphorus (P)-Total (mg/kg wwt)	7060	6490	8260	8670	9470
	Potassium (K)-Total (mg/kg)	10400	10400	12500	11300	10900
	Potassium (K)-Total (mg/kg wwt)	2820	2820	2890	3120	2800
	Rubidium (Rb)-Total (mg/kg)	16.4	15.9	21.7	17.2	15.9
	Rubidium (Rb)-Total (mg/kg wwt)	4.45	4.31	5.03	4.75	4.09
	Selenium (Se)-Total (mg/kg)	1.89	2.34	1.94	1.41	1.84
	Selenium (Se)-Total (mg/kg wwt)	0.513	0.632	0.450	0.390	0.475
	Sodium (Na)-Total (mg/kg)	2280	1970	2840	2150	2640
	Sodium (Na)-Total (mg/kg wwt)	619	532	658	594	681
	Strontium (Sr)-Total (mg/kg)	83.6	76.3	127	110	146
	Strontium (Sr)-Total (mg/kg wwt)	22.7	20.6	29.5	30.5	37.6
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0031	0.0066	0.0066	0.0044	0.0070
	Thallium (Tl)-Total (mg/kg wwt)	0.00084	0.00178	0.00154	0.00122	0.00179
	Tin (Sn)-Total (mg/kg)	0.19	0.12	0.25	0.35	0.15
	Tin (Sn)-Total (mg/kg wwt)	0.051	0.034	0.058	0.097	0.038
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	0.0044	<0.0020	0.0038
	Uranium (U)-Total (mg/kg wwt)	0.00052	<0.00040	0.00101	0.00048	0.00099
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	158	147	277	189	205
	Zinc (Zn)-Total (mg/kg wwt)	42.8	39.6	64.3	52.0	52.9
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
Aggregate Organics	Lipid Content (% wwt)					

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1712036-6	L1712036-7	L1712036-8	L1712036-9
		Description	Tissue	Tissue	Tissue	Tissue
		Sampled Date	10-SEP-15	10-SEP-15	10-SEP-15	10-SEP-15
		Sampled Time	08:00	08:00	08:00	08:00
		Client ID	QUL NEAR GRAIN CR. RSC#6	QUL NEAR GRAIN CR. RSC#7	QUL NEAR GRAIN CR. RSC#8	QUL NEAR GRAIN CR. COMPOSITE (2, 5, 6, 8)
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)		0.451	0.112	0.206	
	Mercury (Hg)-Total (mg/kg wwt)		0.118	0.0264	0.0473	
	Molybdenum (Mo)-Total (mg/kg)		0.044	0.042	0.049	
	Molybdenum (Mo)-Total (mg/kg wwt)		0.0115	0.0098	0.0112	
	Nickel (Ni)-Total (mg/kg)		<0.20	<0.20	<0.20	
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	
	Phosphorus (P)-Total (mg/kg)		20200	33900	38800	
	Phosphorus (P)-Total (mg/kg wwt)		5310	7960	8900	
	Potassium (K)-Total (mg/kg)		11500	12300	12000	
	Potassium (K)-Total (mg/kg wwt)		3010	2890	2750	
	Rubidium (Rb)-Total (mg/kg)		16.6	17.9	15.8	
	Rubidium (Rb)-Total (mg/kg wwt)		4.37	4.21	3.62	
	Selenium (Se)-Total (mg/kg)		2.15	2.20	2.09	
	Selenium (Se)-Total (mg/kg wwt)		0.564	0.517	0.480	
	Sodium (Na)-Total (mg/kg)		2210	2850	2670	
	Sodium (Na)-Total (mg/kg wwt)		581	669	613	
	Strontium (Sr)-Total (mg/kg)		57.6	116	142	
	Strontium (Sr)-Total (mg/kg wwt)		15.1	27.3	32.6	
	Tellurium (Te)-Total (mg/kg)		<0.020	<0.020	<0.020	
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg)		0.0057	0.0078	0.0041	
	Thallium (Tl)-Total (mg/kg wwt)		0.00150	0.00184	0.00094	
	Tin (Sn)-Total (mg/kg)		<0.10	0.15	0.14	
	Tin (Sn)-Total (mg/kg wwt)		0.023	0.036	0.031	
	Uranium (U)-Total (mg/kg)		<0.0020	0.0022	0.0028	
	Uranium (U)-Total (mg/kg wwt)		0.00052	0.00051	0.00064	
	Vanadium (V)-Total (mg/kg)		<0.10	<0.10	<0.10	
	Vanadium (V)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	
	Zinc (Zn)-Total (mg/kg)		172	183	230	
	Zinc (Zn)-Total (mg/kg wwt)		45.3	43.0	52.8	
	Zirconium (Zr)-Total (mg/kg)		<0.20	<0.20	<0.20	
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	
Aggregate Organics	Lipid Content (% wwt)					6.4

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-WET-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
LIPIDS-GRAV-VA	Tissue	Lipids in Tissue by Gravimetric	EPA 3570, 8290
<p>A portion of homogenized sample is extracted with dichloromethane. The extract is evaporated to dryness and the lipid content determined gravimetrically.</p>			
MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p>			
<p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p>			
<p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
<p>This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Report to:		Report Format / Distribution		Service Requested: (rush - subject to availability)	
Company: MOUNT POLLEY MINING CORP.		<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other		<input checked="" type="radio"/> Regular (Default)	
Contact: Colleen Hughes		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax		<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge	
Address: PO BOX 12, Likely, BC, V0L 1N0		Email 1: on file		<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge	
		Email 2:		<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS	

Phone: 250-790-2215 Fax:	Analysis Request	
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Please indicate below Filtered, Preserved or both (F, P, F/P)	

Company:		Job #:	
Contact:		PO / AFE:	
Address:		Legal Site Description: 42281	
Phone: Fax:		Quote #:	
Lab Work Order # (lab use only)		ALS Contact: Can Dang Sampler: Dolighan, Zirnhef	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	T-metals (H/R/CP-MS)(Wet&D)	Moisture	% Lipid	Mercury MDL < 0.1 mg/kg ww											Number of Containers	
	QUL near Grain Cr. RSC # 1	10-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Grain Cr. RSC # 2	10-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Grain Cr. RSC # 3	10-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Grain Cr. RSC # 4	10-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Grain Cr. RSC # 5	10-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Grain Cr. RSC # 6	10-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Grain Cr. RSC # 7	10-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Grain Cr. RSC # 8	10-Sep-15	8:00-16:15	Tissue	X	X	X	X												1



L1712036-COFC

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
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SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)			
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
N.Zirnhef	07/12/2015 1630 hr	<i>[Signature]</i>	Dec 8	9:40 AM	-2.0 °C			



Sample Receipt Confirmation

Report Distribution:

Company Name: MOUNT POLLEY MINING CORP.
Contact: Colleen Hughes
Address: PO Box 12,
Likely, BC, V0L 1N0
Phone: 250-790-2215
Fax: 250-790-2268
Email: chughes@mountpolley.com
kcmcahen@mountpolley.com
slitke@mountpolley.com
EDD Email: chughes@mountpolley.com
kcmcahen@mountpolley.com
slitke@mountpolley.com
Distribution: Hard Copy: N Email: Y Fax: N EDD: Y

Invoice Distribution:

Acct Name: MOUNT POLLEY MINING CORP.
Contact: Accounts Payable
Address: PO Box 12,
Likely, BC, V0L 1N0
Phone: 250-790-2215
Fax: --
Invoice Email: prosette@mountpolley.com
chughes@mountpolley.com
Project #: N/A
Account #: MPM100

Client Information:

Job Reference #:
Project PO #:
Legal Site Description: 42281
Quote #: N/A

Date Sampled: 10-SEP-15
Date Received: 08-DEC-15
Sampled By: Dolighan,Zirnhel
Chain Of Custody: --

Workorder Summary:

Lab Work Order #: L1712036
Estimated completion date: 17-DEC-15
8 Samples received at ALS in VANCOUVER

Account Manager: Can Dang
Estimated sample disposal date: See Sample Disposal Information section below.

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type	Client Job#
L1712036-1	QUL NEAR GRAIN CR. RSC#1	10-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712036-2	QUL NEAR GRAIN CR. RSC#2	10-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712036-3	QUL NEAR GRAIN CR. RSC#3	10-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712036-4	QUL NEAR GRAIN CR. RSC#4	10-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712036-5	QUL NEAR GRAIN CR. RSC#5	10-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712036-6	QUL NEAR GRAIN CR. RSC#6	10-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712036-7	QUL NEAR GRAIN CR. RSC#7	10-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712036-8	QUL NEAR GRAIN CR. RSC#8	10-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	



Analysis Requested :

	Sample Handling and Disposal Fee	Mercury in Tissue by CVAFS [DRY]	Mercury in Tissue by CVAFS [WET]	Lipids in Tissue by Gravimetric	Metals in Tissue by CRC ICPMS [DRY]	Metals in Tissue by CRC ICPMS [WET]	% Moisture in Tissues	Tissue/Vegetation Sample Preparation
QUL NEAR GRAIN CR. RSC#1	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR GRAIN CR. RSC#2	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR GRAIN CR. RSC#3	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR GRAIN CR. RSC#4	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR GRAIN CR. RSC#5	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR GRAIN CR. RSC#6	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR GRAIN CR. RSC#7	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR GRAIN CR. RSC#8	✓	✓	✓	✓	✓	✓	✓	✓

Sample Integrity Observations: No observations were identified for this work order submission.

Sample Disposal Information:

Where possible, ALS will store samples for 30 days from the date a final report is issued, or 30 days from the date samples are placed on hold without analytical requests, after which samples may be discarded. Air samples collected on re-usable media are an exception, and are stored for 7 days from the date a final report is issued. Longer storage times are available upon request.

For information about ALS accreditations and certifications please contact your Account Manager or visit our webpage at www.alsglobal.com (see Canada downloads).

ALS Group strives to deliver on-time results to our clients at all times. However, there are times when due to capacity issues or other unforeseen circumstances we are unable to meet our expected turnaround times. The information above is related to a recent workorder you have submitted to our laboratory. In the event that you have an inquiry, please refer to the Lab Work Order # when calling your Account Manager.

ALS Group appreciates your business. Thank you for the opportunity to work with you.



Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Colleen Hughes	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
	Email 2:	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Phone: 250-790-2215 Fax:	Analysis Request	
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	Job #:	
Contact:	PO / AFE:	
Address:	Legal Site Description: 42281	
Phone: Fax:	Quote #:	
Lab Work Order # (lab use only)	ALS Contact: Can Dang	Sampler: Dolighan, Zirnheft

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	T-metals (H/R/C/P-MS) (Wet&D)	Moisture	% Lipid	Mercury MDL < 0.1 mg/kg ww											Number of Containers	
	QUL near Grain Cr. RSC # 1	10-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Grain Cr. RSC # 2	10-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Grain Cr. RSC # 3	10-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Grain Cr. RSC # 4	10-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Grain Cr. RSC # 5	10-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Grain Cr. RSC # 6	10-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Grain Cr. RSC # 7	10-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Grain Cr. RSC # 8	10-Sep-15	8:00-16:15	Tissue	X	X	X	X												1



L1712036-COFC

Special Instructions / Regulations / Hazardous Details

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SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No? If Yes attach SIF	
N.Zirnheft	07/12/2015 1630 hr	<i>lady</i>	Dec-8	9:40 AM	-2.0 °C				



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 08-DEC-15
Report Date: 21-JAN-16 17:43 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1712039
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc: 42281

Comments: Due to limited samples weight available, as instructed, lipid analysis was performed on a composited sample instead. The samples which could be used for compositing are listed in the "Client ID" description.

Can Dang
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1712039-1 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR. RSC#1	L1712039-2 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR. RSC#2	L1712039-3 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR. RSC#3	L1712039-4 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR. RSC#4	L1712039-5 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR. RSC#5
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	71.7	72.8	77.9	75.2	79.6
Metals	Aluminum (Al)-Total (mg/kg)	5.0	35.0	2.7	2.2	3.5
	Aluminum (Al)-Total (mg/kg wwt)	1.41	9.54	0.60	0.55	0.71
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.052	0.126	0.170	0.135	0.150
	Arsenic (As)-Total (mg/kg wwt)	0.0148	0.0344	0.0377	0.0335	0.0306
	Barium (Ba)-Total (mg/kg)	2.02	3.38	3.94	3.01	6.44
	Barium (Ba)-Total (mg/kg wwt)	0.572	0.921	0.873	0.748	1.32
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.139	0.0743	0.114	0.0790	0.0533
	Cadmium (Cd)-Total (mg/kg wwt)	0.0395	0.0203	0.0253	0.0196	0.0109
	Calcium (Ca)-Total (mg/kg)	34700	32500	50100	40900	58400
	Calcium (Ca)-Total (mg/kg wwt)	9830	8860	11100	10200	11900
	Cesium (Cs)-Total (mg/kg)	0.0611	0.0826	0.0699	0.0539	0.0541
	Cesium (Cs)-Total (mg/kg wwt)	0.0173	0.0225	0.0155	0.0134	0.0110
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cobalt (Co)-Total (mg/kg)	<0.020	0.044	0.092	0.041	0.069
	Cobalt (Co)-Total (mg/kg wwt)	0.0050	0.0121	0.0204	0.0102	0.0141
	Copper (Cu)-Total (mg/kg)	2.16	2.48	2.73	2.25	3.37
	Copper (Cu)-Total (mg/kg wwt)	0.613	0.677	0.606	0.560	0.689
	Iron (Fe)-Total (mg/kg)	52.6	146	54.8	41.6	55.3
	Iron (Fe)-Total (mg/kg wwt)	14.9	39.9	12.1	10.3	11.3
	Lead (Pb)-Total (mg/kg)	0.064	0.068	0.029	0.029	0.036
	Lead (Pb)-Total (mg/kg wwt)	0.0181	0.0184	0.0064	0.0071	0.0074
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1490	1430	2050	1840	2270
	Magnesium (Mg)-Total (mg/kg wwt)	423	389	455	457	464
	Manganese (Mn)-Total (mg/kg)	9.87	14.3	12.6	11.9	13.7
	Manganese (Mn)-Total (mg/kg wwt)	2.80	3.89	2.79	2.96	2.80

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1712039-6	L1712039-7	L1712039-8	L1712039-9
		Description	Tissue	Tissue	Tissue	Tissue
		Sampled Date	20-SEP-15	20-SEP-15	20-SEP-15	20-SEP-15
		Sampled Time	08:00	08:00	08:00	08:00
		Client ID	QUL NEAR HAZELTINE CR. RSC#6	QUL NEAR HAZELTINE CR. RSC#7	QUL NEAR HAZELTINE CR. RSC#8	QUL NEAR HAZELTINE CR. - COMPOSITE(#2, 3, 4 AND 6)
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)		77.5	77.8	73.3	
Metals	Aluminum (Al)-Total (mg/kg)		3.2	<2.0	3.7	
	Aluminum (Al)-Total (mg/kg wwt)		0.71	<0.40	1.00	
	Antimony (Sb)-Total (mg/kg)		0.010	<0.010	<0.010	
	Antimony (Sb)-Total (mg/kg wwt)		0.0023	<0.0020	<0.0020	
	Arsenic (As)-Total (mg/kg)		0.237	0.295	0.062	
	Arsenic (As)-Total (mg/kg wwt)		0.0533	0.0654	0.0167	
	Barium (Ba)-Total (mg/kg)		5.38	4.33	2.36	
	Barium (Ba)-Total (mg/kg wwt)		1.21	0.959	0.630	
	Beryllium (Be)-Total (mg/kg)		<0.010	<0.010	<0.010	
	Beryllium (Be)-Total (mg/kg wwt)		<0.0020	<0.0020	<0.0020	
	Bismuth (Bi)-Total (mg/kg)		0.014	<0.010	<0.010	
	Bismuth (Bi)-Total (mg/kg wwt)		0.0031	<0.0020	<0.0020	
	Boron (B)-Total (mg/kg)		<1.0	<1.0	<1.0	
	Boron (B)-Total (mg/kg wwt)		<0.20	<0.20	<0.20	
	Cadmium (Cd)-Total (mg/kg)		0.116	0.128	0.0748	
	Cadmium (Cd)-Total (mg/kg wwt)		0.0261	0.0284	0.0200	
	Calcium (Ca)-Total (mg/kg)		53800	49300	40900	
	Calcium (Ca)-Total (mg/kg wwt)		12100	10900	10900	
	Cesium (Cs)-Total (mg/kg)		0.0800	0.0623	0.0246	
	Cesium (Cs)-Total (mg/kg wwt)		0.0180	0.0138	0.0066	
	Chromium (Cr)-Total (mg/kg)		<0.050	<0.050	<0.050	
	Chromium (Cr)-Total (mg/kg wwt)		<0.010	<0.010	<0.010	
	Cobalt (Co)-Total (mg/kg)		0.053	0.046	0.021	
	Cobalt (Co)-Total (mg/kg wwt)		0.0119	0.0102	0.0056	
	Copper (Cu)-Total (mg/kg)		2.96	2.88	2.24	
	Copper (Cu)-Total (mg/kg wwt)		0.665	0.639	0.600	
	Iron (Fe)-Total (mg/kg)		58.1	56.7	58.3	
	Iron (Fe)-Total (mg/kg wwt)		13.1	12.6	15.6	
	Lead (Pb)-Total (mg/kg)		0.068	0.021	<0.020	
	Lead (Pb)-Total (mg/kg wwt)		0.0152	0.0047	0.0043	
	Lithium (Li)-Total (mg/kg)		<0.50	<0.50	<0.50	
	Lithium (Li)-Total (mg/kg wwt)		<0.10	<0.10	<0.10	
	Magnesium (Mg)-Total (mg/kg)		2140	2140	1520	
	Magnesium (Mg)-Total (mg/kg wwt)		480	474	405	
	Manganese (Mn)-Total (mg/kg)		12.6	11.5	11.9	
	Manganese (Mn)-Total (mg/kg wwt)		2.84	2.54	3.18	

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1712039-1 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR. RSC#1	L1712039-2 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR. RSC#2	L1712039-3 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR. RSC#3	L1712039-4 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR. RSC#4	L1712039-5 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR. RSC#5
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.124	0.125	0.173	0.274	0.225
	Mercury (Hg)-Total (mg/kg wwt)	0.0350	0.0340	0.0384	0.0681	0.0460
	Molybdenum (Mo)-Total (mg/kg)	0.038	0.062	0.057	0.055	0.066
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0108	0.0168	0.0126	0.0136	0.0135
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	25900	24800	35200	30300	42600
	Phosphorus (P)-Total (mg/kg wwt)	7330	6770	7790	7520	8710
	Potassium (K)-Total (mg/kg)	11000	10500	14800	13000	15200
	Potassium (K)-Total (mg/kg wwt)	3100	2860	3270	3230	3110
	Rubidium (Rb)-Total (mg/kg)	12.3	11.5	23.5	17.0	16.6
	Rubidium (Rb)-Total (mg/kg wwt)	3.49	3.12	5.21	4.23	3.40
	Selenium (Se)-Total (mg/kg)	1.86	1.82	3.24	2.74	3.02
	Selenium (Se)-Total (mg/kg wwt)	0.526	0.497	0.717	0.681	0.617
	Sodium (Na)-Total (mg/kg)	1870	2090	3000	2490	3570
	Sodium (Na)-Total (mg/kg wwt)	530	571	665	619	728
	Strontium (Sr)-Total (mg/kg)	82.2	82.9	105	74.5	136
	Strontium (Sr)-Total (mg/kg wwt)	23.3	22.6	23.2	18.5	27.7
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0026	<0.0020	0.0087	0.0103	0.0053
	Thallium (Tl)-Total (mg/kg wwt)	0.00073	0.00050	0.00192	0.00257	0.00108
	Tin (Sn)-Total (mg/kg)	0.19	0.12	0.18	0.24	0.27
	Tin (Sn)-Total (mg/kg wwt)	0.054	0.033	0.040	0.059	0.054
	Uranium (U)-Total (mg/kg)	<0.0020	0.0040	0.0065	0.0047	0.0133
	Uranium (U)-Total (mg/kg wwt)	0.00057	0.00109	0.00144	0.00116	0.00272
	Vanadium (V)-Total (mg/kg)	<0.10	0.41	<0.10	<0.10	0.19
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.111	<0.020	<0.020	0.039
	Zinc (Zn)-Total (mg/kg)	162	145	198	102	188
	Zinc (Zn)-Total (mg/kg wwt)	45.9	39.6	43.8	25.4	38.4
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
Aggregate Organics	Lipid Content (% wwt)					

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1712039-6 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR. RSC#6	L1712039-7 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR. RSC#7	L1712039-8 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR. RSC#8	L1712039-9 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR. - COMPOSITE(#2, 3, 4 AND 6)
Grouping	Analyte				
TISSUE					
Metals	Mercury (Hg)-Total (mg/kg)	0.221	0.358	0.246	
	Mercury (Hg)-Total (mg/kg wwt)	0.0498	0.0793	0.0658	
	Molybdenum (Mo)-Total (mg/kg)	0.101	0.060	0.047	
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0228	0.0133	0.0126	
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	
	Phosphorus (P)-Total (mg/kg)	36900	38000	29700	
	Phosphorus (P)-Total (mg/kg wwt)	8290	8420	7930	
	Potassium (K)-Total (mg/kg)	13800	15000	12200	
	Potassium (K)-Total (mg/kg wwt)	3100	3320	3250	
	Rubidium (Rb)-Total (mg/kg)	22.0	20.0	14.0	
	Rubidium (Rb)-Total (mg/kg wwt)	4.95	4.44	3.75	
	Selenium (Se)-Total (mg/kg)	2.89	3.32	2.89	
	Selenium (Se)-Total (mg/kg wwt)	0.649	0.735	0.773	
	Sodium (Na)-Total (mg/kg)	3290	3400	2760	
	Sodium (Na)-Total (mg/kg wwt)	740	753	737	
	Strontium (Sr)-Total (mg/kg)	112	105	76.1	
	Strontium (Sr)-Total (mg/kg wwt)	25.1	23.3	20.3	
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	
	Thallium (Tl)-Total (mg/kg)	0.0117	0.0093	0.0039	
	Thallium (Tl)-Total (mg/kg wwt)	0.00262	0.00206	0.00103	
	Tin (Sn)-Total (mg/kg)	0.22	0.18	0.13	
	Tin (Sn)-Total (mg/kg wwt)	0.050	0.039	0.035	
	Uranium (U)-Total (mg/kg)	0.0090	0.0053	<0.0020	
	Uranium (U)-Total (mg/kg wwt)	0.00203	0.00117	0.00053	
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	
	Zinc (Zn)-Total (mg/kg)	179	179	190	
	Zinc (Zn)-Total (mg/kg wwt)	40.3	39.7	50.7	
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	
Aggregate Organics	Lipid Content (% wwt)				2.9

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
HG-WET-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.</p>			
LIPIDS-GRAV-VA	Tissue	Lipids in Tissue by Gravimetric	EPA 3570, 8290
<p>A portion of homogenized sample is extracted with dichloromethane. The extract is evaporated to dryness and the lipid content determined gravimetrically.</p>			
MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p>			
<p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MET-WET-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
<p>This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).</p>			
<p>Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.</p>			
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
<p>This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Colleen Hughes	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
Phone: 250-790-2215 Fax:	Email 2:	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Please indicate below Filtered, Preserved or both (F, P, F/P)																
Company:	Job #:	T-metals(HRCP-MS)(Wet&C)	Moisture	% Lipid	Mercury MDL < 0.1 mg/kg w													Number of Containers
Contact:	PO / AFE:																	
Address:	Legal Site Description: 42281																	
Phone: Fax:	Quote #:																	

Lab Work Order # (lab use only)	ALS Contact: Can Dang	Sampler: Dolghan, Zirnhef
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Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	T-metals(HRCP-MS)(Wet&C)	Moisture	% Lipid	Mercury MDL < 0.1 mg/kg w													Number of Containers
	QUL near Hazeltine Cr. RSC # 1	20-Sep-15	8:00-16:15	Tissue	X	X	X	X													1
	QUL near Hazeltine Cr. RSC # 2	20-Sep-15	8:00-16:15	Tissue	X	X	X	X													1
	QUL near Hazeltine Cr. RSC # 3	20-Sep-15	8:00-16:15	Tissue	X	X	X	X													1
	QUL near Hazeltine Cr. RSC # 4	20-Sep-15	8:00-16:15	Tissue	X	X	X	X													1
	QUL near Hazeltine Cr. RSC # 5	20-Sep-15	8:00-16:15	Tissue	X	X	X	X													1
	QUL near Hazeltine Cr. RSC # 6	20-Sep-15	8:00-16:15	Tissue	X	X	X	X													1
	QUL near Hazeltine Cr. RSC # 7	20-Sep-15	8:00-16:15	Tissue	X	X	X	X													1
	QUL near Hazeltine Cr. RSC # 8	20-Sep-15	8:00-16:15	Tissue	X	X	X	X													1



L1712039-COFC

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysts. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)		
Released by: N.Zirnhef	Date & Time: 07/12/2015 1630 hr	Received by: lady	Date: Dec 8	Time: 9:40 AM	Temperature: -2.0 C	Verified by:	Date & Time:	Observations: Yes / No? If Yes attach SIF



Sample Receipt Confirmation

Report Distribution:

Company Name: MOUNT POLLEY MINING CORP.
Contact: Colleen Hughes
Address: PO Box 12,
Likely, BC, V0L 1N0
Phone: 250-790-2215
Fax: 250-790-2268
Email: chughes@mountpolley.com
kcmahen@mountpolley.com
slitke@mountpolley.com
EDD Email: chughes@mountpolley.com
kcmahen@mountpolley.com
slitke@mountpolley.com
Distribution: Hard Copy: N Email: Y Fax: N EDD: Y

Invoice Distribution:

Acct Name: MOUNT POLLEY MINING CORP.
Contact: Accounts Payable
Address: PO Box 12,
Likely, BC, V0L 1N0
Phone: 250-790-2215
Fax: --
Invoice Email: prosette@mountpolley.com
chughes@mountpolley.com
Project #: N/A
Account #: MPM100

Client Information:

Job Reference #:
Project PO #:
Legal Site Description: 42281
Quote #: N/A
Date Sampled: 20-SEP-15
Date Received: 08-DEC-15
Sampled By: Dolighan/Zirnhel
Chain Of Custody: --

Workorder Summary:

Lab Work Order #: L1712039
Estimated completion date: 17-DEC-15
8 Samples received at ALS in: VANCOUVER
Account Manager: Can Dang
Estimated sample disposal date: See Sample Disposal Information section below.

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type	Client Job#
L1712039-1	QUL NEAR HAZELTINE CR. RSC#1	20-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712039-2	QUL NEAR HAZELTINE CR. RSC#2	20-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712039-3	QUL NEAR HAZELTINE CR. RSC#3	20-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712039-4	QUL NEAR HAZELTINE CR. RSC#4	20-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712039-5	QUL NEAR HAZELTINE CR. RSC#5	20-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712039-6	QUL NEAR HAZELTINE CR. RSC#6	20-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712039-7	QUL NEAR HAZELTINE CR. RSC#7	20-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712039-8	QUL NEAR HAZELTINE CR. RSC#8	20-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	



Analysis Requested :

	Sample Handling and Disposal Fee	Mercury in Tissue by CVAFS [DRY]	Mercury in Tissue by CVAFS [WET]	Lipids in Tissue by Gravimetric	Metals in Tissue by CRC ICPMS [DRY]	Metals in Tissue by CRC ICPMS [WET]	% Moisture in Tissues	Tissue/Vegetation Sample Preparation
QUL NEAR HAZELTINE CR. RSC#1	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR HAZELTINE CR. RSC#2	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR HAZELTINE CR. RSC#3	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR HAZELTINE CR. RSC#4	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR HAZELTINE CR. RSC#5	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR HAZELTINE CR. RSC#6	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR HAZELTINE CR. RSC#7	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR HAZELTINE CR. RSC#8	✓	✓	✓	✓	✓	✓	✓	✓

Sample Integrity Observations: No observations were identified for this work order submission.

Sample Disposal Information:

Where possible, ALS will store samples for 30 days from the date a final report is issued, or 30 days from the date samples are placed on hold without analytical requests, after which samples may be discarded. Air samples collected on re-usable media are an exception, and are stored for 7 days from the date a final report is issued. Longer storage times are available upon request.

For information about ALS accreditations and certifications please contact your Account Manager or visit our webpage at www.alsglobal.com (see Canada downloads).

ALS Group strives to deliver on-time results to our clients at all times. However, there are times when due to capacity issues or other unforeseen circumstances we are unable to meet our expected turnaround times. The information above is related to a recent workorder you have submitted to our laboratory. In the event that you have an inquiry, please refer to the Lab Work Order # when calling your Account Manager.

ALS Group appreciates your business. Thank you for the opportunity to work with you.



Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Colleen Hughes	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
	Email 2:	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Analysis Request

Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Please indicate below Filtered, Preserved or both (F, P, F/P)													
Company:	Job #:	T-metals(HRCP-MS)(Wet&C)	Moisture	% Lipid	Mercury MDL < 0.1 mg/kg w										Number of Containers
Contact:	PO / AFE:														
Address:	Legal Site Description: 42281														
Phone: _____ Fax: _____	Quote #:														

Lab Work Order # (lab use only)	ALS Contact: Can Dang	Sampler: Dolghan, Zirnhef
---------------------------------	-----------------------	---------------------------

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	T-metals(HRCP-MS)(Wet&C)	Moisture	% Lipid	Mercury MDL < 0.1 mg/kg w												Number of Containers
	QUL near Hazeltine Cr. RSC # 1	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Hazeltine Cr. RSC # 2	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Hazeltine Cr. RSC # 3	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Hazeltine Cr. RSC # 4	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Hazeltine Cr. RSC # 5	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Hazeltine Cr. RSC # 6	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Hazeltine Cr. RSC # 7	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Hazeltine Cr. RSC # 8	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1



L1712039-COFC

Special Instructions / Regulations / Hazardous Details

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations:		
N.Zirnhef	07/12/2015 1630 hr	<i>lady</i>	<i>Dec 8</i>	<i>9:40 AM</i>	<i>-2.0 C</i>			Yes / No ? If Yes attach SIF		



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 08-DEC-15
Report Date: 18-JAN-16 12:34 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1712040
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc: 42281

Can Dang
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1712040-1 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR.PCC#1	L1712040-2 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR.PCC#2	L1712040-3 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR.PCC#2	L1712040-4 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR.PCC#4	L1712040-5 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR.PCC#5
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	76.6	74.9	72.8	73.8	76.7
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	48.3	5.2	<2.0	2.3
	Aluminum (Al)-Total (mg/kg wwt)	0.42	12.1	1.41	<0.40	0.53
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.186	0.339	0.173	0.178	0.147
	Arsenic (As)-Total (mg/kg wwt)	0.0435	0.0849	0.0470	0.0466	0.0343
	Barium (Ba)-Total (mg/kg)	2.87	4.12	3.61	4.15	3.67
	Barium (Ba)-Total (mg/kg wwt)	0.672	1.03	0.982	1.09	0.854
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.158	0.249	0.114	0.165	0.163
	Cadmium (Cd)-Total (mg/kg wwt)	0.0371	0.0625	0.0309	0.0433	0.0379
	Calcium (Ca)-Total (mg/kg)	48600	38500	36800	35000	46400
	Calcium (Ca)-Total (mg/kg wwt)	11400	9660	10000	9180	10800
	Cesium (Cs)-Total (mg/kg)	0.0831	0.0581	0.0619	0.0803	0.103
	Cesium (Cs)-Total (mg/kg wwt)	0.0194	0.0146	0.0169	0.0211	0.0240
	Chromium (Cr)-Total (mg/kg)	0.060	0.550	0.124	0.075	0.127
	Chromium (Cr)-Total (mg/kg wwt)	0.014	0.138	0.034	0.020	0.030
	Cobalt (Co)-Total (mg/kg)	0.073	0.148	0.051	0.107	0.087
	Cobalt (Co)-Total (mg/kg wwt)	0.0171	0.0372	0.0138	0.0280	0.0202
	Copper (Cu)-Total (mg/kg)	2.23	2.48	1.92	2.72	2.33
	Copper (Cu)-Total (mg/kg wwt)	0.521	0.622	0.522	0.715	0.542
	Iron (Fe)-Total (mg/kg)	56.5	194	67.0	66.8	70.7
	Iron (Fe)-Total (mg/kg wwt)	13.2	48.7	18.2	17.5	16.4
	Lead (Pb)-Total (mg/kg)	0.031	0.041	0.044	0.044	0.033
	Lead (Pb)-Total (mg/kg wwt)	0.0071	0.0102	0.0121	0.0115	0.0076
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1690	1540	1480	1400	1760
	Magnesium (Mg)-Total (mg/kg wwt)	395	387	402	368	409
	Manganese (Mn)-Total (mg/kg)	9.97	11.9	9.01	11.1	12.1
	Manganese (Mn)-Total (mg/kg wwt)	2.33	2.98	2.45	2.92	2.81

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1712040-6 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR.PCC#6	L1712040-7 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR.PCC#7	L1712040-8 Tissue 20-SEP-15 08:00 QUL NEAR HAZELTINE CR.PCC#8	
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)	72.7	76.6	77.3	
Metals	Aluminum (Al)-Total (mg/kg)	2.1	7.5	3.6	
	Aluminum (Al)-Total (mg/kg wwt)	0.58	1.75	0.81	
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	
	Arsenic (As)-Total (mg/kg)	0.685	0.481	0.285	
	Arsenic (As)-Total (mg/kg wwt)	0.187	0.113	0.0648	
	Barium (Ba)-Total (mg/kg)	2.24	3.17	5.20	
	Barium (Ba)-Total (mg/kg wwt)	0.613	0.743	1.18	
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	
	Cadmium (Cd)-Total (mg/kg)	0.284	0.224	0.144	
	Cadmium (Cd)-Total (mg/kg wwt)	0.0776	0.0524	0.0328	
	Calcium (Ca)-Total (mg/kg)	30200	41300	50000	
	Calcium (Ca)-Total (mg/kg wwt)	8240	9680	11300	
	Cesium (Cs)-Total (mg/kg)	0.0817	0.0906	0.0442	
	Cesium (Cs)-Total (mg/kg wwt)	0.0223	0.0212	0.0100	
	Chromium (Cr)-Total (mg/kg)	0.142	0.193	0.081	
	Chromium (Cr)-Total (mg/kg wwt)	0.039	0.045	0.018	
	Cobalt (Co)-Total (mg/kg)	0.064	0.111	0.093	
	Cobalt (Co)-Total (mg/kg wwt)	0.0176	0.0260	0.0211	
	Copper (Cu)-Total (mg/kg)	1.95	2.73	2.43	
	Copper (Cu)-Total (mg/kg wwt)	0.533	0.639	0.552	
	Iron (Fe)-Total (mg/kg)	56.2	85.0	77.3	
	Iron (Fe)-Total (mg/kg wwt)	15.3	19.9	17.5	
	Lead (Pb)-Total (mg/kg)	0.030	0.022	0.025	
	Lead (Pb)-Total (mg/kg wwt)	0.0082	0.0052	0.0058	
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	
	Magnesium (Mg)-Total (mg/kg)	1310	1560	1950	
	Magnesium (Mg)-Total (mg/kg wwt)	359	365	444	
	Manganese (Mn)-Total (mg/kg)	5.72	9.45	16.1	
	Manganese (Mn)-Total (mg/kg wwt)	1.56	2.21	3.66	

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1712040-1	L1712040-2	L1712040-3	L1712040-4	L1712040-5
		Description	Tissue	Tissue	Tissue	Tissue	Tissue
		Sampled Date	20-SEP-15	20-SEP-15	20-SEP-15	20-SEP-15	20-SEP-15
		Sampled Time	08:00	08:00	08:00	08:00	08:00
		Client ID	QUL NEAR HAZELTINE CR.PCC#1	QUL NEAR HAZELTINE CR.PCC#2	QUL NEAR HAZELTINE CR.PCC#2	QUL NEAR HAZELTINE CR.PCC#4	QUL NEAR HAZELTINE CR.PCC#5
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)		0.614	0.479	0.296	0.462	0.493
	Mercury (Hg)-Total (mg/kg wwt)		0.144	0.120	0.0805	0.121	0.115
	Molybdenum (Mo)-Total (mg/kg)		0.095	0.139	0.072	0.068	0.084
	Molybdenum (Mo)-Total (mg/kg wwt)		0.0222	0.0348	0.0195	0.0178	0.0195
	Nickel (Ni)-Total (mg/kg)		<0.20	0.43	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)		<0.040	0.109	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)		33600	27600	26900	25500	32800
	Phosphorus (P)-Total (mg/kg wwt)		7860	6910	7320	6680	7630
	Potassium (K)-Total (mg/kg)		13700	13400	12700	12900	14400
	Potassium (K)-Total (mg/kg wwt)		3200	3350	3460	3380	3350
	Rubidium (Rb)-Total (mg/kg)		15.0	15.1	12.4	14.5	16.7
	Rubidium (Rb)-Total (mg/kg wwt)		3.51	3.80	3.36	3.81	3.89
	Selenium (Se)-Total (mg/kg)		2.56	4.12	3.24	2.82	3.75
	Selenium (Se)-Total (mg/kg wwt)		0.599	1.03	0.881	0.740	0.874
	Sodium (Na)-Total (mg/kg)		4190	3650	3110	3590	4030
	Sodium (Na)-Total (mg/kg wwt)		981	914	846	941	937
	Strontium (Sr)-Total (mg/kg)		105	70.9	66.7	69.8	101
	Strontium (Sr)-Total (mg/kg wwt)		24.5	17.8	18.1	18.3	23.5
	Tellurium (Te)-Total (mg/kg)		<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)		0.0088	0.0073	0.0025	0.0030	0.0086
	Thallium (Tl)-Total (mg/kg wwt)		0.00207	0.00183	0.00067	0.00080	0.00199
	Tin (Sn)-Total (mg/kg)		0.11	0.11	<0.10	0.13	0.17
	Tin (Sn)-Total (mg/kg wwt)		0.026	0.027	<0.020	0.034	0.040
	Uranium (U)-Total (mg/kg)		0.0611	0.0311	0.0375	0.0218	0.0212
	Uranium (U)-Total (mg/kg wwt)		0.0143	0.00780	0.0102	0.00571	0.00495
	Vanadium (V)-Total (mg/kg)		<0.10	0.30	0.14	0.11	<0.10
	Vanadium (V)-Total (mg/kg wwt)		<0.020	0.075	0.038	0.030	<0.020
	Zinc (Zn)-Total (mg/kg)		99.8	97.2	93.1	101	119
	Zinc (Zn)-Total (mg/kg wwt)		23.3	24.4	25.3	26.4	27.8
	Zirconium (Zr)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040
Aggregate Organics	Lipid Content (% wwt)		1.9	5.4	3.0	1.8	2.6

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1712040-6	L1712040-7	L1712040-8
		Description	Tissue	Tissue	Tissue
		Sampled Date	20-SEP-15	20-SEP-15	20-SEP-15
		Sampled Time	08:00	08:00	08:00
		Client ID	QUL NEAR HAZELTINE CR.PCC#6	QUL NEAR HAZELTINE CR.PCC#7	QUL NEAR HAZELTINE CR.PCC#8
Grouping	Analyte				
TISSUE					
Metals	Mercury (Hg)-Total (mg/kg)		0.528	0.574	0.356
	Mercury (Hg)-Total (mg/kg wwt)		0.144	0.134	0.0808
	Molybdenum (Mo)-Total (mg/kg)		0.080	0.080	0.080
	Molybdenum (Mo)-Total (mg/kg wwt)		0.0220	0.0187	0.0181
	Nickel (Ni)-Total (mg/kg)		<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)		0.050	0.044	<0.040
	Phosphorus (P)-Total (mg/kg)		23100	29600	36200
	Phosphorus (P)-Total (mg/kg wwt)		6300	6920	8220
	Potassium (K)-Total (mg/kg)		12200	13400	14900
	Potassium (K)-Total (mg/kg wwt)		3340	3130	3370
	Rubidium (Rb)-Total (mg/kg)		16.7	17.7	13.8
	Rubidium (Rb)-Total (mg/kg wwt)		4.57	4.14	3.14
	Selenium (Se)-Total (mg/kg)		2.75	3.07	2.36
	Selenium (Se)-Total (mg/kg wwt)		0.752	0.720	0.535
	Sodium (Na)-Total (mg/kg)		3230	3900	4120
	Sodium (Na)-Total (mg/kg wwt)		883	914	935
	Strontium (Sr)-Total (mg/kg)		55.9	81.0	89.5
	Strontium (Sr)-Total (mg/kg wwt)		15.3	19.0	20.3
	Tellurium (Te)-Total (mg/kg)		<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)		0.0065	0.0078	0.0056
	Thallium (Tl)-Total (mg/kg wwt)		0.00177	0.00182	0.00127
	Tin (Sn)-Total (mg/kg)		<0.10	0.19	0.13
	Tin (Sn)-Total (mg/kg wwt)		<0.020	0.044	0.029
	Uranium (U)-Total (mg/kg)		0.0394	0.0213	0.0418
	Uranium (U)-Total (mg/kg wwt)		0.0108	0.00500	0.00949
	Vanadium (V)-Total (mg/kg)		<0.10	<0.10	0.13
	Vanadium (V)-Total (mg/kg wwt)		<0.020	0.021	0.029
	Zinc (Zn)-Total (mg/kg)		84.0	135	126
	Zinc (Zn)-Total (mg/kg wwt)		22.9	31.6	28.5
	Zirconium (Zr)-Total (mg/kg)		<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040
Aggregate Organics	Lipid Content (% wwt)		5.7	1.9	2.1

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7
This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.			
HG-WET-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.			
LIPIDS-GRAV-VA	Tissue	Lipids in Tissue by Gravimetric	EPA 3570, 8290
A portion of homogenized sample is extracted with dichloromethane. The extract is evaporated to dryness and the lipid content determined gravimetrically.			
MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A
This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).			
Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.			
MET-WET-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).			
Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.			
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Colleen Hughes	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
Phone: 250-790-2215 Fax:	Email 2:	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Analysis Request

Company:	Job #:	Please indicate below Filtered, Preserved or both (F, P, F/P)
Contact:	PO / AFE:	
Address:	Legal Site Description: 42281	
Phone: Fax:	Quote #:	

Lab Work Order # (lab use only)	ALS Contact: Can Dang	Sampler: Dolighan, Zirnheit
------------------------------------	-----------------------	-----------------------------

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	T-metals(HRCP-MS)(We&D)	Moisture	% Lipid	Mercury MDL < 0.1 mg/kg ww												Number of Containers
	QUL near Hazeltine Cr.PCC # 1	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Hazeltine Cr.PCC # 2	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Hazeltine Cr.PCC # 3	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Hazeltine Cr.PCC # 4	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Hazeltine Cr.PCC # 5	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Hazeltine Cr.PCC # 6	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Hazeltine Cr.PCC # 7	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Hazeltine Cr.PCC # 8	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1



L1712040-COFC

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)		
Released by: N.Zirnheit	Date & Time: Dec. 7, 2015	Received by: lady	Date: Dec. 8	Time: 9:40 AM	Temperature: -20°C	Verified by:	Date & Time:	Observations: Yes / No? If Yes attach SIF



Sample Receipt Confirmation

Report Distribution:

Company Name: MOUNT POLLEY MINING CORP.
Contact: Colleen Hughes
Address: PO Box 12,
Likely, BC, V0L 1N0
Phone: 250-790-2215
Fax: 250-790-2268
Email: chughes@mountpolley.com
kcmcahen@mountpolley.com
slitke@mountpolley.com
EDD Email: chughes@mountpolley.com
kcmcahen@mountpolley.com
slitke@mountpolley.com
Distribution: Hard Copy: N Email: Y Fax: N EDD: Y

Invoice Distribution:

Acct Name: MOUNT POLLEY MINING CORP.
Contact: Accounts Payable
Address: PO Box 12,
Likely, BC, V0L 1N0
Phone: 250-790-2215
Fax: --
Invoice Email: prosette@mountpolley.com
chughes@mountpolley.com
Project #: N/A
Account #: MPM100

Client Information:

Job Reference #:
Project PO #:
Legal Site Description: 42281
Quote #: N/A
Date Sampled: 20-SEP-15
Date Received: 08-DEC-15
Sampled By: Dolighan,Zirnhel
Chain Of Custody: --

Workorder Summary:

Lab Work Order #: L1712040
Estimated completion date: 17-DEC-15
8 Samples received at ALS in: VANCOUVER
Account Manager: Can Dang
Estimated sample disposal date: See Sample Disposal Information section below.

Lab Sample ID	Client Sample ID	Date Sampled	Date Received	Sample Due Date	Priority Flag	Sample Type	Client Job#
L1712040-1	QUL NEAR HAZELTINE CR.PCC#1	20-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712040-2	QUL NEAR HAZELTINE CR.PCC#2	20-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712040-3	QUL NEAR HAZELTINE CR.PCC#2	20-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712040-4	QUL NEAR HAZELTINE CR.PCC#4	20-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712040-5	QUL NEAR HAZELTINE CR.PCC#5	20-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712040-6	QUL NEAR HAZELTINE CR.PCC#6	20-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712040-7	QUL NEAR HAZELTINE CR.PCC#7	20-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	
L1712040-8	QUL NEAR HAZELTINE CR.PCC#8	20-SEP-15 08:00	08-DEC-15 09:40	17-DEC-15		Tissue	



Analysis Requested :

	Sample Handling and Disposal Fee	Mercury in Tissue by CVAFS [DRY]	Mercury in Tissue by CVAFS [WET]	Lipids in Tissue by Gravimetric	Metals in Tissue by CRC ICPMS [DRY]	Metals in Tissue by CRC ICPMS [WET]	% Moisture in Tissues	Tissue/Vegetation Sample Preparation
QUL NEAR HAZELTINE CR.PCC#1	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR HAZELTINE CR.PCC#2	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR HAZELTINE CR.PCC#2	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR HAZELTINE CR.PCC#4	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR HAZELTINE CR.PCC#5	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR HAZELTINE CR.PCC#6	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR HAZELTINE CR.PCC#7	✓	✓	✓	✓	✓	✓	✓	✓
QUL NEAR HAZELTINE CR.PCC#8	✓	✓	✓	✓	✓	✓	✓	✓

Sample Integrity Observations: No observations were identified for this work order submission.

Sample Disposal Information:

Where possible, ALS will store samples for 30 days from the date a final report is issued, or 30 days from the date samples are placed on hold without analytical requests, after which samples may be discarded. Air samples collected on re-usable media are an exception, and are stored for 7 days from the date a final report is issued. Longer storage times are available upon request.

For information about ALS accreditations and certifications please contact your Account Manager or visit our webpage at www.alsglobal.com (see Canada downloads).

ALS Group strives to deliver on-time results to our clients at all times. However, there are times when due to capacity issues or other unforeseen circumstances we are unable to meet our expected turnaround times. The information above is related to a recent workorder you have submitted to our laboratory. In the event that you have an inquiry, please refer to the Lab Work Order # when calling your Account Manager.

ALS Group appreciates your business. Thank you for the opportunity to work with you.



Report to:	Report Format / Distribution	Service Requested: (rush - subject to availability)
Company: MOUNT POLLEY MINING CORP.	<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Default)
Contact: Colleen Hughes	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge
Address: PO BOX 12, Likely, BC, V0L 1N0	Email 1: on file	<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge
Phone: 250-790-2215 Fax:	Email 2:	<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No	Client / Project Information:	Analysis Request

Company:	Job #:	Please indicate below Filtered, Preserved or both (F, P, F/P)
Contact:	PO / AFE:	
Address:	Legal Site Description: 42281	
Phone: Fax:	Quote #:	

Lab Work Order # (lab use only)	ALS Contact: Can Dang	Sampler: Dolghan, Zirnheit
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Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	T-metals(HRCP-MS)(We&D)	Moisture	% Lipid	Mercury MDL < 0.1 mg/kg ww												Number of Containers
	QUL near Hazeltine Cr.PCC # 1	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Hazeltine Cr.PCC # 2	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Hazeltine Cr.PCC # 3	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Hazeltine Cr.PCC # 4	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Hazeltine Cr.PCC # 5	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Hazeltine Cr.PCC # 6	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Hazeltine Cr.PCC # 7	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1
	QUL near Hazeltine Cr. PCC # 8	20-Sep-15	8:00-16:15	Tissue	X	X	X	X												1



L1712040-COFC

Special Instructions / Regulations / Hazardous Details

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)		
Released by: N.Zirnheit	Date & Time: Dec. 7, 2015	Received by: lady	Date: Dec. 8	Time: 9:40 AM	Temperature: -20°C	Verified by:	Date & Time:	Observations: Yes / No? If Yes attach SIF



8081 Lougheed Highway
Burnaby, British Columbia V5A 1W9
T: +1 604 253 4188
F: +1 604 253 6700
www.alsglobal.com

June 3, 2016

Trish Miller
Golder Associates
Suite 200-2920 Virtual Way
Vancouver, BC V5M 0C4

Dear Ms. Miller

RE: SUMMARY OF SELENIUM IN TISSUE DATA VERIFICATION FOR MOUNT POLLEY MINING CORPORATION FRYPAN GONAD TISSUE SAMPLES - ALS WORK ORDER L1621080 - ALS CORRECTIVE ACTION REPORT (CAR) #143968

On June 3, 2015, ALS received 34 tissue samples from Mount Polley Mining Corporation (MPMC). The samples were analysed for trace metals and reported on July 6, 2015. These methods included collision cell mass spectrometry (CCMS) and high resolution mass spectrometry (HRMS). Golder Associates requested a verification of the gonad tissue data on May 27, 2016 due to some higher than expected Selenium results.

ALS data verifications include a review of the original data, and when feasible, ALS retests the original sample digests and performs at least one additional analysis of the original tissue sample. In the case of the above referenced samples from 2015, the original sample digests and any remaining tissue samples had been disposed of as per ALS policy. At the request of Golder, ALS has checked again and confirmed that there is no remaining sample volume available for any of the referenced samples.

The data verification steps performed by ALS were exhaustive and included the following:

- review of the sample preparation information
- review of sample weights used for the tissue digestion
- review of the sample data factors and calculations, including moisture calculations
- review of all instrument and method quality control results associated with the samples

No errors of any kind were uncovered during this data review.

Please note that a copy of the laboratory QC report for this batch has been included with this letter. All method QC carried out with this batch of samples met all required QC criteria. The QC samples included Method Blanks, Laboratory Duplicates, Certified Reference Materials (CRM) and Laboratory Control Samples (LCS). In addition to the Method QC associated with this batch, all instrument QC data was also re-reviewed and confirmed to have met all required criteria.

All gonad samples in this submission were weighed and digested on a wet weight basis and then analysed by collision cell mass spectrometry (CCMS) with the exception of the



sample identified as “FRYPAN CR. RB-4 – GONAD”. For this sample, less tissue volume was submitted for analysis, requiring that this sample be dried prior to digestion. In order to meet the requested detection limits, this particular sample was then analysed by high resolution mass spectrometry (HRMS). A summary of how samples were weighed for digestion (i.e. wet (as-is) or dry), and which instrumentation they were analysed by, is outlined in Table 1 below.

Table 1. Summary of Wet/Dry Sample Digestion Information & Instrumental Analysis Technique Used for All Gonad Samples in ALS File L1621080

ALS Sample Number L1621080	Golder Sample ID	Sample Weighed Wet or Dry	Instrumental Methodology
4	FRYPAN CR. RB-1 - GONAD	Wet	CCMS
6	FRYPAN CR. RB-1X - GONAD	Wet	CCMS
10	FRYPAN CR. RB-2 - GONAD	Wet	CCMS
14	FRYPAN CR. RB-3 - GONAD	Wet	CCMS
18	FRYPAN CR. RB-4 - GONAD	Dry	HRMS
22	FRYPAN CR. RB-5 - GONAD	Wet	CCMS
26	FRYPAN CR. RB-6 - GONAD	Wet	CCMS
30	FRYPAN CR. RB-7 - GONAD	Wet	CCMS
34	FRYPAN CR. RB-8 - GONAD	Wet	CCMS

A summary of the two methods used for the preparation and analysis of the referenced samples is outlined below:

Metals in Tissue by CCMS

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized, sub-sampled and weighed for digestion as-is (i.e. wet) prior to hotblock digestion with nitric and hydrochloric acids, in combination with the addition of hydrogen peroxide. A separate aliquot of the homogenized tissue is sub-sampled and analysed for moisture content. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A). The moisture content results are used to convert the tissue metals results from wet weight results (mg/kg wwt) to dry weight results (mg/kg).

Metals in Tissue by HR-ICPMS

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled as-is (i.e. wet) and then dried at ≤60° prior to hotblock digestion with nitric and hydrochloric acids, in combination with the addition of hydrogen peroxide. Instrumental analysis is by high resolution inductively coupled plasma mass spectrometry (modified from US EPA Method 200.8, Revision 5.5).



Based on our thorough review of the metals data for this submission, we have not found any errors or possible problems with this data set.

If you have any questions or concerns, or require any additional information, please feel free to contact either of the undersigned.

Sincerely,

Katherine B. Thomas, B.Sc.
Operations Manager - Vancouver

Jerry Holzbecher, B.Sc.
Client Services Manager - Vancouver



MOUNT POLLEY MINING CORP.
ATTN: Colleen Hughes
PO Box 12
Likely BC VOL 1N0

Date Received: 03-JUN-15
Report Date: 06-JUL-15 15:26 (MT)
Version: FINAL

Client Phone: 250-790-2215

Certificate of Analysis

Lab Work Order #: L1621080
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: FT-1
Legal Site Desc:

Can Dang
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1621080-1 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-1 - MUSCLE	L1621080-2 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-1 - LIVER	L1621080-3 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-1 - KIDNEY	L1621080-4 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-1 - GONAD	L1621080-5 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-1X - MUSCLE
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)				
	81.0	77.2	83.0	62.2	80.2
Metals	Aluminum (Al)-Total (mg/kg)				
	<2.0	<5.0	<5.0	<2.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)				
	<0.40	<1.0	<1.0	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	0.0033	<0.0020
	Arsenic (As)-Total (mg/kg)				
	<0.020	0.037	0.343	<0.020	0.028
	Arsenic (As)-Total (mg/kg wwt)				
	<0.0040	0.0084	0.0584	0.0042	0.0056
	Barium (Ba)-Total (mg/kg)				
	0.058	0.052	0.221	0.150	0.149
	Barium (Ba)-Total (mg/kg wwt)				
	0.011	0.012	0.038	0.057	0.030
	Beryllium (Be)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)				
	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)				
	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)				
	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)				
	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)				
	<0.0050	0.131	0.914	<0.0050	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)				
	<0.0010	0.0299	0.156	<0.0010	<0.0010
	Calcium (Ca)-Total (mg/kg)				
	1060	316	1440	1120	1010
	Calcium (Ca)-Total (mg/kg wwt)				
	202	72.0	245	425	200
	Cesium (Cs)-Total (mg/kg)				
	0.0605	0.0386	0.0608	0.0148	0.0684
	Cesium (Cs)-Total (mg/kg wwt)				
	0.0115	0.0088	0.0104	0.0056	0.0136
	Chromium (Cr)-Total (mg/kg)				
	<0.050	<0.20	0.21	<0.050	<0.050
	Chromium (Cr)-Total (mg/kg wwt)				
	<0.010	<0.040	<0.040	0.013	<0.010
	Cobalt (Co)-Total (mg/kg)				
	<0.020	0.095	0.840	0.070	<0.020
	Cobalt (Co)-Total (mg/kg wwt)				
	<0.0040	0.0217	0.143	0.0266	<0.0040
	Copper (Cu)-Total (mg/kg)				
	2.28	30.8	7.10	6.55	2.34
	Copper (Cu)-Total (mg/kg wwt)				
	0.433	7.01	1.21	2.48	0.464
	Iron (Fe)-Total (mg/kg)				
	34.4	2110	709	40.0	30.8
	Iron (Fe)-Total (mg/kg wwt)				
	6.53	481	121	15.1	6.10
	Lead (Pb)-Total (mg/kg)				
	<0.020	<0.050	<0.050	<0.020	<0.020
	Lead (Pb)-Total (mg/kg wwt)				
	<0.0040	<0.010	<0.010	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg)				
	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)				
	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)				
	1210	691	1060	1500	1210
	Magnesium (Mg)-Total (mg/kg wwt)				
	231	157	181	566	239
	Manganese (Mn)-Total (mg/kg)				
	0.684	7.79	1.95	2.67	0.656
	Manganese (Mn)-Total (mg/kg wwt)				
	0.130	1.77	0.333	1.01	0.130

ALS ENVIRONMENTAL ANALYTICAL REPORT

06-JUL-15 15:26 (MT)

Version: FINAL

Sample ID Description Sampled Date Sampled Time Client ID		L1621080-6 Tissue 14-MAY-15 16:15 FRYPAN CR. RB- 1X - GONAD	L1621080-7 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-2 - MUSCLE	L1621080-8 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-2 - LIVER	L1621080-9 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-2 - KIDNEY	L1621080-10 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-2 - GONAD
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	61.3	80.8	78.3	80.5	61.0
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<2.0	<5.0	<5.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<0.40	<1.0	<1.0	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	<0.020	0.045	0.045	0.358	0.024
	Arsenic (As)-Total (mg/kg wwt)	0.0065	0.0086	0.0098	0.0697	0.0095
	Barium (Ba)-Total (mg/kg)	0.145	<0.050	<0.050	0.160	0.092
	Barium (Ba)-Total (mg/kg wwt)	0.056	<0.010	<0.010	0.031	0.036
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	0.0087	0.058	1.31	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	0.0017	0.0127	0.256	0.0011
	Calcium (Ca)-Total (mg/kg)	1160	1240	366	884	1290
	Calcium (Ca)-Total (mg/kg wwt)	449	237	79.5	172	505
	Cesium (Cs)-Total (mg/kg)	0.0148	0.0551	0.0406	0.0441	0.0159
	Cesium (Cs)-Total (mg/kg wwt)	0.0057	0.0106	0.0088	0.0086	0.0062
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.050	<0.20	<0.20	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	0.015	<0.010	<0.040	<0.040	<0.010
	Cobalt (Co)-Total (mg/kg)	0.072	<0.020	0.087	0.434	0.068
	Cobalt (Co)-Total (mg/kg wwt)	0.0277	<0.0040	0.0189	0.0846	0.0267
	Copper (Cu)-Total (mg/kg)	6.81	2.45	12.7	6.41	8.14
	Copper (Cu)-Total (mg/kg wwt)	2.64	0.469	2.76	1.25	3.18
	Iron (Fe)-Total (mg/kg)	40.1	35.3	832	562	35.0
	Iron (Fe)-Total (mg/kg wwt)	15.5	6.78	181	110	13.6
	Lead (Pb)-Total (mg/kg)	<0.020	<0.020	<0.050	<0.050	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.010	<0.010	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1540	1290	697	940	1470
	Magnesium (Mg)-Total (mg/kg wwt)	596	247	151	183	573
	Manganese (Mn)-Total (mg/kg)	2.77	0.642	6.71	2.44	3.34
	Manganese (Mn)-Total (mg/kg wwt)	1.07	0.123	1.46	0.476	1.30

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1621080-11 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-3 - MUSCLE	L1621080-12 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-3 - LIVER	L1621080-13 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-3 - KIDNEY	L1621080-14 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-3 - GONAD	L1621080-15 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-4 - MUSCLE
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	82.4	80.9	85.4	64.1	78.9
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<5.0	6.1	<2.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<1.0	<1.0	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.060	0.054	0.336	0.036	0.037
	Arsenic (As)-Total (mg/kg wwt)	0.0105	0.0103	0.0490	0.0129	0.0078
	Barium (Ba)-Total (mg/kg)	<0.050	<0.050	0.228	0.164	0.088
	Barium (Ba)-Total (mg/kg wwt)	<0.010	<0.010	0.033	0.059	0.018
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	0.259	1.08	<0.0050	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	0.0496	0.157	<0.0010	<0.0010
	Calcium (Ca)-Total (mg/kg)	998	362	925	1240	1070
	Calcium (Ca)-Total (mg/kg wwt)	175	69.2	135	444	226
	Cesium (Cs)-Total (mg/kg)	0.0802	0.0516	0.0814	0.0201	0.0747
	Cesium (Cs)-Total (mg/kg wwt)	0.0141	0.0099	0.0119	0.0072	0.0158
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.20	0.22	0.070	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.040	<0.040	0.025	<0.010
	Cobalt (Co)-Total (mg/kg)	<0.020	0.116	1.62	0.116	<0.020
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040	0.0221	0.236	0.0416	0.0042
	Copper (Cu)-Total (mg/kg)	2.44	126	5.95	11.2	2.76
	Copper (Cu)-Total (mg/kg wwt)	0.428	24.2	0.868	4.02	0.583
	Iron (Fe)-Total (mg/kg)	39.6	2970	1020	50.2	37.3
	Iron (Fe)-Total (mg/kg wwt)	6.97	569	148	18.0	7.87
	Lead (Pb)-Total (mg/kg)	<0.020	<0.050	<0.050	<0.020	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.010	<0.010	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1410	693	1130	1310	1240
	Magnesium (Mg)-Total (mg/kg wwt)	248	133	165	469	262
	Manganese (Mn)-Total (mg/kg)	0.490	7.97	2.13	6.81	0.692
	Manganese (Mn)-Total (mg/kg wwt)	0.086	1.53	0.310	2.44	0.146

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1621080-16 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-4 - LIVER	L1621080-17 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-4 - KIDNEY	L1621080-18 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-4 - GONAD	L1621080-19 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-5 - MUSCLE	L1621080-20 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-5 - LIVER
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	77.8	81.8	61.2	80.1	76.6
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	<5.0	<5.0	<2.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	<1.0	<1.0	<0.40	<1.0
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.056	0.121	<0.030	0.044	0.055
	Arsenic (As)-Total (mg/kg wwt)	0.0123	0.0220	0.0085	0.0087	0.0128
	Barium (Ba)-Total (mg/kg)	<0.050	0.198	0.106	<0.050	<0.050
	Barium (Ba)-Total (mg/kg wwt)	<0.010	0.036	0.041	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.079	0.645	<0.010	<0.0050	0.109
	Cadmium (Cd)-Total (mg/kg wwt)	0.0175	0.117	<0.0020	<0.0010	0.0257
	Calcium (Ca)-Total (mg/kg)	354	663	1100	789	271
	Calcium (Ca)-Total (mg/kg wwt)	78.6	121	427	157	63.6
	Cesium (Cs)-Total (mg/kg)	0.0473	0.0753	0.0187	0.0746	0.0544
	Cesium (Cs)-Total (mg/kg wwt)	0.0105	0.0137	0.0072	0.0148	0.0127
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.050	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.010	<0.040
	Cobalt (Co)-Total (mg/kg)	0.094	0.778	0.062	<0.020	0.085
	Cobalt (Co)-Total (mg/kg wwt)	0.0209	0.141	0.0240	<0.0040	0.0200
	Copper (Cu)-Total (mg/kg)	31.0	6.12	7.17	2.67	201
	Copper (Cu)-Total (mg/kg wwt)	6.89	1.11	2.78	0.529	47.2
	Iron (Fe)-Total (mg/kg)	1190	442	37.1	38.6	1360
	Iron (Fe)-Total (mg/kg wwt)	265	80.3	14.4	7.66	320
	Lead (Pb)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.020	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.0040	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	745	955	1410	1300	594
	Magnesium (Mg)-Total (mg/kg wwt)	166	174	548	258	139
	Manganese (Mn)-Total (mg/kg)	7.81	1.98	6.14	0.571	7.27
	Manganese (Mn)-Total (mg/kg wwt)	1.73	0.359	2.38	0.113	1.71

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1621080-21 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-5 - KIDNEY	L1621080-22 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-5 - GONAD	L1621080-23 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-6 - MUSCLE	L1621080-24 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-6 - LIVER	L1621080-25 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-6 - KIDNEY
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	79.6	62.5	80.8	75.2	80.5
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	<2.0	<2.0	<5.0	7.5
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	<0.40	<0.40	<1.0	1.5
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	0.013
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	0.0026
	Arsenic (As)-Total (mg/kg)	0.120	0.021	0.022	0.079	0.400
	Arsenic (As)-Total (mg/kg wwt)	0.0244	0.0079	0.0043	0.0195	0.0781
	Barium (Ba)-Total (mg/kg)	0.177	0.170	<0.050	<0.050	0.209
	Barium (Ba)-Total (mg/kg wwt)	0.036	0.064	<0.010	<0.010	0.041
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.487	<0.0050	<0.0050	0.179	1.04
	Cadmium (Cd)-Total (mg/kg wwt)	0.0992	0.0011	<0.0010	0.0445	0.203
	Calcium (Ca)-Total (mg/kg)	3820	1010	312	257	1140
	Calcium (Ca)-Total (mg/kg wwt)	779	378	59.9	63.8	222
	Cesium (Cs)-Total (mg/kg)	0.0623	0.0266	0.0466	0.0530	0.0932
	Cesium (Cs)-Total (mg/kg wwt)	0.0127	0.0100	0.0090	0.0131	0.0182
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.050	<0.050	<0.20	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	0.017	<0.010	<0.040	<0.040
	Cobalt (Co)-Total (mg/kg)	0.644	0.052	<0.020	0.068	1.13
	Cobalt (Co)-Total (mg/kg wwt)	0.131	0.0194	<0.0040	0.0168	0.221
	Copper (Cu)-Total (mg/kg)	6.44	7.92	1.15	62.1	7.96
	Copper (Cu)-Total (mg/kg wwt)	1.31	2.97	0.220	15.4	1.56
	Iron (Fe)-Total (mg/kg)	623	45.8	23.4	1950	556
	Iron (Fe)-Total (mg/kg wwt)	127	17.1	4.49	485	109
	Lead (Pb)-Total (mg/kg)	<0.050	<0.020	<0.020	<0.050	<0.050
	Lead (Pb)-Total (mg/kg wwt)	<0.010	<0.0040	<0.0040	<0.010	<0.010
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	920	1560	640	645	1270
	Magnesium (Mg)-Total (mg/kg wwt)	187	583	123	160	249
	Manganese (Mn)-Total (mg/kg)	2.30	4.92	0.190	6.42	2.07
	Manganese (Mn)-Total (mg/kg wwt)	0.469	1.84	0.036	1.59	0.405

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Sample ID Description Sampled Date Sampled Time Client ID		L1621080-26 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-6 - GONAD	L1621080-27 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-7 - MUSCLE	L1621080-28 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-7 - LIVER	L1621080-29 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-7 - KIDNEY	L1621080-30 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-7 - GONAD
Grouping	Analyte					
TISSUE						
Physical Tests	% Moisture (%)	70.9	85.0	75.2	85.0	64.5
Metals	Aluminum (Al)-Total (mg/kg)	2.0	<2.0	<5.0	6.5	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	0.59	<0.40	<1.0	<1.0	0.43
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	0.011	0.022
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	0.0078
	Arsenic (As)-Total (mg/kg)	0.031	0.033	0.050	0.329	0.021
	Arsenic (As)-Total (mg/kg wwt)	0.0089	0.0050	0.0124	0.0492	0.0076
	Barium (Ba)-Total (mg/kg)	0.197	<0.050	<0.050	0.175	0.250
	Barium (Ba)-Total (mg/kg wwt)	0.057	<0.010	<0.010	0.026	0.089
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	<0.0050	0.164	0.759	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	<0.0010	0.0408	0.114	<0.0010
	Calcium (Ca)-Total (mg/kg)	1870	1210	219	808	1480
	Calcium (Ca)-Total (mg/kg wwt)	543	182	54.5	121	528
	Cesium (Cs)-Total (mg/kg)	0.0056	0.0958	0.0260	0.0956	0.0239
	Cesium (Cs)-Total (mg/kg wwt)	0.0016	0.0144	0.0065	0.0143	0.0085
	Chromium (Cr)-Total (mg/kg)	0.088	<0.050	<0.20	<0.20	0.104
	Chromium (Cr)-Total (mg/kg wwt)	0.026	<0.010	<0.040	<0.040	0.037
	Cobalt (Co)-Total (mg/kg)	0.124	0.023	0.069	0.743	0.084
	Cobalt (Co)-Total (mg/kg wwt)	0.0360	<0.0040	0.0170	0.111	0.0298
	Copper (Cu)-Total (mg/kg)	8.95	2.45	188	6.91	9.99
	Copper (Cu)-Total (mg/kg wwt)	2.61	0.367	46.7	1.03	3.55
	Iron (Fe)-Total (mg/kg)	46.0	40.7	1710	686	46.0
	Iron (Fe)-Total (mg/kg wwt)	13.4	6.10	425	103	16.4
	Lead (Pb)-Total (mg/kg)	<0.020	<0.020	<0.050	<0.050	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.010	<0.010	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1030	1370	702	1140	1590
	Magnesium (Mg)-Total (mg/kg wwt)	299	206	174	170	567
	Manganese (Mn)-Total (mg/kg)	6.25	0.637	7.20	2.06	8.80
	Manganese (Mn)-Total (mg/kg wwt)	1.82	0.096	1.79	0.308	3.13

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Sample ID Description Sampled Date Sampled Time Client ID		L1621080-31 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-8 - MUSCLE	L1621080-32 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-8 - LIVER	L1621080-33 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-8 - KIDNEY	L1621080-34 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-8 - GONAD
Grouping	Analyte				
TISSUE					
Physical Tests	% Moisture (%)	81.4	75.8	79.9	66.6
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<5.0	6.8	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<1.0	1.4	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	0.0021	<0.0020
	Arsenic (As)-Total (mg/kg)	0.021	0.087	0.298	<0.020
	Arsenic (As)-Total (mg/kg wwt)	<0.0040	0.0209	0.0600	0.0052
	Barium (Ba)-Total (mg/kg)	<0.050	<0.050	0.218	0.171
	Barium (Ba)-Total (mg/kg wwt)	<0.010	<0.010	0.044	0.057
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	0.278	0.843	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	0.0671	0.170	<0.0010
	Calcium (Ca)-Total (mg/kg)	945	399	851	1330
	Calcium (Ca)-Total (mg/kg wwt)	176	96.4	171	444
	Cesium (Cs)-Total (mg/kg)	0.0608	0.0687	0.0752	0.0203
	Cesium (Cs)-Total (mg/kg wwt)	0.0113	0.0166	0.0151	0.0068
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.20	0.38	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.040	0.077	0.014
	Cobalt (Co)-Total (mg/kg)	0.023	0.071	1.37	0.109
	Cobalt (Co)-Total (mg/kg wwt)	0.0042	0.0172	0.276	0.0364
	Copper (Cu)-Total (mg/kg)	2.14	103	6.41	8.95
	Copper (Cu)-Total (mg/kg wwt)	0.398	24.8	1.29	2.99
	Iron (Fe)-Total (mg/kg)	60.4	3190	667	58.6
	Iron (Fe)-Total (mg/kg wwt)	11.2	771	134	19.6
	Lead (Pb)-Total (mg/kg)	<0.020	<0.050	<0.050	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.010	<0.010	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1260	830	1080	1400
	Magnesium (Mg)-Total (mg/kg wwt)	234	201	218	469
	Manganese (Mn)-Total (mg/kg)	0.625	6.08	1.84	7.99
	Manganese (Mn)-Total (mg/kg wwt)	0.116	1.47	0.371	2.67

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Sample ID Description Sampled Date Sampled Time Client ID		L1621080-1 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-1 - MUSCLE	L1621080-2 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-1 - LIVER	L1621080-3 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-1 - KIDNEY	L1621080-4 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-1 - GONAD	L1621080-5 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-1 X - MUSCLE
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.462	0.345	0.414	0.0100	0.447
	Mercury (Hg)-Total (mg/kg wwt)	0.0878	0.0785	0.0705	0.0038	0.0887
	Molybdenum (Mo)-Total (mg/kg)	<0.020	2.35	0.890	0.041	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.536	0.152	0.0154	<0.0040
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	0.37	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	0.063	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	13000	12300	13800	11600	12900
	Phosphorus (P)-Total (mg/kg wwt)	2470	2810	2350	4380	2550
	Potassium (K)-Total (mg/kg)	21700	10500	17300	6850	21500
	Potassium (K)-Total (mg/kg wwt)	4120	2400	2950	2590	4250
	Rubidium (Rb)-Total (mg/kg)	8.51	5.40	7.86	3.19	8.54
	Rubidium (Rb)-Total (mg/kg wwt)	1.62	1.23	1.34	1.20	1.69
	Selenium (Se)-Total (mg/kg)	3.56	30.6	21.7	28.0	3.77
	Selenium (Se)-Total (mg/kg wwt)	0.678	6.97	3.69	10.6	0.747
	Sodium (Na)-Total (mg/kg)	2000	6380	6370	1710	1970
	Sodium (Na)-Total (mg/kg wwt)	381	1450	1080	646	390
	Strontium (Sr)-Total (mg/kg)	1.53	0.45	2.90	3.39	1.41
	Strontium (Sr)-Total (mg/kg wwt)	0.290	0.103	0.494	1.28	0.279
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0044	0.0342	0.0951	<0.0020	0.0038
	Thallium (Tl)-Total (mg/kg wwt)	0.00084	0.00780	0.0162	<0.00040	0.00075
	Tin (Sn)-Total (mg/kg)	<0.10	0.10	0.46	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	0.024	0.078	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	0.0031	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	0.00054	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	0.32	0.39	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.072	0.066	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	20.0	116	147	57.6	18.5
	Zinc (Zn)-Total (mg/kg wwt)	3.81	26.3	25.1	21.8	3.67
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

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Sample ID Description Sampled Date Sampled Time Client ID		L1621080-6 Tissue 14-MAY-15 16:15 FRYPAN CR. RB- 1X - GONAD	L1621080-7 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-2 - MUSCLE	L1621080-8 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-2 - LIVER	L1621080-9 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-2 - KIDNEY	L1621080-10 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-2 - GONAD
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.0091	0.504	0.302	0.355	0.0089
	Mercury (Hg)-Total (mg/kg wwt)	0.0035	0.0967	0.0655	0.0691	0.0035
	Molybdenum (Mo)-Total (mg/kg)	0.041	<0.020	1.26	0.778	0.033
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0160	<0.0040	0.273	0.152	0.0131
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	0.24	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	0.047	<0.040
	Phosphorus (P)-Total (mg/kg)	12100	13700	12800	12800	11500
	Phosphorus (P)-Total (mg/kg wwt)	4680	2620	2770	2490	4490
	Potassium (K)-Total (mg/kg)	7020	22300	10400	15300	6660
	Potassium (K)-Total (mg/kg wwt)	2720	4270	2270	2990	2600
	Rubidium (Rb)-Total (mg/kg)	3.21	8.95	5.80	7.08	3.47
	Rubidium (Rb)-Total (mg/kg wwt)	1.24	1.72	1.26	1.38	1.36
	Selenium (Se)-Total (mg/kg)	28.0	3.19	19.1	14.6	19.3
	Selenium (Se)-Total (mg/kg wwt)	10.8	0.612	4.15	2.84	7.54
	Sodium (Na)-Total (mg/kg)	1800	2100	6290	4420	1500
	Sodium (Na)-Total (mg/kg wwt)	697	404	1360	862	586
	Strontium (Sr)-Total (mg/kg)	3.37	1.30	0.36	1.58	2.70
	Strontium (Sr)-Total (mg/kg wwt)	1.30	0.250	0.078	0.309	1.05
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	<0.0020	0.0032	0.0369	0.0417	<0.0020
	Thallium (Tl)-Total (mg/kg wwt)	<0.00040	0.00061	0.00801	0.00813	<0.00040
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	0.0029	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	0.00056	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	0.23	0.34	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	0.049	0.067	<0.020
	Zinc (Zn)-Total (mg/kg)	59.3	21.0	127	262	64.0
	Zinc (Zn)-Total (mg/kg wwt)	23.0	4.03	27.6	51.2	25.0
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

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Sample ID Description Sampled Date Sampled Time Client ID		L1621080-11 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-3 - MUSCLE	L1621080-12 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-3 - LIVER	L1621080-13 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-3 - KIDNEY	L1621080-14 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-3 - GONAD	L1621080-15 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-4 - MUSCLE
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.438	0.261	0.266	0.0102	0.315
	Mercury (Hg)-Total (mg/kg wwt)	0.0769	0.0500	0.0388	0.0037	0.0664
	Molybdenum (Mo)-Total (mg/kg)	<0.020	2.75	0.642	0.069	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.525	0.0937	0.0246	<0.0040
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	0.30	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	0.044	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	14100	12300	15400	10900	12400
	Phosphorus (P)-Total (mg/kg wwt)	2480	2360	2240	3910	2620
	Potassium (K)-Total (mg/kg)	23000	11200	20600	6090	19700
	Potassium (K)-Total (mg/kg wwt)	4050	2140	3000	2180	4150
	Rubidium (Rb)-Total (mg/kg)	9.04	6.34	8.60	2.88	8.38
	Rubidium (Rb)-Total (mg/kg wwt)	1.59	1.21	1.25	1.03	1.77
	Selenium (Se)-Total (mg/kg)	5.78	82.1	28.9	50.5	5.74
	Selenium (Se)-Total (mg/kg wwt)	1.02	15.7	4.21	18.1	1.21
	Sodium (Na)-Total (mg/kg)	1630	7120	5800	2560	1390
	Sodium (Na)-Total (mg/kg wwt)	286	1360	846	920	294
	Strontium (Sr)-Total (mg/kg)	1.24	0.49	2.29	3.28	1.18
	Strontium (Sr)-Total (mg/kg wwt)	0.218	0.093	0.335	1.18	0.248
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0058	0.0387	0.0830	<0.0020	0.0035
	Thallium (Tl)-Total (mg/kg wwt)	0.00102	0.00740	0.0121	<0.00040	0.00073
	Tin (Sn)-Total (mg/kg)	<0.10	0.16	0.48	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	0.031	0.070	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	0.0035	0.0049	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	0.00068	0.00072	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	0.71	0.66	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.136	0.096	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	30.0	158	164	63.2	23.1
	Zinc (Zn)-Total (mg/kg wwt)	5.27	30.2	23.9	22.7	4.88
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

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Sample ID Description Sampled Date Sampled Time Client ID		L1621080-16 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-4 - LIVER	L1621080-17 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-4 - KIDNEY	L1621080-18 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-4 - GONAD	L1621080-19 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-5 - MUSCLE	L1621080-20 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-5 - LIVER
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.167	0.182	0.0064	0.364	0.199
	Mercury (Hg)-Total (mg/kg wwt)	0.0372	0.0330	0.0025	0.0723	0.0467
	Molybdenum (Mo)-Total (mg/kg)	1.48	0.403	0.055	<0.020	1.84
	Molybdenum (Mo)-Total (mg/kg wwt)	0.329	0.0732	0.0212	<0.0040	0.432
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	13700	13700	9850	13500	12500
	Phosphorus (P)-Total (mg/kg wwt)	3050	2480	3820	2680	2930
	Potassium (K)-Total (mg/kg)	9970	15400	6120	22800	9890
	Potassium (K)-Total (mg/kg wwt)	2220	2800	2370	4520	2320
	Rubidium (Rb)-Total (mg/kg)	6.85	7.85	3.10	9.10	5.84
	Rubidium (Rb)-Total (mg/kg wwt)	1.52	1.43	1.20	1.81	1.37
	Selenium (Se)-Total (mg/kg)	44.1	18.1	35.3	6.00	97.7
	Selenium (Se)-Total (mg/kg wwt)	9.79	3.28	13.7	1.19	22.9
	Sodium (Na)-Total (mg/kg)	5460	3890	1220	1440	4730
	Sodium (Na)-Total (mg/kg wwt)	1210	706	473	285	1110
	Strontium (Sr)-Total (mg/kg)	0.32	0.91	3.20	1.06	0.35
	Strontium (Sr)-Total (mg/kg wwt)	0.072	0.165	1.24	0.211	0.081
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0311	0.107	<0.0020	0.0042	0.0266
	Thallium (Tl)-Total (mg/kg wwt)	0.00690	0.0195	<0.00040	0.00083	0.00624
	Tin (Sn)-Total (mg/kg)	0.11	0.10	<0.10	<0.10	<0.10
	Tin (Sn)-Total (mg/kg wwt)	0.023	<0.020	<0.020	<0.020	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	0.0020	<0.0020	<0.0020	0.0021
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	0.00048
	Vanadium (V)-Total (mg/kg)	0.42	0.37	<0.10	<0.10	0.41
	Vanadium (V)-Total (mg/kg wwt)	0.094	0.067	<0.020	<0.020	0.095
	Zinc (Zn)-Total (mg/kg)	105	153	49.2	18.8	121
	Zinc (Zn)-Total (mg/kg wwt)	23.3	27.8	19.1	3.73	28.3
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1621080-21	L1621080-22	L1621080-23	L1621080-24	L1621080-25
		Description	Tissue	Tissue	Tissue	Tissue	Tissue
		Sampled Date	14-MAY-15	14-MAY-15	14-MAY-15	14-MAY-15	14-MAY-15
		Sampled Time	16:15	16:15	16:15	16:15	16:15
		Client ID	FRYPAN CR. RB-5 - KIDNEY	FRYPAN CR. RB-5 - GONAD	FRYPAN CR. RB-6 - MUSCLE	FRYPAN CR. RB-6 - LIVER	FRYPAN CR. RB-6 - KIDNEY
Grouping	Analyte						
TISSUE							
Metals	Mercury (Hg)-Total (mg/kg)		0.209	0.0090	0.694	0.318	0.461
	Mercury (Hg)-Total (mg/kg wwt)		0.0426	0.0034	0.133	0.0790	0.0901
	Molybdenum (Mo)-Total (mg/kg)		0.435	0.084	<0.020	2.12	0.818
	Molybdenum (Mo)-Total (mg/kg wwt)		0.0887	0.0316	<0.0040	0.526	0.160
	Nickel (Ni)-Total (mg/kg)		0.29	<0.20	<0.20	<0.20	0.45
	Nickel (Ni)-Total (mg/kg wwt)		0.059	<0.040	<0.040	<0.040	0.088
	Phosphorus (P)-Total (mg/kg)		13200	11300	6440	13100	13200
	Phosphorus (P)-Total (mg/kg wwt)		2700	4250	1240	3260	2580
	Potassium (K)-Total (mg/kg)		16600	6710	10800	9600	17000
	Potassium (K)-Total (mg/kg wwt)		3380	2520	2070	2380	3330
	Rubidium (Rb)-Total (mg/kg)		7.04	3.39	5.29	5.97	9.56
	Rubidium (Rb)-Total (mg/kg wwt)		1.43	1.27	1.02	1.48	1.87
	Selenium (Se)-Total (mg/kg)		18.2	34.8	2.47	57.4	36.8
	Selenium (Se)-Total (mg/kg wwt)		3.72	13.0	0.475	14.2	7.19
	Sodium (Na)-Total (mg/kg)		4190	1850	828	4300	4410
	Sodium (Na)-Total (mg/kg wwt)		854	693	159	1070	861
	Strontium (Sr)-Total (mg/kg)		6.91	3.84	0.373	0.29	3.02
	Strontium (Sr)-Total (mg/kg wwt)		1.41	1.44	0.072	0.072	0.591
	Tellurium (Te)-Total (mg/kg)		<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)		0.0666	<0.0020	0.0048	0.0291	0.136
	Thallium (Tl)-Total (mg/kg wwt)		0.0136	<0.00040	0.00093	0.00722	0.0265
	Tin (Sn)-Total (mg/kg)		<0.10	<0.10	<0.10	<0.10	0.22
	Tin (Sn)-Total (mg/kg wwt)		<0.020	<0.020	<0.020	0.021	0.043
	Uranium (U)-Total (mg/kg)		0.0026	<0.0020	<0.0020	0.0052	0.0080
	Uranium (U)-Total (mg/kg wwt)		0.00053	<0.00040	<0.00040	0.00129	0.00156
	Vanadium (V)-Total (mg/kg)		0.26	<0.10	<0.10	0.68	0.65
	Vanadium (V)-Total (mg/kg wwt)		0.053	<0.020	<0.020	0.169	0.128
	Zinc (Zn)-Total (mg/kg)		173	69.0	11.4	151	218
	Zinc (Zn)-Total (mg/kg wwt)		35.3	25.8	2.19	37.4	42.6
	Zirconium (Zr)-Total (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)		<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1621080-26 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-6 - GONAD	L1621080-27 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-7 - MUSCLE	L1621080-28 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-7 - LIVER	L1621080-29 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-7 - KIDNEY	L1621080-30 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-7 - GONAD
Grouping	Analyte					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.0345	0.459	0.367	0.373	0.0111
	Mercury (Hg)-Total (mg/kg wwt)	0.0100	0.0688	0.0913	0.0559	0.0039
	Molybdenum (Mo)-Total (mg/kg)	<0.020	<0.020	2.40	0.535	0.101
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0055	<0.0040	0.595	0.0801	0.0360
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	0.41	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	0.062	<0.040
	Phosphorus (P)-Total (mg/kg)	9670	14600	12800	15400	11700
	Phosphorus (P)-Total (mg/kg wwt)	2820	2190	3170	2310	4150
	Potassium (K)-Total (mg/kg)	1110	22300	8470	19400	6500
	Potassium (K)-Total (mg/kg wwt)	324	3350	2100	2910	2310
	Rubidium (Rb)-Total (mg/kg)	0.593	11.3	5.72	10.8	3.45
	Rubidium (Rb)-Total (mg/kg wwt)	0.173	1.69	1.42	1.62	1.23
	Selenium (Se)-Total (mg/kg)	55.6	5.71	98.0	24.6	44.8
	Selenium (Se)-Total (mg/kg wwt)	16.2	0.856	24.3	3.69	15.9
	Sodium (Na)-Total (mg/kg)	7920	916	2320	3380	1320
	Sodium (Na)-Total (mg/kg wwt)	2310	137	578	507	470
	Strontium (Sr)-Total (mg/kg)	4.50	1.39	0.24	1.60	3.46
	Strontium (Sr)-Total (mg/kg wwt)	1.31	0.208	0.059	0.240	1.23
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	<0.0020	0.0054	0.0274	0.0550	<0.0020
	Thallium (Tl)-Total (mg/kg wwt)	<0.00040	0.00081	0.00682	0.00824	<0.00040
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	<0.10	0.15	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	0.022	0.024
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	0.0154	0.0155	0.0050
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	0.00383	0.00233	0.00179
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	1.06	0.69	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	0.264	0.103	<0.020
	Zinc (Zn)-Total (mg/kg)	37.7	30.2	210	225	59.1
	Zinc (Zn)-Total (mg/kg wwt)	11.0	4.52	52.1	33.7	21.0
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1621080-31 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-8 - MUSCLE	L1621080-32 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-8 - LIVER	L1621080-33 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-8 - KIDNEY	L1621080-34 Tissue 14-MAY-15 16:15 FRYPAN CR. RB-8 - GONAD
Grouping	Analyte				
TISSUE					
Metals	Mercury (Hg)-Total (mg/kg)	0.469	0.207	0.248	0.0132
	Mercury (Hg)-Total (mg/kg wwt)	0.0872	0.0501	0.0499	0.0044
	Molybdenum (Mo)-Total (mg/kg)	<0.020	2.71	0.727	0.054
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	0.655	0.146	0.0180
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	0.44	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	0.043	0.089	<0.040
	Phosphorus (P)-Total (mg/kg)	14300	13400	13800	11400
	Phosphorus (P)-Total (mg/kg wwt)	2660	3230	2780	3820
	Potassium (K)-Total (mg/kg)	22900	12300	17500	5980
	Potassium (K)-Total (mg/kg wwt)	4260	2980	3510	2000
	Rubidium (Rb)-Total (mg/kg)	10.2	8.70	8.75	3.14
	Rubidium (Rb)-Total (mg/kg wwt)	1.89	2.10	1.76	1.05
	Selenium (Se)-Total (mg/kg)	6.90	72.2	34.7	55.0
	Selenium (Se)-Total (mg/kg wwt)	1.28	17.4	6.99	18.4
	Sodium (Na)-Total (mg/kg)	1980	3410	5240	2440
	Sodium (Na)-Total (mg/kg wwt)	368	824	1060	815
	Strontium (Sr)-Total (mg/kg)	1.16	0.45	1.98	3.30
	Strontium (Sr)-Total (mg/kg wwt)	0.216	0.108	0.399	1.10
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0036	0.0301	0.0936	<0.0020
	Thallium (Tl)-Total (mg/kg wwt)	0.00066	0.00728	0.0188	<0.00040
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	0.37	<0.10
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	0.075	<0.020
	Uranium (U)-Total (mg/kg)	<0.0020	0.0057	0.0070	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	0.00137	0.00140	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	1.11	0.74	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	0.267	0.149	<0.020
	Zinc (Zn)-Total (mg/kg)	24.8	236	193	61.0
	Zinc (Zn)-Total (mg/kg wwt)	4.61	57.1	38.9	20.4
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7
This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.			
HG-DRY-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (DRY)	EPA 200.3, EPA 245.7
This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.			
HG-WET-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (WET)	EPA 200.3, EPA 245.7
This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.			
HG-WET-MICR-CVAF-VA	Tissue	Mercury in Tissue by CVAFS Micro (WET)	EPA 200.3, EPA 245.7
This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.			
MET-DRY-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (DRY)	EPA 200.3/6020A
This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).			
Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.			
MET-DRY-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (DRY)	EPA 200.3/200.8
Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.			
Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.			
MET-WET-CCMS-N-VA	Tissue	Metals in Tissue by CRC ICPMS (WET)	EPA 200.3/6020A
This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).			
Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.			
MET-WET-MICR-HRMS-VA	Tissue	Metals in Tissue by HR-ICPMS Micro (WET)	EPA 200.3/200.8
Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on wet weight basis.			
Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.			
MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A
This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
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Chain of Custody Numbers:

Reference Information

FT-1

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1621080

Report Date: 03-JUN-16

Page 1 of 21

Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-DRY-CVAFS-N-VA Tissue								
Batch R3217624								
WG2114282-3 CRM		VA-NIST-1566B						
Mercury (Hg)-Total			99.8		%		70-130	30-JUN-15
WG2114282-2 DUP		L1621080-11						
Mercury (Hg)-Total		0.438	0.487		mg/kg	11	40	30-JUN-15
WG2114282-1 MB								
Mercury (Hg)-Total			<0.0050		mg/kg		0.005	30-JUN-15
HG-DRY-MICR-CVAF-VA Tissue								
Batch R3216198								
WG2112362-4 CRM		VA-NIST-1566B						
Mercury (Hg)-Total			96.0		%		70-130	28-JUN-15
WG2112362-3 DUP		L1621080-8						
Mercury (Hg)-Total		0.302	0.313		mg/kg	3.7	30	28-JUN-15
WG2112362-5 LCS								
Mercury (Hg)-Total			106.9		%		70-130	28-JUN-15
WG2112362-1 MB								
Mercury (Hg)-Total			<0.0050		mg/kg		0.005	28-JUN-15
WG2112362-2 MB								
Mercury (Hg)-Total			<0.0050		mg/kg		0.005	28-JUN-15
HG-WET-CVAFS-N-VA Tissue								
Batch R3217623								
WG2114282-3 CRM		VA-NIST-1566B						
Mercury (Hg)-Total			99.8		%		70-130	30-JUN-15
WG2114282-2 DUP		L1621080-11						
Mercury (Hg)-Total		0.0769	0.0855		mg/kg wwt	11	40	30-JUN-15
WG2114282-1 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	30-JUN-15
HG-WET-MICR-CVAF-VA Tissue								
Batch R3216194								
WG2112362-4 CRM		VA-NIST-1566B						
Mercury (Hg)-Total			96.0		%		70-130	28-JUN-15
WG2112362-3 DUP		L1621080-8						
Mercury (Hg)-Total		0.0655	0.0680		mg/kg wwt	3.7	30	28-JUN-15
WG2112362-5 LCS								
Mercury (Hg)-Total			106.9		%		70-130	28-JUN-15
WG2112362-1 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	28-JUN-15
WG2112362-2 MB								



Quality Control Report

Workorder: L1621080

Report Date: 03-JUN-16

Page 2 of 21

Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-WET-MICR-CVAF-VA Tissue								
Batch R3216194								
WG2112362-2 MB								
Mercury (Hg)-Total			<0.0010		mg/kg wwt		0.001	28-JUN-15
MET-DRY-CCMS-N-VA Tissue								
Batch R3219162								
WG2114282-3 CRM VA-NIST-1566B								
Antimony (Sb)-Total			0.009		mg/kg		0-0.018	30-JUN-15
Arsenic (As)-Total			98.7		%		70-130	30-JUN-15
Barium (Ba)-Total			96.8		%		70-130	30-JUN-15
Boron (B)-Total			97.7		%		70-130	30-JUN-15
Cadmium (Cd)-Total			100.2		%		70-130	30-JUN-15
Calcium (Ca)-Total			93.5		%		70-130	30-JUN-15
Chromium (Cr)-Total			91.7		%		70-130	30-JUN-15
Cobalt (Co)-Total			95.6		%		70-130	30-JUN-15
Copper (Cu)-Total			96.8		%		70-130	30-JUN-15
Iron (Fe)-Total			99.5		%		70-130	30-JUN-15
Lead (Pb)-Total			100.6		%		70-130	30-JUN-15
Magnesium (Mg)-Total			94.3		%		70-130	30-JUN-15
Manganese (Mn)-Total			96.4		%		70-130	30-JUN-15
Molybdenum (Mo)-Total			98.6		%		70-130	30-JUN-15
Nickel (Ni)-Total			102.5		%		70-130	30-JUN-15
Phosphorus (P)-Total			105.8		%		70-130	30-JUN-15
Potassium (K)-Total			96.7		%		70-130	30-JUN-15
Rubidium (Rb)-Total			102.3		%		70-130	30-JUN-15
Selenium (Se)-Total			100.7		%		70-130	30-JUN-15
Sodium (Na)-Total			93.6		%		70-130	30-JUN-15
Strontium (Sr)-Total			91.4		%		70-130	30-JUN-15
Uranium (U)-Total			95.9		%		70-130	30-JUN-15
Vanadium (V)-Total			97.9		%		70-130	30-JUN-15
Zinc (Zn)-Total			94.8		%		70-130	30-JUN-15
WG2114282-2 DUP L1621080-11								
Aluminum (Al)-Total		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	30-JUN-15
Antimony (Sb)-Total		<0.010	<0.010	RPD-NA	mg/kg	N/A	40	30-JUN-15
Arsenic (As)-Total		0.060	0.052		mg/kg	14	40	30-JUN-15
Barium (Ba)-Total		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	30-JUN-15



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA								
	Tissue							
Batch	R3219162							
WG2114282-2	DUP	L1621080-11						
Beryllium (Be)-Total		<0.010	<0.010	RPD-NA	mg/kg	N/A	40	30-JUN-15
Bismuth (Bi)-Total		<0.010	<0.010	RPD-NA	mg/kg	N/A	40	30-JUN-15
Boron (B)-Total		<1.0	<1.0	RPD-NA	mg/kg	N/A	40	30-JUN-15
Cadmium (Cd)-Total		<0.0050	<0.0050	RPD-NA	mg/kg	N/A	40	30-JUN-15
Calcium (Ca)-Total		998	646		mg/kg	43	60	30-JUN-15
Cesium (Cs)-Total		0.0802	0.0832		mg/kg	3.6	40	30-JUN-15
Chromium (Cr)-Total		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	30-JUN-15
Cobalt (Co)-Total		<0.020	<0.020	RPD-NA	mg/kg	N/A	40	30-JUN-15
Copper (Cu)-Total		2.44	1.96		mg/kg	22	40	30-JUN-15
Iron (Fe)-Total		39.6	37.7		mg/kg	5.0	40	30-JUN-15
Lead (Pb)-Total		<0.020	<0.020	RPD-NA	mg/kg	N/A	40	30-JUN-15
Lithium (Li)-Total		<0.50	<0.50	RPD-NA	mg/kg	N/A	40	30-JUN-15
Magnesium (Mg)-Total		1410	1420		mg/kg	0.9	40	30-JUN-15
Manganese (Mn)-Total		0.490	0.418		mg/kg	16	40	30-JUN-15
Molybdenum (Mo)-Total		<0.020	<0.020	RPD-NA	mg/kg	N/A	40	30-JUN-15
Nickel (Ni)-Total		<0.20	<0.20	RPD-NA	mg/kg	N/A	40	30-JUN-15
Phosphorus (P)-Total		14100	14900		mg/kg	5.1	40	30-JUN-15
Potassium (K)-Total		23000	24500		mg/kg	6.0	40	30-JUN-15
Rubidium (Rb)-Total		9.04	9.22		mg/kg	2.0	40	30-JUN-15
Selenium (Se)-Total		5.78	5.75		mg/kg	0.5	40	30-JUN-15
Sodium (Na)-Total		1630	1720		mg/kg	5.7	40	30-JUN-15
Strontium (Sr)-Total		1.24	0.722		mg/kg	53	60	30-JUN-15
Tellurium (Te)-Total		<0.020	<0.020	RPD-NA	mg/kg	N/A	40	30-JUN-15
Thallium (Tl)-Total		0.0058	0.0054		mg/kg	7.7	40	30-JUN-15
Tin (Sn)-Total		<0.10	<0.10	RPD-NA	mg/kg	N/A	40	30-JUN-15
Uranium (U)-Total		<0.0020	<0.0020	RPD-NA	mg/kg	N/A	40	30-JUN-15
Vanadium (V)-Total		<0.10	<0.10	RPD-NA	mg/kg	N/A	40	30-JUN-15
Zinc (Zn)-Total		30.0	26.4		mg/kg	13	40	30-JUN-15
Zirconium (Zr)-Total		<0.20	<0.20	RPD-NA	mg/kg	N/A	40	30-JUN-15
WG2114282-4	LCS							
Aluminum (Al)-Total			99.3		%		70-130	30-JUN-15
Antimony (Sb)-Total			90.6		%		70-130	30-JUN-15
Arsenic (As)-Total			98.2		%		70-130	30-JUN-15



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA		Tissue						
Batch	R3219162							
WG2114282-4	LCS							
Barium (Ba)-Total			98.5		%		70-130	30-JUN-15
Beryllium (Be)-Total			91.4		%		70-130	30-JUN-15
Bismuth (Bi)-Total			90.8		%		70-130	30-JUN-15
Boron (B)-Total			87.2		%		70-130	30-JUN-15
Cadmium (Cd)-Total			97.7		%		70-130	30-JUN-15
Calcium (Ca)-Total			92.9		%		70-130	30-JUN-15
Cesium (Cs)-Total			94.1		%		70-130	30-JUN-15
Chromium (Cr)-Total			97.4		%		70-130	30-JUN-15
Cobalt (Co)-Total			98.0		%		70-130	30-JUN-15
Copper (Cu)-Total			96.3		%		70-130	30-JUN-15
Iron (Fe)-Total			95.0		%		70-130	30-JUN-15
Lead (Pb)-Total			92.5		%		70-130	30-JUN-15
Lithium (Li)-Total			92.4		%		70-130	30-JUN-15
Magnesium (Mg)-Total			97.1		%		70-130	30-JUN-15
Manganese (Mn)-Total			98.0		%		70-130	30-JUN-15
Molybdenum (Mo)-Total			90.3		%		70-130	30-JUN-15
Nickel (Ni)-Total			94.8		%		70-130	30-JUN-15
Phosphorus (P)-Total			94.2		%		70-130	30-JUN-15
Potassium (K)-Total			99.6		%		70-130	30-JUN-15
Rubidium (Rb)-Total			98.4		%		70-130	30-JUN-15
Selenium (Se)-Total			97.8		%		70-130	30-JUN-15
Sodium (Na)-Total			97.9		%		70-130	30-JUN-15
Strontium (Sr)-Total			93.6		%		70-130	30-JUN-15
Tellurium (Te)-Total			91.7		%		70-130	30-JUN-15
Thallium (Tl)-Total			91.0		%		70-130	30-JUN-15
Tin (Sn)-Total			92.2		%		70-130	30-JUN-15
Uranium (U)-Total			95.8		%		70-130	30-JUN-15
Vanadium (V)-Total			100.3		%		70-130	30-JUN-15
Zinc (Zn)-Total			95.3		%		70-130	30-JUN-15
Zirconium (Zr)-Total			85.5		%		70-130	30-JUN-15
WG2114282-1	MB							
Aluminum (Al)-Total			<2.0		mg/kg		2	30-JUN-15
Arsenic (As)-Total			<0.020		mg/kg		0.02	30-JUN-15
Barium (Ba)-Total			<0.050		mg/kg		0.05	30-JUN-15



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 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-CCMS-N-VA Tissue								
Batch R3219162								
WG2114282-1 MB								
Beryllium (Be)-Total			<0.010		mg/kg		0.01	30-JUN-15
Bismuth (Bi)-Total			<0.010		mg/kg		0.01	30-JUN-15
Boron (B)-Total			<1.0		mg/kg		1	30-JUN-15
Cadmium (Cd)-Total			<0.0050		mg/kg		0.005	30-JUN-15
Calcium (Ca)-Total			<20		mg/kg		20	30-JUN-15
Cesium (Cs)-Total			<0.0050		mg/kg		0.005	30-JUN-15
Chromium (Cr)-Total			<0.050		mg/kg		0.05	30-JUN-15
Cobalt (Co)-Total			<0.020		mg/kg		0.02	30-JUN-15
Copper (Cu)-Total			<0.10		mg/kg		0.1	30-JUN-15
Iron (Fe)-Total			<3.0		mg/kg		3	30-JUN-15
Lead (Pb)-Total			<0.020		mg/kg		0.02	30-JUN-15
Lithium (Li)-Total			<0.50		mg/kg		0.5	30-JUN-15
Magnesium (Mg)-Total			<2.0		mg/kg		2	30-JUN-15
Manganese (Mn)-Total			<0.050		mg/kg		0.05	30-JUN-15
Molybdenum (Mo)-Total			<0.020		mg/kg		0.02	30-JUN-15
Nickel (Ni)-Total			<0.20		mg/kg		0.2	30-JUN-15
Phosphorus (P)-Total			<10		mg/kg		10	30-JUN-15
Potassium (K)-Total			<20		mg/kg		20	30-JUN-15
Rubidium (Rb)-Total			<0.050		mg/kg		0.05	30-JUN-15
Selenium (Se)-Total			<0.050		mg/kg		0.05	30-JUN-15
Sodium (Na)-Total			<20		mg/kg		20	30-JUN-15
Strontium (Sr)-Total			<0.050		mg/kg		0.05	30-JUN-15
Tellurium (Te)-Total			<0.020		mg/kg		0.02	30-JUN-15
Thallium (Tl)-Total			<0.0020		mg/kg		0.002	30-JUN-15
Tin (Sn)-Total			<0.10		mg/kg		0.1	30-JUN-15
Uranium (U)-Total			<0.0020		mg/kg		0.002	30-JUN-15
Vanadium (V)-Total			<0.10		mg/kg		0.1	30-JUN-15
Zinc (Zn)-Total			<0.50		mg/kg		0.5	30-JUN-15
Zirconium (Zr)-Total			<0.20		mg/kg		0.2	30-JUN-15
Batch R3220330								
WG2114282-1 MB								
Antimony (Sb)-Total			<0.010		mg/kg		0.01	04-JUL-15

MET-DRY-MICR-HRMS-VA Tissue



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch	R3217740							
WG2112362-4 CRM		VA-NIST-1566B						
Antimony (Sb)-Total			0.007		mg/kg		0-0.018	29-JUN-15
Arsenic (As)-Total			91.6		%		70-130	29-JUN-15
Barium (Ba)-Total			103.2		%		70-130	29-JUN-15
Boron (B)-Total			110.8		%		70-130	29-JUN-15
Cadmium (Cd)-Total			121.3		%		70-130	29-JUN-15
Calcium (Ca)-Total			101.5		%		70-130	29-JUN-15
Chromium (Cr)-Total			0.44		mg/kg		0.06-0.46	29-JUN-15
Cobalt (Co)-Total			76.8		%		70-130	29-JUN-15
Copper (Cu)-Total			87.4		%		70-130	29-JUN-15
Iron (Fe)-Total			96.1		%		70-130	29-JUN-15
Lead (Pb)-Total			91.3		%		70-130	29-JUN-15
Magnesium (Mg)-Total			90.1		%		70-130	29-JUN-15
Manganese (Mn)-Total			99.1		%		70-130	29-JUN-15
Molybdenum (Mo)-Total			91.3		%		70-130	29-JUN-15
Nickel (Ni)-Total			86.6		%		70-130	29-JUN-15
Phosphorus (P)-Total			89.5		%		70-130	29-JUN-15
Potassium (K)-Total			83.1		%		70-130	29-JUN-15
Rubidium (Rb)-Total			90.2		%		70-130	29-JUN-15
Selenium (Se)-Total			91.0		%		70-130	29-JUN-15
Sodium (Na)-Total			79.4		%		70-130	29-JUN-15
Strontium (Sr)-Total			108.5		%		70-130	29-JUN-15
Uranium (U)-Total			118.4		%		70-130	29-JUN-15
Vanadium (V)-Total			83.2		%		70-130	29-JUN-15
Zinc (Zn)-Total			77.6		%		70-130	29-JUN-15
WG2112362-3 DUP		L1621080-8						
Aluminum (Al)-Total		<5.0	<5.0	RPD-NA	mg/kg	N/A	40	29-JUN-15
Antimony (Sb)-Total		<0.010	<0.010	RPD-NA	mg/kg	N/A	40	29-JUN-15
Arsenic (As)-Total		0.045	0.045		mg/kg	0.2	40	29-JUN-15
Barium (Ba)-Total		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	29-JUN-15
Beryllium (Be)-Total		<0.010	<0.010	RPD-NA	mg/kg	N/A	40	29-JUN-15
Bismuth (Bi)-Total		<0.010	<0.010	RPD-NA	mg/kg	N/A	40	29-JUN-15
Boron (B)-Total		<1.0	<1.0	RPD-NA	mg/kg	N/A	40	29-JUN-15
Cadmium (Cd)-Total		0.058	0.059		mg/kg	1.9	40	29-JUN-15



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch	R3217740							
WG2112362-3 DUP		L1621080-8						
Calcium (Ca)-Total		366	362		mg/kg	1.3	60	29-JUN-15
Cesium (Cs)-Total		0.0406	0.0398		mg/kg	2.1	40	29-JUN-15
Chromium (Cr)-Total		<0.20	<0.20	RPD-NA	mg/kg	N/A	40	29-JUN-15
Cobalt (Co)-Total		0.087	0.087		mg/kg	0.5	40	29-JUN-15
Copper (Cu)-Total		12.7	14.5		mg/kg	13	40	29-JUN-15
Iron (Fe)-Total		832	878		mg/kg	5.4	40	29-JUN-15
Lead (Pb)-Total		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	29-JUN-15
Lithium (Li)-Total		<0.50	<0.50	RPD-NA	mg/kg	N/A	40	29-JUN-15
Magnesium (Mg)-Total		697	706		mg/kg	1.3	40	29-JUN-15
Manganese (Mn)-Total		6.71	6.91		mg/kg	3.0	40	29-JUN-15
Molybdenum (Mo)-Total		1.26	1.34		mg/kg	6.6	40	29-JUN-15
Nickel (Ni)-Total		<0.20	<0.20	RPD-NA	mg/kg	N/A	40	29-JUN-15
Phosphorus (P)-Total		12800	13300		mg/kg	4.5	40	29-JUN-15
Potassium (K)-Total		10400	10200		mg/kg	2.4	40	29-JUN-15
Rubidium (Rb)-Total		5.80	5.67		mg/kg	2.2	40	29-JUN-15
Selenium (Se)-Total		19.1	20.2		mg/kg	5.7	40	29-JUN-15
Sodium (Na)-Total		6290	6180		mg/kg	1.7	40	29-JUN-15
Strontium (Sr)-Total		0.36	0.36		mg/kg	0.5	60	29-JUN-15
Tellurium (Te)-Total		<0.020	<0.020	RPD-NA	mg/kg	N/A	40	29-JUN-15
Thallium (Tl)-Total		0.0369	0.0416		mg/kg	12	40	29-JUN-15
Tin (Sn)-Total		<0.10	<0.10	RPD-NA	mg/kg	N/A	40	29-JUN-15
Uranium (U)-Total		<0.0020	<0.0020	RPD-NA	mg/kg	N/A	40	29-JUN-15
Vanadium (V)-Total		0.23	0.23		mg/kg	4.0	40	29-JUN-15
Zinc (Zn)-Total		127	128		mg/kg	1.0	40	29-JUN-15
Zirconium (Zr)-Total		<0.20	<0.20	RPD-NA	mg/kg	N/A	40	29-JUN-15
WG2112362-5 LCS								
Aluminum (Al)-Total			90.8		%		70-130	29-JUN-15
Antimony (Sb)-Total			104.2		%		70-130	29-JUN-15
Arsenic (As)-Total			92.4		%		70-130	29-JUN-15
Barium (Ba)-Total			115.8		%		70-130	29-JUN-15
Beryllium (Be)-Total			98.5		%		70-130	29-JUN-15
Boron (B)-Total			95.0		%		70-130	29-JUN-15
Cadmium (Cd)-Total			106.9		%		70-130	29-JUN-15



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
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Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch R3217740								
WG2112362-5 LCS								
Calcium (Ca)-Total			118.9		%		70-130	29-JUN-15
Cesium (Cs)-Total			95.1		%		70-130	29-JUN-15
Chromium (Cr)-Total			98.8		%		70-130	29-JUN-15
Cobalt (Co)-Total			129.2		%		70-130	29-JUN-15
Copper (Cu)-Total			101.2		%		70-130	29-JUN-15
Iron (Fe)-Total			101.5		%		70-130	29-JUN-15
Lead (Pb)-Total			97.8		%		70-130	29-JUN-15
Lithium (Li)-Total			97.5		%		70-130	29-JUN-15
Magnesium (Mg)-Total			100.2		%		70-130	29-JUN-15
Manganese (Mn)-Total			113.6		%		70-130	29-JUN-15
Molybdenum (Mo)-Total			103.6		%		70-130	29-JUN-15
Nickel (Ni)-Total			110.3		%		70-130	29-JUN-15
Phosphorus (P)-Total			95.9		%		70-130	29-JUN-15
Potassium (K)-Total			94.9		%		70-130	29-JUN-15
Rubidium (Rb)-Total			95.0		%		70-130	29-JUN-15
Selenium (Se)-Total			86.5		%		70-130	29-JUN-15
Sodium (Na)-Total			104.9		%		70-130	29-JUN-15
Strontium (Sr)-Total			115.7		%		70-130	29-JUN-15
Tellurium (Te)-Total			93.8		%		70-130	29-JUN-15
Thallium (Tl)-Total			99.1		%		70-130	29-JUN-15
Tin (Sn)-Total			90.5		%		70-130	29-JUN-15
Uranium (U)-Total			113.2		%		70-130	29-JUN-15
Vanadium (V)-Total			122.2		%		70-130	29-JUN-15
Zinc (Zn)-Total			81.2		%		70-130	29-JUN-15
Zirconium (Zr)-Total			105.0		%		70-130	29-JUN-15
WG2112362-1 MB								
Antimony (Sb)-Total			<0.010		mg/kg		0.01	29-JUN-15
Arsenic (As)-Total			<0.030		mg/kg		0.03	29-JUN-15
Barium (Ba)-Total			<0.050		mg/kg		0.05	29-JUN-15
Beryllium (Be)-Total			<0.010		mg/kg		0.01	29-JUN-15
Bismuth (Bi)-Total			<0.010		mg/kg		0.01	29-JUN-15
Cadmium (Cd)-Total			<0.010		mg/kg		0.01	29-JUN-15
Cesium (Cs)-Total			<0.0050		mg/kg		0.005	29-JUN-15
Chromium (Cr)-Total			<0.20		mg/kg		0.2	29-JUN-15



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Client: MOUNT POLLEY MINING CORP.
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Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch R3217740								
WG2112362-1 MB								
Cobalt (Co)-Total			<0.020		mg/kg		0.02	29-JUN-15
Copper (Cu)-Total			<0.20		mg/kg		0.2	29-JUN-15
Iron (Fe)-Total			<5.0		mg/kg		5	29-JUN-15
Lead (Pb)-Total			<0.050		mg/kg		0.05	29-JUN-15
Lithium (Li)-Total			<0.50		mg/kg		0.5	29-JUN-15
Magnesium (Mg)-Total			<2.0		mg/kg		2	29-JUN-15
Molybdenum (Mo)-Total			<0.040		mg/kg		0.04	29-JUN-15
Nickel (Ni)-Total			<0.20		mg/kg		0.2	29-JUN-15
Phosphorus (P)-Total			<10		mg/kg		10	29-JUN-15
Rubidium (Rb)-Total			<0.050		mg/kg		0.05	29-JUN-15
Selenium (Se)-Total			<0.10		mg/kg		0.1	29-JUN-15
Tellurium (Te)-Total			<0.020		mg/kg		0.02	29-JUN-15
Thallium (Tl)-Total			<0.0020		mg/kg		0.002	29-JUN-15
Tin (Sn)-Total			<0.10		mg/kg		0.1	29-JUN-15
Uranium (U)-Total			<0.0020		mg/kg		0.002	29-JUN-15
Vanadium (V)-Total			<0.10		mg/kg		0.1	29-JUN-15
Zinc (Zn)-Total			<1.0		mg/kg		1	29-JUN-15
Zirconium (Zr)-Total			<0.20		mg/kg		0.2	29-JUN-15
WG2112362-2 MB								
Aluminum (Al)-Total			<5.0		mg/kg		5	29-JUN-15
Antimony (Sb)-Total			<0.010		mg/kg		0.01	29-JUN-15
Arsenic (As)-Total			<0.030		mg/kg		0.03	29-JUN-15
Barium (Ba)-Total			<0.050		mg/kg		0.05	29-JUN-15
Beryllium (Be)-Total			<0.010		mg/kg		0.01	29-JUN-15
Bismuth (Bi)-Total			<0.010		mg/kg		0.01	29-JUN-15
Boron (B)-Total			<1.0		mg/kg		1	29-JUN-15
Cadmium (Cd)-Total			<0.010		mg/kg		0.01	29-JUN-15
Calcium (Ca)-Total			<20		mg/kg		20	29-JUN-15
Cesium (Cs)-Total			<0.0050		mg/kg		0.005	29-JUN-15
Chromium (Cr)-Total			<0.20		mg/kg		0.2	29-JUN-15
Cobalt (Co)-Total			<0.020		mg/kg		0.02	29-JUN-15
Copper (Cu)-Total			<0.20		mg/kg		0.2	29-JUN-15
Iron (Fe)-Total			<5.0		mg/kg		5	29-JUN-15
Lead (Pb)-Total			<0.050		mg/kg		0.05	29-JUN-15



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Client: MOUNT POLLEY MINING CORP.
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Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DRY-MICR-HRMS-VA Tissue								
Batch R3217740								
WG2112362-2 MB								
			<0.50		mg/kg		0.5	29-JUN-15
			<2.0		mg/kg		2	29-JUN-15
			<0.050		mg/kg		0.05	29-JUN-15
			<0.040		mg/kg		0.04	29-JUN-15
			<0.20		mg/kg		0.2	29-JUN-15
			<10		mg/kg		10	29-JUN-15
			<20		mg/kg		20	29-JUN-15
			<0.050		mg/kg		0.05	29-JUN-15
			<0.10		mg/kg		0.1	29-JUN-15
			<0.10		mg/kg		0.1	29-JUN-15
			<0.020		mg/kg		0.02	29-JUN-15
			<0.0020		mg/kg		0.002	29-JUN-15
			<0.10		mg/kg		0.1	29-JUN-15
			<0.0020		mg/kg		0.002	29-JUN-15
			<0.10		mg/kg		0.1	29-JUN-15
			<1.0		mg/kg		1	29-JUN-15
			<0.20		mg/kg		0.2	29-JUN-15
Batch R3218179								
WG2112362-5 LCS								
			125.6		%		70-130	30-JUN-15
WG2112362-1 MB								
			<5.0		mg/kg		5	30-JUN-15
			<1.0		mg/kg		1	30-JUN-15
			<20		mg/kg		20	30-JUN-15
			<0.050		mg/kg		0.05	30-JUN-15
			<20		mg/kg		20	30-JUN-15
			<20		mg/kg		20	30-JUN-15
			<0.10		mg/kg		0.1	30-JUN-15
WG2112362-2 MB								
			<20		mg/kg		20	30-JUN-15
MET-WET-CCMS-N-VA Tissue								



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Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-N-VA Tissue								
Batch R3219162								
WG2114282-3 CRM		VA-NIST-1566B						
Antimony (Sb)-Total			0.0087		mg/kg wwt		0-0.0177	30-JUN-15
Arsenic (As)-Total			98.7		%		70-130	30-JUN-15
Barium (Ba)-Total			96.8		%		70-130	30-JUN-15
Boron (B)-Total			97.7		%		70-130	30-JUN-15
Cadmium (Cd)-Total			100.2		%		70-130	30-JUN-15
Calcium (Ca)-Total			93.5		%		70-130	30-JUN-15
Chromium (Cr)-Total			91.7		%		70-130	30-JUN-15
Cobalt (Co)-Total			95.6		%		70-130	30-JUN-15
Copper (Cu)-Total			96.8		%		70-130	30-JUN-15
Iron (Fe)-Total			99.5		%		70-130	30-JUN-15
Lead (Pb)-Total			100.6		%		70-130	30-JUN-15
Magnesium (Mg)-Total			94.3		%		70-130	30-JUN-15
Manganese (Mn)-Total			96.4		%		70-130	30-JUN-15
Molybdenum (Mo)-Total			98.6		%		70-130	30-JUN-15
Nickel (Ni)-Total			102.5		%		70-130	30-JUN-15
Phosphorus (P)-Total			105.8		%		70-130	30-JUN-15
Potassium (K)-Total			96.7		%		70-130	30-JUN-15
Rubidium (Rb)-Total			102.3		%		70-130	30-JUN-15
Selenium (Se)-Total			100.7		%		70-130	30-JUN-15
Sodium (Na)-Total			93.6		%		70-130	30-JUN-15
Strontium (Sr)-Total			91.4		%		70-130	30-JUN-15
Uranium (U)-Total			95.9		%		70-130	30-JUN-15
Vanadium (V)-Total			97.9		%		70-130	30-JUN-15
Zinc (Zn)-Total			94.8		%		70-130	30-JUN-15
WG2114282-2 DUP		L1621080-11						
Aluminum (Al)-Total		<0.40	<0.40	RPD-NA	mg/kg wwt	N/A	40	30-JUN-15
Antimony (Sb)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	30-JUN-15
Arsenic (As)-Total		0.0105	0.0092		mg/kg wwt	14	40	30-JUN-15
Barium (Ba)-Total		<0.010	<0.010	RPD-NA	mg/kg wwt	N/A	40	30-JUN-15
Beryllium (Be)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	30-JUN-15
Bismuth (Bi)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	30-JUN-15
Boron (B)-Total		<0.20	<0.20	RPD-NA	mg/kg wwt	N/A	40	30-JUN-15
Cadmium (Cd)-Total		<0.0010	<0.0010	RPD-NA	mg/kg wwt	N/A	40	30-JUN-15



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Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-N-VA								
	Tissue							
Batch	R3219162							
WG2114282-2	DUP	L1621080-11						
Calcium (Ca)-Total		175	114		mg/kg wwt	43	60	30-JUN-15
Cesium (Cs)-Total		0.0141	0.0146		mg/kg wwt	3.6	40	30-JUN-15
Chromium (Cr)-Total		<0.010	<0.010	RPD-NA	mg/kg wwt	N/A	40	30-JUN-15
Cobalt (Co)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	30-JUN-15
Copper (Cu)-Total		0.428	0.344		mg/kg wwt	22	40	30-JUN-15
Iron (Fe)-Total		6.97	6.63		mg/kg wwt	5.0	40	30-JUN-15
Lead (Pb)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	30-JUN-15
Lithium (Li)-Total		<0.10	<0.10	RPD-NA	mg/kg wwt	N/A	40	30-JUN-15
Magnesium (Mg)-Total		248	250		mg/kg wwt	0.9	40	30-JUN-15
Manganese (Mn)-Total		0.086	0.074		mg/kg wwt	16	40	30-JUN-15
Molybdenum (Mo)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	30-JUN-15
Nickel (Ni)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	30-JUN-15
Phosphorus (P)-Total		2480	2610		mg/kg wwt	5.1	40	30-JUN-15
Potassium (K)-Total		4050	4300		mg/kg wwt	6.0	40	30-JUN-15
Rubidium (Rb)-Total		1.59	1.62		mg/kg wwt	2.0	40	30-JUN-15
Selenium (Se)-Total		1.02	1.01		mg/kg wwt	0.5	40	30-JUN-15
Sodium (Na)-Total		286	303		mg/kg wwt	5.7	40	30-JUN-15
Strontium (Sr)-Total		0.218	0.127		mg/kg wwt	53	60	30-JUN-15
Tellurium (Te)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	30-JUN-15
Thallium (Tl)-Total		0.00102	0.00095		mg/kg wwt	7.7	40	30-JUN-15
Tin (Sn)-Total		<0.020	<0.020	RPD-NA	mg/kg wwt	N/A	40	30-JUN-15
Uranium (U)-Total		<0.00040	<0.00040	RPD-NA	mg/kg wwt	N/A	40	30-JUN-15
Vanadium (V)-Total		<0.020	<0.020	RPD-NA	mg/kg wwt	N/A	40	30-JUN-15
Zinc (Zn)-Total		5.27	4.64		mg/kg wwt	13	40	30-JUN-15
Zirconium (Zr)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	30-JUN-15
WG2114282-4	LCS							
Aluminum (Al)-Total			99.3		%		70-130	30-JUN-15
Antimony (Sb)-Total			90.6		%		70-130	30-JUN-15
Arsenic (As)-Total			98.2		%		70-130	30-JUN-15
Barium (Ba)-Total			98.5		%		70-130	30-JUN-15
Beryllium (Be)-Total			91.4		%		70-130	30-JUN-15
Bismuth (Bi)-Total			90.8		%		70-130	30-JUN-15
Boron (B)-Total			87.2		%		70-130	30-JUN-15



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Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-N-VA		Tissue						
Batch	R3219162							
WG2114282-4	LCS							
Cadmium (Cd)-Total			97.7		%		70-130	30-JUN-15
Calcium (Ca)-Total			92.9		%		70-130	30-JUN-15
Cesium (Cs)-Total			94.1		%		70-130	30-JUN-15
Chromium (Cr)-Total			97.4		%		70-130	30-JUN-15
Cobalt (Co)-Total			98.0		%		70-130	30-JUN-15
Copper (Cu)-Total			96.3		%		70-130	30-JUN-15
Iron (Fe)-Total			95.0		%		70-130	30-JUN-15
Lead (Pb)-Total			92.5		%		70-130	30-JUN-15
Lithium (Li)-Total			92.4		%		70-130	30-JUN-15
Magnesium (Mg)-Total			97.1		%		70-130	30-JUN-15
Manganese (Mn)-Total			98.0		%		70-130	30-JUN-15
Molybdenum (Mo)-Total			90.3		%		70-130	30-JUN-15
Nickel (Ni)-Total			94.8		%		70-130	30-JUN-15
Phosphorus (P)-Total			94.2		%		70-130	30-JUN-15
Potassium (K)-Total			99.6		%		70-130	30-JUN-15
Rubidium (Rb)-Total			98.4		%		70-130	30-JUN-15
Selenium (Se)-Total			97.8		%		70-130	30-JUN-15
Sodium (Na)-Total			97.9		%		70-130	30-JUN-15
Strontium (Sr)-Total			93.6		%		70-130	30-JUN-15
Tellurium (Te)-Total			91.7		%		70-130	30-JUN-15
Thallium (Tl)-Total			91.0		%		70-130	30-JUN-15
Tin (Sn)-Total			92.2		%		70-130	30-JUN-15
Uranium (U)-Total			95.8		%		70-130	30-JUN-15
Vanadium (V)-Total			100.3		%		70-130	30-JUN-15
Zinc (Zn)-Total			95.3		%		70-130	30-JUN-15
Zirconium (Zr)-Total			85.5		%		70-130	30-JUN-15
WG2114282-1		MB						
Aluminum (Al)-Total			<0.40		mg/kg wwt		0.4	30-JUN-15
Arsenic (As)-Total			<0.0040		mg/kg wwt		0.004	30-JUN-15
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	30-JUN-15
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	30-JUN-15
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	30-JUN-15
Boron (B)-Total			<0.20		mg/kg wwt		0.2	30-JUN-15
Cadmium (Cd)-Total			<0.0010		mg/kg wwt		0.001	30-JUN-15



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Client: MOUNT POLLEY MINING CORP.
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Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-CCMS-N-VA Tissue								
Batch R3219162								
WG2114282-1 MB								
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	30-JUN-15
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	30-JUN-15
Chromium (Cr)-Total			<0.010		mg/kg wwt		0.01	30-JUN-15
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	30-JUN-15
Copper (Cu)-Total			<0.020		mg/kg wwt		0.02	30-JUN-15
Iron (Fe)-Total			<0.60		mg/kg wwt		0.6	30-JUN-15
Lead (Pb)-Total			<0.0040		mg/kg wwt		0.004	30-JUN-15
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	30-JUN-15
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	30-JUN-15
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	30-JUN-15
Molybdenum (Mo)-Total			<0.0040		mg/kg wwt		0.004	30-JUN-15
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	30-JUN-15
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	30-JUN-15
Potassium (K)-Total			<4.0		mg/kg wwt		4	30-JUN-15
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	30-JUN-15
Selenium (Se)-Total			<0.010		mg/kg wwt		0.01	30-JUN-15
Sodium (Na)-Total			<4.0		mg/kg wwt		4	30-JUN-15
Strontium (Sr)-Total			<0.010		mg/kg wwt		0.01	30-JUN-15
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	30-JUN-15
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	30-JUN-15
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	30-JUN-15
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	30-JUN-15
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	30-JUN-15
Zinc (Zn)-Total			<0.10		mg/kg wwt		0.1	30-JUN-15
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	30-JUN-15
Batch R3220330								
WG2114282-1 MB								
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	04-JUL-15
MET-WET-MICR-HRMS-VA Tissue								
Batch R3217741								
WG2112362-4 CRM								
VA-NIST-1566B								
Antimony (Sb)-Total			0.0075		mg/kg wwt		0-0.0177	29-JUN-15
Arsenic (As)-Total			91.6		%		70-130	29-JUN-15



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-MICR-HRMS-VA Tissue								
Batch	R3217741							
WG2112362-4 CRM		VA-NIST-1566B						
Barium (Ba)-Total			103.2		%		70-130	29-JUN-15
Boron (B)-Total			110.8		%		70-130	29-JUN-15
Cadmium (Cd)-Total			121.3		%		70-130	29-JUN-15
Calcium (Ca)-Total			101.5		%		70-130	29-JUN-15
Chromium (Cr)-Total			0.439		mg/kg wwt		0.06-0.46	29-JUN-15
Cobalt (Co)-Total			76.8		%		70-130	29-JUN-15
Copper (Cu)-Total			87.4		%		70-130	29-JUN-15
Iron (Fe)-Total			96.1		%		70-130	29-JUN-15
Lead (Pb)-Total			91.3		%		70-130	29-JUN-15
Magnesium (Mg)-Total			90.1		%		70-130	29-JUN-15
Manganese (Mn)-Total			99.1		%		70-130	29-JUN-15
Molybdenum (Mo)-Total			91.3		%		70-130	29-JUN-15
Nickel (Ni)-Total			86.6		%		70-130	29-JUN-15
Phosphorus (P)-Total			89.5		%		70-130	29-JUN-15
Potassium (K)-Total			83.1		%		70-130	29-JUN-15
Rubidium (Rb)-Total			90.2		%		70-130	29-JUN-15
Selenium (Se)-Total			91.0		%		70-130	29-JUN-15
Sodium (Na)-Total			79.4		%		70-130	29-JUN-15
Strontium (Sr)-Total			108.5		%		70-130	29-JUN-15
Uranium (U)-Total			118.4		%		70-130	29-JUN-15
Vanadium (V)-Total			83.2		%		70-130	29-JUN-15
Zinc (Zn)-Total			77.6		%		70-130	29-JUN-15
WG2112362-3 DUP		L1621080-8						
Aluminum (Al)-Total		<1.0	<1.0	RPD-NA	mg/kg wwt	N/A	40	29-JUN-15
Antimony (Sb)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	29-JUN-15
Arsenic (As)-Total		0.0098	0.0098		mg/kg wwt	0.2	40	29-JUN-15
Barium (Ba)-Total		<0.010	<0.010	RPD-NA	mg/kg wwt	N/A	40	29-JUN-15
Beryllium (Be)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	29-JUN-15
Bismuth (Bi)-Total		<0.0020	<0.0020	RPD-NA	mg/kg wwt	N/A	40	29-JUN-15
Boron (B)-Total		<0.20	<0.20	RPD-NA	mg/kg wwt	N/A	40	29-JUN-15
Cadmium (Cd)-Total		0.0127	0.0129		mg/kg wwt	1.9	40	29-JUN-15
Calcium (Ca)-Total		79.5	78.5		mg/kg wwt	1.3	60	29-JUN-15
Cesium (Cs)-Total		0.0088	0.0086		mg/kg wwt	2.1	40	29-JUN-15



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Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-MICR-HRMS-VA Tissue								
Batch R3217741								
WG2112362-3 DUP		L1621080-8						
Chromium (Cr)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	29-JUN-15
Cobalt (Co)-Total		0.0189	0.0190		mg/kg wwt	0.5	40	29-JUN-15
Copper (Cu)-Total		2.76	3.15		mg/kg wwt	13	40	29-JUN-15
Iron (Fe)-Total		181	191		mg/kg wwt	5.4	40	29-JUN-15
Lead (Pb)-Total		<0.010	<0.010	RPD-NA	mg/kg wwt	N/A	40	29-JUN-15
Lithium (Li)-Total		<0.10	<0.10	RPD-NA	mg/kg wwt	N/A	40	29-JUN-15
Magnesium (Mg)-Total		151	153		mg/kg wwt	1.3	40	29-JUN-15
Manganese (Mn)-Total		1.46	1.50		mg/kg wwt	3.0	40	29-JUN-15
Molybdenum (Mo)-Total		0.273	0.291		mg/kg wwt	6.6	40	29-JUN-15
Nickel (Ni)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	29-JUN-15
Phosphorus (P)-Total		2770	2900		mg/kg wwt	4.5	40	29-JUN-15
Potassium (K)-Total		2270	2220		mg/kg wwt	2.4	40	29-JUN-15
Rubidium (Rb)-Total		1.26	1.23		mg/kg wwt	2.2	40	29-JUN-15
Selenium (Se)-Total		4.15	4.39		mg/kg wwt	5.7	40	29-JUN-15
Sodium (Na)-Total		1360	1340		mg/kg wwt	1.7	40	29-JUN-15
Strontium (Sr)-Total		0.078	0.078		mg/kg wwt	0.5	60	29-JUN-15
Tellurium (Te)-Total		<0.0040	<0.0040	RPD-NA	mg/kg wwt	N/A	40	29-JUN-15
Thallium (Tl)-Total		0.00801	0.00902		mg/kg wwt	12	40	29-JUN-15
Tin (Sn)-Total		<0.020	<0.020	RPD-NA	mg/kg wwt	N/A	40	29-JUN-15
Uranium (U)-Total		<0.00040	<0.00040	RPD-NA	mg/kg wwt	N/A	40	29-JUN-15
Vanadium (V)-Total		0.049	0.051		mg/kg wwt	4.0	40	29-JUN-15
Zinc (Zn)-Total		27.6	27.9		mg/kg wwt	1.0	40	29-JUN-15
Zirconium (Zr)-Total		<0.040	<0.040	RPD-NA	mg/kg wwt	N/A	40	29-JUN-15
WG2112362-5 LCS								
Aluminum (Al)-Total			90.8		%		70-130	29-JUN-15
Antimony (Sb)-Total			104.2		%		70-130	29-JUN-15
Arsenic (As)-Total			92.4		%		70-130	29-JUN-15
Barium (Ba)-Total			115.8		%		70-130	29-JUN-15
Beryllium (Be)-Total			98.5		%		70-130	29-JUN-15
Boron (B)-Total			95.0		%		70-130	29-JUN-15
Cadmium (Cd)-Total			106.9		%		70-130	29-JUN-15
Calcium (Ca)-Total			118.9		%		70-130	29-JUN-15
Cesium (Cs)-Total			95.1		%		70-130	29-JUN-15



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Client: MOUNT POLLEY MINING CORP.
 PO Box 12
 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-MICR-HRMS-VA Tissue								
Batch R3217741								
WG2112362-5 LCS								
Chromium (Cr)-Total			98.8		%		70-130	29-JUN-15
Cobalt (Co)-Total			129.2		%		70-130	29-JUN-15
Copper (Cu)-Total			101.2		%		70-130	29-JUN-15
Iron (Fe)-Total			101.5		%		70-130	29-JUN-15
Lead (Pb)-Total			97.8		%		70-130	29-JUN-15
Lithium (Li)-Total			97.5		%		70-130	29-JUN-15
Magnesium (Mg)-Total			100.2		%		70-130	29-JUN-15
Manganese (Mn)-Total			113.6		%		70-130	29-JUN-15
Molybdenum (Mo)-Total			103.6		%		70-130	29-JUN-15
Nickel (Ni)-Total			110.3		%		70-130	29-JUN-15
Phosphorus (P)-Total			95.9		%		70-130	29-JUN-15
Potassium (K)-Total			94.9		%		70-130	29-JUN-15
Rubidium (Rb)-Total			95.0		%		70-130	29-JUN-15
Selenium (Se)-Total			86.5		%		70-130	29-JUN-15
Sodium (Na)-Total			104.9		%		70-130	29-JUN-15
Strontium (Sr)-Total			115.7		%		70-130	29-JUN-15
Tellurium (Te)-Total			93.8		%		70-130	29-JUN-15
Thallium (Tl)-Total			99.1		%		70-130	29-JUN-15
Tin (Sn)-Total			90.5		%		70-130	29-JUN-15
Uranium (U)-Total			113.2		%		70-130	29-JUN-15
Vanadium (V)-Total			122.2		%		70-130	29-JUN-15
Zinc (Zn)-Total			81.2		%		70-130	29-JUN-15
Zirconium (Zr)-Total			105.0		%		70-130	29-JUN-15
WG2112362-1 MB								
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	29-JUN-15
Arsenic (As)-Total			<0.0060		mg/kg wwt		0.006	29-JUN-15
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	29-JUN-15
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	29-JUN-15
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	29-JUN-15
Cadmium (Cd)-Total			<0.0020		mg/kg wwt		0.002	29-JUN-15
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	29-JUN-15
Chromium (Cr)-Total			<0.040		mg/kg wwt		0.04	29-JUN-15
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	29-JUN-15
Copper (Cu)-Total			<0.040		mg/kg wwt		0.04	29-JUN-15



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Client: MOUNT POLLEY MINING CORP.
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Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-MICR-HRMS-VA Tissue								
Batch R3217741								
WG2112362-1 MB								
Iron (Fe)-Total			<1.0		mg/kg wwt		1	29-JUN-15
Lead (Pb)-Total			<0.010		mg/kg wwt		0.01	29-JUN-15
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	29-JUN-15
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	29-JUN-15
Molybdenum (Mo)-Total			<0.0080		mg/kg wwt		0.008	29-JUN-15
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	29-JUN-15
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	29-JUN-15
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	29-JUN-15
Selenium (Se)-Total			<0.020		mg/kg wwt		0.02	29-JUN-15
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	29-JUN-15
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	29-JUN-15
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	29-JUN-15
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	29-JUN-15
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	29-JUN-15
Zinc (Zn)-Total			<0.20		mg/kg wwt		0.2	29-JUN-15
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	29-JUN-15
WG2112362-2 MB								
Aluminum (Al)-Total			<1.0		mg/kg wwt		1	29-JUN-15
Antimony (Sb)-Total			<0.0020		mg/kg wwt		0.002	29-JUN-15
Arsenic (As)-Total			<0.0060		mg/kg wwt		0.006	29-JUN-15
Barium (Ba)-Total			<0.010		mg/kg wwt		0.01	29-JUN-15
Beryllium (Be)-Total			<0.0020		mg/kg wwt		0.002	29-JUN-15
Bismuth (Bi)-Total			<0.0020		mg/kg wwt		0.002	29-JUN-15
Boron (B)-Total			<0.20		mg/kg wwt		0.2	29-JUN-15
Cadmium (Cd)-Total			<0.0020		mg/kg wwt		0.002	29-JUN-15
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	29-JUN-15
Cesium (Cs)-Total			<0.0010		mg/kg wwt		0.001	29-JUN-15
Chromium (Cr)-Total			<0.040		mg/kg wwt		0.04	29-JUN-15
Cobalt (Co)-Total			<0.0040		mg/kg wwt		0.004	29-JUN-15
Copper (Cu)-Total			<0.040		mg/kg wwt		0.04	29-JUN-15
Iron (Fe)-Total			<1.0		mg/kg wwt		1	29-JUN-15
Lead (Pb)-Total			<0.010		mg/kg wwt		0.01	29-JUN-15
Lithium (Li)-Total			<0.10		mg/kg wwt		0.1	29-JUN-15
Magnesium (Mg)-Total			<0.40		mg/kg wwt		0.4	29-JUN-15



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Client: MOUNT POLLEY MINING CORP.
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 Likely BC V0L 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WET-MICR-HRMS-VA Tissue								
Batch R3217741								
WG2112362-2 MB								
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	29-JUN-15
Molybdenum (Mo)-Total			<0.0080		mg/kg wwt		0.008	29-JUN-15
Nickel (Ni)-Total			<0.040		mg/kg wwt		0.04	29-JUN-15
Phosphorus (P)-Total			<2.0		mg/kg wwt		2	29-JUN-15
Potassium (K)-Total			<4.0		mg/kg wwt		4	29-JUN-15
Rubidium (Rb)-Total			<0.010		mg/kg wwt		0.01	29-JUN-15
Selenium (Se)-Total			<0.020		mg/kg wwt		0.02	29-JUN-15
Strontium (Sr)-Total			<0.020		mg/kg wwt		0.02	29-JUN-15
Tellurium (Te)-Total			<0.0040		mg/kg wwt		0.004	29-JUN-15
Thallium (Tl)-Total			<0.00040		mg/kg wwt		0.0004	29-JUN-15
Tin (Sn)-Total			<0.020		mg/kg wwt		0.02	29-JUN-15
Uranium (U)-Total			<0.00040		mg/kg wwt		0.0004	29-JUN-15
Vanadium (V)-Total			<0.020		mg/kg wwt		0.02	29-JUN-15
Zinc (Zn)-Total			<0.20		mg/kg wwt		0.2	29-JUN-15
Zirconium (Zr)-Total			<0.040		mg/kg wwt		0.04	29-JUN-15
Batch R3218205								
WG2112362-5 LCS								
Bismuth (Bi)-Total			125.6		%		70-130	30-JUN-15
WG2112362-1 MB								
Aluminum (Al)-Total			<1.0		mg/kg wwt		1	30-JUN-15
Boron (B)-Total			<0.20		mg/kg wwt		0.2	30-JUN-15
Calcium (Ca)-Total			<4.0		mg/kg wwt		4	30-JUN-15
Manganese (Mn)-Total			<0.010		mg/kg wwt		0.01	30-JUN-15
Potassium (K)-Total			<4.0		mg/kg wwt		4	30-JUN-15
Sodium (Na)-Total			<4.0		mg/kg wwt		4	30-JUN-15
Strontium (Sr)-Total			<0.020		mg/kg wwt		0.02	30-JUN-15
WG2112362-2 MB								
Sodium (Na)-Total			<4.0		mg/kg wwt		4	30-JUN-15
MOISTURE-TISS-VA Tissue								
Batch R3213223								
WG2112360-1 DUP								
% Moisture		L1621080-8	78.1		%	0.3	20	19-JUN-15



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Client: MOUNT POLLEY MINING CORP.
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Likely BC VOL 1N0

Contact: Colleen Hughes

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-TISS-VA	Tissue							
Batch	R3213580							
WG2114884-1	DUP	L1621080-1						
% Moisture		81.0	81.1		%	0.2	20	23-JUN-15

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Contact: Colleen Hughes

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Report to:		Report Format / Distribution			Service Requested: (rush - subject to availability)					
Company: MOUNT POLLEY MINING CORP.		<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Default)					
Contact: Colleen Hughes		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-3 Business Days) - 50% Surcharge					
Address: PO BOX 12, Likely, BC, V0L 1N0		Email 1: on file			<input type="radio"/> Emergency (1 Business Day) - 100% Surcharge					
Phone: 250-790-2215 Fax:		Email 2:			<input type="radio"/> For Emergency < 1 Day, ASAP or Weekend - Contact ALS					
Invoice To: Same as Report? <input checked="" type="radio"/> Yes <input type="radio"/> No		Client / Project Information:			Analysis Request					
Company:		Job #:			Please indicate below Filtered, Preserved or both (F, P, F/P)					
Contact:		PO / AFE:								
Address:		Legal Site Description:								
Phone: Fax:		Quote #:								
Lab Work Order # (lab use only)		ALS Contact: Can Dang			Sampler: Norm Zirnhelt 25					
L1621080										
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type	T-metals (HR/CP-MS) (Met&D)	Moisture	Liver Metals	Kidney Metals	Gonad Metals	Number of Containers
	Frypan Cr. RB-1	14-May-15	8:00-16:15	Tissue	X	X	X	X	X	4
	Frypan Cr. RB-1X	14-May-15	8:00-16:15	Tissue	X	X			X	2
	Frypan Cr. RB-2	14-May-15	8:00-16:15	Tissue	X	X	X	X	X	4
	Frypan Cr. RB-3	14-May-15	8:00-16:15	Tissue	X	X	X	X	X	4
	Frypan Cr. RB-4	14-May-15	8:00-16:15	Tissue	X	X	X	X	X	4
	Frypan Cr. RB-5	14-May-15	8:00-16:15	Tissue	X	X	X	X	X	4
	Frypan Cr. RB-6	14-May-15	8:00-16:15	Tissue	X	X	X	X	X	4
	Frypan Cr. RB-7	14-May-15	8:00-16:15	Tissue	X	X	X	X	X	4
	Frypan Cr. RB-8	14-May-15	8:00-16:15	Tissue	X	X	X	X	X	4



Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)			
Released by: N.Zirnhelt	Date & Time: June 2, 2015 1600hr	Received by: lady	Date: 06/03	Time: 9AM	Temperature: 2.2°C	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF



APPENDIX I

Terrestrial Ecosystem Assessment

Terrestrial Ecosystem Assessment of Hazeltine Creek Halo

Prepared by:

Trish Miller, M.Sc., R.P.Bio., CSAP

Golder Associates Ltd.

Suzanne Simard, Ph.D., RPF

University of British Columbia

DATE May 30, 2016**REFERENCE No.** 1411734-104-TM-Rev0-11000**TO** Lyn Anglin, Colleen Hughes
Mount Polley Mining Corporation**FROM** Trish Miller, Suzanne Simard**EMAIL** trish_miller@golder.com;
suzanne.simard@ubc.ca**TERRESTRIAL ECOSYSTEM ASSESSMENT OF HAZELTINE CREEK HALO**

This memo presents the methods and results of the terrestrial ecosystem field assessment and sampling program conducted between July 28 and August 4, 2015 at the Mount Polley Mine. This work was conducted in support of the terrestrial ecological risk assessment for the area along Hazeltine Creek where tailings had deposited on top of the native soil (this area is referred to as the halo area).

Prior to and during a site reconnaissance conducted July 8 and 9, 2015, it was observed that some trees located in the halo had died. By August, most trees in the halo zone were dead or showing signs of decline (Figure 1). The objective of this study was to describe and quantify the differences in terrestrial habitat quality between the halo and reference/background areas, by considering forest floor and mineral soil properties, forest stand attributes (e.g., tree species composition, site index, height, age, basal area, stems per hectare, and stand structure), vegetation attributes (e.g., species cover, richness and diversity), evidence of wildlife use, and wildlife attributes (e.g., snag density and size, and coarse woody debris cover and diameter).

This memo presents the methods and results of the terrestrial ecosystem assessment. Interpretations of the data presented herein are also included in the memo titled *Forest Conditions and Die-Back in Areas of Thicker Tailings Deposition* submitted October 5, 2015 to the Mount Polley Mine and published on their website October 15, 2015.



Figure 1: Temporal trend of tree decline observed in the halo area.

1.0 METHODS

1.1 Ecosystem Variables

The British Columbia government protocol for terrestrial ecosystem descriptions (BC MFR and BC MoE 2010) was used to guide field measurements and describe the terrestrial ecosystem. The protocol is a form driven process that involves collecting and integrating information on several ecosystem components, including forest floor and mineral soil properties, forest stand attributes (e.g., tree species composition, site index, height, age, basal area, stems per hectare, and stand structure), vegetation attributes (e.g., species cover, richness and diversity), evidence of wildlife use, and wildlife attributes (e.g., snag density and size, and coarse woody debris cover and diameter).

Terrestrial ecosystem data were collected from 21 plots located within the halo area and 8 plots located in nearby reference forests (Figures 1-1 to 1-6, attached). Plots were proportionally distributed across the two biogeoclimatic subzones present in the study area (ICHmk3 and ICHwc2). Within the halo area, plots were generally located at random distances along the transects established during the 2014 soil sampling program conducted by SNC-Lavalin (SNC 2015). Reference plots were located at least 20 metres outside of the area of visual impact of the tailings material and were chosen to match a halo plot (i.e., locations selected had similar biogeoclimatic site series, elevation, slope gradient, and stand type [e.g., old growth or plantation]). All plots were located to avoid edge effects as much as possible. Plot size was generally 78.5 m² (circular fixed-area with 5 m radius), but was sometimes made larger to include at least 15 trees within the plot. The plots were generally centered on the soil pit excavated for describing and sampling the tailings, forest floor and mineral soil. Photographs of plots are provided in Attachment 2.

Terrestrial ecosystem data was collected using the Site Description (FS882-1), Soil Description (FS882-2), Vegetation (FS882-3), Mensuration (FS882-4), and Wildlife Habitat Assessment (FS882-5) forms (BC MFR and BC MoE 2010). The protocol for completing the forms was followed, but only those data fields that were relevant to the assessment objectives were recorded. The coarse woody debris sampling methodology was modified to estimate the percent cover and average diameter of coarse woody debris in each decay class within a plot; rather than measure coarse woody debris along transects.

1.2 In Situ Soil Measurements

Anaerobic conditions in the native soil below the tailings were observed during the site reconnaissance (July 8 and 9, 2015). Specifically a strong sulfurous (H₂S) smell and very dark, rotting forest floor (black) were noted in the test pits dug. To support the olfactory observations of potential anaerobic conditions, field measurements of dissolved oxygen content (DO), pH, oxidation-reduction potential (ORP) and specific conductivity were measured in soil pits located in both halo and reference plots.

A sample of known volume was collected from the target native soil layer (i.e., including the H layer of the forest floor and the A horizon of the mineral soil) below the tailings using a standard 1 litre plastic water sample container. A slurry mixture was created by adding an equal volume of de-ionized water (1:1 ratio). The sample was stirred and allowed to equilibrate for approximately 10 minutes before sampling. Parameters of interest were measured using a multi meter calibrated to the manufacturer's instructions and recorded on field sheets.

1.3 Soil Samples for Nutrients and Root Health

Soil samples were collected from halo and reference plots for analysis of soil chemistry and root condition. Soil collection methods and raw analytical results for soil chemistry samples are presented in Golder 2015 (draft in progress, Appendix B). A summary of nutrient results are presented in this report (Table 2, below). Separate samples were collected for tailings, forest floor and mineral soil horizons. Forest floor soil samples were comprised of a mix of F and H layers, except where the soil order was Organic, in which case the upper organic layer was sampled. Mineral soil samples generally represent the A and B horizons. A total of 75 soil samples were analyzed for nutrients (including 15 tailings, 46 native soil below tailings and 18 reference) and 51 soil samples were analyzed for root condition (including 2 tailings, 31 native soil below tailings and 18 reference).

For analysis of root condition, approximately half (60 ml) of each sample was used. Roots were carefully removed with tweezers, washed and randomly spread out on a tray inscribed with 70 2 x 2 cm squares in a grid pattern, that were numbered consecutively. Random numbers (1 through 70), representing the numbered squares, were drawn until five squares containing or bisected with root pieces were selected. Roots in these squares were then examined under a 100x magnification microscope.

Although care was taken to keep the root segments intact, many had been previously torn during soil collection. An attempt was made to extract all root segments from the samples, but in most cases about 10% of the root pieces were not removed because they were short (1-5 mm) and difficult and time consuming to handle.

All roots were recorded as either black or a translucent orange-red colour, representing dead and alive condition, respectively, according to Bohm (1979), who identified root colour as the main feature for distinguishing live from dead roots. Root elasticity was used as additional criterion for discerning root condition, with live roots elastic compared to dead roots. In most cases, all roots within a square were of one colour, but where there was a mix of black and orange-red pieces, the proportion of each colour was estimated to the nearest 25%. The number of intact dead and live root tips, the number of mycorrhizal root tips and the presence of saprophytic fungi (present or absent) were recorded. Saprophytic fungi were identified as thin translucent hyphal filaments growing among the roots.

2.0 DATA ANALYSIS

Statistical analysis was used to compare the field measurements and observations between the halo area plots and the reference forest plots (Attachment 3). Summary statistics (e.g., mean, standard error) were calculated to describe the proportion of halo and reference plots with various characteristics, including classification; live roots, mycorrhizae and saprophytic hypha in the forest floor; abundant or plentiful roots in the F, H, A and B horizons; abundant or common fecal droppings and mycelia in the F and H horizons; and evidence of bear, deer, small mammal, woodpecker, and songbird use (Tables 3-1 to 3-4). Lists were compiled of the tree, shrub, herb, and moss species within each plot and species richness, species diversity and evenness (Shannon's and Simpson's indices), and percent cover by functional group were calculated. T-tests (for continuous variables) and chi-square tests (for categorical variables) were used to compare variables between halo and reference groups. Differences between the halo and reference groups were considered significant at $p \leq 0.05$.

3.0 RESULTS

3.1 Field Observations

During the July-August field program, the majority of trees in the halo area were observed to be either dead or dying. The pattern of tree mortality observed was the same for all tree species, wherein the entire crown had turned brown and dried up. Also observed, was sap rot (decay) in the increment cores of numerous trees in the halo plots (Photograph 19 and 20, Attachment 2).

In each plot sampled, a soil pit was excavated to expose the B horizon (mineral layer). A distinct anaerobic odour was evident in the root zone (i.e., A horizon) of most pits excavated in the halo area.

3.2 In Situ Soil Measurements

The methods used to create the slurry mixture inherently led to the introduction of oxygen to the samples; thus the absolute values measured were not considered interpretable in the analysis. Rather, whether the relative difference between the measurements in reference and halo areas was significant used to determine if a meaningful difference existed. In general, DO and ORP measurements were significantly lower in halo plots compared to reference plots, confirming a significant decrease in the oxygen content in the root zone in halo plots (Table 1). Oxygen is the favoured electron acceptor for anaerobic organisms like trees, plants and most soil microbes. Low ORP values, like those in the halo soils, indicate that other metals were being used as electron acceptors and generating reduced end products.

Table 1: Field Measurements of Soil Using a Soil and Water Slurry

Parameter	Reference	Halo (Native)	P-Value
Dissolved Oxygen (mg/L)	8.5	5.1	0.02**
Oxidation-reduction potential (mV)	241.9	91.9	0.001**
pH	5.7	7.0	<0.001**
Specific conductivity (µS/cm)	39.5	217.4	<0.001**

Notes:

Average measurements are shown.

** indicates a significant difference ($p \leq 0.05$).

mg/L – milligrams per litre; mV – millivolts; µS/cm – micro Siemens per centimetre

3.3 Soil Nutrient Concentrations

The average concentrations of plant available nutrients and total organic carbon (TOC) in reference soil, native soil below tailings and tailings are presented in Table 2. The average nutrient concentrations were up to 12 times less and concentrations of TOC were up to 34 times less in tailings compared to reference and native soil.

Table 2: Plant Available Nutrient and Total Organic Carbon Concentrations in Soil

Plant Available Nutrients	Reference	Halo (Native)	Halo (Tailings)
Nitrogen (µg/g)	11	47	4.7
Ammonium (µg/g)	11	38	4.4
Nitrate (µg/g)	7.4	12	1.0
Phosphate (µg/g)	16	17	2.9
Potassium (µg/g)	174	125	92
Sulfate (µg/g)	17	108	28
Total Organic Carbon (%)	2.0	5.1	0.15

Notes:

Average concentrations are shown.

µg/g – micrograms per gram; % – percent

3.4 Soils, Microbial Community and Root Health

Average rooting depth was shallower in the halo than the reference plots, and roots were less abundant (Table 3). The roots that were present in the halo were associated with more saprophytic hyphae (fungi that feed on dead organic material). These results indicate that the roots were in a state of decay and were visibly disappearing from the soil horizons. Colonization of roots by ectomycorrhizal fungi was used as an indicator of the microbial community's overall health. Ectomycorrhizae were absent from the roots in most of the plots in the halo area. The root restricting layer identified only in halo plots resulted from a high water table. The high water table was caused by retention of water in the overlying finely textured tailings. In most plots, the saturation extended completely through the native soils, but in some plots native soils beneath were drier, indicative of a perched water table inside the tailings. At some outer edges and in isolated pockets of the halo zone where the tailings were sandy (i.e., more coarsely textured) and shallow, the root zone remained partially aerated and roots were in good condition.

Table 3: Summary of Indicators of Root, Microbial Community and Fungi Health

Ecosystem Variable	Reference	Halo (Native)	P-Value
Rooting depth (cm)	30.3	15.7	0.03**
Root restricting layer (% of plots)	0	52	0.01**
% live roots	Alive	Dead	
F horizon	88	43	0.03**
H horizon	75	33	0.04**
Ah horizon	100	89	0.44
B horizon	0	0	nc
Live mycorrhizae on roots (% of roots)	16	1	<0.001**
Saprophytic hyphae on roots (% of roots)	8	22	0.14

Notes: Average measurements are shown.

** indicates a significant difference ($p \leq 0.05$).

cm – centimetre; % – percent; nc – not calculated

3.5 Plant Species Richness and Diversity

The inventories of plant and moss species (hereafter collectively referred to as 'plant species') in halo and reference plots were compiled for comparison (Table 4-5, Attachment 4). Overall, a similar total number of plant species were identified in halo plots (80 species) and reference plots (76 species), and 61 species were common to both area types. However, 44 species were either eliminated or reduced by over 80% in the halo compared to reference. Species gained in the halo plots tended to be "weedy" species, characteristic of disturbed areas (e.g., fireweed, dandelion, great mullein, hawksweed, white clover). Species lost tended to be characteristic of mature forests (e.g., wild ginger, rattlesnake plantain, one-side wintergreen). At the plot level, species richness and diversity were significantly lower in the halo compared to reference forests (Table 4). Cover of all plant layers were also significantly reduced due to the decline of the trees and burial of the plant community.

Table 4: Comparison of plant diversity between reference and halo plots.

Variable	Reference	Halo	P-value
Species richness	32	18	<0.001**
Shannon's diversity index	2.7	1.9	<0.001**
Simpson's diversity index	0.9	0.75	0.008**
Cover by layer (%)			
Trees	101	50	0.002**
Shrubs	68	18	<0.001**
Herbs	75	19	<0.001**
Forest floor moss	60	5	0.001**

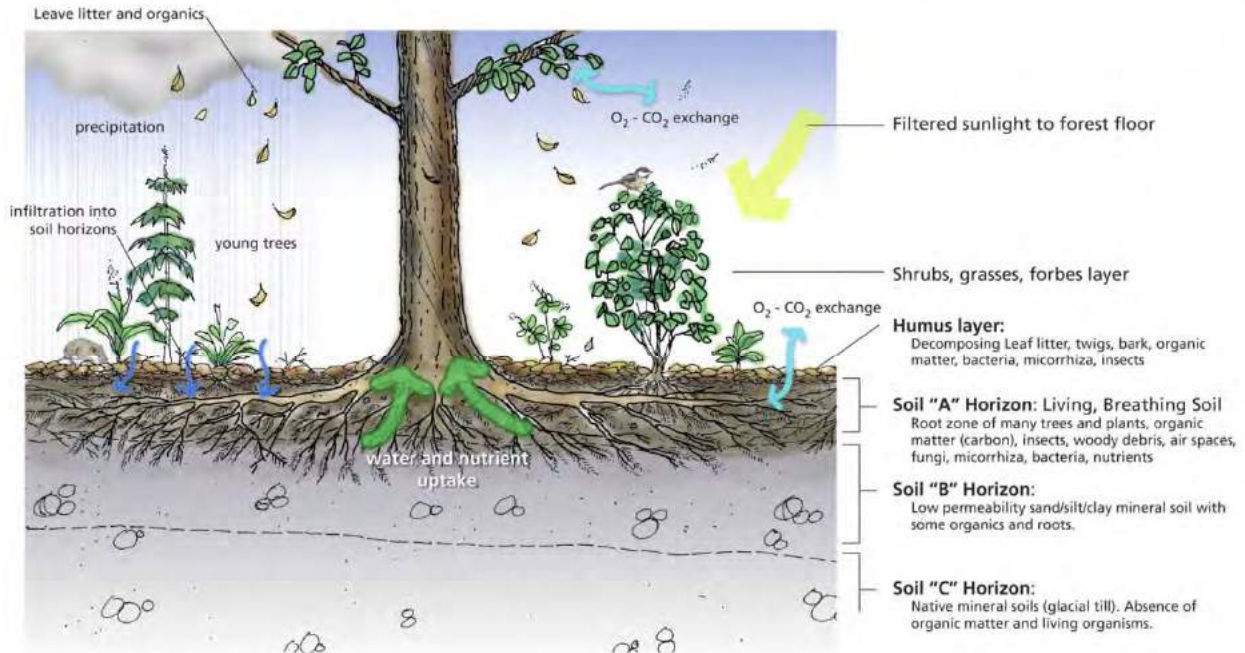
Notes: Average values are shown.

** indicates a significant difference ($p \leq 0.05$).

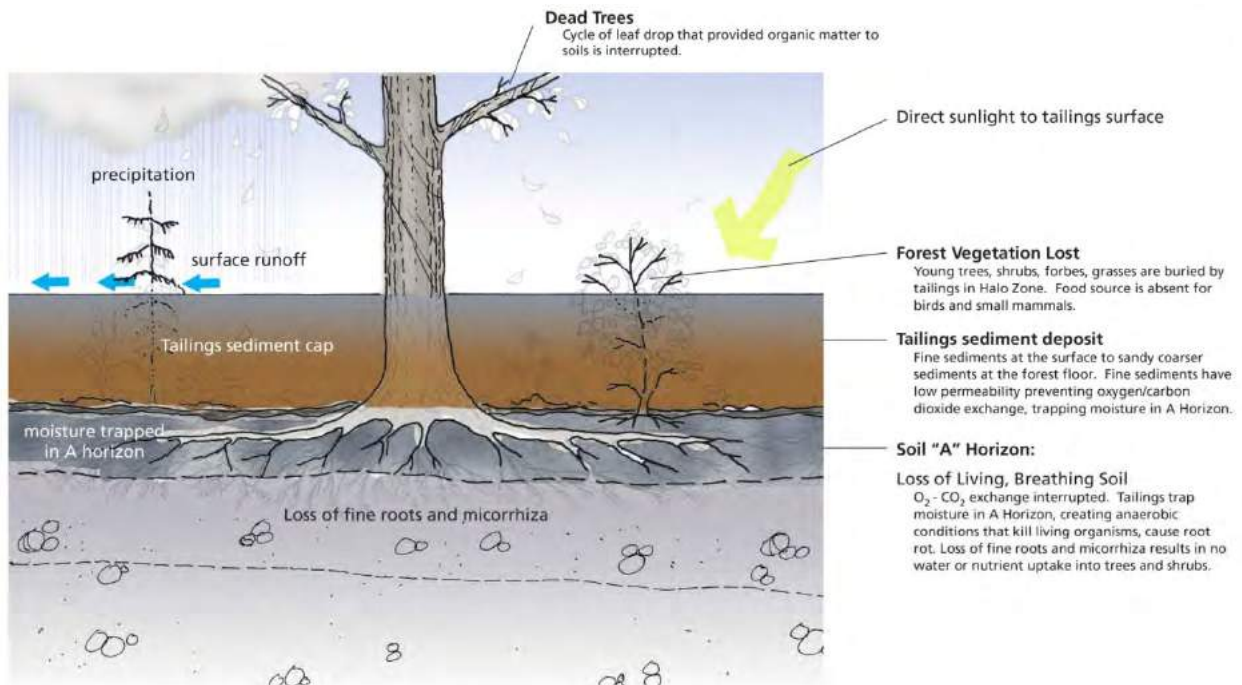
cm – centimetre; % – percent

4.0 SUMMARY

Results available from the field program indicate that the pattern of tree mortality in the halo area at Mount Polley was caused by the anaerobic conditions in the tree rooting zone created by the deposit of fine, saturated tailings material over the forest floor (Photograph 1). This deposit would have immediately blocked soil pores and reduced oxygen reaching the roots of the trees. Water trapped within the fine particles created a perched water table that continued to restrict oxygen reaching the roots. Health of the soil and microbial community also declined in response to the restricting layer of water or deposited material. Figure 2 illustrates the changes in the halo area that led to the visible decline of the forests.



HEALTHY FOREST



IMPACTED FOREST

Figure 2: Illustration of reference (healthy) forest versus the halo (impacted) forest.

5.0 CLOSURE

We trust the above meets your present requirements. If you have any questions or requirements, please contact the undersigned.

GOLDER ASSOCIATES LTD.



Trish Miller, M.Sc., R.P.Bio.
Principal, Senior Environmental Scientist

AA/TM/SS/pn

Attachments: 1 – Figures
2 – Photographs
3 – Statistical Results Tables
4 – Field Data Tables



Suzanne Simard, Ph.D., RPF
Professor of Forest Ecology, University of British Columbia

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6.0 REFERENCES

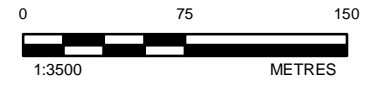
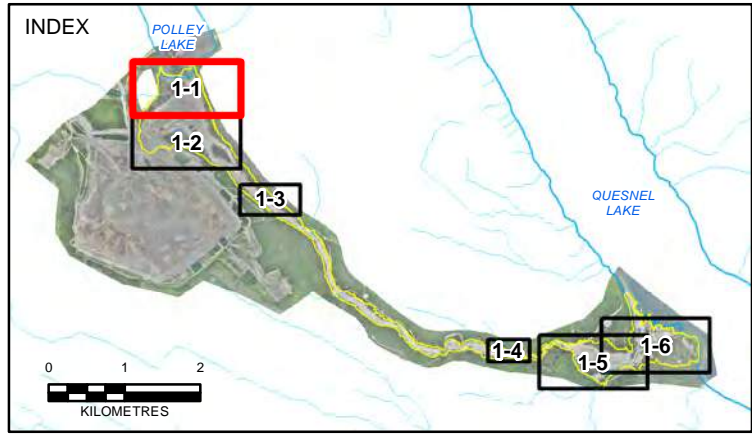
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- Böhm, W. 1979. Methods of studying root systems. Springer, Volume 33. ISBN: 978-3-642-67284-2 (Print) 978-3-642-67282-8
- Golder Associates Ltd. 2015. Mount Polley Tailings Dam Failure – Detailed Site Investigation. Draft in progress.
- SNC (SNC-Lavalin). 2015. Mount Polley Tailings Dam Failure - Soil Quality Impact Assessment. June 3, 2015. Prepared for Mount Polley Mining Corporation.

ATTACHMENT 1

Figures



- LEGEND**
- TERRESTRIAL HABITAT SAMPLE LOCATION
 - POST BREACH AFFECTED AREA EXTENT
 - NEW HAZELTINE CREEK CHANNEL (APPROXIMATE)
 - WATERBODY



CLIENT
MOUNT POLLEY MINING CORPORATION
IMPERIAL METALS

CONSULTANT
 Golder Associates

YYYY-MM-DD	2016-05-27
DESIGNED	AA
PREPARED	RH
REVIEWED	AA
APPROVED	TM

- REFERENCES**
1. WATERBODY DATA OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
 2. POST BREACH AFFECTED AREA, SOIL SAMPLE LOCATIONS OBTAINED FROM SNC LAVALIN LTD.
 3. SITE IMAGE OBTAINED FROM MPMC (MAY 2015). BASE IMAGERY OBTAINED FROM BING MAPS FOR ARCGIS PUBLISHED BY MICROSOFT CORPORATION, REDMOND, WA, MAY 2009.
 4. COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

PROJECT
DETAILED SITE INVESTIGATION AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

TITLE
SAMPLE LOCATIONS FOR TERRESTRIAL ECOSYSTEM ASSESSMENT

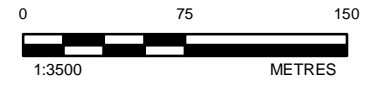
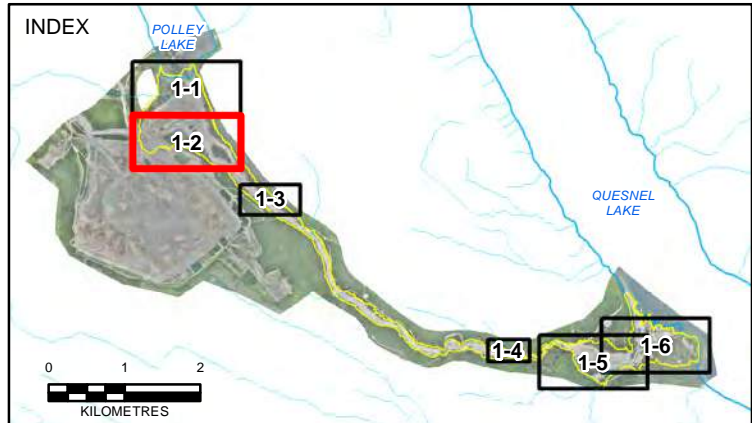
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- LEGEND**
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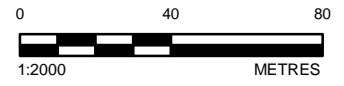
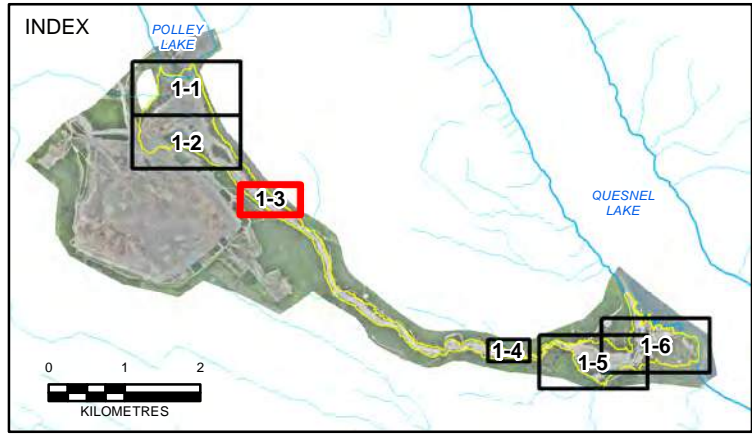
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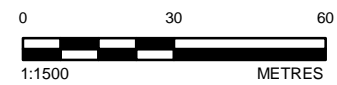
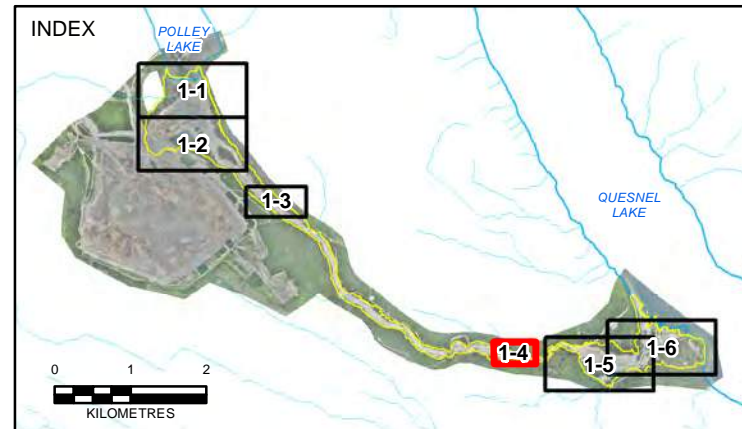
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 IMPERIAL METALS

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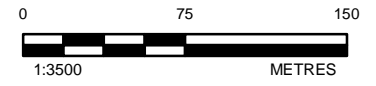
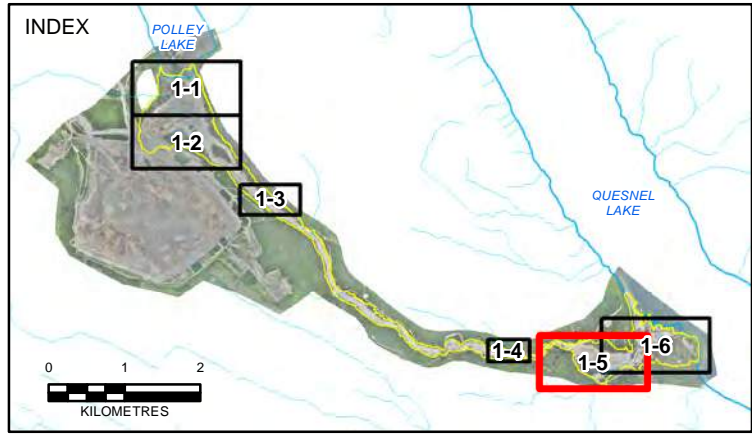
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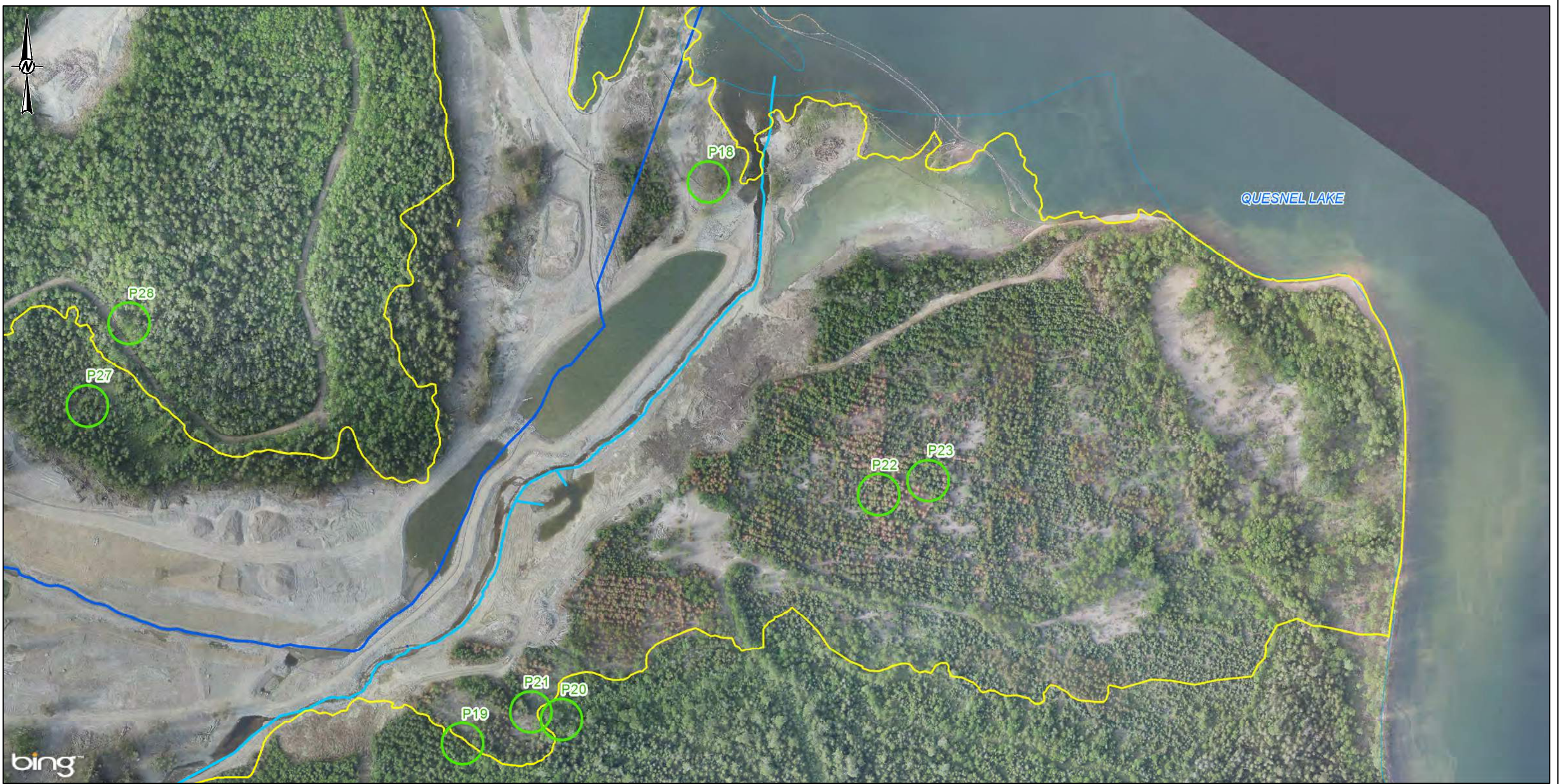
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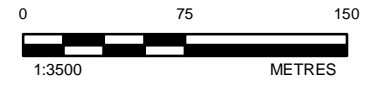
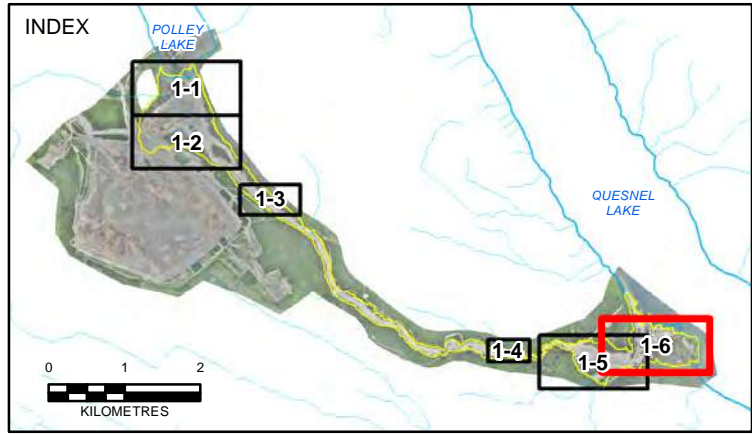
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IMPERIAL METALS

CONSULTANT
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SAMPLE LOCATIONS FOR TERRESTRIAL ECOSYSTEM ASSESSMENT

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ATTACHMENT 2

Photographs



ATTACHMENT 1
Photographs



Figure 1: View of Plot 1 within Reference Forest and soil test pit (July 28, 2015).



Figure 2: View of Plot 2 within the Halo Area and soil test pit (July 29, 2015).



ATTACHMENT 1
Photographs



Figure 3: View of Plot 3 within the Halo Area and soil test pit (July 29, 2015).



Figure 4: View of Plot 7 within the Halo Area (July 30, 2015). A soil test pit could not be dug because the tailings were saturated.



ATTACHMENT 1

Photographs



Figure 5: View of Plot 8 within the Halo Area and silty grey tailings (July 30, 2015). A soil test pit could not be dug because the tailings were saturated.



Figure 6: View of Plot 10 within the Halo Area and soil test pit (July 30, 2015).



ATTACHMENT 1

Photographs



Figure 7: View of Plot 11 within the Halo Area and soil test pit (July 31, 2015).



Figure 8: View of Plot 12 within the Halo Area and soil test pit (July 31, 2015).



ATTACHMENT 1

Photographs



Figure 9: View of Plot 13 within the Halo Area and soil test pit (July 31, 2015).



Figure 10: View of Plot 15 within the Halo Area (August 1, 2015).



ATTACHMENT 1

Photographs



Figure 11: View of Plot 16 within the Halo Area (August 1, 2015).



Figure 12: View of Plot 17 within Reference Forest (August 1, 2015).



ATTACHMENT 1
Photographs



Figure 13: View of Plot 18 within the Halo Area and soil test pit (August 1, 2015).



Figure 14: View of Plot 19 within Reference Forest and soil test pit (August 2, 2015).



ATTACHMENT 1
Photographs



Figure 15: View of Plot 20 within Reference Forest and soil test pit (August 2, 2015).



Figure 16: View of Plot 21 within the Halo Area and soil test pit (August 2, 2015).



ATTACHMENT 1
Photographs



Figure 17: View of Plot 22 within the Halo Area (August 2, 2015).



Figure 18: View of Plot 23 within the Halo Area and soil test pit (August 2, 2015).



ATTACHMENT 1
Photographs

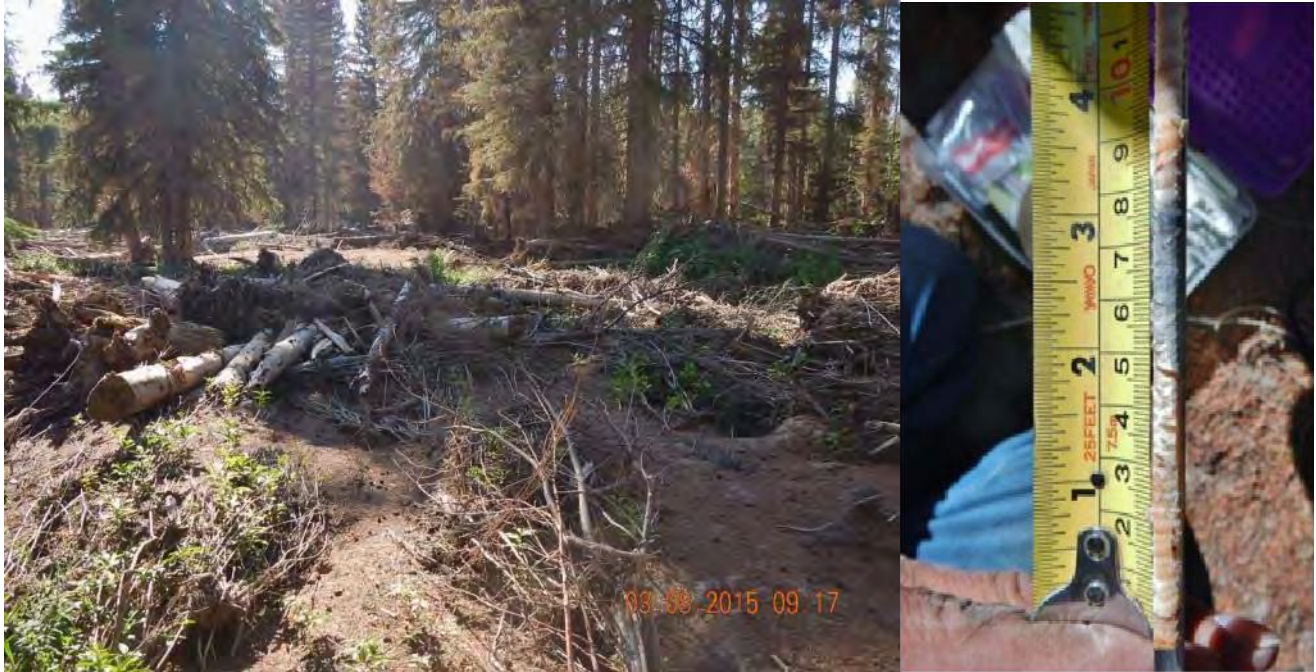


Figure 19: View of Plot 24 within the Halo Area and sap rot observed in tree core (August 3, 2015).

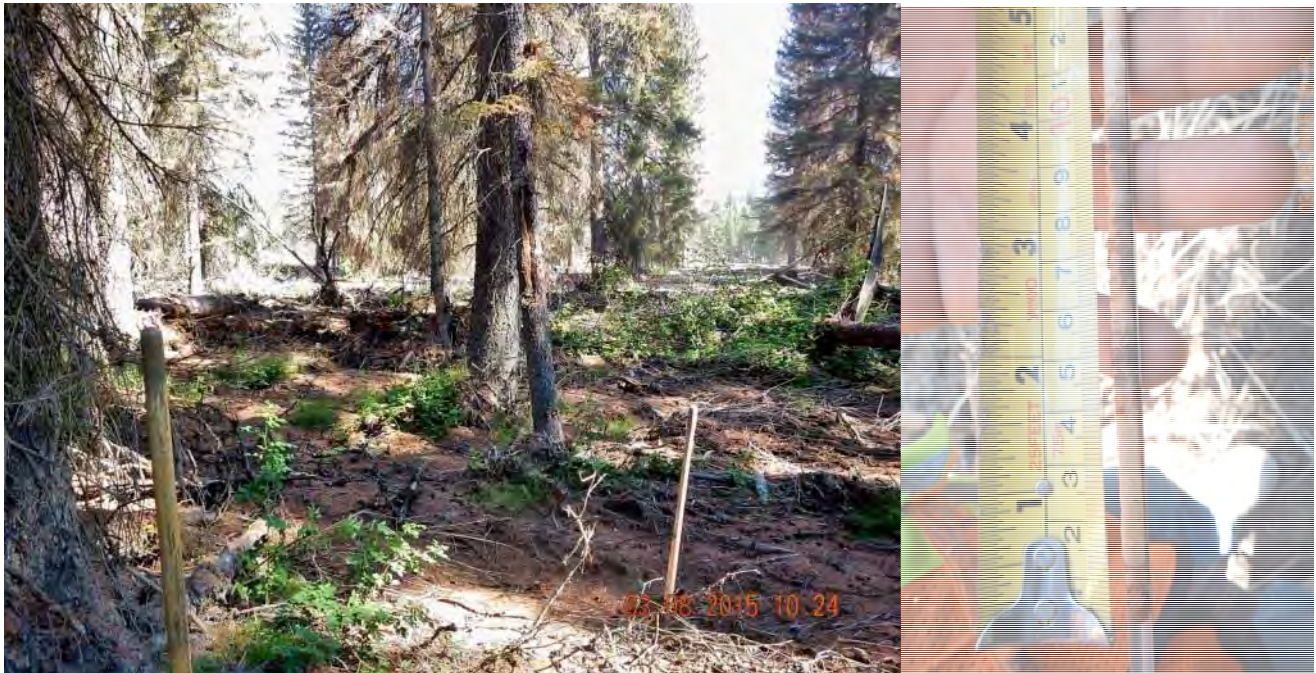


Figure 20: View of Plot 25 within the Halo Area and sap rot observed in tree core (August 3, 2015).



ATTACHMENT 1
Photographs



Figure 21: View of Plot 26 within Reference Forest and soil test pit (August 3, 2015).



Figure 22: View of Plot 27 within the Halo Area and soil test pit (August 3, 2015).



ATTACHMENT 1

Photographs



Figure 23: View of Plot 28 within Reference Forest (August 3, 2015).

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ATTACHMENT 3
Statistical Results Tables

Variable	Reference			Halo			P-value
	Mean	S.E.	n	Mean	S.E.	n	
Mor classification (% of plots)							
HR (%)	50	nc	4	29	nc	6	0.26
UR (%)	0	nc	0	33	nc	7	
RD (%)	38	nc	3	29	nc	6	
n/a (%)	13	nc	1	5	nc	1	
Forest floor							
Depth (cm)	9.8	2.2	8	9.3	0.92	21	0.43
Live roots ^{1,2} (%)	33	nc	113 (83)	3	nc	125 (120)	<0.001
Live mycorrhizae on roots ^{1,3} (%)	9	nc	90 (82)	1	nc	153 (152)	0.001
Saprophytic hypha ^{1,4} (%)	8	nc	67 (60)	22	nc	181 (148)	0.14
L horizon							
Depth (cm)	1.8	0.62	8	0.095	0.066	21	0.016
F horizon							
Depth (cm)	5.6	1.3	8	4.5	0.66	21	0.22
Abundant/plentiful roots (% of plots)	88	nc	8 (1)	43	nc	21 (12)	0.031
Abundant/common mycelia (% of plots)	63	nc	8 (3)	29	nc	21 (15)	0.092
Abundant/common fecal droppings (% of plots)	75	nc	8 (2)	33	nc	21 (14)	0.044
Dominant root size							
F (% of plots)	53	nc	5	80	nc	8	0.76
M (% of plots)	17	nc	1	10	nc	1	
H horizon							
Depth (cm)	2.6	1.1	8	4.8	0.83	21	0.067
Abundant/plentiful roots (% of plots)	75	nc	8 (2)	33	nc	21 (14)	0.044
Abundant/common mycelia (% of plots)	50	nc	8 (4)	29	nc	21 (15)	0.28
Abundant/common fecal droppings (% of plots)	63	nc	8 (3)	38	nc	21 (13)	0.24
Dominant root size							
F (% of plots)	100	nc	6	89	nc	8	0.4
X (% of plots)	0	nc	0	11	nc	1	
Substrate (% of ground cover)							
Organic matter	87	5.0	8	3.5	1.8	21	<0.001
Decayed wood	28	10	8	21	2.9	21	0.27
Mineral soil	0	0	8	0	0	21	nc
Bedrock	0	0	8	2.4	2.4	21	0.16
Rock	0	0	8	0	0	21	nc
Water	0	0	8	0	0	21	nc
Sediment	0	0	8	3.8	3.8	21	0.16
Tailings	0	0	8	70	6.4	21	<0.001

1. Determined by microscopic observation and based on 5 subsamples per plot.

2. Black roots assumed dead; orange-red roots assumed alive. Calculated as (number of subsamples where roots were alive/total number of subsamples) * 100.

3. Calculated as (number of live root tips with mycorrhiza/ total number of live root tips) *100.

4. Calculated as (number of subsamples where saprophytic hyphae were present/ total number of samples) *100

S.E. = standard error; nc = not calculated; N = number of samples (number in brackets indicates number of non-detects for chi-square test)

Bold and shaded indicates a significant difference ($p \leq 0.05$)

Variable	Reference			Halo			P-value
	Mean	S.E.	N	Mean	S.E.	N	
Rooting depth (cm)	30	6.1	8.0	16	2.3	21	0.026
Dominant root zone particle size (% of plots)							
Fine-loamy-skeletal	88	-	7.0	76	-	16	0.13
Humic	13	-	1.0	0	-	0	
Clayey-skeletal	0	-	0	19	-	4.0	
Root restricting water layer (% of plots)	0	-	0	52	-	11	0.0094
Depth of root restricting water layer (cm)	-	-	-	6.4	2.0	21	-
Drainage (% of plots)							
Well drained	39	-	3.0	24	-	5.0	0.11
Poorly drained	0	-	0	43	-	9.0	
Imperfectly drained	63	-	5.0	29	-	6.0	
Very poorly drained	0	-	0	5.0	-	1.0	
Seepage (cm)	0	0	8.0	9.5	5.5	21	0.048
Ah horizon							
Presence (% of plots)	88	-	8	90	-	19	0.81
Depth (cm)	3.9	1.1	7	6.3	0.8	19	0.056
Live roots ^{1,2} (%)	38	-	17 (28)	3.1	-	2 (63)	<0.001
Live mycorrhizae on roots ^{1,3} (%)	16	-	7 (38)	0	-	0 (65)	0.001
Saprophytic hypha ^{1,4} (%)	4.4	-	2 (43)	14	-	9 (56)	0.11
B horizon							
Fine root abundance ⁵ (%)	0	-	0	0	-	0	-
Live roots ^{1,2} (%)	40	-	4 (6)	0	-	0 (25)	<0.001
Live mycorrhizae on roots ^{1,3} (%)	0	-	0 (0)	0	-	0 (25)	-
Saprophytic hypha ^{1,4} (%)	0	-	0 (0)	8	-	2 (23)	-

1. Determined by microscopic observation and based on 5 subsamples per plot.

2. Black roots assumed dead; orange-brown roots assumed alive. Calculated as (number of subsamples where roots were alive/total number of subsamples) * 100.

3. Calculated as (number of live root tips with mycorrhiza/ total number of live root tips) *100.

4. Calculated as (number of subsamples where saprophytic hyphae were present/ total number of samples) *100

5. Proportion of plots where fine roots abundant or plentiful

S.E. = standard error; nc = not calculated; N = number of samples (number in brackets indicates number of non-detects for chi-square test)

Bold and shaded indicates a significant difference ($p \leq 0.05$)

Table 3-3. A comparison of coarse woody debris between the reference and halo plots, Mount Polley Mine 2015

Variable	Reference			Halo			P-value
	Mean	S.E.	N	Mean	S.E.	N	
Total cover (%)	62	14	8	32	5.2	21	0.04
Class 1							
Cover (%)	8.4	2.2	8	13	2.9	21	0.088
Average diameter (cm)	14	3.2	8	21	3.0	17	0.078
Class 2							
Cover (%)	7.0	2.4	8	7.1	3.4	21	0.49
Average diameter (cm)	11	3.3	6	27	6.1	10	0.018
Class 3							
Cover (%)	9.5	3.7	8	6.0	1.8	21	0.2
Average diameter (cm)	20	4.5	7	28	5.2	10	0.13
Class 4							
Cover (%)	10	2.8	8	1.7	0.63	21	0.01
Average diameter (cm)	53	5.6	6	35	5.6	6	0.022
Class 5							
Cover (%)	27	7.4	8	3.6	2.4	21	0.0088
Average diameter (cm)	54	5.3	7	28	6.6	5	0.0073

S.E. = standard error; N = number of samples

Bold and shaded indicates a significant difference ($p \leq 0.05$)

Wildlife	Reference			Halo			P-value
	Percent of plots (%) ¹	S.E.	N	Percent of plots (%) ¹	S.E.	N	
Black bear	13	0.12	8	38	0.11	21	0.18
Grizzly bear	0	0	8	14	0.076	21	0.26
Deer	38	0.17	8	38	0.11	21	0.98
Moose	13	0.12	8	57	0.11	21	0.031
Coyote	0	0	8	10	0.064	21	0.37
Wolf	0	0	8	5	0.046	21	0.061
Small mammals	75	0.15	8	33	0.1	21	0.044
Squirrel	50	0.18	8	29	0.099	21	0.28
Bird	50	0.18	8	43	0.11	21	0.73
Eagle	0	0	8	5	0.046	21	0.53
Woodpecker	0	0	8	10	0.064	21	0.37
Grouse	13	0.12	8	0	0	21	0.099
Loon	0	0	8	5	0.046	21	0.53
Hummingbird	13	0.12	8	0	0	21	0.099
Chickadee	0	0	8	5	0.046	21	0.53
Chutterbird	0	0	8	5	0.046	21	0.53
Other songbird	13	0.12	8	0	0	21	0.099
Toad	0	0	8	5	0.046	21	0.53
Insects	0	0	8	14	0.076	21	0.26
Beetle	0	0	8	5	0.046	21	0.53
Wasp	0	0	8	5	0.046	21	0.53
Cricket	0	0	8	5	0.046	21	0.53

1. Percentage of plots (including nearby off-plot areas) where sign observed. Sign includes sightings, auditory signs, and presence of droppings, tracks, bedding areas and/or burrows

S.E. = standard error; N = number of samples

Bold and shaded indicates a significant difference ($p \leq 0.05$)

ATTACHMENT 4

Field Data Tables

Table 4-1. Site characteristics of reference and halo plots, Mount Polley Mine 2015

Plot Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Plot Type	Ref	Halo	Halo	Halo	Halo	Halo	Halo	Halo	Ref	Halo	Halo	Halo	Halo	Ref	Halo	Halo	Ref	Halo	Ref	Ref	Halo	Halo	Halo	Halo	Halo	Ref	Halo	Ref	Halo
SNC Reference	T18	T18	T17-18	T16	T16	T18	T18	T18	T15	T15	T14	T14	-	-	T6	T6	-	-	-	T2	-	-	-	T2	-	T2	-	-	-
Forest Region	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR	SIFR
UTM Zone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Easting	595981	595904	595688	595739	595685	595421	595353	595335	596230	596117	596647	596661	596680	596706	599780	599813	599798	601784	601560	601650	601622	601939	601984	601020	600973	601067	601218	601256	596992
Northing	5820506	5820522	5820222	5820047	5819997	5820734	5820744	5820841	5820008	5819897	5819368	5819385	5819406	5819422	5817188	5817198	5817143	5817533	5817021	5817043	5817050	5817248	5817261	5817043	5816984	5816830	5817329	5817404	5819114
Elevation (m)	954	927	928	930	932	933	940	928	936	913	916	910	913	928	841	837	836	732	750	745	759	736	735	753	750	759	754	743	-
BGC Region	ICHmk3	ICHmk3	ICHmk3	ICHmk3	ICHmk3	ICHmk3	ICHmk3	ICHmk3	ICHmk3	ICHmk3	ICHmk1	ICHmk3	ICHmk	ICHmk1	ICHmk3	ICHmk3	ICHmk3	ICHwk2	ICHwk2	ICHwk2	ICHwk2	ICHwk2	ICHwk2	ICHwk2	ICHwk2	ICHwk2	ICHwk2	ICHwk2	ICHmk3
Site Series	7	7	7	7	7	7	7	7	7	7-Jan	7	7	7	7	5	5	5	8	6	6	6	6	6	6	6	6	8	8	7
Moisture regime ¹	SHG	HG	HG	HG	SHG	HG	HG	HG	m-SHG	SHG	HG	SHG	SHG	SHG	M-SHG	M-SHG	M	HG	M	SHG	SHG	SHG	SHG	SHG	SHG	SHG	HG	HG	SHG
Nutrient regime ²	R	R	-	R	R	R	R	R	m-R	m-R	R	R	R	M	M-R	M-R	R	R	M	R	R	M	M	R	R	Ref	R	R	-
Success Status ³	YS	YC	YC	YC	YC	YC	YC	YC	YC	YC	YC	YS	YS	YS	YC	YS	YS	YC	YS	YC	YC	YS	YS	YC	YC	YC	YC	YC	YS
Structure Stage ⁴	OG	UR	SR	UR	UR	UR	UR	UR	UR	UR	UR	SI	SI	SI	SI	SI	SI	OG	SI	OG	OG	SI	SI	UR	OG	OG	OG	UR	SI
Slope (%)	1	1	0	1	1	0	1	0	2	3	4	4	2	5	5	5	5	5	20	10	0	2	2	5	0	5	2	5	2
Aspect (degrees) ⁵	270	270	150	90	90	150	150	250	200	120	250	250	200	270	270	E-90	40	20	320	320	320	40	40	E-90	90	E	E	W	240
Meso Slope Position ⁶	Lower	Toe	Toe	Toe	Toe	Toe	Toe	Toe	lower to To	Toe	Toe	Toe	Toe	Lower	Mid	Mid	Lower	Toe	Lower	Lower	Toe	Toe	Toe	Toe	Toe	Toe	Toe	Toe	Toe
Surface Shape	Straight	Straight	Flat	Straight	Straight	Straight	Straight	Straight	Straight	Straight	Straight	Straight	Straight	Straight	Convex	Concave	Straight	Straight	Straight	Straight	Concave	Straight	Straight	Straight	Straight	Straight	Straight	Concave	Straight
Microtopography	Hummock	None	Straight	Hummock	Hummock	Flat	Fat	Straight	Hummock	Flat	Flat	Flat	Hummock	Hummock	Straight	Straight	Straight	Flat	Hummock	Hummock	Flat	Flat	Flat	Hummock	Hummock	Hummock	Hummock	Hummock	Flat
Notes	Near Polley Plug	30 m within halo near Polley Plug	Tree island within floodplain	10 m within halo	At edge of healthy forest, saturated tailings on top of aerated native greysol	Halo within Polley Plug area	Halo within Polley Plug area	Halo within Polley Plug area	20 m outside halo	Tree island within floodplain	10 m within halo; SXW plantation	Spruce plantation	Spruce plantation	Spruce plantation	tailings on hilltop; area denuded of vegetation like floodplain	tailings on hilltop	-	Hazeltine Creek delta at Quesnel Lake; natural floodplain covered with >1 m of tailings	Douglas fir plantation	-	-	Douglas fir plantation	Douglas fir plantation (many live trees)	Mature forest; 20 m within halo	Old growth forest; 100m within halo	-	-	-	Spruce plantation
Surface Substrate																													
Tailings (%)	0	0	50	60	30	70	75	70	0	85	75	100	100	0	70	0	0	70	0	0	95	97	95	80	80	0	70	0	100
Organic Matter (%)	70	0	0	5	30	0	0	10	98	0	0	0	0	100	0	25	100	0	80	75	0	3	0	0	0	70	0	100	0
Decaying Wood (%)	30	20	50	40	30	30	25	20	2	15	25	1	0	0	30	25	20	30	20	25	5	0	10	20	20	30	30	95	10
Exposed Bedrock (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0
Sediment (%)	0	80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cover (%)⁷																													
Tree	60	50	20	30	50	30	50	60	70	25	10	5	85	75	0	30	70	50	95	60	80	90	80	45	60	70	60	70	90
Shrub	25	1	2	10	50	5	10	10	20	3	0	1	25	40	10	25	30	0	45	80	1	3	15	10	60	30	50	25	
Herb	50	1	5	20	5	10	5	5	80	10	1	1	25	70	2	20	50	5	25	40	1	2	5	5	15	70	25	60	35
Moss/Lichen	80	1	1	1	1	1	10	0	90	0	0	1	5	95	0	30	50	0	50	20	0	0	0	0	90	15	30	5	

1. X = xerix, SX = subxeric, SM = submesic, M = mesic, SHG = subhygric, HG = hygric, SHD = subhydric. These categories are defined in [BCMOFR & BCMOE 2010] and represent least moisture (xeric) to most moisture (subhygric)
 2. Nutrient regime is an estimate of the available nutrient supply and is based on a combination of environmental and soil properties and indicator plants The relationship between site properties and nutrient regime is described in [BCMOFR & BCMOE 2010]
 3. YC = young climax, YS = young seral
 4. OG = old growth, SI = stand initiation, SR = understory reinitiation, UR = stem exclusion
 5. Aspect is the direction that the slope is facing, as measured by a compass (e.g. 180° is due south).
 6. Meso slope position is the position of the plot relative to the localized catchment area as defined in [BCMOFR & BCMOE 2010]
 7. All cover present in quantities less than 1 are rounded to 1

Table 4-2. Mineral soil characteristics of reference and halo plots, Mount Polley Mine 2015

Plot Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Plot Type	Ref	Halo	Halo	Halo	Halo	Halo	Halo	Halo	Ref	Halo	Halo	Halo	Halo	Ref	Halo
Soil Class ¹	PZ.GL	O.HG	O.G	O.HG	O.G	O.HG	O.G	O.G	D.GL	GLD.GL	GLD.GL	O.HG	GLD.GL	GLD.GL	GLD.GL
Humus Form ²	HR	UR	HR	HR	HR	UR	UR	UR	HR	UR	UR	HR	UR	HR	HR
Rooting Depth (cm)	20	10	5	20	10	0	15	0	12	10-15	10	10	10	15	15
Root Zone Particle Size ³	FLS	FLS	CS	CS	FLS	FLS	FLS	FLS	FLS	FLS	CS	FLS	FLS	FLS	FLS
Root Restricting Layer ⁴	N	W	W	W	W	W	W	W	N	W	W	W	N	N	N
Depth of Root Restricting Layer (cm)	n/a	20	5	20	5	0	0	0	n/a	0	0	0	n/a	n/a	n/a
Drainage ⁵	I	P	P	P	P	P	P	P	I	I	I	P	I	I	I
Tailings Deposit															
Total Depth (cm)	-	50	150	20	20	110	50	45	-	56	115	70	10	-	45
Tailings Layer 1															
Depth (cm)	-	30	60	20	10	65	35	25	-	56	10	30	10	-	45
Texture ⁶	-	vfS	SiC	S	SiS	Si	SiC	SiS	-	S	SiS	S	SiS	-	S
Tailings Layer 2															
Depth (cm)	-	20	90	-	10	45	15	20	-	-	30	10	-	-	-
Texture ⁶	-	vfSiS	S	-	-	S	-	S	-	-	S	Si	-	-	-
Tailings Layer 3															
Depth (cm)	-	-	-	-	-	-	-	-	-	-	75	30	-	-	-
Texture ⁶	-	-	-	-	-	-	-	-	-	-	SiS (below 5cm thick buried organic layer)	SiS	-	-	-
Forest Floor															
Total Depth (cm)	8	21	15	10	10	10	6	10	13	10	10	10	9	12	10
L Horizon															
Depth (cm)	<1	1	0	0	0	0	0	0	5	0	0	0	0	3	0
F Horizon															
Depth (cm)	5	10	10	8	5	0	1	0	6	5	5	5	7	7	5
Mycelia Abundance ⁶	A	A	X	X	X	X	X	X	F	X	X	X	A	A	F
Fecal Abundance ⁷	A	A	X	A	X	X	X	X	A	A	X	X	F	F	X
Root Abundance ⁸	A	A	X	A	A	X	A	X	A	P	X	A	A	A	X
Dominant Root Size ⁹	M	F	-	F	F	-	F	-	F	F	-	M	F	F	-
H Horizon															
Depth (cm)	3	10	5	2	5	10	5	10	2	5	5	5	2	2	5
Mycelia Abundance ⁶	A	A	M	X	X	X	X	X	F	X	X	X	A	A	F
Fecal Abundance ⁷	A	A	A	A	X	X	X	X	A	A	X	X	F	F	X
Root Abundance ⁸	A	A	X	A	A	X	A	X	A	F	X	X	A	A	X
Dominant Root Size ⁹	F	F,C,M	X	F	F	-	F	-	F	F	-	-	F	F	-
Mineral Layers															
Ahe horizon															
Depth (cm)	10	10	2	10	5	2	5	10	4	5	2	10	3	2	2
Texture ⁶	SiCL	SiL	SCL	SiL	SiL	SCL	SiCL	SiCL	SiL	SiL	SiL	SiL	SiL	SiL	SiL
Root Abundance ⁸	A	A	X	A	A	X	A	X	A	X	X	M	X	A	A
Dominant Root Size ⁹	F	L	-	F	F	-	F	-	F	-	-	M	-	M	F
B horizon															
Classification	Bh	Bg	Bg	Bg	Bg	Bg	Bg1	Bg1	Bh	Btjg	Btgj	Bgh	Bh	Bht	Bgtj
Texture ⁶	CL	SiC	C	SiCl	SiL	SiCL	SiCL	SCL	SiL	CL	CL	CL	SiCL	SiCL	SiCL
Root Abundance ⁸	M	A	X	M	F	X	X	X	M	X	X	X	X	X	X
Dominant Root Size ⁹	F	L	-	M	F	-	X	-	M	-	-	-	-	-	-

1. D.GL = Dark Grey Luvisol; GL.FHP = Gleyed Ferro-Humic Podzol; GLD.GL = Gleyed Dark Gray Luvisol; O.FHP = Orthic Ferro-Humic Podzol; O.G = Orthic Gleysol; O.GL = Orthic Gray Luvisol; O.HFP = Orthic Humo-Ferric Podzol ; O.HG = Orthic Humic Gleysol; PZ.GL = Podzolic Gray Luvisol ; TY.H = Typic Humisol ; TY.M = Typic Mesisol
 2. HR = Hemimor; UR = Humimor; RD = Mormoder
 3. CS = Clayey-skeletal; FLS = Fine-loamy-skeletal; HU = Humic
 4. N = No root restriction evident; W = Excessive moisture
 5. M = Moderately well drained; W = Well drained; R = Rapidly drained; I = Imperfectly drained; V = Very poorly drained. Drainage classes are defined in BCMOF & BCMOE (2010).
 6. vfS = very fine sand; vfSiS = very fine silt sand; SiC = Silty Clay; S = Sand; SCL = Sandy Clay Loam; C = Clay; LS = Loamy Sand; Si = Silt; SiCL = Silty Clay Loam; LC = Loamy Clay; SiL = Silty Loam; SiS = Silty Sand; O = Organics
 7. X = None; F = Few; C = Common; A = Abundant. Mycelia and fecal abundance classes are defined in BCMOF & BCMOE (2010).
 8. X = none; F = Few; P = Plentiful; A = Abundant. Abundance rating depends on root size. Root abundance classes are defined in BCMOF & BCMOE (2010).
 9. V = Very fine (< 1mm); F = Fine (1-2 mm); M = Medium (3-5 mm); C = Coarse (6-15 mm); K = Very Coarse (> 15 mm)

Table 4-2. Mineral soil characteristics of reference and halo plots, Mount Polley Mine 2015

Plot Number	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Plot Type	Halo	Ref	Halo	Ref	Ref	Halo	Halo	Halo	Halo	Halo	Ref	Halo	Ref	Halo
Soil Class ¹	GLD.GL	PZ.GL	O.HG	O.HFP	O.HFP	O.HFP	O.HFP	O.HFP	O.HFP	O.HFP	GL.FHP	TY.H	TY.M	O.GL
Humus Form ²	HR	HR	HD	RD	RD	RD	RD	RD	RD	RD	RD	n/a	n/a	RD
Rooting Depth (cm)	10	15	20	40	40	40	10	30	30	30	40	30	60	15
Root Zone Particle Size ³	FLS	FLS	CS	FLS	FLS	FLS	FLS	FLS	FLS	FLS	FLS	H	H	FLS
Root Restricting Layer ⁴	N	N	W	N	N	N	N	N	N	N	N	N	N	N
Depth of Root Restricting Layer (cm)	n/a	n/a	20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Drainage ⁵	I	W	P	W	W	W	W	W	W	W	I	I	V	I
Tailings Deposit														
Total Depth (cm)	16	-	85	-	-	45	45	20	30	70	-	17	-	8
Tailings Layer 1														
Depth (cm)	16	-	25	-	-	45	30	20	30	10	-	17	-	8
Texture ⁶	S	-	Si	-	-	-	SiC	SiS	S	SiS	-	-	-	S
Tailings Layer 2														
Depth (cm)	-	-	60	-	-	-	15	-	-	40	-	-	-	-
Texture ⁶	-	-	S	-	-	-	S	-	-	S	-	-	-	-
Tailings Layer 3														
Depth (cm)	-	-	-	-	-	-	-	-	-	20	-	-	-	-
Texture ⁶	-	-	-	-	-	-	-	-	-	S	-	-	-	-
Forest Floor														
Total Depth (cm)	8	9	7	3	13	15	5	5	9	6	20	0	0	10
L Horizon														
Depth (cm)	0	3	0	1	1	0	0	0	<1	0	0	0	0	0
F Horizon														
Depth (cm)	4	6	3	1	10	0	5	5	7	4	10	0	0	5
Mycelia Abundance ⁶	X	A	X	C	A	X	X	C	A	A	F	-	-	A
Fecal Abundance ⁷	X	C	A	C	C	X	X	C	A	C	A	-	-	F
Root Abundance ⁸	X	A	X	A	A	X	X	X	A	X	A	-	-	A
Dominant Root Size ⁹	-	F	-	M,F	F,M	-	-	-	F,M	-	-	-	-	F,M,C
H Horizon														
Depth (cm)	4	<1	4	1	2	15	0	0	2	2	10	0	0	5
Mycelia Abundance ⁶	X	A	X	M	X	X	X	X	A	A	F	-	-	A
Fecal Abundance ⁷	X	A	A	M	X	X	X	X	A	M	A	-	-	M
Root Abundance ⁸	X	A	X	A	A	X	X	X	A	X	X	-	-	A
Dominant Root Size ⁹	-	F	-	M,F	F,M	-	-	-	F,M	-	-	-	-	F,M,C
Mineral Layers														
Ahe horizon														
Depth (cm)	<1	6	10	2	4	10	4	4	10	10	4	-	-	3
Texture ⁶	SiL	SiL	SiL	fSL	SiL	SiL	SiL	fSiC	SiL	SiL (some clay)	SiL	-	-	SiL
Root Abundance ⁸	A	X	X	M	A	X	A	X	X	X	X	-	-	X
Dominant Root Size ⁹	C	-	-	F,M,C	F	-	F,M	-	-	-	-	-	-	-
B horizon														
Classification	Btg	Bft	Bg	Bf	Bf	-	Bf	Bf	Bm	Bfh	Bfh	-	-	Bt
Texture ⁶	SiCL	SiCL	LC	fSL	SiL	SiL	fSL	fSL/SiL/fSiL	SL	SiL	SiL	-	-	SiL
Root Abundance ⁸	F	X	F	F	F	X	X	X	X	X	X	-	-	X
Dominant Root Size ⁹	W	-	M	F	M	-	-	-	-	-	-	-	-	-

1. D.GL = Dark Grey Luvisol; GL.FHP = Gleyed Ferro-Humic Podzol; GLD.GL = Gleyed Dark Gray Luvisol; O.HFP = Orthic Ferro-Humic Podzol; O.G = Orthic Gleysol; O.GL = Orthic Gray Luvisol; O.HFP = Orthic Humo-Ferric Podzol ; O.HG = Orthic Humic Gleysol; PZ.GL = Podzolic Gray Luvisol ; TY.H = Typic Humisol ; TY.M = Typic Mesisol
 2. HR = Hemimor; UR = Humimor; RD = Mormoder
 3. CS = Clayey-skeletal; FLS = Fine-loamy-skeletal; HU = Humic
 4. N = No root restriction evident; W = Excessive moisture
 5. M = Moderately well drained; W = Well drained; R = Rapidly drained; I = Imperfectly drained; V = Very poorly drained. Drainage classes are defined in BCMOF & BCMOE (2010).
 6. vfS = very fine sand; vfSiS = very fine silt sand; SiC = Silty Clay; S = Sand; SCL = Sandy Clay Loam; C = Clay; LS = Loamy Sand; Si = Silt; SiCL = Silty Clay Loam; LC = Loamy Clay; SiL = Silty Loam; SiS = Silty Sand; O = Organics
 7. X = None; F = Few; C = Common; A = Abundant. Mycelia and fecal abundance classes are defined in BCMOF & BCMOE (2010).
 8. X = none; F = Few; P = Plentiful; A = Abundant. Abundance rating depends on root size. Root abundance classes are defined in BCMOF & BCMOE (2010).
 9. V = Very fine (< 1mm); F = Fine (1-2 mm); M = Medium (3-5 mm); C = Coarse (6-15 mm); K = Very Coarse (> 15 mm)

Table 4-3. Evidence of wildlife use in reference and halo plots, Mount Polley Mine 2015

Plot Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Plot Type ¹	R	H	H	H	H	H	H	H	R	H	H	H	H	R	H	H	R	H	R	R	H	H	H	H	H	R	H	R	H
Bears																													
Prints	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grizzly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	O	O	O	-	-	-	-	-	-
Bear	-	X	X	-	-	-	O	O	-	-	O	O	-	-	-	-	-	-	-	-	-	-	O	-	-	-	-	-	-
Bed	-	-	-	-	-	O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Deer																													
Prints	X	O	-	O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Deer	-	-	-	-	-	-	-	-	O	-	-	O	-	-	O	-	-	-	-	-	O	O	O	O	-	-	-	-	-
Droppings	-	-	-	-	-	-	-	-	-	-	-	-	-	O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Moose																													
Prints	X	-	X	O	-	O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Moose	-	-	-	-	-	-	-	O	-	-	O	O	-	-	-	-	-	-	-	-	O	O	O	O	-	-	-	-	O
Droppings	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	O	-	-
Small Mammals																													
Squirrel seen	O	-	-	-	-	-	O	-	O	-	-	-	-	O	-	O	-	-	-	-	-	O	-	-	O	O	O	-	O
Burrow	-	-	-	-	-	-	-	-	-	-	-	-	-	O	-	-	-	-	-	-	O	-	-	-	-	-	O	-	-
Birds																													
Eagle feather	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Birds	-	-	-	-	-	-	-	-	-	-	O	-	-	-	-	O	-	-	-	-	-	-	-	-	-	-	O	-	-
Grouse	-	-	-	-	-	-	-	-	O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eagle	-	-	-	-	-	-	-	O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Song birds	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	O	-	-	-	-	-	-	-	-	-
Hummingbird nest	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	O	-	-	-	-	-	-	-	-	-
Loon	-	-	-	-	-	-	-	O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chickadee	-	-	O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chutterbird	-	-	O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Woodpecker	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	O	-	-	-
Wolf																													
Droppings	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coyote																													
Droppings	-	-	-	-	-	-	-	-	-	-	-	O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coyote	-	-	-	-	-	-	-	-	-	-	-	-	-	-	O	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amphibians																													
Toad	-	-	-	-	-	-	-	-	-	-	-	-	O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Insects																													
Beetle	-	-	-	-	-	-	-	-	-	-	-	-	O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wasps	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	O	-	-	-	-	-	-	-	-
Cricketts	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	O	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

X - off plot evidence; O - on plot evidence

1. H = halo, R = reference

Plot Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Plot Type ¹	R	H	H	H	H	H	H	H	R	H	H	H	H	R	H	H	R	H	R	R	H	H	H	H	H	R	H	R	H
Class 1																													
Percent cover (%)	5	0	50	20	0	0	15	5	5	20	30	10	5	5	30	10	5	30	15	10	10	1	1	15	20	2	0	20	10
Average diameter (cm)	35	-	40	50	-	-	30	20	10	30	20	20	10	15	30	10	15	10	15	5	30	10	10	5	10	10	-	10	20
Class 2																													
Percent cover (%)	10	70	0	0	0	10	10	5	20	20	0	10	5	5	0	0	0	0	0	10	0	0	0	5	0	1	10	10	5
Average diameter (cm)	25	65	-	-	-	20	50	20	5	40	-	20	10	15	-	-	-	-	-	5	-	-	-	30	-	5	10	10	5
Class 3																													
Percent cover (%)	1	30	0	0	0	15	5	5	30	10	15	10	0	5	0	10	5	0	0	20	0	0	0	0	0	5	5	10	20
Average diameter (cm)	20	15	-	-	-	50	30	50	5	40	20	20	-	15	-	40	40	-	-	10	-	-	-	-	-	20	5	30	10
Class 4																													
Percent cover (%)	15	0	0	0	0	7	5	2	20	0	0	10	0	0	0	5	5	0	0	10	0	0	2	0	4	10	0	20	0
Average diameter (cm)	40	-	-	-	-	30	40	S	50	-	-	20	-	-	-	20	40	-	-	50	-	-	50	-	50	70	-	70	-
Class 5																													
Percent cover (%)	25	0	0	0	0	5	5	0	30	0	0	10	0	30	0	0	5	0	0	30	0	0	0	0	5	25	50	70	0
Average diameter (cm)	40	-	-	-	-	10	30	-	50	-	-	20	-	60	-	-	50	-	-	60	-	-	-	-	30	40	50	80	-
Total percent cover (%)	56	100	50	20	0	37	40	17	105	50	45	50	10	45	30	25	20	30	15	80	10	1	3	20	29	43	65	130	35

1. H = halo, R = reference

Table 4-5. A comparison of plant species occurring in the reference and halo plots, Mount Polley Mine 2015

Species	Species common to reference and halo				Species unique to reference (n = 8 plots)			Species unique to halo (n = 21 plots)		
	Reference		Halo		Species	Reference		Species	Halo	
	Presence (% of plots)	Abundance (avg % cover) ¹	Presence (% of plots)	Abundance (avg % cover) ¹		Presence (% of plots)	Abundance (avg % cover) ¹		Presence (% of plots)	Abundance (avg % cover) ¹
Trees										
Thuja plicata	88	44	52	15	Tsuga heterophylla	13	15			
Picea glauca	63	30	86	27	Taxus brevifolia	13	0.5			
Abies lasiocarpa	88	25	71	16						
Pseudotsuga menziesii	25	43	9.5	40						
Betula papyrifera	50	11	33	7.5						
Populus trichocarpa	25	15	29	5.9						
Shrubs										
Acer douglasii	50	6.0	19	2.5	Actea rubra	38	2.2	Salix scouleriana	29	4.1
Alnus sinuata	25	15	38	6.9				Sambucus racemosa	29	1.9
Oplopanax horridus	75	23	48	4.0				Ribes sp	4.8	10
Rubus idaeus	13	4.0	29	3.5				Mahonia aquilinum	4.8	0.5
Rubus parviflorus	63	27	29	4.4						
Ribes lacustre	88	1.9	48	1.4						
Rosa gymnocarpa	75	2.1	33	1.1						
Viburnum edule	38	2.3	14	1.5						
Lonicera involucrata	88	13	71	5.4						
Sorbus sitchensis	38	0.83	9.5	1.3						
Amelanchier alnifolia	63	1.1	9.5	1.3						
Rubus pubescens	63	5.4	33	2.9						
Spirea douglasii	13	4.0	33	4.0						
Spirea betulifolia	13	3.0	4.8	5.0						
Paxistima myrsenites	50	1.8	4.8	1.0						
Symphoricarpos albus	13	1.0	9.5	0.75						
Vaccinium scoparium	25	0.5	4.8	0.5						
Vaccinium membranaceum	13	0.5	4.8	1.0						
Vaccinium ovalifolium	13	3.0	4.8	0.5						
Cornus stolonifera	50	7.8	29	2.9						
Herbs										
Rubus pedatus	25	2.5	19	0.5	Heraclium sphondylium	13	2.0	Aster cilleolatus	19	1.8
Galium triflorum	75	1.0	43	1.1	Asarum canadense	38	1.0	Fragaria vesca	4.8	0.5
Mitella nudum	75	1.9	14	1.0	Orthilia secunda	13	1.0	Epilobium angustifolium	48	1.8
Tiarella unifoliata	88	2.3	71	0.67	Unknown fern	13	0.5	Viola orbiculata	4.8	0.5
Tiarella trifoliata	63	3.0	9.5	0.5	Oryzopsis asperifolia	13	1.0	Trientalis borealis	4.8	0.5
Equisetum arvense	75	8.3	95	6.9	Goodyeara oblongifolia	25	0.5	Urtica dioica	29	1.3
Petasites palmatus	13	5.0	14	10	Mianthemum dilatatum	38	0.5	Hieracium caespitosum	9.5	0.5
Aster conspicuus	13	0.5	9.5	5.0	Lilium columbianum	13	0.5	Mimulus lewisii	9.5	1.3
Cornus canadensis	63	17	33	4.2				Cinna latifolia	14	4.0
Fragaria virginiana	38	4.5	14	2.2				Taraxicum officinale	4.8	0.5
Osmorhiza chilensis	38	0.5	4.8	0.5				Verbascum thapsis	4.8	0.5
Linnaea borealis	100	6.8	24	4.4				Arnica cordifolia	4.8	0.5
Clintonia uniflora	88	2.2	4.8	0.5				Lysichitum americanum	4.8	0.5
Athyrium felix-femina	38	10	52	1.0				Trifolium repens	4.8	0.5
Gymnocarpium dryopteris	100	18	76	1.1				Mentha arvensis	4.8	0.5
Dryopteris assimilis	50	6.0	38	1.1						
Smilacina racemosa	100	2.6	9.5	1.3						
Smilacina stellata	13	1.0	9.5	0.75						
Streptopus amplexifolius	88	3.0	33	0.93						
Streptopus lanceolatus	38	1.3	14	3.8						
Thalictrum occidentale	25	0.75	4.8	0.5						
Pyrola asarifolia	25	0.75	4.8	0.5						
Circea alpina	25	6.0	29	0.5						
Aralia nudicaulis	75	8.6	33	2.4						
Unknown grass	13	1.0	24	0.6						
Anaphalis margaritacea	13	0.5	4.8	0.5						
Mosses										
Ptilium crista-castrensis	88	13	24	2.7	Lycopodium annotinum	50	5.8	Reindeer moss	4.8	1.0
Pleurozium schreberi	63	27	9.5	7.5	Rhytidiadelphus robusta	13	25			
Rhytidiadelphus loreus	38	17	9.5	0.75	Sphagnum	13	2.0			
Rhytidiadelphus triquetrus	75	18	29	4.6	unknown moss	13	3.0			
Plagiomnium medium	50	11	19	4.0						
Hylocomnium splendens	13	0.5	4.8	2.0						
Dicranum polysetum	13	1.0	4.8	25						
Polytrichum juniperinum	13	1.0	9.5	0.75						

1. Abundance only includes plots where the species was present. Abundance in the tree layer is the sum of covers for each canopy layer.



APPENDIX J

Terrestrial Plant and Invertebrate Tissue Metal Analysis

Terrestrial Vegetation Data Report

Terrestrial Invertebrate Tissue Data Report

Prepared by:

Kerrie Serben, M.Sc. and Trish Miller, M.Sc., R.P.Bio., CSAP

Golder Associates Ltd.

DATE May 25, 2016**REFERENCE No.** 1411734-11000-2000**TO** Katie McMahan
Mount Polley Mine Corporation**CC** Arainn Atkinson**FROM** Kerrie Serben, Trish Miller**EMAIL** Kerrie_Serben@golder.com;
Trish_Miller@golder.com**TERRESTRIAL VEGETATION DATA REPORT**

1.0 INTRODUCTION

On August 4, 2014, the failure of a glacial lacustrine layer beneath the perimeter embankment of the Tailings Storage Facility (TSF) at the Mount Polley Mine, British Columbia caused a breach of the embankment and resulted in the release of water and tailings from the TSF to Polley Lake, Hazeltine Creek and Quesnel Lake. This technical memorandum provides the vegetation data collected along Hazeltine Creek in the summer of 2015 and presents the analysis of these data. The purpose of the sampling program was to determine whether plants that could be eaten by humans and/or wildlife had accumulated higher than normal concentrations of metals from the tailings. Plant tissue samples, co-located with soil samples, were collected for chemical analyses, which will provide site-specific chemistry results to determine exposure concentrations and calculate site-specific bioaccumulation factors as part of the Human Health and Ecological Risk Assessment (HHERA).

2.0 METHODS**2.1 Sample Collection**

Samples of edible plants (berries, spruce [*Picea* spp.], willow [*Salix* spp.], and rye grass [*Elymus* sp.]) were collected between July 28 and August 4, 2015 by Golder Associates Ltd. (Golder) field staff and members of the Soda Creek Indian Band (Xat'sül First Nation), and between August 19 and 30, 2015 by MPMC staff. Each vegetation sample was collected along with a soil/tailings sample at the same time and location. In the reference area, the soil sample was collected from the root zone. In the halo and floodplain areas, the sample was collected from the top layer and therefore consisted of soil/tailings mixture. The soil chemistry results are provided in a separate technical memorandum (Appendix B, Soil Quality Update).

Samples of berries and spruce needles were collected from plants/trees remaining within the area along Hazeltine Creek where tailings had deposited on top of the native soil (this area is referred to as the halo area). Berries that could be consumed by humans and wildlife were collected from common shrub species (e.g., cranberry, blueberry [*Vaccinium* spp.]) when they were ripe. Spruce samples, which consisted of the new growth



at the tips of branches that would be consumed by ungulates, were collected. Also, one sample of leaves from a willow shrub was collected in the halo area.

Samples of willow leaves and rye grass were primarily collected from the floodplain, where the forest and portions of native soils were removed by the flood of debris from the embankment breach. Rye grass was heli-seeded in September 2014 along the Hazeltine Creek floodplain in an effort to reduce erosion of exposed materials. Willow (wattles, stakes and seedlings) were also hand-planted by members of the Soda Creek Indian Band, contractors, and MPMC staff along the reconstructed Hazeltine Creek. The above ground portion of rye grass growing in areas with tailings deposits were collected, as well as willow leaves.

Berry, spruce, and willow samples were also collected from unaffected reference forested areas located at least 20 metres (m) from the edge of visible tailings. These samples were collected from reference areas to provide an indication of normal metal concentrations in the native plants and to compare against samples collected from the halo and floodplain areas.

Tissue samples were frozen as soon as possible and kept frozen until submitted to ALS Laboratory (Burnaby, BC) for analysis of metals¹ and moisture content. Analytical detection limits, the lowest quantity of a substance that can be distinguished from the absence of the substance within a stated confidence limit, are provided in Table 1. A suite of metals were analyzed by inductively coupled plasma mass spectrometry (ICPMS) and total mercury was analyzed by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry. The laboratory provided the results in wet weight and dry weight; only the dry weight results are reported in this memorandum. The results of the chemistry analysis are presented in Attachment A, Table A-1 (berries), Table A-2 (spruce), Table A-3 (willow), and Table A-4 (rye-grass).

¹ The term "metals" refers to metals, metalloids, and non-metals.

Table 1: Analytical Parameters and Method Detection Limits for Plant Tissue Samples

Parameter	Units	Method Detection Limit (Number of Samples) ^(a)
Moisture Content	%	0.25
Aluminum (Al)-Total	mg/kg dw	2.0 (69); 5.0 (8)
Antimony (Sb)-Total	mg/kg dw	0.010 (77)
Arsenic (As)-Total	mg/kg dw	0.020 (69); 0.030 (8)
Barium (Ba)-Total	mg/kg dw	0.050 (77)
Beryllium (Be)-Total	mg/kg dw	0.010 (77)
Bismuth (Bi)-Total	mg/kg dw	0.010 (77)
Boron (B)-Total	mg/kg dw	1.0 (77)
Cadmium (Cd)-Total	mg/kg dw	0.0050 (69); 0.010 (8)
Calcium (Ca)-Total	mg/kg dw	20 (77)
Cesium (Cs)-Total	mg/kg dw	0.0050 (77)
Chromium (Cr)-Total	mg/kg dw	0.050 (69); 0.20 (8)
Cobalt (Co)-Total	mg/kg dw	0.020 (77)
Copper (Cu)-Total	mg/kg dw	0.10 (69); 0.20 (8)
Iron (Fe)-Total	mg/kg dw	3.0 (69); 5.0 (8)
Lead (Pb)-Total	mg/kg dw	0.020 (69); 0.050 (8)
Lithium (Li)-Total	mg/kg dw	0.50 (77)
Magnesium (Mg)-Total	mg/kg dw	2.0 (77)
Manganese (Mn)-Total	mg/kg dw	0.050 (77)
Mercury (Hg)-Total	mg/kg dw	0.0050 (27)
Molybdenum (Mo)-Total	mg/kg dw	0.020 (69); 0.040 (8)
Nickel (Ni)-Total	mg/kg dw	0.20 (77)
Phosphorus (P)-Total	mg/kg dw	10 (77)
Potassium (K)-Total	mg/kg dw	20 (77)
Rubidium (Rb)-Total	mg/kg dw	0.050 (77)
Selenium (Se)-Total	mg/kg dw	0.050 (69); 0.10 (8)
Sodium (Na)-Total	mg/kg dw	20 (77)
Strontium (Sr)-Total	mg/kg dw	0.050 (69); 0.10 (8)
Tellurium (Te)-Total	mg/kg dw	0.020 (77)
Thallium (Tl)-Total	mg/kg dw	0.0020 (77)
Tin (Sn)-Total	mg/kg dw	0.10 (77)
Uranium (U)-Total	mg/kg dw	0.0020 (77)
Vanadium (V)-Total	mg/kg dw	0.10 (77)
Zinc (Zn)-Total	mg/kg dw	0.50 (69); 1.0 (8)
Zirconium (Zr)-Total	mg/kg dw	0.20 (77)

Notes:

^(a) Method detection limits varied among samples due to differences in available sample mass for analysis.

% = percent; mg/kg dw = milligrams per kilogram dry weight.

2.2 Data Analysis

2.2.1 Historical Data

Baseline vegetation sampling at the Mount Polley Property was conducted for the purpose of documenting the pre-impact metal levels in vegetation at or near the mine site. Sampling was conducted in 1989, 1995, and 1996 in areas including the Central and West Pits (now the Cariboo and Springer Pits), the Mill Site, and the Tailings Storage Facility (TSF) (MPMC 2015). Refer to Table 2 for a summary of the relevant, available, baseline vegetation metal sampling.

Table 2: Summary of Baseline Vegetation Metal Sampling Program

Species	1989	1995	1996
Western red cedar (<i>Thuja plicata</i>)	Central Pit, Mill Site		
Subalpine fir (<i>Abies lasiocarpa</i>)		Tailings North, Central Pit	Mill Area ^(a) , Open Pit ^(a)
Black cottonwood (<i>Populus balsamifera</i>)			Tailings Area ^(a)
Western mountain as (<i>Sorbus acuparia</i>)		Central Pit	Mill Area ^(a)
Trembling aspen (<i>Populus tremuloides</i>)			Open Pit ^(a)
Paper birch (<i>Betula papyrifera</i>)			Tailings Area ^(a) , Southeast Dump ^(a)
Sitka alder (<i>Alnus crispa</i>)	West Pit, Central Pit, Mill Site, North of Mine		Tailings Area ^(a)
Red osier dogwood (<i>Cornus sericea</i>)			Tailings Area ^(a)
Scouler's willow (<i>Salix scouleriana</i>)	West Pit, North of Mine	Tailings North, Mill South	
Sitka willow (<i>Salix sitchensis</i>)	West Pit, Mill Site		
Undergreen willow (<i>Salix commutate</i>)		Tailings North, Central Pit	
Willow (<i>Salix</i> sp)	Central Pit	Tailings North	Open Pit ^(a) , Tailings Area ^(a)
Douglas maple (<i>Acer glabrum</i>)			Open Pit ^(a)
Prickly rose (<i>Rosa acicularis</i>)		Tailing North, Mill South	Southeast Dump ^(a)
Baldhip rose (<i>Rosa gymnocarpa</i>)		Mill South	
Red elderberry (<i>Sambucus racemosa</i>)			Southeast Dump ^(a)
Mountain bilberry (<i>Vaccinium membranaceum</i>)	West Pit, Central Pit		
Black twinberry (<i>Lonicera involucrata</i>)			Tailings Area ^(a)
Highbush cranberry (<i>Viburnum edule</i>)			Tailings Area ^(a)
Black huckleberry (<i>Vaccinium membranaceum</i>)		Mill South	Southeast Dump ^(a)
Black gooseberry (<i>Ribes lacustre</i>)			Tailings Area ^(a)
Saskatoon (<i>Amelanchier alnifolia</i>)		Central Pit	Southeast Dump ^(a)
Raspberry (<i>Rubus idaeus strigosus</i>)		Central Pit	
Thimble berry (<i>Rubus parviflorus</i>)			Open Pit ^(a)
Falsebox (<i>Paxistima myrsinites</i>)		Central Pit	Tailings Area ^(a)
Birch-leaved spirea (<i>Spiraea betulifolia</i>)			Southeast Dump ^(a)
Wheeler's blue grass (<i>Poa nervosa</i>)	West Pit, North of Mine		
Timothy (<i>Phleum pretense</i>)	Mine Site	Tailings North	
Northern reed grass (<i>Calamagrostis inexpansa</i>)	North of Mine		

Species	1989	1995	1996
Redtop (<i>Agrostis stolonifera</i>)	North of Mine		
Aslike clover (<i>Trifolium hybridum</i>)	West Pit, Mill Site, North of Mine		Mill Area ^(a)
Common horsetail (<i>Equisetum arvense</i>)		Tailings North	
Pumpelly brome (<i>Bromus inermis</i>)		Tailings North	
Witches hair (<i>Alectoria sarmentosa</i>)		Tailings North, Central Pit	
Red clover (<i>Trifolium pratense</i>)		Tailings North, Central Pit	
Rye grass (<i>Elymus</i> sp)			Mill Area ^(a)
Fringed aster (<i>Aster ciliolatus</i>)			Southeast Dump ^(a)
Fireweed (<i>Chamerion angustifolium</i>)			Open Pit ^a

Notes:

^(a) Triplicate samples collected.

The baseline programs targeted wildlife forage plant species, and species were selected based on their importance in the diet of ungulates and other herbivores. Vegetation that appeared browsed was also sampled. The baseline vegetation data provides context to evaluating current conditions, as it was collected to provide a comparison for assessing outcomes or impacts in the future. Baseline data were available for eleven metals: arsenic, cadmium, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, and zinc.

Several plant species were sampled during the baseline studies and the same species were not sampled in 2015. To facilitate the comparison between baseline and 2015 data, plant species were divided into six groups according to the BC Species and Ecosystems Explorer website (Province of British Columbia 2015): i) arboreal lichen, ii) forb/herb, iii) grass, iv) shrub, v) deciduous tree, and vi) coniferous tree. General descriptions of each vegetation group are provided in Table 3. Table 4 lists the vegetation group for each plant species from the baseline studies. Twigs, leaves, and unspecified tissue groups were combined within each vegetation group.

Table 3: General Definition of Vegetation Groups

Vegetation Group	Definition
Arboreal Lichen	A lichen that grows on trees. A lichen is defined as composite organisms consisting of a fungus and a photosynthetic partner (e.g., green algae or cyanobacterium) growing together in a symbiotic relationship.
Berry	In the strict sense, a fleshy or pulpy fruit formed from a single ovary and containing one to many seeds; loosely, any juicy or pulpy fruit.
Forb/ Herb	An herbaceous vascular plant that is not a grass, sedge, or rush.
Grass (Graminoid)	An herbaceous vascular plant with narrow leaves growing from the base. These include “true grasses” of the family Poaceae (Gramineae), as well as sedges (Cyperaceae) and rushes (Juncaceae).
Shrub	A woody perennial plant differing from a tree by its low stature and by generally producing several basal shoots instead of a single trunk.
Tree	Single-stemmed woody plant that is typically taller than 10 metres when mature. Deciduous refers to trees that shed their leaves in the autumn. Coniferous refers to trees that retain their leaves all year long.

Table 4: Assigned Vegetation Groups for Plants Collected during Baseline Studies (1989, 1995, 1996)

Vegetation Group	Common Names ^(a)
Arboreal Lichen	Witches Hair ^(b)
Forb	Alsike Clover, Bain Berry, Bunch Berry, Clover, Common Horsetail, False Solomons Seal, Fireweed, Fringed Aster, Red Clover
Grass	Blue Grass, Northern Reed Grass, Pumpelly Brome, Red Top, Rye Grass, Timothy
Shrub	Baldhip Rose, Bilberry, Birched-Leaved Spiraea, Black Current, Black Gooseberry, Black Huckleberry, Black Twinberry, Douglas Maple, Falsebox, High Bush Cranberry, Huckleberry, Prickly Rose, Red Elderberry, Red Osier Dogwood, Red Raspberry, Saskatoon Berry, Scoulers Willow Leaves, Thimbleberry, Variable Willow, Western Mountain Ash, Willow
Tree, conifer	Cedar, Spruce, Subalpine Fir
Tree, deciduous	Alder, Black Cottonwood, Paper Birch, Sitka Alder, Trembling Aspen

Notes:

The laboratory results did not specify whether berries were collected from fruit-bearing plants, so this was not differentiated in baseline data (1989, 1995, 1996). Twigs, leaves, and unspecified tissue groups from each vegetation group were also combined.

^(a) Common name as listed in the laboratory report.

^(b) This common name was not found on the BC Species and Ecosystems Explorer website. It is assumed that the lichen is either *Bryoria* species (horsehair lichen) or *Usnea* species (old man's beard lichen).

2.2.2 2015 Data

Vegetation groups were assigned to the 2015 data in the same manner as to the baseline data, except that in 2015 a “berry” group was added (Table 5). All non-berry samples in 2015 were leaf tissue samples.

Table 5: Assigned Vegetation Groups for Plants Collected from the Reference, Floodplain, and Halo Areas in 2015

Vegetation Group	Common Names ^(a)
Berry	Bain Berry, Black Current, Black Twinberry, Bunch Berry, False Solomon's Seal, High Bush Cranberry, Thimbleberry
Grass	Rye Grass
Shrub	Willow
Tree, conifer	Spruce

Notes:

Only berries were collected from vegetation groups that are classified as “berry” while leaves were collected from all other vegetation groups.

^(a) Common name as listed in the laboratory report.

Metal concentrations in plants collected from the floodplain, halo and reference areas were compared to each other, and when available, to baseline concentrations. Summary statistics were collected for each area including number of samples, detection frequency, minimum, maximum, mean, standard deviation, mean and 95th percentile. Where reported concentrations were below the laboratory detection limit, concentrations were set to the detection limit to calculate summary statistics. If 70 percent (%) or more of the reported concentrations were below the analytical detection limit, then the parameter was not analyzed further. If the maximum floodplain or halo area concentrations were below the maximum baseline or reference + 20% concentrations, then the parameter was not carried forward in the analysis.

3.0 QUALITY ASSURANCE/QUALITY CONTROL

3.1 Field Quality Assurance/Quality Control

Plant samples were hand-picked by field staff wearing nitrile gloves and placed in labelled collection bags. Care was taken to minimize the introduction of foreign material into the samples or loss of material of interest from the samples prior to analysis. Field notes were maintained to document the field sampling program. Each sample was labelled with a unique identifier and the date sampled. Chain-of-custody forms were updated as samples were collected, and were checked to verify the information recorded before samples were submitted.

Six duplicate samples were collected and analyzed. Duplicate samples of vegetation were separate composites from the same areas or plants. The relative percent difference (RPD)² was used to evaluate the level of variability between duplicate samples. An RPD value of >50% was used to identify notable differences between original and duplicate tissue samples, when values were greater than or equal to five times the method detection limit (MDL). The RPD value used for tissue is relatively high because a higher degree of natural variability is expected for this biological matrix. Values less than five times the MDL were not included in the RPD calculations, because analytical variability near the MDL is higher and does not provide a good measure of variability associated with the collection of field samples.

Between-sample variability was highest in the rye-grass samples compared to willow or berry samples, with several metals in the rye-grass samples having RPDs >50% compared to none in the willow or berry samples (Attachment B Table B-1). The spruce duplicate samples were more similar than rye-grass samples in that only three metals (aluminum, iron, and rubidium) had RPDs >50%. Overall, these results suggest higher variability in metal concentrations among rye-grass samples compared to other vegetation types.

3.2 Laboratory Quality Assurance/Quality Control

ALS Laboratory (ALS) is an accredited laboratory (locally, Canadian Association for Laboratory Accreditation Inc. and Standard Council of Canada) and methods are based on International Organization for Standards / International Electrotechnical Commission (ISO/IEC) 17025:2005. ALS analytical methods are based on well-established, internationally-recognized procedures such as those published by the United States Environmental Protection Agency and the American Public Health Association, as well as local country standards. All approved methods included quality control and performance criteria that must be achieved prior to releasing the data. Samples were rinsed prior to analysis.

Laboratory quality control for chemistry samples included analysis of method blanks, laboratory duplicates, spiked samples, and control samples using certified reference materials to assess precision and accuracy of chemical analyses. Laboratory data quality control reports were reviewed upon receipt to confirm that the laboratory data quality objectives (DQOs) had been met and that the appropriate quality control information had been reported.

² Relative percent difference is calculated as follows: $(|Original\ Concentration - Duplicate\ Concentration| \div Mean\ Concentration) \times 100$

4.0 RESULTS

The summary statistics for the analyzed parameters are presented in Attachment C Table C-1. Seven metals were infrequently detected in the samples (i.e., antimony, beryllium, lithium, tellurium, tin, thallium, and zirconium) as 30% or more of the measured concentrations of these metals in the plant samples were below the analytical detection limit. These metals were not considered further in the analysis.

Maximum halo or floodplain area concentration was higher than the maximum baseline or reference + 20% concentration for the following metals: aluminum, barium, cesium, chromium, iron, magnesium, selenium, sodium, thallium, uranium, and vanadium. Plots of the concentrations in each vegetation group for these metals by sampling areas are presented in Attachment D.

A more detailed discussion of the copper and vanadium results are presented below because soil/tailings mixture concentrations of copper and vanadium were above CSR standards for the protection of plants.

Copper concentrations in 2015 plant samples were within the range of historic baseline copper concentrations and were similar among the reference, floodplain, and halo areas (Table 6). Some grass and willow samples from the floodplain and halo areas had copper concentrations that were higher than in the reference areas, but these concentrations were within historic baseline concentrations (Figure 1). Copper concentrations in plant samples collected in 2015 ranged from 2.30 to 27.6 milligrams per kilogram dry weight (mg/kg dw). In soil, copper concentrations ranged from 19 to 1030 mg/kg dw (Figure 2). Bioaccumulation factors were well below one and are plotted in Figure 3. These data indicate that there is not a linear relationship between copper concentrations in soil and plants; that plants can regulate uptake of copper and that they are taking up the amount of copper that they need for normal plant metabolism.

Table 6: Summary of Copper Concentrations in Plants Collected on the Site Prior to Mine Development (Baseline: 1989, 1995, and 1996) and in Three Areas in 2015 (Reference, Floodplain, and Halo)

Area	Number of Samples	Copper Concentration (mg/kg dw)				
		Minimum	Maximum	Mean	Standard Deviation	Median
<i>Prior to Mine Development (Baseline)</i>						
Mine Site	144	1.35	40.7	8.72	7.24	6.53
<i>July 28 to August 30, 2015 (Post-Dam Breach)</i>						
Reference	19	2.30	8.96	4.75	1.67	4.21
Halo	19	2.48	15.3	5.61	3.69	4.85
Floodplain	31	3.71	27.6	9.39	4.98	8.14

Notes: mg/kg dw = milligrams per kilogram dry weight

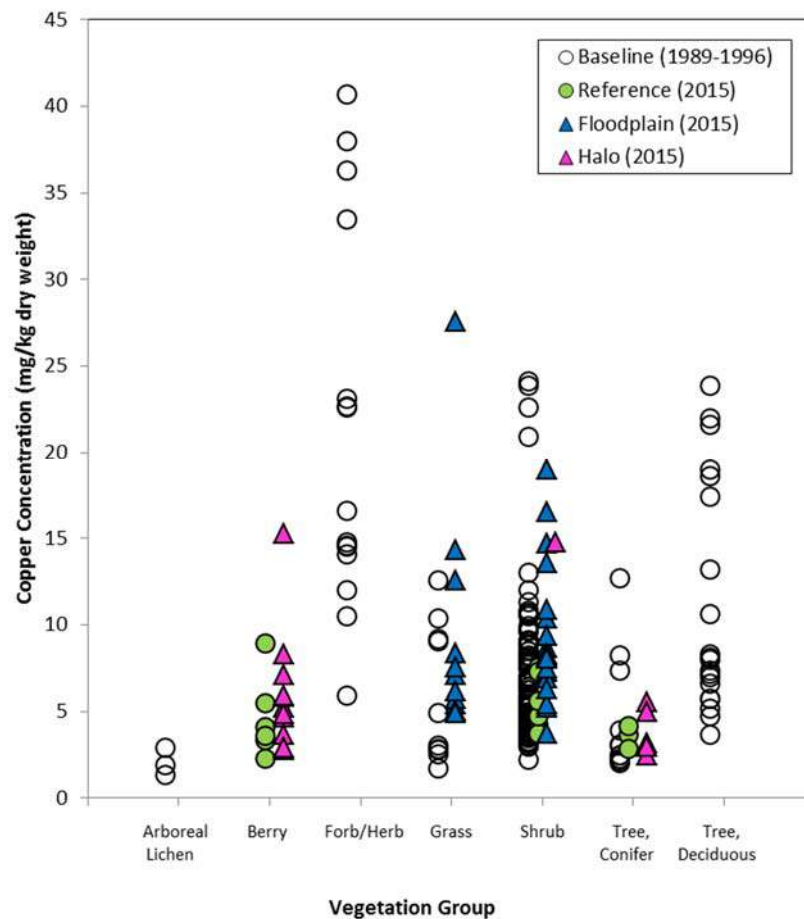


Figure 1: Copper Concentrations in Plant Samples Collected on the Site Prior to Mine Development (1989, 1995, 1996) and in Three Areas in 2015 (Reference, Floodplain, and Halo)

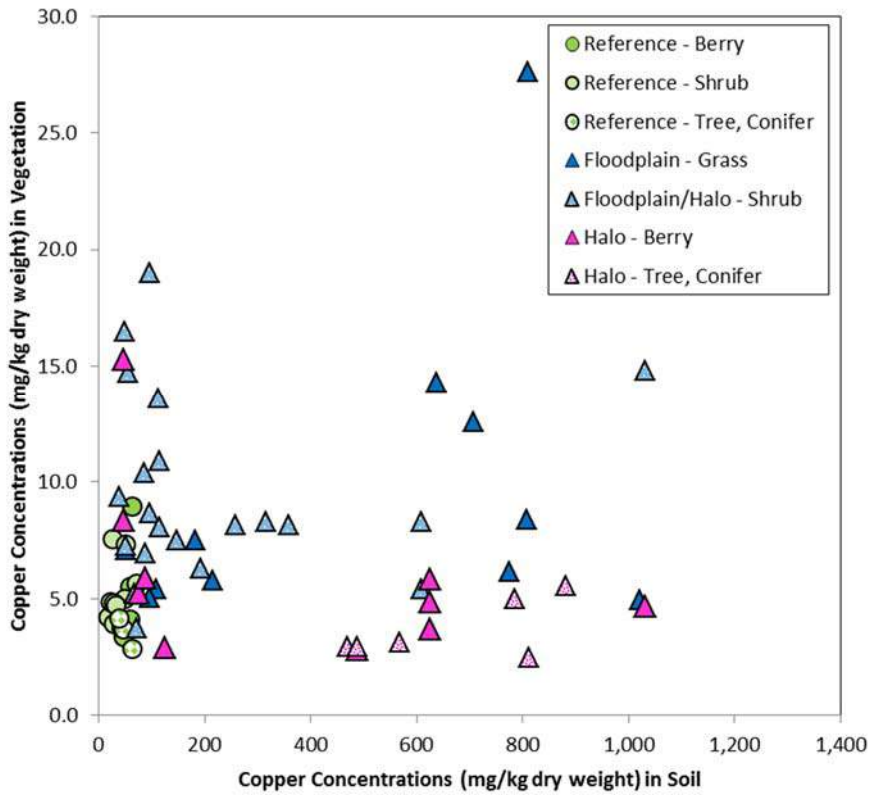


Figure 2: Copper Concentrations in Plant Samples Compared to Those in Co-located Soil Samples Collected in Three Areas in 2015 (Reference, Floodplain, and Halo)

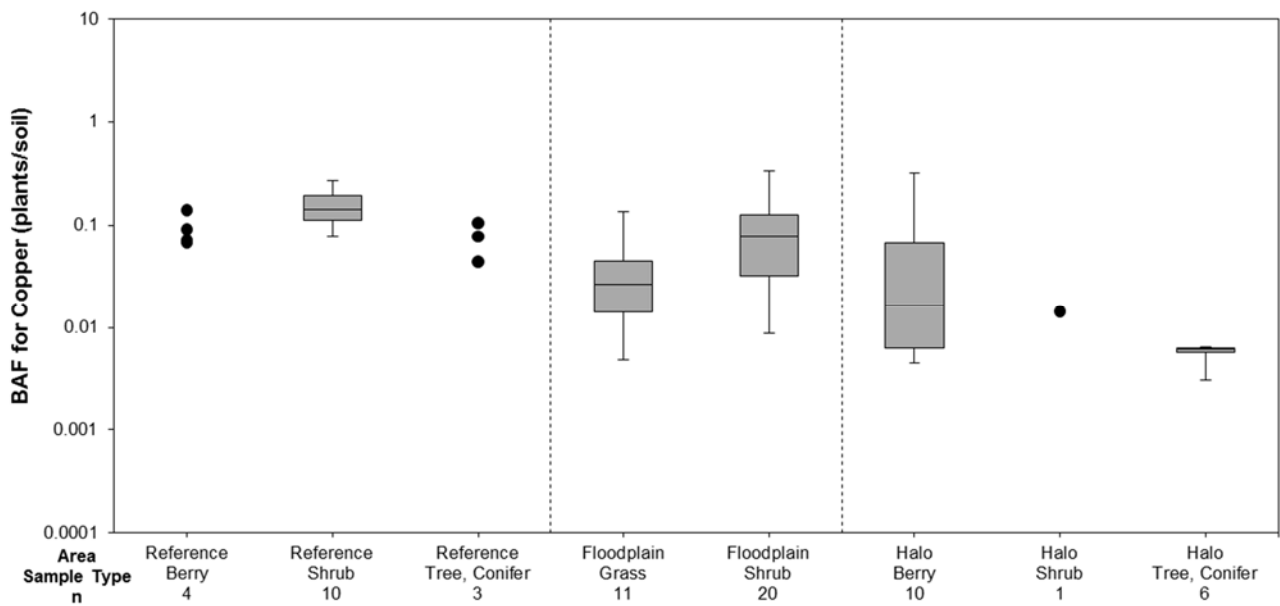


Figure 3: Bioaccumulation Factors for Copper in Plant and Soil Samples Collected in 2015

Vanadium concentrations in plants were similar between the reference and halo areas, but relatively higher in the floodplain area (Table 7). As observed for copper, some grass and willow samples from the floodplain and halo areas had vanadium concentrations that were higher than in the reference areas (Figure 4). The majority of co-located soil concentrations for these samples are within the range of background concentrations (Figure 5). The ratio of vanadium concentrations in plants to soil ranged from 0.0004 to 0.05 (Figure 6). The lack of baseline data for vanadium concentrations in plants and the low sample numbers hinders the interpretation of the 2015 data; however, it appears that the pattern of vanadium concentrations in plants is similar to that observed for copper.

Table 7: Summary of Vanadium Concentrations in Plants in Three Areas in 2015 (Reference, Floodplain, and Halo)

Area	Number of Samples	Detection Frequency	Vanadium Concentration (mg/kg dw)				
			Minimum	Maximum	Mean	Standard Deviation	Median
<i>July 28 to August 30, 2015 (Post-Dam Breach)</i>							
Reference	19	53%	<0.10	0.51	0.20	0.14	0.12
Halo	19	97%	<0.10	0.64	0.24	0.17	0.19
Floodplain	31	63%	<0.10	3.97	1.27	0.99	1.23

Notes: mg/kg dw = milligrams per kilogram dry weight; < = less than.

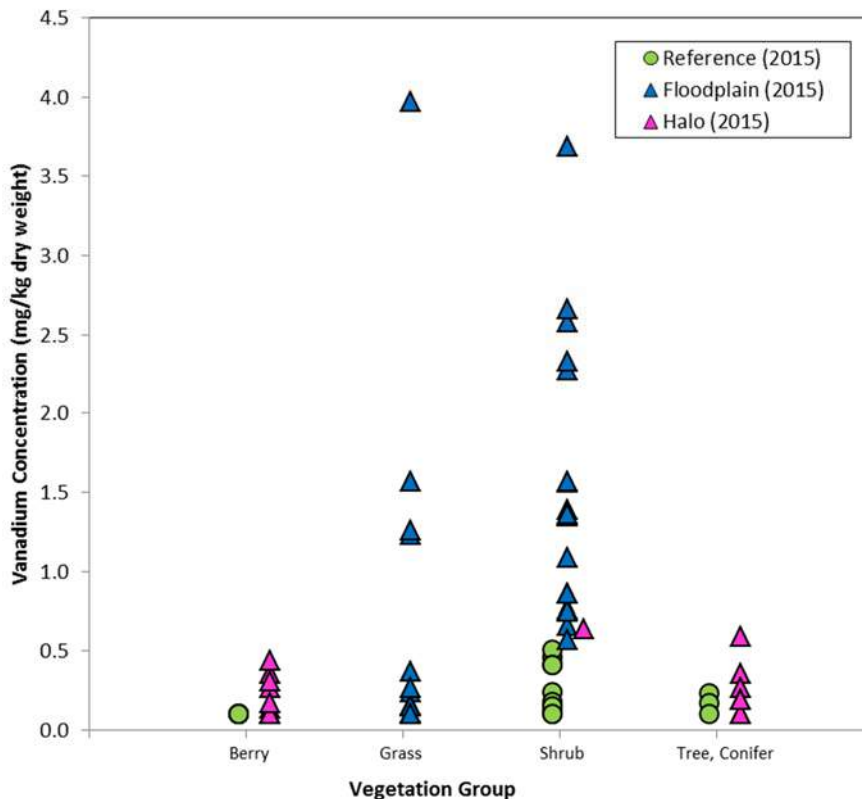


Figure 4: Vanadium Concentrations in Plant Samples Collected in Three Areas in 2015 (Reference, Floodplain, and Halo)

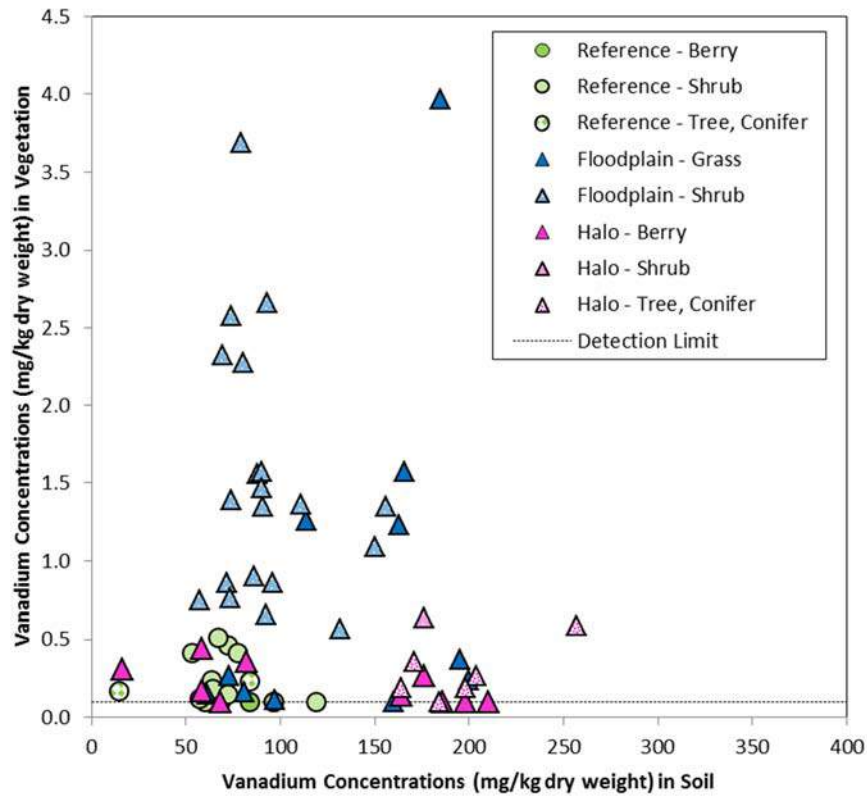


Figure 5: Vanadium Concentrations in Plant Samples Compared to Those in Co-located Soil Samples Collected in Three Areas in 2015 (Reference, Floodplain, and Halo)

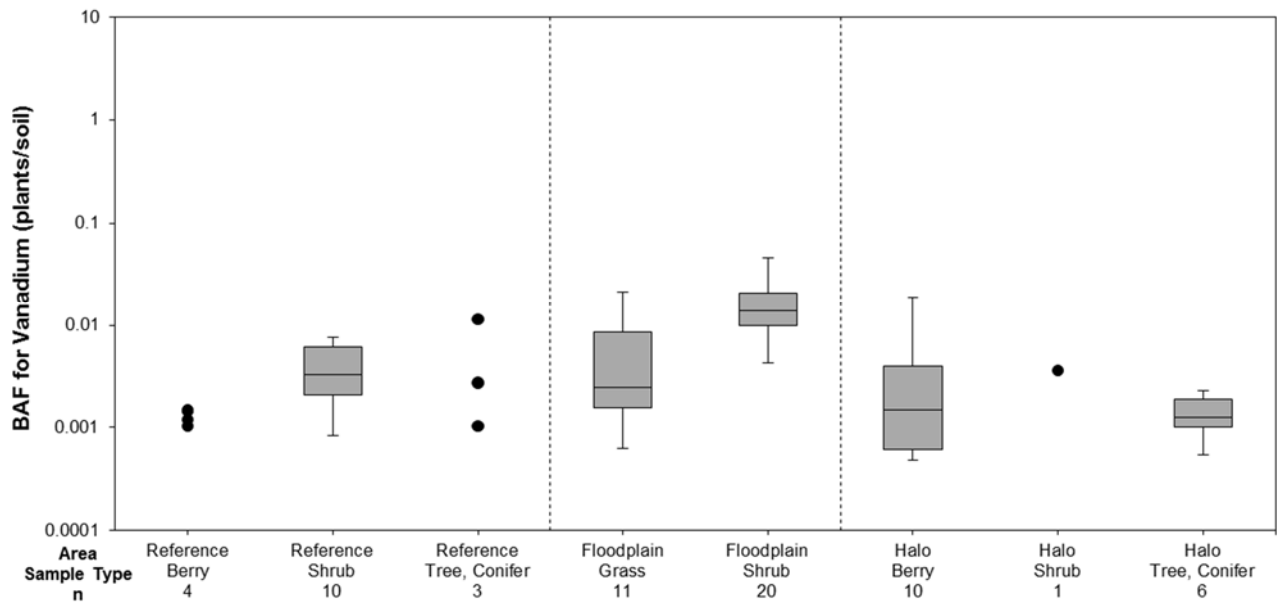


Figure 6: Bioaccumulation Factors for Vanadium in Plant and Soil Samples Collected in 2015

GOLDER ASSOCIATES LTD.



Kerrie Serben, MSc
Environmental Scientist



Trish Miller, MSc, R.P.Bio
Principal, Senior Environmental Scientist

KS/TM/pn

Attachments: A: Vegetation Chemistry
B: Relative Percent Difference for Samples Collected
C: Plant Metal Concentration Summary Statistics
D: Plant Sample Plots

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5.0 REFERENCES

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ATTACHMENT A
Vegetation Chemistry

ATTACHMENT B

Relative Percent Difference for Samples Collected

Attachment B Table B-1: Relative Percent Difference for Samples Collected at Mount Polley Mine, 2015

Sample ID	Units	Method Detection Limit (L1667546)	Rye Grass-4	Rye Grass-4X	Average Value Greater Than 5 x Detection Limit?	Relative Percent Difference	Rye Grass-7	Rye Grass-7X	Average Value Greater Than 5 x Detection Limit?	Relative Percent Difference	Willow Stake-4	Willow Stake-4X	Average Value Greater Than 5 x Detection Limit?	Relative Percent Difference	Willow Wattle-4	Willow Wattle-4X	Average Value Greater Than 5 x Detection Limit?	Relative Percent Difference	
ALS Sample ID			L1667546-4	L1667546-5			L1667546-8	L1667546-9			L1667546-24	L1667546-25			L1667546-23	L1667546-26			
Date Sampled			30-Aug-2015	30-Aug-2015			30-Aug-2015	30-Aug-2015			25-Aug-2015	25-Aug-2015			25-Aug-2015	25-Aug-2015			
Area			Floodplain	Floodplain			Floodplain	Floodplain			Floodplain	Floodplain			Floodplain	Floodplain			
Easting			599204	599204			596992	596992			601291	601291			600634	600634			
Northing			5817298	5817298			5818984	5818984			5817147	5817147			5817341	5817341			
Plant Species			Rye Grass	Rye Grass			Rye Grass	Rye Grass			Willow	Willow			Willow	Willow			
QA/QC			FDA	FD			FDA	FD			FDA	FD			FDA	FD			
Physical Tests																			
% Moisture	%	0.25	61.7	53.2	Yes	15%	71.1	72.3	Yes	2%	60.8	60.9	Yes	0%	62.9	62.3	Yes	1%	
Metals																			
Aluminum (Al)-Total	mg/kg dw	2.0	155	30.9	Yes	134%	31.4	20.5	Yes	42%	344	367	Yes	6%	160	179	Yes	11%	
Antimony (Sb)-Total	mg/kg dw	0.010	<0.010	<0.010	No	-	<0.010	<0.010	No	-	0.015	0.016	No	-	0.014	0.014	No	-	
Arsenic (As)-Total	mg/kg dw	0.020	0.138	0.033	No	-	0.040	0.031	No	-	0.598	0.635	Yes	6%	0.830	0.595	Yes	33%	
Barium (Ba)-Total	mg/kg dw	0.050	41.9	21.7	Yes	64%	21.2	13.2	Yes	47%	9.84	11.0	Yes	11%	6.39	6.43	Yes	1%	
Beryllium (Be)-Total	mg/kg dw	0.010	<0.010	<0.010	No	-	<0.010	<0.010	No	-	0.012	0.012	No	-	<0.010	<0.010	No	-	
Bismuth (Bi)-Total	mg/kg dw	0.010	<0.010	<0.010	No	-	<0.010	<0.010	No	-	0.012	0.015	No	-	0.075	0.021	No	-	
Boron (B)-Total	mg/kg dw	1.0	1.6	1.8	No	-	2.0	1.2	No	-	48.3	49.7	Yes	3%	76.9	74.6	Yes	3%	
Cadmium (Cd)-Total	mg/kg dw	0.0050	0.102	0.0528	Yes	64%	0.170	0.113	Yes	40%	2.51	2.94	Yes	16%	0.400	0.345	Yes	15%	
Calcium (Ca)-Total	mg/kg dw	20	1850	1150	Yes	47%	2260	1230	Yes	59%	13200	14000	Yes	6%	15800	16000	Yes	1%	
Cesium (Cs)-Total	mg/kg dw	0.0050	0.186	0.165	Yes	12%	0.0106	0.0053	No	-	0.0512	0.0508	Yes	1%	0.0614	0.0685	Yes	11%	
Chromium (Cr)-Total	mg/kg dw	0.050	0.141	0.055	No	-	0.094	0.071	No	-	0.501	0.508	Yes	1%	0.351	0.361	Yes	3%	
Cobalt (Co)-Total	mg/kg dw	0.020	0.182	0.047	Yes	118%	0.040	0.023	No	-	0.508	0.526	Yes	3%	1.63	1.25	Yes	26%	
Copper (Cu)-Total	mg/kg dw	0.10	12.6	5.56	Yes	78%	6.16	3.35	Yes	59%	19.0	19.4	Yes	2%	9.36	9.71	Yes	4%	
Iron (Fe)-Total	mg/kg dw	3.0	355	97.4	Yes	114%	109	65.0	Yes	51%	798	821	Yes	3%	321	357	Yes	11%	
Lead (Pb)-Total	mg/kg dw	0.020	0.073	0.022	No	-	0.026	0.021	No	-	0.171	0.167	Yes	2%	0.109	0.121	Yes	10%	
Lithium (Li)-Total	mg/kg dw	0.50	<0.50	<0.50	No	-	<0.50	<0.50	No	-	<0.50	<0.50	No	-	1.18	0.94	No	-	
Magnesium (Mg)-Total	mg/kg dw	2.0	811	500	Yes	47%	665	409	Yes	48%	2090	2070	Yes	1%	4360	4440	Yes	2%	
Manganese (Mn)-Total	mg/kg dw	0.050	39.8	28.9	Yes	32%	46.6	26.0	Yes	57%	127	137	Yes	8%	111	113	Yes	2%	
Mercury (Hg)-Total	mg/kg dw	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Molybdenum (Mo)-Total	mg/kg dw	0.020	0.823	0.599	Yes	32%	3.19	2.19	Yes	37%	2.37	2.45	Yes	3%	2.65	2.03	Yes	26%	
Nickel (Ni)-Total	mg/kg dw	0.20	0.27	<0.20	No	-	0.21	<0.20	No	-	2.00	2.94	Yes	38%	3.03	2.56	Yes	17%	
Phosphorus (P)-Total	mg/kg dw	10	1660	1770	Yes	6%	1050	724	Yes	37%	2010	1920	Yes	5%	1210	1290	Yes	6%	
Potassium (K)-Total	mg/kg dw	20	13200	6410	Yes	69%	11400	7580	Yes	40%	13100	13000	Yes	1%	9680	11300	Yes	15%	
Rubidium (Rb)-Total	mg/kg dw	0.050	43.4	24.8	Yes	55%	7.63	4.40	Yes	54%	5.25	5.18	Yes	1%	6.36	7.43	Yes	16%	
Selenium (Se)-Total	mg/kg dw	0.050	0.076	0.061	No	-	0.089	<0.050	No	-	1.57	1.70	Yes	8%	1.65	1.61	Yes	2%	
Sodium (Na)-Total	mg/kg dw	20	64	28	No	-	60	44	No	-	57	75	No	-	79	50	No	-	
Strontium (Sr)-Total	mg/kg dw	0.050	15.0	7.47	Yes	67%	14.7	9.01	Yes	48%	80.3	90.0	Yes	11%	179	168	Yes	6%	
Tellurium (Te)-Total	mg/kg dw	0.020	<0.020	<0.020	No	-	<0.020	<0.020	No	-	<0.020	<0.020	No	-	<0.020	<0.020	No	-	
Thallium (Tl)-Total	mg/kg dw	0.0020	0.0054	<0.0020	No	-	<0.0020	<0.0020	No	-	0.0048	0.0058	No	-	0.0048	0.0036	No	-	
Tin (Sn)-Total	mg/kg dw	0.10	0.11	<0.10	No	-	0.66	<0.10	No	-	<0.10	<0.10	No	-	<0.10	<0.10	No	-	
Uranium (U)-Total	mg/kg dw	0.0020	0.0114	<0.0020	No	-	0.0027	<0.0020	No	-	0.0252	0.0257	Yes	2%	0.0168	0.0170	Yes	1%	
Vanadium (V)-Total	mg/kg dw	0.10	1.23	0.27	Yes	128%	0.37	0.18	No	-	2.66	2.77	Yes	4%	0.75	0.87	Yes	15%	
Zinc (Zn)-Total	mg/kg dw	0.50	37.1	31.0	Yes	18%	20.5	17.0	Yes	19%	55.8	62.9	Yes	12%	16.3	13.0	Yes	23%	
Zirconium (Zr)-Total	mg/kg dw	0.20	<0.20	<0.20	No	-	<0.20	<0.20	No	-	<0.20	<0.20	No	-	<0.20	<0.20	No	-	
Mean	mg/kg dw	-	-	-	-	61%	-	-	-	43%	-	-	-	6%	-	-	-	10%	
Median	mg/kg dw	-	-	-	-	59%	-	-	-	47%	-	-	-	3%	-	-	-	10%	

Attachment B Table B-1: Relative Percent Difference for Samples Collected at Mount Polley Mine, 2015

Sample ID	Units	Method Detection Limit (L1667546)	Willow-3	Willow-3X	Average Value Greater Than 5 x Detection Limit?	Relative Percent Difference	Willow-6	Willow-6X	Average Value Greater Than 5 x Detection Limit?	Relative Percent Difference	Method Detection Limit (L1656480-36 and -43)	P23-Spruce-DUP	Spruce - 1	Average Value Greater Than 5 x Detection Limit?	Relative Percent Difference	Method Detection Limit (L1656480-39 and -40)	Berries-6	Berries-6-DUP	Average Value Greater Than 5 x Detection Limit?	Relative Percent Difference
ALS Sample ID			L1667546-35	L1667546-36			L1667546-39	L1667546-40				L1656480-36	L1656480-43				L1656480-39	L1656480-40		
Date Sampled			25-Aug-2015	25-Aug-2015			25-Aug-2015	25-Aug-2015				4-Aug-2015	4-Aug-2015				4-Aug-2015	4-Aug-2015		
Area			Background	Background			Background	Background				Halo	Halo				Halo	Halo		
Easting			601207	601207			601070	601070				601984	596855				596855	596855		
Northing			5816851	5816851			5817400	5817400				5817261	5819234				5819234	5819234		
Plant Species			Willow	Willow			Willow	Willow				Spruce	Spruce				High Bush Cranberry	High Bush Cranberry		
QA/QC			FDA	FD			FDA	FD				FD	FDA				FDA	FD		
Physical Tests																				
% Moisture	%	0.25	64.8	62.3	Yes	4%	57.7	57.9	Yes	0%	0.25	57.1	54.9	Yes	4%	0.25	84.4	81.2	Yes	4%
Metals																				
Aluminum (Al)-Total	mg/kg dw	2.0	103	87.8	Yes	16%	40.5	48.6	Yes	18%	2.0	8.0	28.3	Yes	112%	5.0	11.9	17.2	No	-
Antimony (Sb)-Total	mg/kg dw	0.010	<0.010	<0.010	No	-	<0.010	<0.010	No	-	0.010	<0.010	<0.010	No	-	0.010	<0.010	<0.010	No	-
Arsenic (As)-Total	mg/kg dw	0.020	0.082	0.086	No	-	0.038	0.041	No	-	0.020	<0.020	<0.020	No	-	0.030	<0.030	<0.030	No	-
Barium (Ba)-Total	mg/kg dw	0.050	18.0	17.8	Yes	1%	38.2	38.6	Yes	1%	0.050	76.0	55.1	Yes	32%	0.050	7.03	5.63	Yes	22%
Beryllium (Be)-Total	mg/kg dw	0.010	<0.010	<0.010	No	-	<0.010	<0.010	No	-	0.010	<0.010	<0.010	No	-	0.010	<0.010	<0.010	No	-
Bismuth (Bi)-Total	mg/kg dw	0.010	0.024	0.033	No	-	0.086	0.059	Yes	37%	0.010	<0.010	<0.010	No	-	0.010	<0.010	<0.010	No	-
Boron (B)-Total	mg/kg dw	1.0	68.1	79.6	Yes	16%	54.4	54.3	Yes	0%	1.0	18.1	13.1	Yes	32%	1.0	9.0	7.8	Yes	14%
Cadmium (Cd)-Total	mg/kg dw	0.0050	9.34	9.74	Yes	4%	1.72	1.94	Yes	12%	0.0050	0.0249	0.0184	No	-	0.010	0.030	0.038	No	24%
Calcium (Ca)-Total	mg/kg dw	20	24000	24800	Yes	3%	20900	21100	Yes	1%	20	4530	5880	Yes	26%	20	1820	1850	Yes	2%
Cesium (Cs)-Total	mg/kg dw	0.0050	0.0182	0.0168	No	-	0.0188	0.0208	No	-	0.0050	0.0073	0.0421	No	-	0.0050	0.0051	0.0053	No	-
Chromium (Cr)-Total	mg/kg dw	0.050	0.215	0.192	No	-	0.108	0.120	No	-	0.050	<0.050	0.073	No	-	0.20	<0.20	<0.20	No	-
Cobalt (Co)-Total	mg/kg dw	0.020	1.09	1.20	Yes	10%	0.464	0.470	Yes	1%	0.020	0.060	0.071	No	-	0.020	<0.020	<0.020	No	-
Copper (Cu)-Total	mg/kg dw	0.10	7.31	7.38	Yes	1%	3.94	3.79	Yes	4%	0.10	2.29	2.94	Yes	25%	0.20	2.78	4.53	Yes	48%
Iron (Fe)-Total	mg/kg dw	3.0	269	256	Yes	5%	89.4	104	Yes	15%	3.0	17.2	68.6	Yes	120%	5.0	51.9	53.0	Yes	2%
Lead (Pb)-Total	mg/kg dw	0.020	0.066	0.068	No	-	0.027	0.028	No	-	0.020	<0.020	0.028	No	-	0.050	<0.050	<0.050	No	-
Lithium (Li)-Total	mg/kg dw	0.50	<0.50	<0.50	No	-	<0.50	<0.50	No	-	0.50	<0.50	<0.50	No	-	0.50	<0.50	<0.50	No	-
Magnesium (Mg)-Total	mg/kg dw	2.0	1690	1710	Yes	1%	2620	2540	Yes	3%	2.0	683	867	Yes	24%	2.0	621	768	Yes	21%
Manganese (Mn)-Total	mg/kg dw	0.050	68.4	64.3	Yes	6%	42.1	40.1	Yes	5%	0.050	173	256	Yes	39%	0.050	2.64	3.57	Yes	30%
Mercury (Hg)-Total	mg/kg dw	-	-	-	-	-	-	-	-	-	0.0050	0.0051	0.0208	No	-	0.0050	0.01	0.01	No	-
Molybdenum (Mo)-Total	mg/kg dw	0.020	0.147	0.164	Yes	11%	0.120	0.116	Yes	3%	0.020	0.418	0.297	Yes	34%	0.040	0.066	0.085	No	-
Nickel (Ni)-Total	mg/kg dw	0.20	4.37	4.47	Yes	2%	1.29	1.39	Yes	7%	0.20	0.33	1.06	No	-	0.20	0.65	0.65	No	-
Phosphorus (P)-Total	mg/kg dw	10	1790	1890	Yes	5%	2110	1970	Yes	7%	10	1700	1600	Yes	6%	10	1170	1540	Yes	27%
Potassium (K)-Total	mg/kg dw	20	11100	10400	Yes	7%	7060	7500	Yes	6%	20	8720	8450	Yes	3%	20	11300	9230	Yes	20%
Rubidium (Rb)-Total	mg/kg dw	0.050	7.82	6.71	Yes	15%	3.44	3.85	Yes	11%	0.050	5.20	10.6	Yes	68%	0.050	24.3	22.0	Yes	10%
Selenium (Se)-Total	mg/kg dw	0.050	0.793	0.932	Yes	16%	<0.050	<0.050	No	-	0.050	<0.050	<0.050	No	-	0.10	<0.10	<0.10	No	-
Sodium (Na)-Total	mg/kg dw	20	58	44	No	-	51	29	No	-	20	<20	24	No	-	20	<20	<20	No	-
Strontium (Sr)-Total	mg/kg dw	0.050	117	125	Yes	7%	124	122	Yes	2%	0.050	31.7	33.9	Yes	7%	0.10	11.0	9.56	Yes	14%
Tellurium (Te)-Total	mg/kg dw	0.020	<0.020	<0.020	No	-	<0.020	<0.020	No	-	0.020	<0.020	<0.020	No	-	0.020	<0.020	<0.020	No	-
Thallium (Tl)-Total	mg/kg dw	0.0020	0.0030	0.0030	No	-	<0.0020	<0.0020	No	-	0.0020	<0.0020	0.0052	No	-	0.0020	<0.0020	<0.0020	No	-
Tin (Sn)-Total	mg/kg dw	0.10	<0.10	<0.10	No	-	<0.10	<0.10	No	-	0.10	<0.10	<0.10	No	-	0.10	1.06	0.91	Yes	15%
Uranium (U)-Total	mg/kg dw	0.0020	0.0064	0.0056	No	-	<0.0020	<0.0020	No	-	0.0020	<0.0020	<0.0020	No	-	0.0020	<0.0020	<0.0020	No	-
Vanadium (V)-Total	mg/kg dw	0.10	0.51	0.43	No	-	0.18	0.22	No	-	0.10	<0.10	0.19	No	-	0.10	0.14	0.11	No	-
Zinc (Zn)-Total	mg/kg dw	0.50	111	112	Yes	1%	25.2	25.7	Yes	2%	0.50	43.9	44.1	Yes	0%	1.0	5.0	7.5	Yes	40%
Zirconium (Zr)-Total	mg/kg dw	0.20	<0.20	<0.20	No	-	<0.20	<0.20	No	-	0.20	<0.20	<0.20	No	-	0.20	<0.20	<0.20	No	-
Mean	mg/kg dw		-	-	-	7%	-	-	-	7%	-	-	-	-	35%	-	-	-	-	20%
Median	mg/kg dw		-	-	-	5%	-	-	-	4%	-	-	-	-	26%	-	-	-	-	20%

ATTACHMENT C

Plant Metal Concentration Summary Statistics

Attachment C Table C-1: Plant Metal Concentration Summary Statistics

Parameters	Units	Baseline							Reference							Maximum Baseline or Reference	
		Number of Samples	Minimum	Maximum	Mean	Standard Deviation	Median	95th Percentile	Number of Samples	Detection Frequency	Minimum	Maximum	Mean	Standard Deviation	Median		95th Percentile
Physical Tests																	
% Moisture	%	-	-	-	-	-	-	-	19	100%	52.2	88.4	65.3	12.3	60.3	85.5	88.4
Metals																	
Aluminum (Al)-Total	mg/kg dw	-	-	-	-	-	-	-	19	100%	3.8	117	41	36	31	104	117
Antimony (Sb)-Total	mg/kg dw	-	-	-	-	-	-	-	19	5%	<0.010	0.012	0.010	0.00046	0.010	0.010	0.010
Arsenic (As)-Total	mg/kg dw	144	0.015	1.47	0.14	0.20	0.053	0.35	19	58%	<0.020	0.087	0.039	0.023	0.039	0.083	1.47
Barium (Ba)-Total	mg/kg dw	-	-	-	-	-	-	-	19	100%	2.16	93.3	25.0	26.2	10.9	71.6	93.3
Beryllium (Be)-Total	mg/kg dw	-	-	-	-	-	-	-	19	0%	<0.010	<0.010	-	-	-	-	<0.010
Bismuth (Bi)-Total	mg/kg dw	-	-	-	-	-	-	-	19	47%	<0.010	1.37	0.95	0.31	0.010	0.27	1.37
Boron (Bo)-Total	mg/kg dw	-	-	-	-	-	-	-	19	100%	6.0	68.1	26.6	19.1	22.8	59.6	68.1
Cadmium (Cd)-Total	mg/kg dw	21	<0.010	6.0	0.56	1.4	0.065	3.0	19	100%	0.0089	9.34	1.8	2.4	0.58	5.4	9.3
Calcium (Ca)-Total	mg/kg dw	-	-	-	-	-	-	-	19	100%	876	32500	13993	9648	17200	25300	32500
Cesium (Cs)-Total	mg/kg dw	-	-	-	-	-	-	-	19	95%	<0.0050	0.0576	0.023	0.017	0.019	0.056	0.0576
Chromium (Cr)-Total	mg/kg dw	-	-	-	-	-	-	-	19	68%	<0.050	0.25	0.11	0.069	0.066	0.22	0.245
Cobalt (Co)-Total	mg/kg dw	-	-	-	-	-	-	-	19	84%	<0.020	2.71	0.50	0.67	0.39	1.49	2.71
Copper (Cu)-Total	mg/kg dw	144	1.35	40.7	8.72	7.24	6.53	23.0	19	100%	2.30	8.96	4.75	1.67	4.21	7.67	40.7
Iron (Fe)-Total	mg/kg dw	21	38.8	945	143	196	85.5	318	19	100%	15.1	269	91.5	71.5	72.4	211	945
Lead (Pb)-Total	mg/kg dw	144	<0.050	1.33	0.27	0.24	0.20	0.88	19	58%	<0.020	0.072	0.035	0.018	0.027	0.067	1.33
Lithium (Li)-Total	mg/kg dw	-	-	-	-	-	-	-	19	0%	<0.50	<0.50	-	-	-	-	<0.50
Magnesium (Mg)-Total	mg/kg dw	-	-	-	-	-	-	-	19	100%	606	3450	1844	920	1690	3342	3450
Manganese (Mn)-Total	mg/kg dw	21	61.4	2705	435	666	175	1971	19	100%	3.5	562	105	146	49	441	2705
Mercury (Hg)-Total	mg/kg dw	21	0.015	0.11	0.031	0.021	0.025	0.060	9	100%	0.0052	0.0224	0.012	0.0073	0.0091	0.022	0.11
Molybdenum (Mo)-Total	mg/kg dw	144	<0.20	57	2.7	5.9	0.8	9.1	19	100%	0.030	2.02	0.31	0.43	0.24	0.57	57
Nickel (Ni)-Total	mg/kg dw	21	0.20	16.5	2.8	3.4	1.8	5.5	19	100%	0.58	7.23	2.5	1.8	1.6	5.9	16.5
Phosphorus (P)-Total	mg/kg dw	-	-	-	-	-	-	-	19	100%	1340	5340	2158	882	1960	3270	5340
Potassium (K)-Total	mg/kg dw	-	-	-	-	-	-	-	19	100%	4010	36500	11475	7179	10400	21920	36500
Rubidium (Rb)-Total	mg/kg dw	-	-	-	-	-	-	-	19	100%	2.8	119	18	27	9.2	52	119
Selenium (Se)-Total	mg/kg dw	123	<0.050	0.75	0.095	0.073	0.10	0.19	19	37%	<0.050	0.793	0.14	0.19	0.050	0.50	0.793
Sodium (Na)-Total	mg/kg dw	-	-	-	-	-	-	-	19	68%	20	61	32	14	29	58	61
Strontium (Sr)-Total	mg/kg dw	-	-	-	-	-	-	-	19	100%	5.4	152	71	48	63	152	152
Tellurium (Te)-Total	mg/kg dw	-	-	-	-	-	-	-	19	0%	<0.020	<0.020	-	-	-	-	<0.020
Thallium (Tl)-Total	mg/kg dw	-	-	-	-	-	-	-	19	32%	<0.0020	0.0086	0.0030	0.0019	0.0020	0.0066	0.0086
Tin (Sn)-Total	mg/kg dw	-	-	-	-	-	-	-	19	37%	<0.10	6.59	0.90	1.8	0.10	4.5	6.59
Uranium (U)-Total	mg/kg dw	-	-	-	-	-	-	-	19	26%	<0.0020	0.0064	0.0026	0.0013	0.0020	0.0051	0.0064
Vanadium (V)-Total	mg/kg dw	-	-	-	-	-	-	-	19	53%	<0.10	0.51	0.20	0.14	0.12	0.47	0.51
Zinc (Zn)-Total	mg/kg dw	144	8.1	278	72	63	47	225	19	100%	6.5	128	44	36	37	113	278
Zirconium (Zr)-Total	mg/kg dw	-	-	-	-	-	-	-	19	0%	<0.20	<0.20	-	-	-	-	<0.20

Notes:

% = percent; mg/kg dw = milligram per kilogram dry weight; < = less than.

Attachment C Table C-1: Plant Metal Concentration Summary Statistics (Continued)

Parameters	Units	Maximum Baseline or Reference	Floodplain							Halo								
			Number of Samples	Detection Frequency	Minimum	Maximum	Mean	Standard Deviation	Median	95th Percentile	Number of Samples	Detection Frequency	Minimum	Maximum	Mean	Standard Deviation	Median	95th Percentile
Physical Tests																		
% Moisture	%	88.4	31	100%	52.9	76.2	60.8	4.99	60.0	69.3	19	100%	48.4	85.6	66.7	13.0	69.6	84.5
Metals																		
Aluminum (Al)-Total	mg/kg dw	117	31	100%	8.5	618	209	155	193	515	19	100%	5.6	76.5	32	23	28	72
Antimony (Sb)-Total	mg/kg dw	0.012	31	58%	<0.010	0.054	0.01613	0.00923	0.013	0.0265	19	0%	<0.010	<0.010	-	-	-	-
Arsenic (As)-Total	mg/kg dw	1.47	31	100%	0.026	1.09	0.327	0.257	0.315	0.752	19	37%	<0.020	0.075	0.033	0.014	0.030	0.054
Barium (Ba)-Total	mg/kg dw	93.3	31	100%	3.34	73.6	20.0	16.2	14.3	46.7	19	100%	1.59	115	34.0	34.3	15.0	92.9
Beryllium (Be)-Total	mg/kg dw	0.01	31	19%	<0.010	0.020	0.011	0.0024	0.010	0.017	19	0%	<0.010	<0.010	-	-	-	-
Bismuth (Bi)-Total	mg/kg dw	1.37	31	58%	<0.010	1.07	0.16	0.29	0.012	0.77	19	0%	<0.010	<0.010	-	-	-	-
Boron (B)-Total	mg/kg dw	68.1	31	100%	1.6	76.9	23	21	20	59	19	100%	3.5	27.6	13	6.1	12	23
Cadmium (Cd)-Total	mg/kg dw	9.34	31	100%	0.0716	2.51	0.662	0.684	0.366	2.08	19	95%	0.0059	0.565	0.11	0.17	0.030	0.47
Calcium (Ca)-Total	mg/kg dw	32500	31	100%	1240	22200	9713	6201	11000	19300	19	100%	1220	10700	5204	2834	5630	10610
Cesium (Cs)-Total	mg/kg dw	0.0576	31	94%	<0.0050	0.186	0.059	0.044	0.057	0.14	19	84%	<0.0050	0.293	0.043	0.071	0.013	0.15
Chromium (Cr)-Total	mg/kg dw	0.245	31	94%	<0.050	1.21	0.39	0.30	0.35	0.98	19	53%	<0.050	0.595	0.14	0.13	0.099	0.24
Cobalt (Co)-Total	mg/kg dw	2.71	31	94%	<0.020	1.63	0.49	0.38	0.50	1.1	19	79%	<0.020	0.761	0.11	0.16	0.072	0.25
Copper (Cu)-Total	mg/kg dw	40.7	31	100%	3.71	27.6	9.39	4.98	8.14	17.8	19	100%	2.48	15.30	5.61	3.69	4.85	14.85
Iron (Fe)-Total	mg/kg dw	945	31	100%	36.8	1350	450	320	371	1050	19	100%	26.6	248.0	84.9	59.1	68.6	184.1
Lead (Pb)-Total	mg/kg dw	1.33	31	100%	0.021	0.423	0.13	0.090	0.12	0.29	19	37%	<0.020	0.109	0.039	0.022	0.032	0.058
Lithium (Li)-Total	mg/kg dw	0.5	31	16%	<0.50	1.18	0.53	0.12	0.50	0.60	19	0%	<0.50	<0.50	-	-	-	-
Magnesium (Mg)-Total	mg/kg dw	3450	31	100%	665	5240	2474	1429	2490	4740	19	100%	558	2190	1143	476	992	2163
Manganese (Mn)-Total	mg/kg dw	2705	31	100%	16.8	328	115	82.9	92.0	287	19	100%	2.60	894	185	236	96	574
Mercury (Hg)-Total	mg/kg dw	0.11	3	67%	<0.0050	0.0083	0.0070	0.0017	0.0073	0.0082	17	87%	<0.0050	0.0226	0.012	0.0063	0.023	0.021
Molybdenum (Mo)-Total	mg/kg dw	57	31	100%	0.252	8.56	1.84	1.96	0.966	6.27	19	100%	0.044	1.92	0.38	0.50	0.20	1.4
Nickel (Ni)-Total	mg/kg dw	16.5	31	90%	<0.20	3.03	1.3	0.86	1.3	2.6	19	95%	<0.20	2.21	0.90	0.52	0.92	1.6
Phosphorus (P)-Total	mg/kg dw	5340	31	100%	603	4290	1554	729	1450	2725	19	100%	1110	3940	1933	722	1640	3463
Potassium (K)-Total	mg/kg dw	36500	31	100%	3340	17100	9538	3106	9430	13350	19	100%	3550	18700	9013	3466	8450	12940
Rubidium (Rb)-Total	mg/kg dw	119	31	100%	2.04	43.4	7.86	8.50	5.94	23.7	19	100%	2.94	43.6	15.7	12.0	10.8	38.7
Selenium (Se)-Total	mg/kg dw	0.793	31	87%	<0.050	2.22	0.49	0.056	0.23	1.6	19	16%	<0.050	0.13	0.071	0.029	0.050	0.12
Sodium (Na)-Total	mg/kg dw	61	31	94%	<20	670	96	130	62	335	19	42%	<20	737	70	164	20	184
Strontium (Sr)-Total	mg/kg dw	152	31	100%	8.8	179	69	48	55	158	19	100%	7.46	79.2	33.8	23.6	31.6	77.5
Tellurium (Te)-Total	mg/kg dw	0.02	31	0%	<0.020	<0.020	-	-	-	-	19	0%	<0.020	<0.020	-	-	-	-
Thallium (Tl)-Total	mg/kg dw	0.0086	31	61%	<0.0020	0.0146	0.0047	0.0033	0.0048	0.011	19	16%	<0.0020	0.0143	0.0030	0.0029	0.0020	0.0061
Tin (Sn)-Total	mg/kg dw	6.59	31	6%	<0.10	0.66	0.12	0.10	0.10	0.11	19	53%	<0.10	4.27	0.87	1.1	0.44	2.2
Uranium (U)-Total	mg/kg dw	0.0064	31	87%	<0.0020	0.0598	0.021	0.018	0.015	0.059	19	21%	<0.0020	0.0044	0.0023	0.00074	0.0020	0.0043
Vanadium (V)-Total	mg/kg dw	0.51	31	97%	<0.10	3.97	1.3	0.99	1.2	3.2	19	63%	<0.10	0.64	0.24	0.17	0.19	0.60
Zinc (Zn)-Total	mg/kg dw	278	31	100%	5.53	103	32	24	24	77	19	100%	5.0	54.9	25	19	17	53.8
Zirconium (Zr)-Total	mg/kg dw	0.2	31	16%	<0.20	0.46	0.22	0.051	0.20	0.29	19	5%	<0.20	0.21	0.20	0.0023	0.20	0.20

Notes:

Bolded maximum concentrations in floodplain and halo area dataset are values that are greater than the maximum baseline or reference concentration +20%. Parameters with less than 30% detection frequency were not considered.

% = percent; mg/kg dw = milligram per kilogram dry weight; < = less than.

ATTACHMENT D
Plant Sample Plots

Attachment D – Terrestrial Vegetation Chemistry Memo

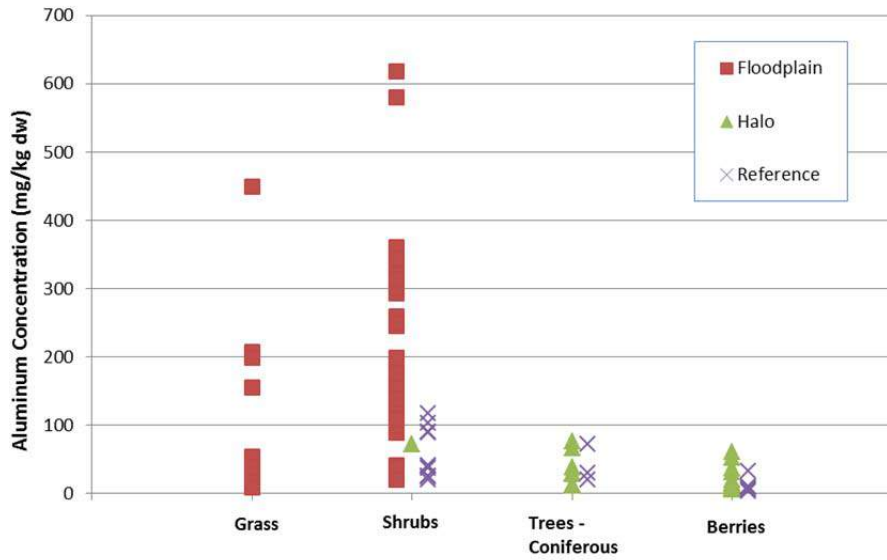


Figure D-1: Aluminum Concentrations in Plant Samples Collected on the Site from Three Areas in 2015 (Floodplain, Halo, and Reference)

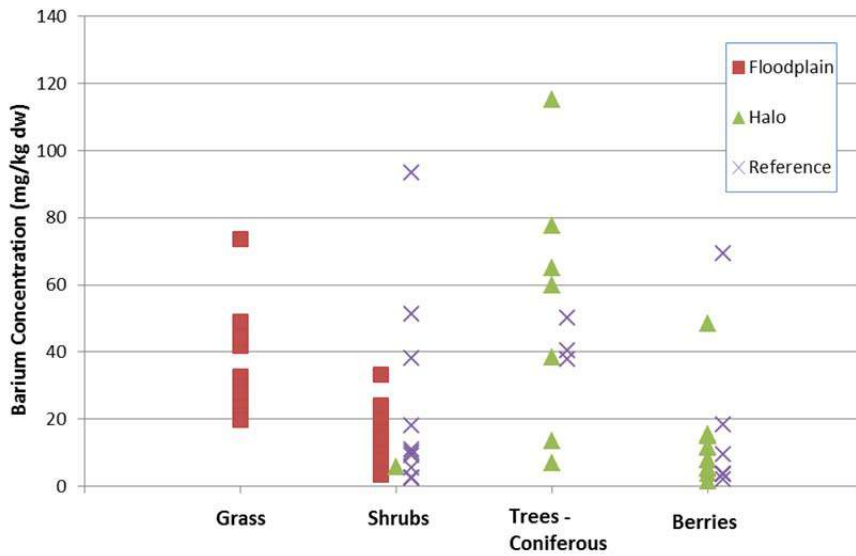


Figure D-2: Barium Concentrations in Plant Samples Collected on the Site from Three Areas in 2015 (Floodplain, Halo, and Reference)

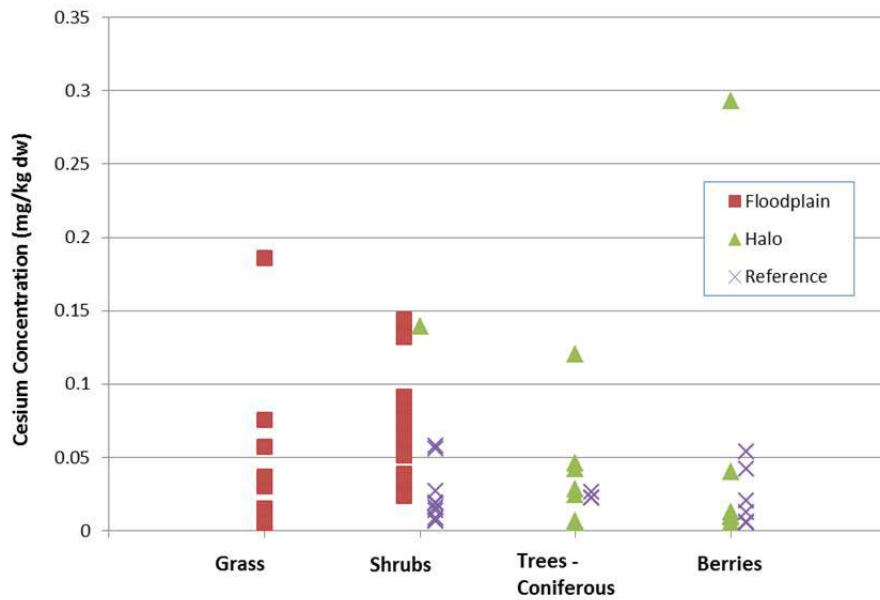


Figure D-3: Cesium Concentrations in Plant Samples Collected on the Site from Three Areas in 2015 (Floodplain, Halo, and Reference)

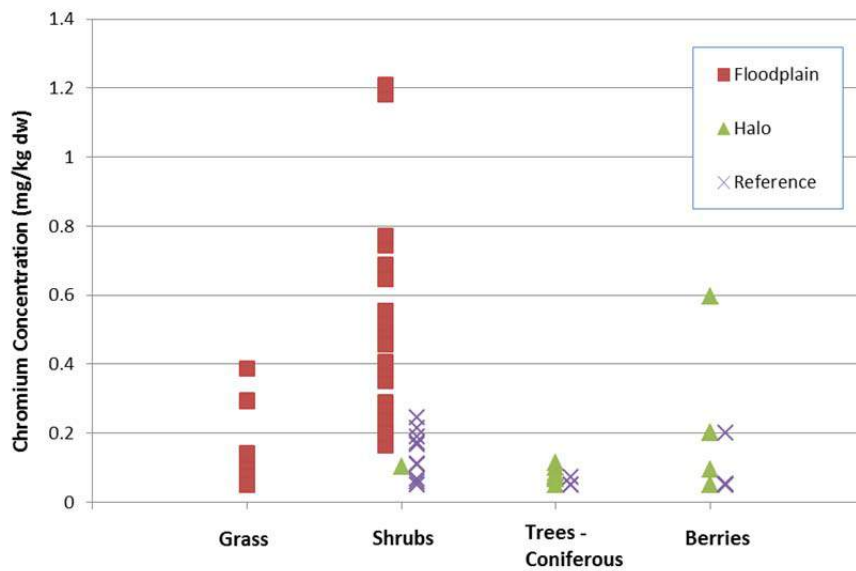


Figure D-4: Chromium Concentrations in Plant Samples Collected on the Site from Three Areas in 2015 (Floodplain, Halo, and Reference)

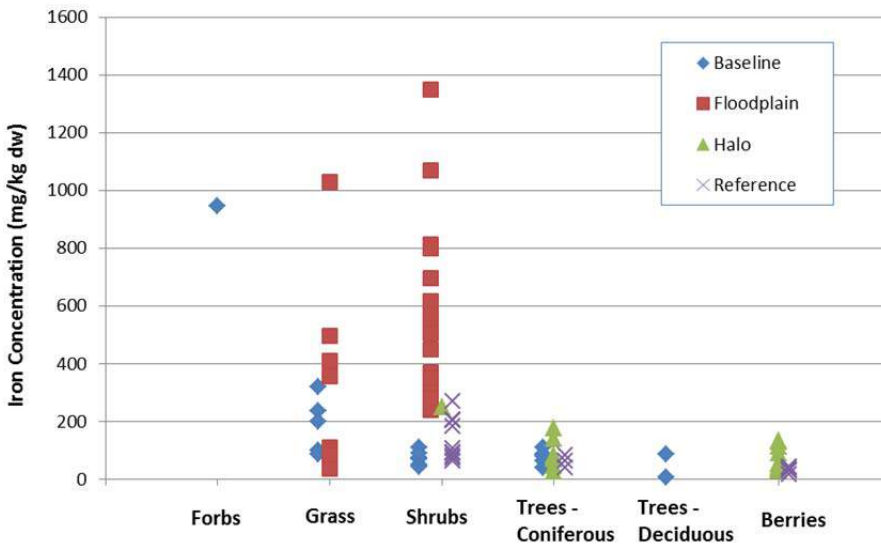


Figure D-5: Iron Concentrations in Plant Samples Collected on the Site Prior to Mine Development (1989, 1995, and 1996) and in Three Areas in 2015 (Floodplain, Halo, and Reference)

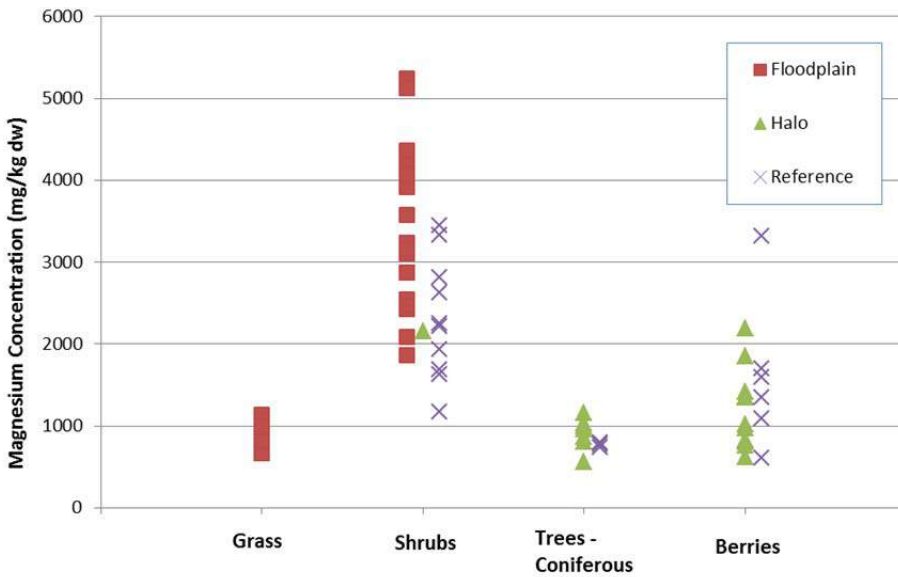


Figure D-6: Magnesium Concentrations in Plant Samples Collected on the Site from Three Areas in 2015 (Floodplain, Halo, and Reference)

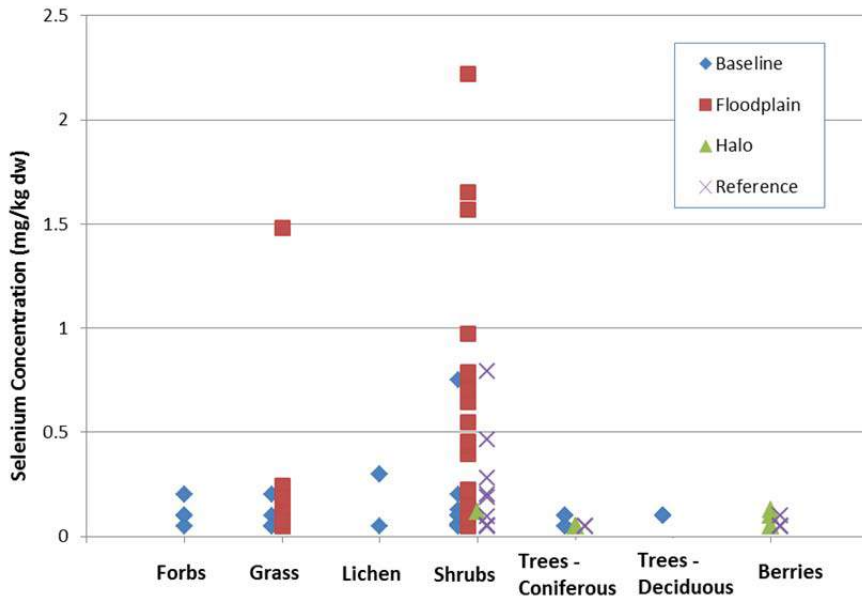


Figure D-7: Selenium Concentrations in Plant Samples Collected on the Site Prior to Mine Development (1989, 1995, and 1996) and in Three Areas in 2015 (Floodplain, Halo, and Reference)

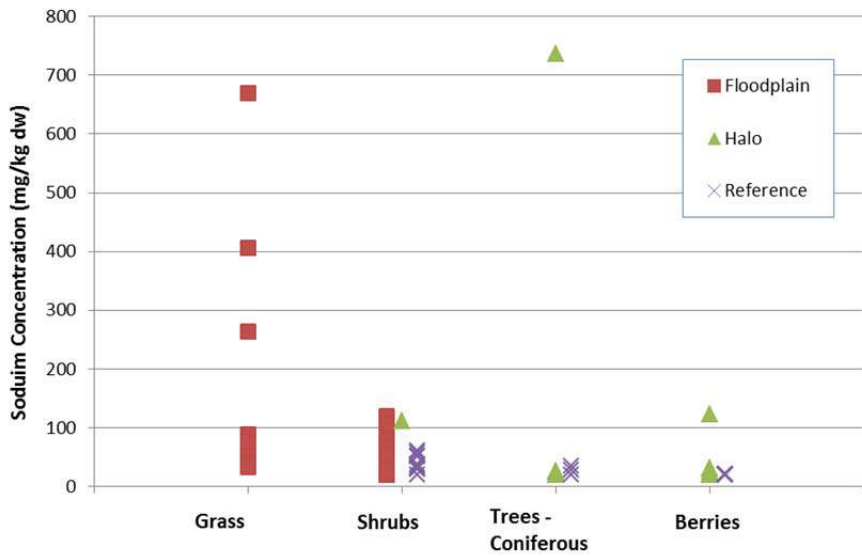


Figure D-8: Sodium Concentrations in Plant Samples Collected on the Site from Three Areas in 2015 (Floodplain, Halo, and Reference)

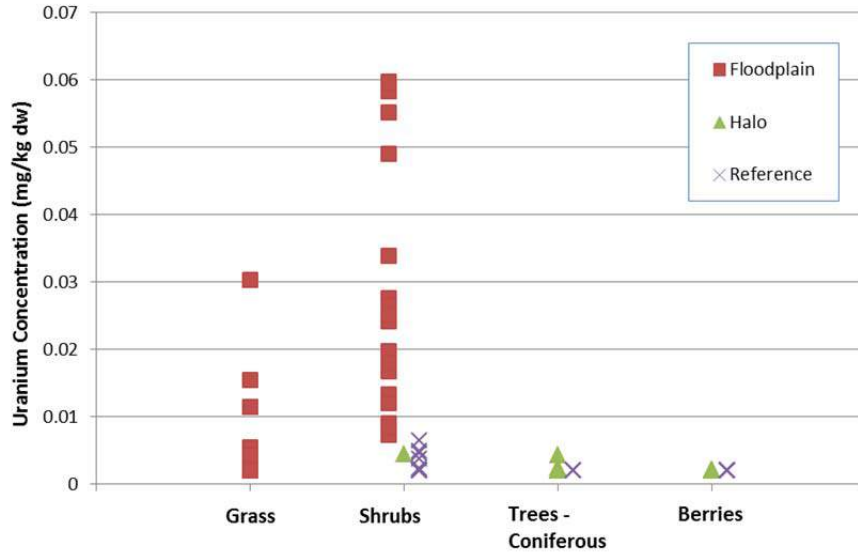


Figure D-9: Uranium Concentrations in Plant Samples Collected on the Site from Three Areas in 2015 (Floodplain, Halo, and Reference)

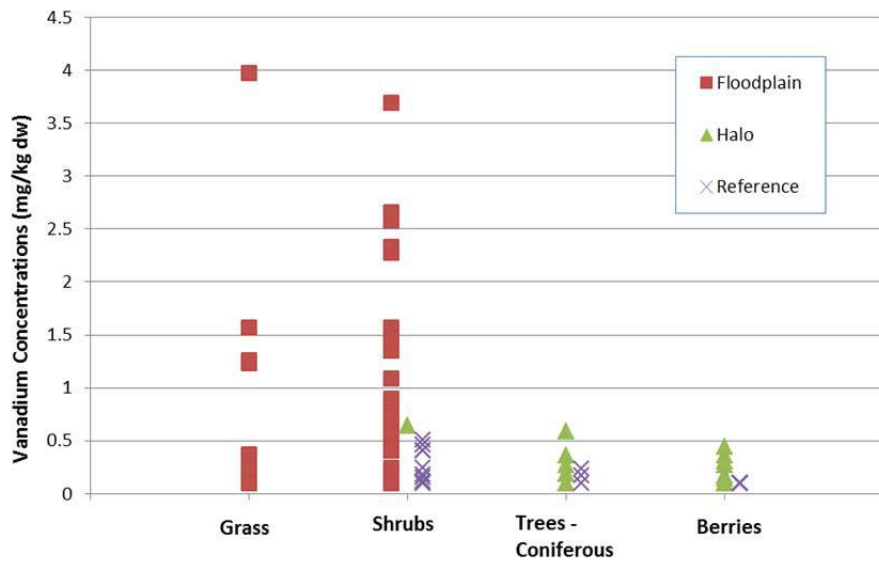


Figure D-10: Vanadium Concentrations in Plant Samples Collected on the Site from Three Areas in 2015 (Floodplain, Halo, and Reference)

DATE May 25, 2016**REFERENCE No.** 1411734-110-TM-Rev0-11000**TO** Katie McMahan
Mount Polley Mine Corporation**CC** Arainn Atkinson, Trish Miller**FROM** Kerrie Serben**EMAIL** kserben@golder.com**TERRESTRIAL INVERTEBRATE TISSUE DATA REPORT****1.0 INTRODUCTION**

On August 4, 2014, the failure of a glacial lacustrine layer beneath the perimeter embankment of the Tailings Storage Facility (TSF) at the Mount Polley Mine, British Columbia caused a breach of the embankment and resulted in the release of water and tailings from the TSF to Polley Lake, Hazeltine Creek and Quesnel Lake. This technical memorandum provides the terrestrial invertebrate data collected in the summer of 2015 and presents the analysis of these data. The purpose of the sampling program was to determine whether soil invertebrates living in the halo area had accumulated higher concentrations of metals than normal from the tailings. The soil community was lost immediately following the event, so low sample numbers, particularly in the floodplain area were expected. Terrestrial invertebrate samples, along with co-located soil samples, were collected for chemical analyses, which will provide site-specific chemistry results to determine exposure concentrations and determine if invertebrates have accumulated higher than normal concentrations of metals in their bodies.

2.0 METHODS

Samples of terrestrial invertebrates (ants, beetles, worms, and slugs) were collected between July 31 and August 4, 2015 by Golder Associates Ltd. (Golder) field staff and members of the Soda Creek Indian Band (Xat'sūll First Nation). Each invertebrate sample was collected along with a soil sample at the same time and location. In the reference area, the soil sample was collected from the root zone. In the halo area, the sample was collected from the top layer and therefore consisted of soil/tailings mixture. The soil chemistry results are provided in a separate technical memorandum (Appendix B – Soil Quality Update).

Tissue samples were frozen as soon as possible and kept frozen until submitted to ALS Laboratory (Burnaby, BC) for analysis of metals¹ and moisture content (Table 1). A suite of metals were analyzed by inductively coupled plasma mass spectrometry (ICPMS) and mercury was analyzed by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry. The laboratory provided the results in wet weight

¹ The term "metals" refers to metals, metalloids, and non-metals.



and dry weight; only the dry weight results are reported in this memorandum. The results of the chemistry analysis are presented in Attachment A, Table A-1.

Table 1: Analytical Parameters and Method Detection Limits for Terrestrial Invertebrate Samples

Parameter	Units	Method Detection Limit (Number of Samples) ^(a)
Moisture Content	%	0.25
Aluminum (Al), Total	mg/kg dw	5.0 (12); 10 (2)
Antimony (Sb), Total	mg/kg dw	0.010 (12); 0.020 (2)
Arsenic (As), Total	mg/kg dw	0.030 (12); 0.060 (2)
Barium (Ba), Total	mg/kg dw	0.050 (12); 0.10 (2)
Beryllium (Be), Total	mg/kg dw	0.010 (12); 0.020 (2)
Bismuth (Bi), Total	mg/kg dw	0.010 (12); 0.020 (2)
Boron (B), Total	mg/kg dw	1.0 (12); 2.0 (2)
Cadmium (Cd), Total	mg/kg dw	0.010 (12); 0.020 (2)
Calcium (Ca), Total	mg/kg dw	20 (12); 40 (2)
Cesium (Cs), Total	mg/kg dw	0.0050 (12); 0.010 (2)
Chromium (Cr), Total	mg/kg dw	0.20 (12); 0.40 (2)
Cobalt (Co), Total	mg/kg dw	0.020 (12); 0.040 (2)
Copper (Cu), Total	mg/kg dw	0.20 (12); 0.40 (2)
Iron (Fe), Total	mg/kg dw	5.0 (12); 10 (2)
Lead (Pb), Total	mg/kg dw	0.050 (12); 0.10 (2)
Lithium (Li), Total	mg/kg dw	0.50 (12); 1.0 (2)
Magnesium (Mg), Total	mg/kg dw	2.0 (12); 4.0 (2)
Manganese (Mn), Total	mg/kg dw	0.050 (12); 0.10 (2)
Mercury (Hg), Total	mg/kg dw	0.0050 (9); 0.010 (3); 0.025 (1); 0.030 (1)
Molybdenum (Mo), Total	mg/kg dw	0.040 (12); 0.080 (2)
Nickel (Ni), Total	mg/kg dw	0.20 (8); 0.40 (2); 0.60 (1); 0.70 (2); 1.1 (1)
Phosphorus (P), Total	mg/kg dw	10 (12); 20 (2)
Potassium (K), Total	mg/kg dw	20 (12); 40 (2)
Rubidium (Rb), Total	mg/kg dw	0.050 (12); 0.10 (2)
Selenium (Se), Total	mg/kg dw	0.10 (12); 0.20 (2)
Sodium (Na), Total	mg/kg dw	20 (12); 40 (2)
Strontium (Sr), Total	mg/kg dw	0.1 (12); 0.2 (2)
Tellurium (Te), Total	mg/kg dw	0.020 (12); 0.040 (2)
Thallium (Tl), Total	mg/kg dw	0.0020 (12); 0.0040 (2)
Tin (Sn), Total	mg/kg dw	0.10 (12); 0.20 (2)
Uranium (U), Total	mg/kg dw	0.0020 (12); 0.0040 (2)
Vanadium (V), Total	mg/kg dw	0.10 (12); 0.20 (2)
Zinc (Zn), Total	mg/kg dw	1.0 (12); 2.0 (2)
Zirconium (Zr), Total	mg/kg dw	0.20 (12); 0.40 (2)

Notes:

^(a) Method detection limits varied among samples due to differences in available sample mass for analysis.

% = percent; mg/kg dw = milligrams per kilogram dry weight.

3.0 QUALITY ASSURANCE/QUALITY CONTROL

3.1 Field Quality Assurance/Quality Control

Invertebrates were hand-picked by field staff wearing nitrile gloves and grouped by species in labelled collection bags. Invertebrates were euthanized by freezing. Care was taken to minimize the introduction of foreign material into the samples or loss of material of interest from the samples prior to analysis. Field notes were maintained to document the field sampling program. Each sample was labelled with a unique identifier and the date sampled. Chain of custody forms were updated as samples were collected, and were checked to verify the information recorded before samples were submitted.

Duplicate samples were collected and analyzed. One duplicate sample was collected, which is consistent with standard practice of collecting one duplicate for every ten samples (i.e., 10% field duplicates). The duplicate sample was a separate worm collected at the same location as the original sample. Because the duplicate samples consisted of separate living and mobile organisms, they should not be used to determine sampler variability or laboratory variability; instead, the duplicate samples provide a measure of the environmental variability. This is particularly significant for worms and other primary consumers that ingest soil, extract nutrients along their digestive system, and deplete the remaining soil. Worms were not deputed prior to analysis.

For duplicate analyses the relative percent difference (RPD)² was calculated. An RPD value of >50% was used to identify notable differences between original and duplicate tissue samples, when values were greater than or equal to five times the method detection limit (MDL). The RPD value used for tissue is relatively high because a higher degree of natural variability is expected for this biological matrix. Values less than five times the MDL were not included in the RPD calculations, because analytical variability near the MDL is higher and does not provide a good measure of variability associated with the collection of field samples.

The original and field duplicate samples consisted of worms collected at a halo plot. Three out of 35 parameters had RPDs above 50% (cadmium, mercury, and zinc) (Attachment A, Table A-2). However, most parameters had RPDs lower than 50%, with an overall median value of 22%. This suggests that the variability in whole body tissue concentrations was low for the parameters of interest.

3.2 Laboratory Quality Assurance/Quality Control

ALS Laboratory (ALS) is an accredited laboratory (locally, Canadian Association for Laboratory Accreditation Inc. and Standard Council of Canada) and methods are based on International Organization for Standards / International Electrotechnical Commission (ISO/IEC) 17025:2005. ALS analytical methods are based on well, established, internationally, recognized procedures such as those published by the United States Environmental Protection Agency and the American Public Health Association, as well as local country standards. All approved methods included quality control and performance criteria that must be achieved prior to releasing the data.

Laboratory quality control for chemistry samples included analysis of method blanks, laboratory duplicates, spiked samples, and control samples using certified reference materials to assess precision and accuracy of chemical analyses. Laboratory data quality control results were reviewed to confirm that the laboratory data quality objectives (DQOs) had been met and that the appropriate quality control information had been reported.

² Relative percent difference is calculated as follows: $(|Original\ Concentration - Duplicate\ Concentration| \div Mean\ Concentration) \times 100\%$

4.0 RESULTS

Soil invertebrates were limited in the soil/tailings mixture both in the floodplain and halo areas. Ants were relatively abundant on the soil/tailings mixture surface while invertebrates normally found below the surface were sparse. With two reference area samples and seven halo area samples, the sample size was limited but was considered to be representative of invertebrate concentrations generally. The significance of the limited sample size will be discussed further in the uncertainty section of the risk assessment report.

Summary statistics, including number of samples, detection frequency, minimum, maximum, and mean concentrations were calculated to compare metal concentrations in terrestrial invertebrates from the halo area to those in the reference area (Attachment A, Table A-3). Where concentrations were below the detection limit, concentrations were set to the detection limit to calculate summary statistics.

The data were examined to determine which parameters to evaluate further. If 70 percent (%) or more of the reported concentrations in the halo samples were below the detection limit, then the parameter was not further analyzed. Therefore, bismuth, lithium, and tellurium were not analyzed further. If the maximum halo area concentration was below the maximum reference + 20% concentration, then the parameter was not further analyzed. Based on this criterion, percent moisture, cadmium, calcium, manganese, mercury, phosphorus, tin, and zinc were not analyzed further.

Additional summary statistics (standard deviation, median, 95th percentile) were calculated for the remaining parameters, which included aluminum, antimony, arsenic, barium, beryllium, boron, cesium, chromium, cobalt, copper, iron, lead, magnesium, molybdenum, nickel, potassium, rubidium, selenium, sodium, strontium, thallium, uranium, vanadium, and zirconium (Attachment A, Table A-4). Plots were made of the concentration (mg/kg dry weight) versus invertebrate group for these parameters (Attachment A Figure A-1), which illustrated that metal concentrations in two of the worm samples from the halo area were typically higher than in the worm and slug samples from the reference area or beetles and ants samples from the halo area.

Further discussion of the results focused on copper and vanadium because soil/tailings mixture concentrations of copper and vanadium were above CSR standards for the protection of terrestrial invertebrates. Concentrations of copper and vanadium were lower in beetles and ants than in earthworms (Figure 1 for copper, and Figure 2 for vanadium). The higher concentrations in earthworms are likely due to the presence of soil in the intestinal tract because the earthworms were not deperated prior to analysis. Worms (primary consumers) consume soil for organic residues while ants and beetles (tertiary consumers) forage on the soil surface.



Figure 1: Copper Concentrations in Terrestrial Invertebrates Collected in the Reference and Halo Areas, 2015

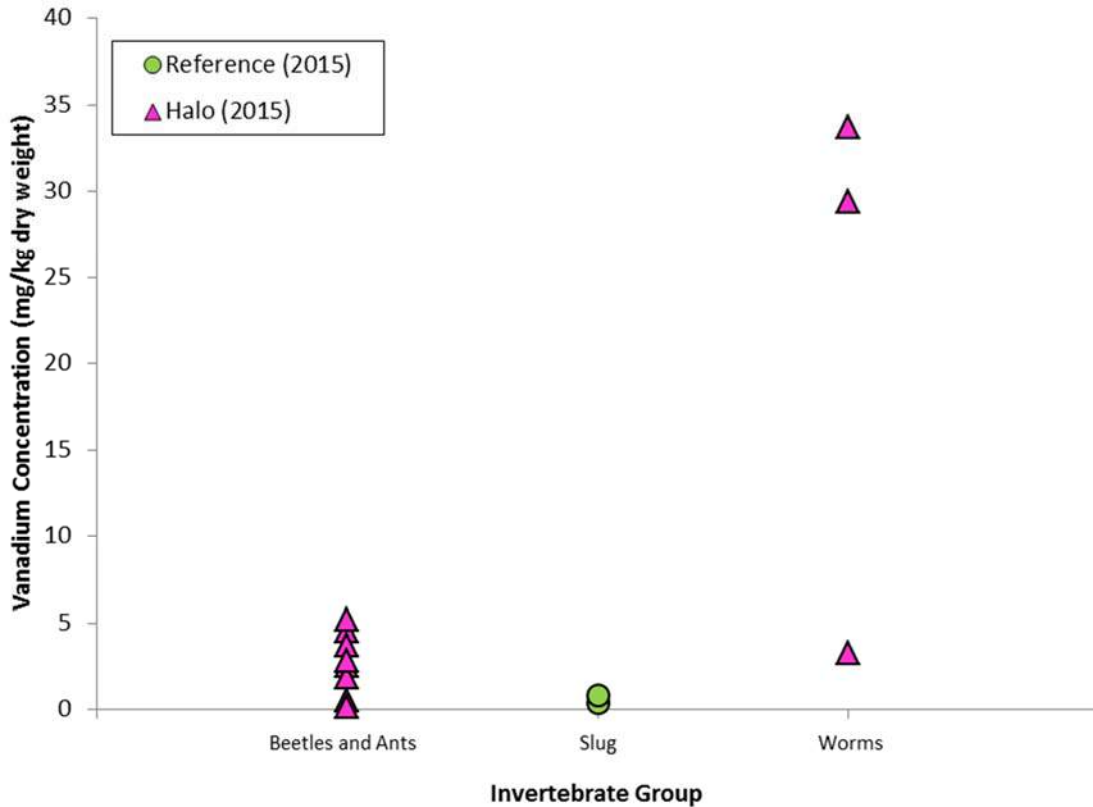


Figure 2: Vanadium Concentrations in Terrestrial Invertebrates Collected in the Reference and Halo Areas, 2015

The terrestrial invertebrate and soil chemistry data were normalized to bulk density so that the ratio of metal concentration in invertebrate to that in soil/tailings could be calculated (i.e., bioaccumulation factor). For terrestrial invertebrates, a worm bulk density of 1 gram per centimetre (g/cm^3) was used (Armitage 2004, Hughes et al. 2005). The bulk density of mineral soil is between 1 to 2 g/cm^3 , with the value dependent on organic carbon content of the soil. For soils with very low organic carbon content, like the tailings, 1.5 g/cm^3 was selected as a reasonable estimate based on the equations given in Hossain et al. (2015) and Alexander (1989).

When normalized to bulk density, ratios of invertebrate concentration to soil/tailings mixture concentration were less than one, indicating that there is not a linear relationship between soil and invertebrate concentrations of copper and vanadium. It would appear that the invertebrates are taking up the copper and vanadium they need (Figure 3 for copper, and Figure 4 for vanadium). Confirmatory sampling of the concentrations of copper and vanadium will be recommended to reduce uncertainty with this measurement. However, these results are consistent with other lines of evidence that indicate that the low leaching potential of the tailings is indicative of low bioavailability of the tailings.

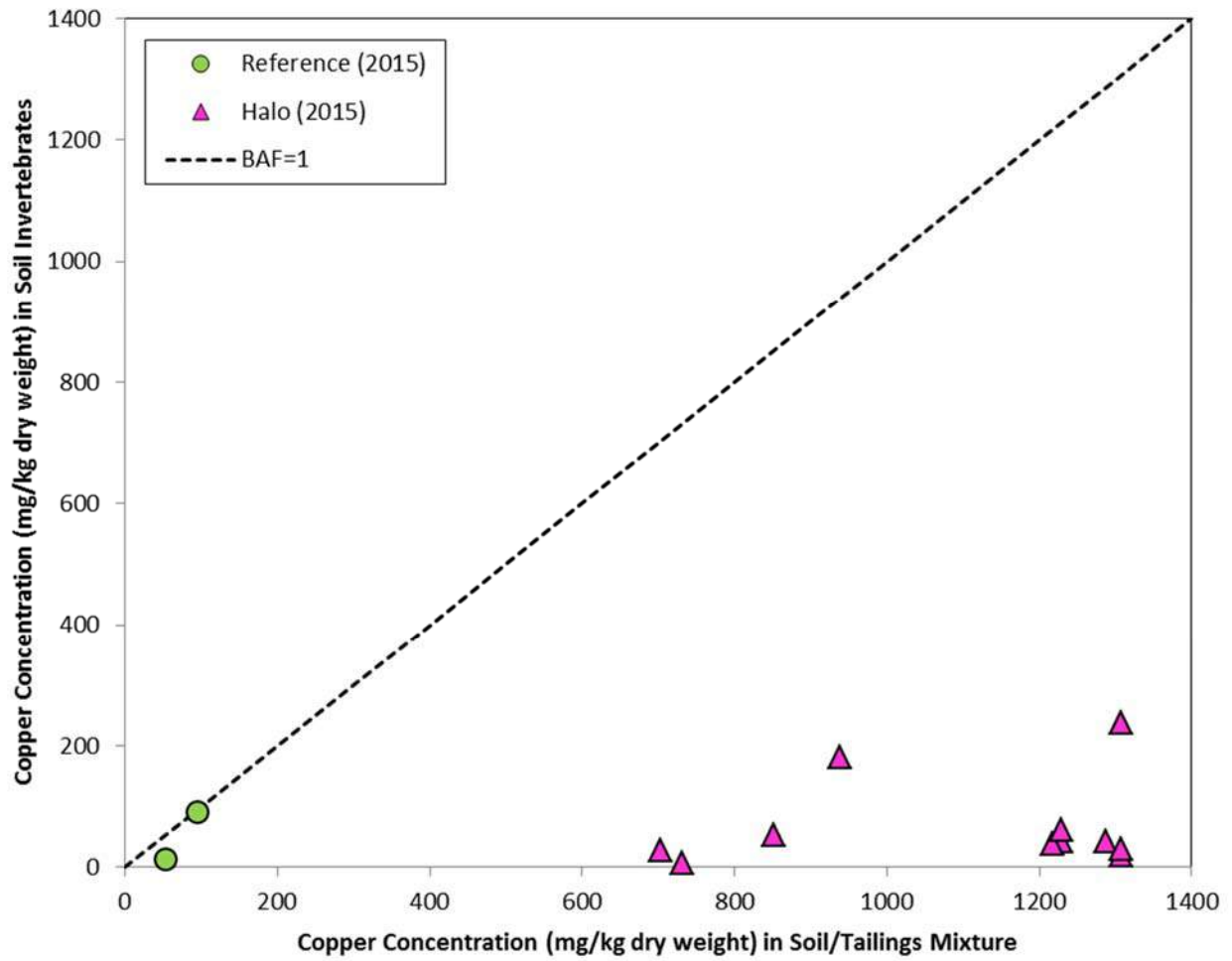


Figure 3: Copper Concentrations in Soil Invertebrates Versus Soil/Tailings Mixture Normalized for Relative Bulk Density

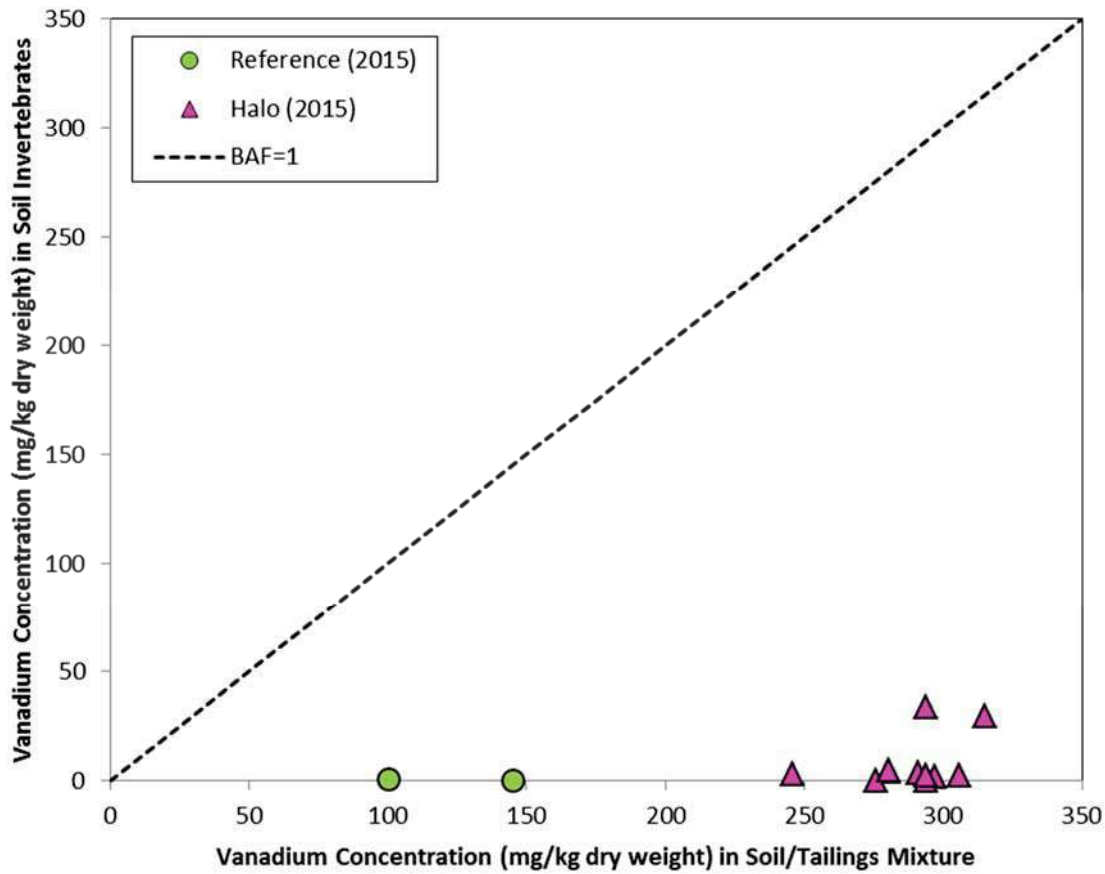


Figure 4: Vanadium Concentrations in Soil Invertebrates Versus Soil/Tailings Mixture Normalized for Relative Bulk Density

GOLDER ASSOCIATES

Kerrie Serben, MSc
Environmental Scientist

Trish Miller, MSc, R.P.Bio
Principal, Senior Environmental Scientist

KS/TM/pn

Attachments: A: Terrestrial Invertebrate Tissue Data

B: Figure A-1: Select Metal Concentrations in Terrestrial Invertebrates Collected from the Reference and Halo Areas, 2015

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ATTACHMENT A
TERRESTRIAL INVERTEBRATE TISSUE DATA

Attachment A Table A-2: Relative Percent Difference for Terrestrial Invertebrate Samples Collected at Mount Polley Mine, 2015

COC Sample ID			384848-09	384848-10	Average Value Greater Than 5 x Detection Limit?	Relative Percent Difference (%)		
ALS Sample ID			L1656480-21	L1656480-22				
Date Sampled			04-Aug-2015	04-Aug-2015				
Plot			P21	P21				
Area	Units	Method Detection Limit	Halo	Halo				
Easting			601622	601622				
Northing			5817050	5817050				
Invertebrate Group			Worm	Worm				
QA/QC			FDA	FD				
Physical Tests								
% Moisture			%	0.25	72.8	74.3	Yes	2%
Metals								
Aluminum (Al)-Total			mg/kg dw	2.0	4300	6220	Yes	37%
Aluminum (Al)-Total	mg/kg ww	0.40	1170	1600	Yes	31%		
Antimony (Sb)-Total	mg/kg dw	0.010	0.061	0.058	Yes	5%		
Antimony (Sb)-Total	mg/kg ww	0.0020	0.0167	0.0149	Yes	11%		
Arsenic (As)-Total	mg/kg dw	0.020	4.02	3.90	Yes	3%		
Arsenic (As)-Total	mg/kg ww	0.0040	1.09	1.00	Yes	9%		
Barium (Ba)-Total	mg/kg dw	0.050	53.2	71.0	Yes	29%		
Barium (Ba)-Total	mg/kg ww	0.010	14.5	18.2	Yes	23%		
Beryllium (Be)-Total	mg/kg dw	0.010	0.162	0.222	Yes	31%		
Beryllium (Be)-Total	mg/kg ww	0.0020	0.0441	0.0570	Yes	26%		
Bismuth (Bi)-Total	mg/kg dw	0.010	0.015	0.025	No	-		
Bismuth (Bi)-Total	mg/kg ww	0.0020	0.0041	0.0064	No	-		
Boron (B)-Total	mg/kg dw	1.0	6.2	5.6	Yes	10%		
Boron (B)-Total	mg/kg ww	0.20	1.69	1.43	Yes	17%		
Cadmium (Cd)-Total	mg/kg dw	0.0050	10.7	2.80	Yes	117%		
Cadmium (Cd)-Total	mg/kg ww	0.0010	2.90	0.719	Yes	121%		
Calcium (Ca)-Total	mg/kg dw	20	13600	13900	Yes	2%		
Calcium (Ca)-Total	mg/kg ww	4.0	3710	3560	Yes	4%		
Cesium (Cs)-Total	mg/kg dw	0.0050	0.564	0.803	Yes	35%		
Cesium (Cs)-Total	mg/kg ww	0.0010	0.154	0.206	Yes	29%		
Chromium (Cr)-Total	mg/kg dw	0.050	3.86	5.43	Yes	34%		
Chromium (Cr)-Total	mg/kg ww	0.010	1.05	1.39	Yes	28%		
Cobalt (Co)-Total	mg/kg dw	0.020	7.36	8.33	Yes	12%		
Cobalt (Co)-Total	mg/kg ww	0.0040	2.00	2.14	Yes	7%		
Copper (Cu)-Total	mg/kg dw	0.10	182	206	Yes	12%		
Copper (Cu)-Total	mg/kg ww	0.020	49.5	52.8	Yes	6%		
Iron (Fe)-Total	mg/kg dw	3.0	7130	9180	Yes	25%		
Iron (Fe)-Total	mg/kg ww	0.60	1940	2360	Yes	20%		
Lead (Pb)-Total	mg/kg dw	0.020	1.39	2.06	Yes	39%		
Lead (Pb)-Total	mg/kg ww	0.0040	0.379	0.530	Yes	33%		
Lithium (Li)-Total	mg/kg dw	0.50	5.17	7.62	Yes	38%		
Lithium (Li)-Total	mg/kg ww	0.10	1.41	1.96	Yes	33%		
Magnesium (Mg)-Total	mg/kg dw	2.0	3890	5600	Yes	36%		
Magnesium (Mg)-Total	mg/kg ww	0.40	1060	1440	Yes	30%		
Manganese (Mn)-Total	mg/kg dw	0.050	228	268	Yes	16%		
Manganese (Mn)-Total	mg/kg ww	0.010	62.0	68.8	Yes	10%		
Mercury (Hg)-Total	mg/kg dw	0.0050	0.109	0.0642	Yes	52%		
Mercury (Hg)-Total	mg/kg ww	0.0010	0.0297	0.0165	Yes	57%		
Molybdenum (Mo)-Total	mg/kg dw	0.020	1.55	1.43	Yes	8%		
Molybdenum (Mo)-Total	mg/kg ww	0.0040	0.422	0.367	Yes	14%		
Nickel (Ni)-Total	mg/kg dw	0.20	3.79	5.06	Yes	29%		
Nickel (Ni)-Total	mg/kg ww	0.040	1.03	1.30	Yes	23%		
Phosphorus (P)-Total	mg/kg dw	10	7820	6730	Yes	15%		
Phosphorus (P)-Total	mg/kg ww	2.0	2130	1730	Yes	21%		
Potassium (K)-Total	mg/kg dw	20	7770	8350	Yes	7%		
Potassium (K)-Total	mg/kg ww	4.0	2120	2150	Yes	1%		
Rubidium (Rb)-Total	mg/kg dw	0.050	18.1	15.2	Yes	17%		
Rubidium (Rb)-Total	mg/kg ww	0.010	4.92	3.90	Yes	23%		
Selenium (Se)-Total	mg/kg dw	0.050	4.85	3.73	Yes	26%		
Selenium (Se)-Total	mg/kg ww	0.010	1.32	0.958	Yes	32%		
Sodium (Na)-Total	mg/kg dw	20	3440	3240	Yes	6%		
Sodium (Na)-Total	mg/kg ww	4.0	937	831	Yes	12%		
Strontium (Sr)-Total	mg/kg dw	0.050	80.6	82.6	Yes	2%		
Strontium (Sr)-Total	mg/kg ww	0.010	21.9	21.2	Yes	3%		
Tellurium (Te)-Total	mg/kg dw	0.020	0.021	0.021	No	-		
Tellurium (Te)-Total	mg/kg ww	0.0040	0.0057	0.0054	No	-		
Thallium (Tl)-Total	mg/kg dw	0.0020	0.0224	0.0284	Yes	24%		
Thallium (Tl)-Total	mg/kg ww	0.00040	0.00609	0.00729	Yes	18%		
Tin (Sn)-Total	mg/kg dw	0.10	0.37	0.53	No	-		
Tin (Sn)-Total	mg/kg ww	0.020	0.100	0.137	Yes	31%		
Uranium (U)-Total	mg/kg dw	0.0020	0.326	0.357	Yes	9%		
Uranium (U)-Total	mg/kg ww	0.00040	0.0887	0.0916	Yes	3%		
Vanadium (V)-Total	mg/kg dw	0.10	29.4	36.8	Yes	22%		
Vanadium (V)-Total	mg/kg ww	0.020	8.00	9.46	Yes	17%		
Zinc (Zn)-Total	mg/kg dw	0.50	413	209	Yes	66%		
Zinc (Zn)-Total	mg/kg ww	0.10	113	53.6	Yes	71%		
Zirconium (Zr)-Total	mg/kg dw	0.20	2.27	3.25	Yes	36%		
Zirconium (Zr)-Total	mg/kg ww	0.040	0.618	0.835	Yes	30%		

Notes:

% = percent; mg/kg dw = milligram per kilogram dry weight; mg/kg ww = milligram per kilogram wet weight; < = less than.

ID = Identification; QA/QC = quality assurance/quality control; FDA = field duplicate available; FD = field duplicate

Attachment A Table A-4: Summary Statistics of Metal Concentrations in Terrestrial Invertebrates Collected at Mount Polley Mine, 2015

Plot	Units	P14	P20	# Detected (Total Samples)	Detection Frequency	Minimum	Maximum	Mean	P13	P15	-	P22	P23	P25	P21	-	P29	P29	P29
		Slug	Worm						Beetles/Ants	Ants	Ants	Ants	Ants	Beetles	Worm	Worm	Worm	Beetles	Ants
QA/QC		-	-						-	-	-	-	-	-	FDA	-	-	-	-
Metals																			
Aluminum (Al)-Total	mg/kg dw	64.9	72.2	2 (2)	100%	64.9	72.2	68.6	182	353	342	77.8	502	193	4300	543	5480	14.9	225
Antimony (Sb)-Total	mg/kg dw	<0.010	<0.010	0 (2)	0%	<0.010	<0.010	-	<0.010	0.010	<0.010	<0.010	0.021	<0.020	0.061	0.018	0.079	<0.010	<0.010
Arsenic (As)-Total	mg/kg dw	0.078	0.189	2 (2)	100%	0.078	0.189	0.134	0.303	0.427	6.46	31.6	30.3	0.288	4.02	1.22	5.26	0.040	0.436
Barium (Ba)-Total	mg/kg dw	63.9	6.62	2 (2)	100%	6.62	63.9	35.3	3.76	29.2	33.6	17.0	27.9	3.81	53.2	9.50	95.9	0.623	25.1
Beryllium (Be)-Total	mg/kg dw	<0.010	<0.010	0 (2)	0%	<0.010	<0.010	-	<0.010	0.016	0.014	<0.010	0.028	<0.020	0.162	0.021	0.220	<0.010	0.012
Boron (B)-Total	mg/kg dw	2.7	3.6	2 (2)	100%	2.7	3.6	3.2	1.7	13.8	12.9	14.6	15.2	3.3	6.2	<1.0	5.4	<1.0	13.9
Cesium (Cs)-Total	mg/kg dw	0.350	0.0582	2 (2)	100%	0.0582	0.350	0.204	0.0296	0.0730	0.0515	0.0213	0.0635	0.020	0.564	0.0608	0.764	<0.0050	0.0802
Chromium (Cr)-Total	mg/kg dw	<0.20	<0.20	0 (2)	0%	<0.20	<0.20	-	<0.20	0.43	0.44	0.27	0.56	0.43	3.86	1.62	4.44	<0.20	0.28
Cobalt (Co)-Total	mg/kg dw	0.157	4.08	2 (2)	100%	0.16	4.08	2.12	0.252	0.472	0.535	0.339	0.628	0.207	7.36	1.08	5.26	0.021	0.526
Copper (Cu)-Total	mg/kg dw	90.6	12.6	2 (2)	100%	12.6	90.6	51.6	52.2	43.2	42.3	37.8	62.0	28.1	182	6.84	237	19.6	29.7
Iron (Fe)-Total	mg/kg dw	162	354	2 (2)	100%	162	354	258	779	1330	1140	262	1430	584	7130	1240	8970	83.5	825
Lead (Pb)-Total	mg/kg dw	0.075	0.094	2 (2)	100%	0.075	0.094	0.085	0.056	0.184	0.195	0.082	0.233	0.10	1.39	0.508	2.61	<0.050	0.114
Magnesium (Mg)-Total	mg/kg dw	2410	978	2 (2)	100%	978	2410	1694	1260	1580	1210	970	1150	1230	3890	761	4380	505	972
Molybdenum (Mo)-Total	mg/kg dw	0.462	0.450	2 (2)	100%	0.450	0.462	0.456	0.788	0.561	1.31	1.63	1.77	0.430	1.55	0.477	1.77	0.551	1.07
Nickel (Ni)-Total	mg/kg dw	0.28	0.50	2 (2)	100%	0.28	0.50	0.39	<1.1	<0.70	<0.60	0.81	<0.70	<0.40	3.79	1.33	4.54	<0.20	0.63
Potassium (K)-Total	mg/kg dw	5600	8210	2 (2)	100%	5600	8210	6905	8190	10800	8310	9110	7470	7860	7770	6770	6550	4560	11200
Rubidium (Rb)-Total	mg/kg dw	5.89	10.8	2 (2)	100%	5.89	10.8	8.35	4.38	15.6	3.93	4.42	2.43	1.63	18.1	8.38	9.14	0.663	9.75
Selenium (Se)-Total	mg/kg dw	1.23	0.72	2 (2)	100%	0.72	1.23	0.98	1.90	0.66	0.23	0.17	0.20	1.44	4.85	4.43	4.91	0.49	0.41
Sodium (Na)-Total	mg/kg dw	1410	2050	2 (2)	100%	1410	2050	1730	2610	2480	1870	1670	1390	2680	3440	2740	3000	1730	1530
Strontium (Sr)-Total	mg/kg dw	55.4	29.6	2 (2)	100%	29.6	55.4	42.5	5.65	30.9	39.0	25.2	30.7	7.09	80.6	13.0	115	1.16	27.4
Thallium (Tl)-Total	mg/kg dw	0.0212	0.0140	2 (2)	100%	0.0140	0.0212	0.0176	0.0046	<0.0020	<0.0020	<0.0020	<0.0020	0.0076	0.0224	0.0200	0.0280	<0.0020	0.0023
Uranium (U)-Total	mg/kg dw	0.0066	0.0074	2 (2)	100%	0.0066	0.0074	0.0070	0.0159	0.0380	0.0461	0.0203	0.397	0.0143	0.326	0.116	0.408	<0.0020	0.0147
Vanadium (V)-Total	mg/kg dw	0.39	0.79	2 (2)	100%	0.39	0.79	0.59	2.51	4.52	3.70	0.53	5.21	1.84	29.4	3.25	33.7	0.14	2.80
Zirconium (Zr)-Total	mg/kg dw	<0.20	<0.20	0 (2)	0%	<0.20	<0.20	-	<0.20	0.21	0.23	<0.20	0.32	<0.40	2.27	0.29	2.13	<0.20	<0.20

Notes:

Median, standard deviation, and 95th percentile were not calculated for reference area samples because only two samples are available for this area.

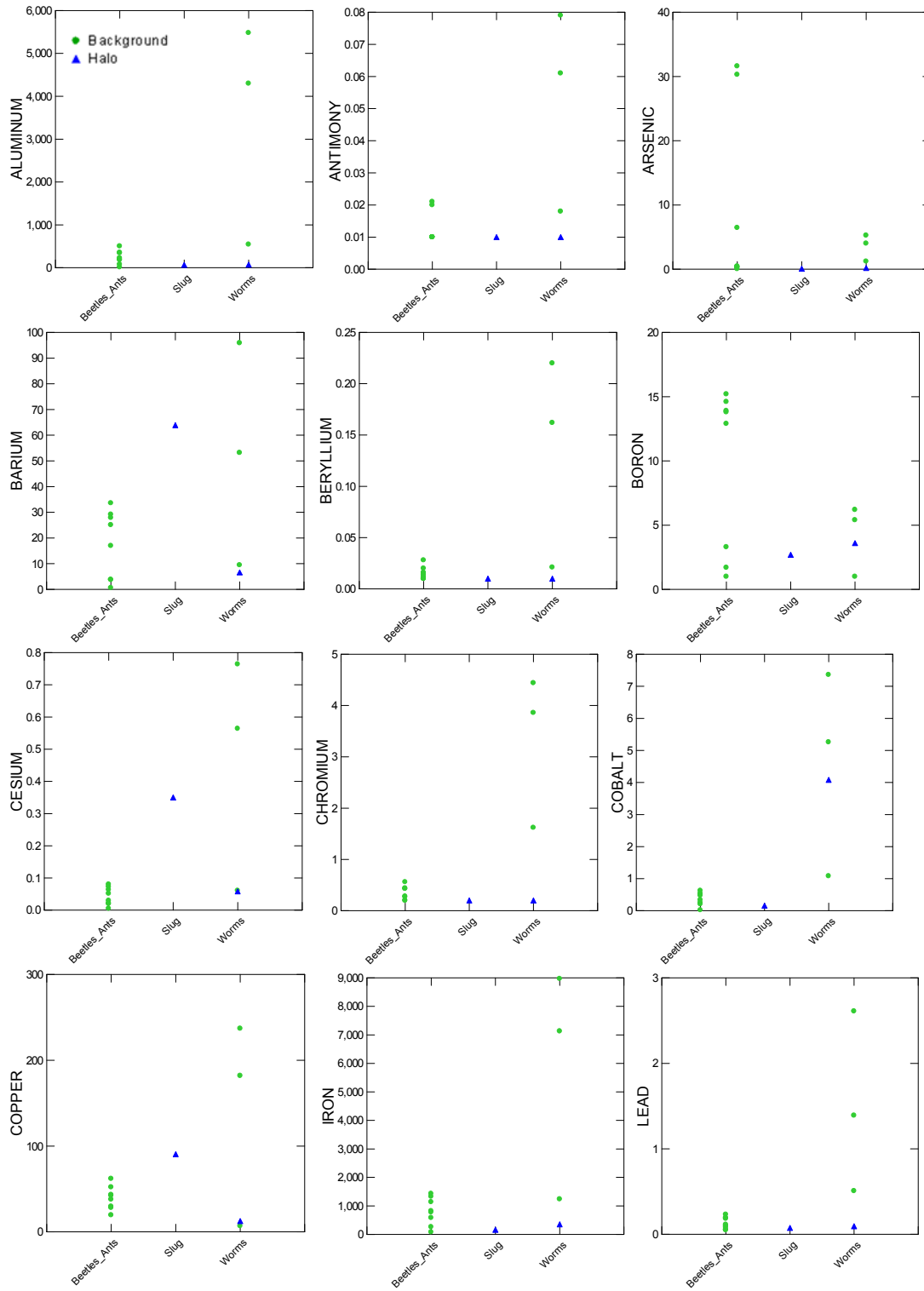
mg/kg dw = milligram per kilogram dry weight; < = less than.

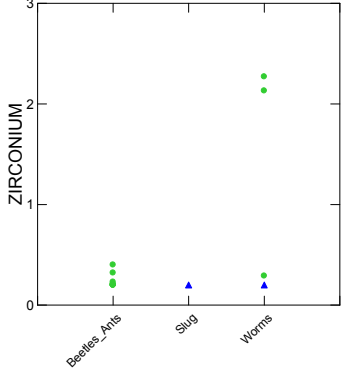
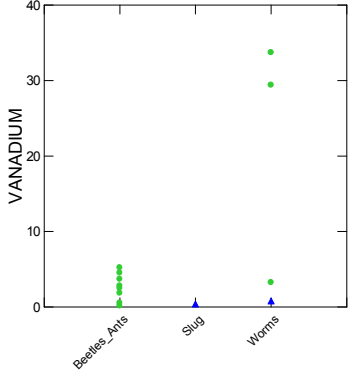
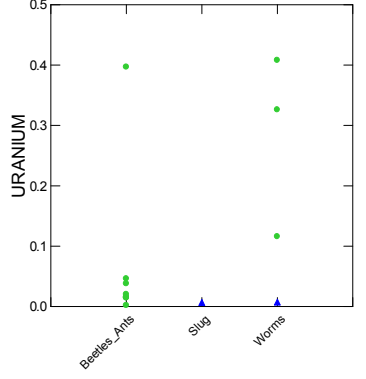
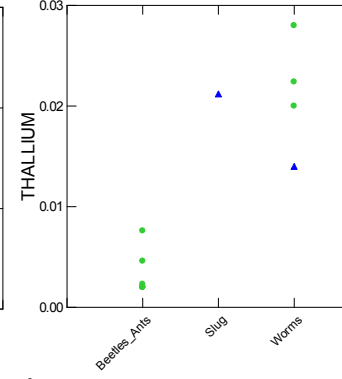
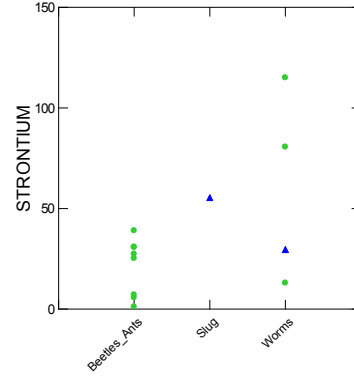
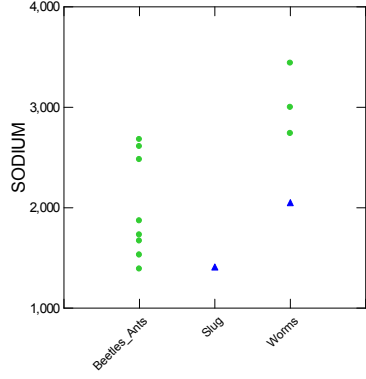
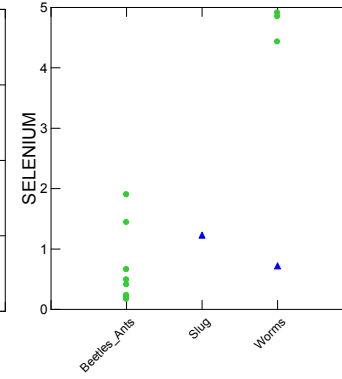
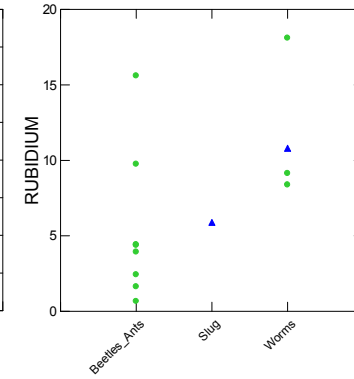
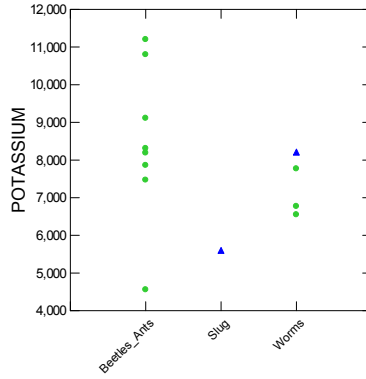
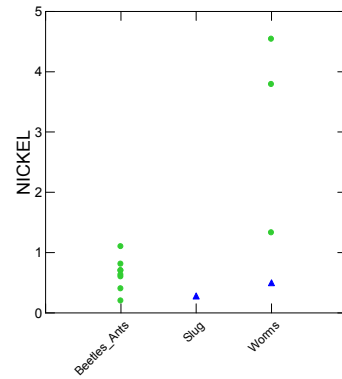
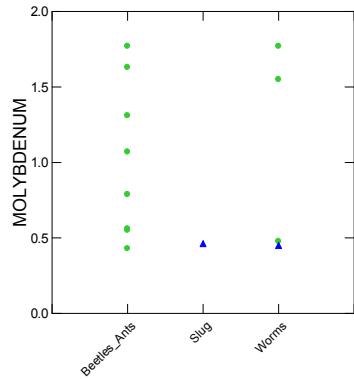
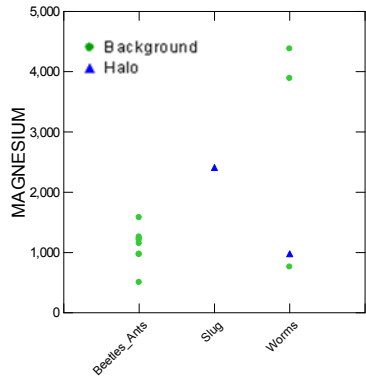
ID = Identification; QA/QC = quality assurance/quality control; FDA = field duplicate available

ATTACHMENT B

Figure A-1: Select Metal Concentrations in Terrestrial Invertebrates Collected from the Reference and Halo Areas, 2015

Figure A-1: Select Metal Concentrations in Terrestrial Invertebrates Collected from the Reference and Halo Areas, 2015







APPENDIX K

Evaluation of the Mercury Biomagnification Potential in Quesnel and Polley Lakes

Review of Mercury Data in Quesnel Lake and Polley Lake

Prepared by:

Emily-Jane Costa, M.Sc., Adrian de Bruyn, Ph.D., R.P.Bio., and Trish Miller, M.Sc., R.P.Bio., CSAP

Golder Associates Ltd.

DATE 30 May 2016**REFERENCE No.** 1411734-157-TM-Rev0-10000**TO** Colleen Hughes
Mount Polley Mining Corporation**FROM** Emily-Jane Costa, Adrian deBruyn, Trish Miller**EMAIL** ECosta@golder.com
AdeBruyn@golder.com
TMiller@golder.com

REVIEW OF MERCURY DATA IN QUESNEL LAKE AND POLLEY LAKE

1.0 BACKGROUND AND OBJECTIVE

Following the failure of the dam foundation at the Tailings Storage Facility at the Mount Polley Mine on August 4, 2014, an estimated 18.6 ± 1.4 million cubic metres of tailings mixed with native soil and other material entered Polley Lake, Hazeltine Creek, and Quesnel Lake. Contaminants of potential concern (COPCs) related to the failure of the dam were identified for surface water (Golder 2015, Golder 2016a), soil (SNC 2015, Golder 2016b), and sediment (Minnow 2015a, Minnow 2015b). Although mercury was not identified as a COPC based on measured concentrations in these media, and trees deposited in Quesnel Lake following the breach were salvaged, mercury has been identified as a stakeholder concern due to the perceived potential for the deposited mixture of tailings and native soil to result in enhanced mercury mobilization into the lake food web via a “reservoir effect” in Quesnel Lake.

The reservoir effect refers to a phenomenon of enhanced mercury mobilization sometimes observed in newly-formed reservoirs. Reservoirs formation often involves flooding soils and vegetation, thus providing a new source of nutrients and organic material for bacteria that can methylate and de-methylate mercury in the flooded environment (Ullrich et al. 2001). Bacterial decomposition of this new organic material can increase the natural rate of formation of methylmercury. Methylmercury is a positively charged ion that readily binds to sulfur-based amino acids such as cysteine (Newman 2009).

Once attached to amino acids, methylmercury can be incorporated into proteins and transferred to higher trophic levels. Bacteria that methylate inorganic mercury are consumed by invertebrates, which are consumed by fish, leading to increased concentrations of methylmercury in fish tissues (CCME 2000). Stakeholder concern related to mercury is connected to the hypothesis that the deposited mixture of tailings and native organic material created conditions that promote the methylation of mercury, as occurs in a reservoir.

The purpose of this technical memorandum is to provide an overview of conditions that favour the methylation of mercury and assess whether these conditions occur in Quesnel Lake or Polley Lake (Section 2.0) and to review monitoring data to examine the evidence (if any) of increased mercury concentrations as a result of the tailings dam failure (Section 3.0). Uncertainty in the assessment (Section 4.0), a summary of findings (Section 5.0), and recommendations for future monitoring (Section 5.0) are also provided. A list of information sources used in this memorandum is provided in Table 1.



Table 1: Information Sources

Information Source	Reference
Mount Polley Tailings Dam Failure – Surface Water Quality Impact Assessment	Golder 2015
Mount Polley Surface Water Quality Impact Assessment Updated, March 2015 to August 2015	Golder 2016a
Factual Report for Soil Investigation, Hazeltine Creek Floodplain	Golder 2016b
Quesnel and Polley Lakes 2015 Plankton Update Report	Golder 2016c
Summary of Available Fish Tissue Chemistry Data (2014-2015)	Golder 2016d
Mount Polley Tailings Dam Failure Sediment Quality Impact Assessment	Minnow 2015a
Sediment Quality Data Report – August 2015 Collections	Minnow 2015b
Soil Quality Impact Assessment – Hazeltine Creek Study Area, Mount Polley Mine, BC	SNC 2015
Bathymetry Analysis and Volume Balance	Tetra Tech 2015

2.0 PARAMETERS THAT INFLUENCE MERCURY METHYLATION

This section identifies key conditions that influence mercury methylation, and evaluates whether these conditions occur in Quesnel Lake and Polley Lake such that mercury methylation would be favoured. The purpose of this section is to provide a high-level overview, and as such, is not intended to represent an exhaustive list of conditions that influence mercury methylation.

Azimuth (2010, 2012, 2015) summarized environmental factors that influence mercury methylation. As outlined in Sections 4.3 to 4.5 of Azimuth (2012), key parameters that influence methylation potential are residence time, trophic status, temperature, dissolved oxygen, pH, dissolved organic carbon, total suspended solids, sulphate, sediment grain size, and total organic carbon in sediment. The correlation of these parameters with mercury methylation (i.e., positive or negative) is summarized in Table 2. Further details are provided in Azimuth (2010, 2012, 2015). Quesnel Lake and Polley Lake data are provided in Table 2 and discussed briefly below.

As summarized in Table 2, conditions in Quesnel Lake generally do not favour mercury methylation. Quesnel Lake is oligotrophic, cold, well oxygenated, slightly basic, and relatively low in concentrations of dissolved organic carbon, total suspended solids, and sulphate. Sediment grain size and total organic carbon are also not favourable for mercury methylation.

In Polley Lake, some parameters indicate that mercury methylation would not be favoured (i.e., temperature, pH, and total suspended solids), whereas other parameters indicate that mercury methylation could be favoured (i.e., trophic status, dissolved oxygen, sulphate, and sediment characteristics). For the latter set of parameters, these conditions are not a result of the tailings dam failure because, with the exception of sulphate¹, pre-event and post-event conditions are comparable. Prior to the failure, Polley Lake was classified as a mesotrophic/eutrophic lake with hypoxic conditions (i.e., dissolved oxygen concentrations less than 5 mg/L) generally occurring at depths greater than 20 metres (Golder 2015). Pre-event sediment grain size (predominantly silt; Table 3.5 of Minnow 2015a) and total organic carbon in sediment (mean in deep areas = 18.2%, mean in mid-depth areas = 8.4%; Table 3.5 of Minnow 2015a) were also similar to conditions shown in Table 2. Overall, based on the key parameters identified in Sections 4.3 to 4.5 of Azimuth (2012) and the data presented in Table 2, the potential for the tailings dam failure to increase mercury methylation in Polley Lake is considered low.

¹ Mean pre-event sulphate concentration was 20 mg/L (Appendix A of Golder 2015).

Table 2: Summary of Parameters that Influence Mercury Methylation (Azimuth 2012) and Current (Post-event) Conditions of these Parameters in Quesnel Lake and Polley Lake

Parameter	Correlation	Conditions that Favour Methylation	Quesnel Lake	Polley Lake	Source for Polley Lake and Quesnel Lake data
Residence time	Positive	Longer residence time	10 years (entire lake); 3 months (West Basin)	16.2 years	1,6
Trophic status	Positive	Highly productive systems	Low productivity; classified as oligotrophic	Moderate to high productivity; classified as mesotrophic/eutrophic	1
Water - Temperature	Positive	Warmer temperatures (weakly related)	Temperature < 10 °C at depths greater than 40 m	Temperature < 10 °C at depths greater than 15 m	2
Water - Dissolved Oxygen	Negative	Low oxygen conditions	Concentrations > 5 mg/L at all depths	Concentrations < 5 mg/L at depths greater than 10 m	2
Water - pH	Negative	Slightly acidic waters (pH <6.5)	Median pH = 7.95	Median pH = 8.1	3
Water - dissolved organic carbon	Positive	Concentrations > 5 mg/L	Mean concentration = 2.2 mg/L	Mean concentration = 6.2 mg/L	3
Water - total suspended solids	Positive	Higher concentrations (as transport media for mercury)	Below detection limit of 3 mg/L in most samples (n= 198); 13 samples had detected concentrations that ranged from 3 to 54.1 mg/L.	Below detection limit of 3 mg/L in most samples (n= 54); 4 samples had detected concentrations that ranged from 3.1 to 5.4 mg/L.	3
Water - sulphate	Positive	Higher concentrations over environmentally relevant range (5-30 mg/L)	Mean concentration = 6.6 mg/L	Mean concentration = 44.3 mg/L	3
Sediment - grain size	Negative	Fine grain sediment ⁵	In the <63 µm fraction, predominantly silt in profundal samples and predominantly sand in littoral samples.	Predominantly silt in the <63 µm fraction	4
Sediment - total organic carbon	Positive	Higher	Mean total organic carbon ≤ 2.3% in the <63 µm fraction	Mean total organic carbon ≤ 7.7% in the <63 µm fraction	4

Abbreviations: < = less than; ≤ = less than or equal to; > = greater than; ~ = approximately; °C = degrees Celsius; m = metres; mg/L = milligrams per litre; µm = micrometres; % = percent.

Sources:

¹ Golder (2015).

² Depth profiles presented in Appendix D of Golder (2015).

³ Attachment 8 of Golder (2016a). Values calculated using all Quesnel Lake samples or all Polley Lake samples collected in 2015.

⁴ Minnow (2015b). Based on mean particle size or mean total organic carbon at exposed locations sampled in 2014 and 2015.

⁵ Condition that favours mercury methylation is described in Azimuth (2012).

⁶ TetraTech (2015).

3.0 REVIEW OF MERCURY MONITORING DATA

This section summarizes water chemistry, sediment chemistry, zooplankton tissue chemistry, and fish tissue chemistry data collected from Quesnel Lake (Section 3.1) and Polley Lake (Section 3.2). An overview of spatial and temporal trends in mercury concentrations is provided below.

3.1 Quesnel Lake

3.1.1 Water Chemistry

Water chemistry data collected between August 2014 and July 2015 are reported in Attachment 8 of Golder (2016a). Between August 2014 and July 2015, with the exception of one water sample, total aqueous mercury concentrations in Quesnel Lake samples have been below the reported detection limits of 50 ng/L (August 2014 samples), 10 ng/L (late August and September 2014 samples), or 5 ng/L (2015 samples). The single sample with a detected concentration (11 ng/L) was collected from station QUL-96 in September 2014. Water samples collected on the same day from nearby station QUL-2 were below the detection limit of 10 ng/L. Because mercury data are sparse and total aqueous mercury concentrations were below the reported detection limit in all but one sample, interpretation of aqueous mercury trends is limited.

In Golder (2016a), the single measured aqueous mercury concentration and the detection limits for samples with no detected mercury were compared to the BC water quality guideline (BC MoE 2001) of 10 ng/L, based on the assumption that the percent methylmercury in Quesnel Lake is 1%. Because the percent methylmercury in Quesnel Lake has not been measured (see Section 5.0 for recommendations related to this data gap), the aqueous mercury data cannot be directly compared to the BC water quality guideline. However, comparison to the CCME (2003) water quality guidelines for inorganic mercury suggest that the potential for mercury effects is low. In water samples collected from late August 2014 (i.e., detection limit of 10 ng/L) to July 2015 (i.e., detection limit of 5 ng/L), aqueous mercury concentrations were lower than the CCME (2003) water quality guideline for inorganic mercury (26 ng/L).

Although the above comparison to the CCME (2003) water quality guideline suggests that the potential for mercury effects is low, CCME (2003) states that the water quality guideline may not fully protect higher trophic levels. Therefore, sediment (Section 3.1.2), zooplankton tissue chemistry (Section 3.1.3), and fish tissue chemistry (Section 3.1.4) data collected from Quesnel Lake were also reviewed to assess spatial and temporal trends in mercury concentrations.

3.1.2 Sediment Chemistry

Sediment chemistry data are reported in Minnow (2015a,b). Sampling in Quesnel Lake was conducted in 2014 and 2015 at two depths: littoral (1 to 2 metres deep) and profundal (approximately 80 to 100 metres deep). In 2014, both the littoral and profundal sampling in Quesnel Lake included two reference areas and four exposed areas. For each sampling location, concentrations were measured in the <2 mm fraction and the <63 µm fraction. In 2015, both the littoral and profundal sampling included one reference area and one exposed area. Concentrations were measured in the <63 µm fraction only. Baseline sediment chemistry data were not available for Quesnel Lake (Minnow 2015a).

In littoral and profundal sediment samples collected in 2014 and 2015, concentrations of mercury in exposed areas were generally higher than concentrations in reference areas. However, mercury concentrations in exposed areas were lower than the BC working sediment quality guideline. In 2014 and 2015, mean sediment mercury concentrations in exposed areas were either lower than or similar to the mean baseline concentration in Hazeltine Creek.

With respect to temporal comparisons, sediment mercury concentrations in 2015 were generally higher than concentrations measured in 2014 post-event. Mean sediment mercury concentrations were higher in 2015 relative to 2014 both in exposed areas (31 to 42%) and reference areas (16 to 19%).

3.1.3 Zooplankton Tissue

Zooplankton tissue chemistry collected in 2014 and 2015 from Quesnel Lake is reported in Golder (2016c). Tissue samples were collected from three stations in Quesnel Lake: one exposed station called Hazeltine (in the West Arm west of Cariboo Island) and two reference stations, Horsefly (near the Horsefly River) and Junction (in the Main Basin where the east and north arms meet; Golder 2016c).

Zooplankton tissue mercury concentrations were variable at all three stations, with no consistent spatial or temporal trends. Zooplankton tissue mercury concentrations at the exposed site were generally lower than or similar to concentrations measured at the reference stations.

3.1.4 Fish Tissue

Fish tissue chemistry collected in 2014 and 2015 from Quesnel Lake is reported in Golder (2016d). Tissue chemistry comparisons were conducted spatially (i.e., exposure versus reference areas) and temporally (i.e., 2014 versus 2015 data) for site, species, and tissue type, where data were available.

The following observations were made with respect to spatial comparisons in Quesnel Lake:

- For five of the sampled fish species with sufficient tissue mercury data to compare between exposed and reference areas (i.e., lake trout, largescale sucker, northern pikeminnow, redbelt shiner, and juvenile sockeye salmon), mercury concentrations in fish collected from exposed locations were lower than or similar to concentrations in fish collected from reference locations.
- Two species exhibited potential differences between exposed and reference areas:
 - Kokanee collected in 2014 from Quesnel Lake near Quesnel River (exposure) had higher mercury concentrations in ovary relative to kokanee collected from Quesnel Lake North Arm (reference), although concentrations in liver and muscle samples were similar.
 - Peamouth chub collected in 2015 from Quesnel Lake Hazeltine Creek Confluence (exposure) had higher mercury concentrations in whole body relative to fish collected from Quesnel Lake North Arm (reference). There is uncertainty in this comparison because it was not possible to confirm that similar length distributions were sampled in the two waterbodies due to a lack of fish length data.

With respect to temporal comparisons in Quesnel Lake, mercury concentrations in tissue were either greater in 2014 relative to 2015 (lake trout) or similar in 2014 and 2015 (kokanee).

Overall, the spatial and temporal comparisons indicate that fish tissue mercury concentrations in Quesnel Lake are comparable to concentrations measured in reference locations and that concentrations have not increased since the tailings dam failure. These results are consistent with the lack of spatial and temporal trends observed in water chemistry (Section 3.1.1), sediment chemistry (Section 3.1.2), and zooplankton tissue chemistry (Section 3.1.3).

3.2 Polley Lake

3.2.1 Water Chemistry

Water chemistry data collected between August 2014 and July 2015 are reported in Attachment 8 of Golder (2016a). During this time total aqueous mercury concentrations in Polley Lake samples have been below the reported detection limits of 50 ng/L (August 2014 samples), 10 ng/L (September 2014 samples), or 5 ng/L (2015 samples). Because mercury data are sparse and total aqueous mercury concentrations were below the reported detection limit in all samples, interpretation of aqueous mercury trends is limited.

In Golder (2016a), detection limits for samples with no detected mercury were compared to the BC water quality guideline (BC MoE 2001) of 10 ng/L, based on the assumption that the percent methylmercury in Polley Lake is 1%. Because the percent methylmercury in Polley Lake has not been measured (see Section 5.0 for recommendations related to this data gap), the aqueous mercury data cannot be directly compared to the BC water quality guideline. However, comparison to the CCME (2003) water quality guideline for inorganic mercury suggests that the potential for mercury effects is low. In water samples collected from September 2014 (i.e., detection limit of 10 ng/L) to July 2015 (i.e., a detection limit of 5 ng/L), aqueous mercury concentrations were lower than the CCME (2003) water quality guideline for inorganic mercury (26 ng/L).

Although the above comparisons to the CCME (2003) water quality guidelines suggest that the potential for mercury effects is low, the CCME (2003) derivation document states that the water quality guidelines may not fully protect higher trophic level fish. Therefore, sediment (Section 3.1.2), zooplankton tissue chemistry (Section 3.1.3), and fish tissue chemistry (Section 3.1.4) data collected from Polley Lake were also reviewed to assess spatial and temporal trends in mercury concentrations.

3.2.2 Sediment Chemistry

Sediment chemistry data are reported in Minnow (2015a) and Minnow (2015b). Sampling in Polley Lake was conducted in 2014 at two depths: mid-depth (approximately 20 metres deep) and deep basins (approximately 29 meters deep). Sampling of both the mid-depth and deep basins were done in two areas, one located on the south side and the other on the north side of Polley Lake. Mercury concentrations were measured in the <2 mm fraction (deep basin samples) and the <63 µm fraction (mid-depth and deep basin samples). In 2015, sampling of the deep basin on the south side of Polley Lake was conducted and concentrations were measured for the <63 µm fraction. The deep basins had been historically sampled as a part of baseline studies for Mount Polley Mine and are summarized in Minnow (2015a). Bootjack Lake served as a reference for Polley Lake.

In 2014 and 2015, sediment mercury concentrations in Polley Lake were lower than concentrations in Bootjack Lake (i.e., the reference lake), lower than the BC sediment quality guideline, and lower than the mean baseline concentration in Polley Lake. With respect to temporal comparisons, mercury concentrations in sediment were similar in 2014 and 2015 (Minnow 2015b).

3.2.3 Zooplankton Tissue

Zooplankton tissue chemistry collected in 2015 from Polley Lake is reported in Golder (2016b). Tissue samples were collected in four months (May, July, August, and September) from two stations in Polley Lake; P1 (northern end of Polley Lake) and P2 (southern end of Polley Lake, closer to the confluence with Hazeltine Creek). No baseline or reference data were available for comparison.

Zooplankton mercury concentrations were similar between sampling stations (P1 and P2) in Polley Lake in 2015, with the exception of the September 2015 sampling event when P1 was higher than P2. At P1, the station located at the northern end of Polley Lake, tissue mercury concentrations displayed an increasing trend from July to September. At P2, the station located closer to the confluence with Hazeltine Creek, there was no temporal trend in mercury concentrations. Tissue mercury concentrations in all Polley Lake samples were lower than or similar to those measured in the Quesnel Lake reference stations.

3.2.4 Fish Tissue

Fish tissue chemistry collected in 2014 and 2015 from Polley Lake is reported in Golder (2016d). Tissue chemistry comparisons were conducted spatially (i.e., exposure versus reference areas) and temporally (i.e., 2014 versus 2015 data) for site, species, and tissue type, where data were available.

In 2014 and 2015, mercury concentrations in all fish species collected from Polley Lake were either lower than or similar to concentrations in fish collected from reference locations. With respect to temporal comparisons, mercury concentrations in fish were similar in 2014 and 2015. These results are consistent with the lack of spatial and/or temporal trends observed in water chemistry (Section 3.2.1), sediment chemistry (Section 3.2.2), and zooplankton tissue chemistry (Section 3.2.3).

4.0 UNCERTAINTY

Uncertainty related to the evaluation of the potential for mercury methylation in Quesnel Lake and Polley Lake is as follows.

- Key parameters that influence mercury methylation were identified based on the review conducted by Azimuth (2012). It is possible that other parameters not summarized therein could also influence mercury methylation. However, it is expected that the parameters identified by Azimuth (2012) are those for which there is good scientific support for their influence on mercury methylation. This uncertainty is not expected to affect the overall interpretation based on the suite of parameters evaluated.
- Percent aqueous methylmercury in Quesnel Lake and Polley Lake has not been measured, and the value of 1% assumed in Golder (2016a) could be an underestimate if conditions in one or both lakes promote mercury methylation, either naturally or as a result of the event. This uncertainty is not expected to affect the overall interpretation because aqueous concentrations were below the CCME (2003) water quality guideline and the majority of sediment and tissue chemistry data collected from Quesnel Lake and Polley Lake do not indicate spatial or temporal changes in mercury concentrations. Overall, the weight of available evidence supports a conclusion that a reservoir effect has not occurred.

5.0 SUMMARY AND RECOMMENDATIONS

Based on the key parameters that influence mercury methylation identified by Azimuth (2012), and the conditions of these parameters in Quesnel Lake and Polley Lake (discussed in Section 2.0), the potential for mercury methylation is considered to be low and/or similar to pre-event conditions. A review of available water, sediment, and tissue chemistry data indicated no consistent spatial or temporal trends that would indicate an effect of the tailings dam failure on mercury methylation or mercury concentrations in either lake.

Notwithstanding the overall conclusion presented above, there is residual uncertainty in the percent aqueous methylmercury in the lakes, and therefore residual uncertainty regarding whether aqueous mercury concentrations in Quesnel Lake and Polley Lake meet the BC water quality guideline in both exposed and reference areas. To address this uncertainty, it is recommended that water samples be collected for mercury speciation to determine percent aqueous methylmercury. Ultra-trace mercury sampling using the “dirty hand, clean hand²” technique may be required in future sampling to achieve a lower analytical detection limit. Percent aqueous methylmercury is expected to be a sensitive indicator to confirm that an enhancement of mercury methylation has not occurred.

6.0 CLOSURE

We trust that this information is sufficient for your needs at this time. Should you have any questions or concerns, please do not hesitate to contact the undersigned at 604-296-4200.

GOLDER ASSOCIATES LTD.



Emily-Jane Costa, M.Sc.
Environmental Scientist



Adrian deBruyn, Ph.D., R.P.Bio.
Associate, Senior Environmental Scientist



Trish Miller, M.Sc., CSAP
Principal, Senior Environmental Scientist

EMC/AMD/TAM/pn

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² Available at:

https://www.google.ca/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwiT9bSWsvjMAhUJNz4KHhYhEBEIQFggcMAA&url=http%3A%2F%2Fwww.alsglobal.com%2F~%2Fmedia%2FFiles%2FDivisions%2FLife%2520Sciences%2FEnvironmental%2FEnvironmental%2520Resources%2FNorth%2520America%2FCanada%2FFlyers%2520and%2520Brochures%2FCANADA%2520Low%2520Level%2520Mercury%2520Preservatives.pdf&usg=AFQjCNG4f_79TXf_2xN_kDoGr0wGnLpPmg&sig2=XzKwd913Naac7qjqc0IORQ

7.0 REFERENCES

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Africa	+ 27 11 254 4800
Asia	+ 86 21 6258 5522
Australasia	+ 61 3 8862 3500
Europe	+ 44 1628 851851
North America	+ 1 800 275 3281
South America	+ 56 2 2616 2000

solutions@golder.com
www.golder.com

Golder Associates Ltd.
Suite 200 - 2920 Virtual Way
Vancouver, BC, V5M 0C4
Canada
T: +1 (604) 296 4200

